



PCARA Update



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Let's Go – to the races

PCARA will be providing communications support for the 36th Annual **Harry Chapin Memorial Run Against Hunger** on Sunday October 16, 2016 at Croton-Harmon High School in Croton-on-Hudson, NY. This is the third year that we've been invited to help with this important event, and we will be joined again this year by members from WECA and the Westchester RACES Communications Vehicle.



Greg KB2CQE at Croton-Harmon High School during the 2015 Run Against Hunger. Westchester County's RACES communications vehicle is visible at right.

The Annual Harry Chapin Memorial Run Against Hunger is actually three separate events. The 5K Run/Walk begins at 9:30 a.m., the One Mile Fun Run begins at 11:00 a.m., and the 10K Race begins at 12:00 p.m. We need volunteers to be situated along the courses to help provide

communications as needed.

If you are interested in helping out, please let us know by sending an email to: *mail@pcara.org* and joining us for planning at the October 2016 PCARA meeting. To learn more about the Harry Chapin Memorial Run Against Hunger, please see the article on page 11 and visit <http://www.runagainsthunger.com>.

The **New York State QSO Party** will be held on Saturday, October 15, 2016, 10:00 am to 10:00 pm ET. As in years past, PCARA will be participating from Joe WA2MCR's station using the club callsign W2NYW. If you can't join us, consider taking part in the NYQP yourself. Once again PCARA will be sponsoring plaques.

Bring your "Go Box" to the November 2016 meeting for a Show and Tell. This idea from a recent "Old Goats Net" was discussed in September. Gather up your setup, bring it to the November meeting and share your ideas and techniques — or take this opportunity to build a Go Box and show it off.

The 2016 PCARA Holiday Dinner is scheduled for December 4, 2016 at the Cortlandt Colonial Restaurant (subject to booking). Menu selections and pricing to follow.

Just a reminder on upcoming regional hamfests:

Mount Beacon Amateur Radio Club Fallfest, Saturday October 1, 2016, Fishkill, NY. Details at: <http://www.arrl.org/hamfests/mbarc-fall-fest-1>.

Bergen Amateur Radio Association Hamfest, Saturday October 8, 2016, Township of Washington, Bergen County, NJ. Details at: <http://www.bara.org/hamfest/>.

Our next scheduled meeting is Sunday October 2, 2016 at 3:00 p.m. at New York-Presbyterian / Hudson Valley Hospital in Cortlandt Manor, NY. I look forward to seeing each of you there.

- 73 de Greg, KB2CQE

PCARA Officers

President:

Greg Appleyard, KB2CQE; kb2cqe at arrl.net

Vice President:

Joe Calabrese, WA2MCR; wa2mcr at arrl.net

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Net night

Peekskill/Cortlandt Amateur Radio Association holds a weekly net on the 146.67 MHz W2NYW repeater on Thursdays at 8:00 p.m. Join net control Karl, N2KZ for news and neighborly information.

Adventures in DXing

-N2KZ

Hit the Heights!

Imagine having your own 1300 foot tower. You don't need a building permit, thousands of dollars of steel sections, a big rigging crane or a helicopter to assemble it. All you need is a car key and a HT! With the autumn leaves about to turn, you couldn't pick a better time of year to give it a try. Where is this place? Paradise can be found at the top of **Bear Mountain**, right across the Hudson River in Orange/Rockland County. Adventure waits for you!



The view from Bear Mountain is quite something. [N2KZ pic.]

Until you have tried it, the miracle of height belies you. After you visit, you'll be forever fascinated by the summit's ability to boost your signal unlike any linear amplifier. I wish I could supply you with scientifically accurate data quoting the relative gain you can achieve by operating at the top of The Bear. All I can say is: It's profound!

One of my first solo experiences on The Bear was during an ARRL VHF/UHF contest. My trusty Yaesu FT-690RII single band six meter transceiver sat on my car's front seat feeding a Cushcraft 6 meter mag-mount antenna I purchased for a song on closeout. I positioned the mag mount, as best as I could, horizontally on the side of my car. With just ten measly watts, my CW signals reached Rhode Island, Boston and Maine. Can you imagine where I could reach with a powerful rig and a 'real' antenna?

Similar results were achieved during our first ever PCARA Simplex Challenge a few months ago. After we all touched base and had good conversation on two meter simplex, Lovji, N2CKD, suggested we try 70 cm simplex. Contact with most everyone was effortless, so I dropped power down to 300 milliwatts (less than one-third of a watt) and we still could talk around with little effort and just a little more background noise.

I hope to return someday and try a further QRP challenge. Lovji suggested we might even try contact using inexpensive Family Radio Service walkie-talkies. FRS HTs operate at no more than 500 milliwatts on 462 or 467 MHz and usually have less than optimum receivers. Using FRS radios would also allow unlicensed users to participate in our event. PCARAns could encourage hobbyists, Boy Scouts and casual users to join in (and hopefully introduce them to ham radio.)

The Family Radio Service began after Radio Shack petitioned the FCC in 1994 for a small range of frequencies for unlicensed casual two-way radios. In 1996 they got their wish! Thousands and thousands of pairs of radios were sold inexpensively and the idea really caught on. If you want to really hear FRS in action, visit a theme park like Disney World or Six Flags. Not only are you likely to hear park workers using FRS, you'll hear plenty of parents and kids chatting, as well!

Maybe you can help: Most FRS and GMRS (General Mobile Radio Service — a similar but *licensed* service also on 462 MHz) are very casual users talking to friends and family. Nationwide Internet searches revealed some organized GMRS groups with enthusiastic memberships volunteering, operating repeaters and enjoying each other's company. I haven't found a local FRS/GMRS group yet. If you know people or groups who would like to join PCARA with our experiments using FRS, let us know!

The best-known GMRS Internet site can be found at <https://www.mygmrs.com/>. Hosted by Rich, N2DLX in Trenton, New Jersey, the site is filled with interesting information and repeater listings.



Down county from us, Mike KA2FBL, hosts a GMRS repeater based in Armonk (just northwest of Westchester County Airport.) Registered to the Westchester County Amateur Radio Club, it uses a 462.700 MHz output frequency with a typical 5 MHz offset for the input — 467.700 MHz — with a PL of 179.9 Hz. During some pass-bys in my car riding northbound on I-684 near exit 3, I seem to be able to bring it up but haven't had a QSO on it yet.

Another group, Dutchess/Putnam County REACT, is listed as using the exact same GMRS repeater pair 462.7/467.7 without a PL, but I could not reach their repeater during a recent visit to the Bear Mountain summit. Warren, K2DPR based in Holmes, New York just outside of Pawling, hosts this public service club.

Getting on FRS and GMRS frequencies could not be easier. Compact FRS and GMRS transceivers can be obtained for nearly nothing. Motorola, Midland, Cobra, Uniden and Icom all offer transceivers for these services. Check for them at hamfests or on-line for as little

as \$20 a pair. It could be your introduction to a new facet of QRP operation! I hope to organize our second **Simplex Challenge** in the next few months featuring 70 cm QRP narrow-band FM operation and highly efficient antennas. Encourage everyone to join in!



An FRS radio from Cobra (left) and an FRS/GMRS set by Motorola (right) alongside an Icom IC-F21GM (center). The IC-F21GM was considered the legacy standard GMRS/FRS handheld after its introduction in 2001.

We Are Not Alone!

70 cm also hosts a multitude of business users. At work, you'll find myself and my peers conversing in simplex on an 'itinerant' frequency, 464.55 MHz, casually known as 'yellow dot' (a nationwide nickname for this frequency, going back decades and decades.) My building is a densely packed four-story concrete and steel structure just filled with every kind of electronic noise-maker imaginable. Calling this building 'RF unfriendly' would be an understatement. Yet, with just



Icom IC-F21GM brochure

two watts output into a short rubber duck style antenna, we manage to communicate pretty well using our HTs, (with a dead spot or two here and there,) across four floors and a subterranean basement.

The true range of these industrial 70 cm handhelds comes to light if you head towards the roof. I once held a conversation with a co-worker, Glenn N1XD, using just our company HTs on 464.55 MHz simplex. As I stood on the highest point of our roof,

probably about 50 feet up, I managed to hold contact with him as he drove up Connecticut Route 7 towards Danbury until he approached Danbury Airport. Only when he went behind a stony mountain did we lose each other's signal. Pretty impressive for modest hand-held HTs with compact rubber duck antennas!

After living on this band for a while, it becomes obvious that radio operation on 70 cm shares a lot of the characteristics of light. If you have a reasonable line-of-sight between you and your friend, you can probably reach them via 70 cm without using a great deal of power. It is no wonder that these radios are so popular. Usable range of one or two miles seems to be pretty attainable. I have seen advertising claims that some more advanced 70 cm HTs can reach as far as 35 miles. Unless you find yourself in an aircraft with an efficient antenna, I really think that this is a stretch!



Icom IC-F21GM

Wait... there's more!

Would you like to listen in on TV and radio news reporters in action? Your 70 cm radio can take you there! Tune just a little bit higher above amateur radio's 420 to 450 MHz allocation and you'll find two one megahertz segments set aside for broadcast auxiliary use at 450 to 451 MHz and 455 to 456 MHz.

Local radio and TV stations use these frequencies to facilitate remote out-of-studio broadcasts for cueing and conversing with correspondents. In broadcast 'lingo,' this is known as wireless IFB (interruptible fold-back.) This is what reporters will hear in their earpieces while they are on the air. Program broadcast audio is heard most of the time with the voices of directors and producers interrupting that audio for quick cues like countdowns or 'go!'

Along with these insider conversations, you might also hear traffic helicopters and airplanes or audio meant for closed circuits and not necessarily for air. You can listen in to all sorts of behind-the-scenes and alternate audio supporting the programming most of us see live on the air. Now that analog TV has left the air, this is one way you can hear TV newscasts and insider information while you are on the go!

In the late afternoon, you may often hear me on the PCARA 2m repeater, roaming around my neighborhood, leash in hand, as N2KZ dog portable. If there isn't much action on 2m FM, I will often listen to Broadcast Auxiliary frequencies to hear evening newscasts in progress. Here is a short list of what you may

catch: WCBS-AM's helicopter reports on 450.0875, the WCBS-AM main IFB on 450.5125 and WCBS-TV news on 455.3125 MHz. Fox 5 WNYW-TV radiates on 450.85 and 455.1125 MHz. NBC Network News operates on 450.75 and local WNBC-TV always has a strong signal on 450.3875. Channel 7 WABC-TV sits on 455.050 and WPIX-TV Channel 11 can be heard on 455.5625 MHz. Consider this list just a start. A comprehensive (although somewhat outdated) list of New York City broadcast auxiliary users can be found at: <http://www.radioreference.com/apps/db/?aid=8326>.



Chopper 880 transmits Tom Kaminsky's reports from the helicopter to WCBS-AM studio on UHF.

70 cm is also known for being a popular amateur radio frequency range for exotic modes such as satellite and International Space Station communications, earth-moon-earth experiments and amateur television. Maybe you can add even more to the list! You could spend a lot of time in these parts. Why don't you tune in and see what you can hear!

Until next month, 73 de N2KZ 'The Old Goat', dit dit.



[Although transmission on FRS channels is license-free, GMRS operation does require an FCC license. For combined FRS/GMRS consumer radios, transmitting on the FRS/GMRS channels 1-7 requires a license if using more than 0.5 watt. - Ed.]

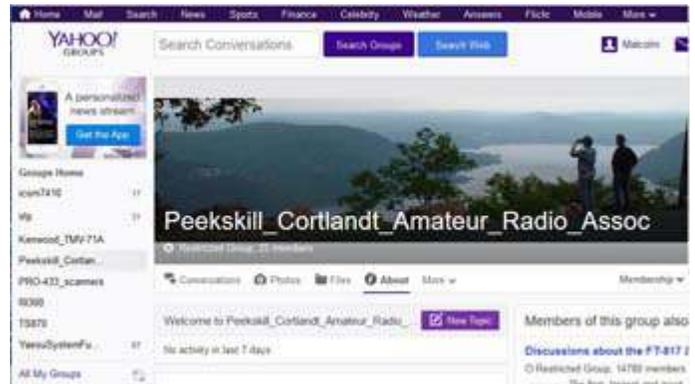
Yahoo Groups – KD2ITZ

The PCARA Yahoo Group has been idle for over a 12 months. There are many opportunities throughout the year to share information with a group email list. These may include National Park activations, technical questions, equipment sales, and event logistics.

If you haven't already subscribed, please take a moment to do so. One does **not** need to be a Yahoo account holder to join and spam messages are blocked from the system. Simply send an email to: Peekskill_Cortlandt_Amateur_Radio_Assoc-subscribe@yahoogroups.com

Archived messages, photos, and other files can be viewed by subscribers at the following Internet address:

http://groups.yahoo.com/group/Peekskill_Cortlandt_Amateur_Radio_Assoc



Yahoo Groups web page for Peekskill/Cortlandt Amateur Radio Association gives access to messages, photos and other files. 'Cover image' shows Bob N2CBH and Jerry WA2ZOA looking out across Peekskill Bay from Bear Mountain.

We are looking for additional ideas to revive interest in our list. Please send your thoughts or concerns to radiocassette@gmail.com.

- Lou, KD2ITZ

Editorial note

PCARA's Yahoo Group is a "Restricted Group", meaning that group content is visible to members only. Membership requires approval by a group owner or moderator.

Bear in mind that when replying to an e-mail generated by the Yahoo Groups e-mail distribution list, you are effectively using "Reply-All". If you need to keep a reply private, address it to the originator only.

-Ed.

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Yahoo data breach

If you are a Yahoo account holder, you are probably aware that on September 22, 2016 Yahoo announced that information from at least 500 million Yahoo accounts had been stolen from the company during 2014, probably by a state-sponsored hacker. The information taken could include names, e-mail addresses, telephone numbers and dates of birth. Encrypted password information as well as answers to security questions may also have been taken.

Yahoo is recommending that all users should change their passwords if they have not done so since 2014. In addition, any security questions associated with the account should be invalidated. If any *other* online accounts used the same or similar security questions, then the settings for those accounts should also be changed.

New York QSO Party - NW2K

Get Ready for October 15!

It's all about New York on October 15 as radio amateurs from around the world get on the air to work all 62 NY counties, Chautauqua to Clinton, Niagara to Suffolk. A dozen or more mobile operators will take to the mean streets of NYC or the bucolic surrounds of the Southern Tier and North Country. Brave souls will sneak out to the woodlands to activate a rare county, Field Day style, as temperatures may dip into the 30's. And good, solid Elmers will open up their shacks to new hams and build excitement as the spotlight is on us!

The NYQP game is easy to play as all operating modes and bands are eligible. The QSO exchange is simple for NY operators: signal report and county. For those eager, out-of-state operators wanting to work all 62 counties, they'll send a signal report and their state, province or DX.

There's a category for all operating styles, from single-operator-QRP to multi-operator-high-power-mobile. And the 48 plaques, which are awarded to category winners, are simply beautiful and I think they're the best in the business. Serious "furniture" for the discerning ham's shack! The state-wide NYQP Plaque Sponsorship Team and the Rochester DX Association really step up to the plate each year to make all the effort worthwhile.

Please start thinking about your NYQP operations. Mobile or Fixed, SSB, CW or digital, the important thing is to get on the air with friends, make some "noise" and help promote amateur radio spirit in NY. Please consider using this event to introduce new hams into the mix. Elmering has always been an important



Carey K2RNY, operates during NYQP 2015 as part of the high power multi-multi entry for Rochester DX Association (W2RDX) from the super-station of Jeff, W2FU. [Pic NYQP]

aspect of our hobby and NYQP is a perfect vehicle from which to teach operating concepts and station engineering. Make a new antenna, try a new digital mode, operate a vintage rig, have fun!

There is a page at the NYQP website, (<http://www.nyqp.org>) that we've created to announce activity across the state. It's called "2016 Planned Activations" and it's easy to list your plans online to alert others of your activity in that rare or not-so-rare QTH. It helps all of us make informed choices on how to operate to maximize fun. The event's rules are also listed at the site.

In 2015, we had a record 314 logs, 156 from NY, 135 stateside, 14 from Canada, and 9 from DX. 5,670 unique call signs participated in the event, with 43,065 reported QSOs. Contacts were made in all 62 counties from 49 states (missed AK), 9 Canadian Provinces (AB, BC, MB, NB, NT, ON, PEI, QC, SK), and dozens of DX countries. There were 57 amateur radio clubs involved in the event — 25 New York and 32 out of state. Let's set some new records in 2016!

Need any assistance or have any questions? Wondering which are the rare counties? Have a question about logging software? The NYQP Team is at the ready... send me a note any time to NW2K@arrl.net or check out the great NYQP website (<http://www.nyqp.org>) for all the details. We'll help you get on the air on October 15!

- Dean, NW2K, NYQP Coordinator

Footnote

Final results from the 2015 NY State QSO Party have been announced. PCARA sponsored two plaques for last year's event, which were awarded as follows:

NY awards

Multi-One Low Power: W2ORC (Orleans County Amateur Radio Club). 52,152 points. Operators K2EYS, KA2BCE, KB1JAE, KD2PTM, KD2SJM, KZ2R, N2WK, N8CL, WA2TMC.

DX awards

SSB Low Power: W1KDA, Warwick RI. 9,604 points.

We hope to sponsor the same two plaques in 2016, subject to availability.

PCARA

PCARA's entry in the 2015 event came **third** out of seven in the multi-one low power section:

Multi-One Low Power: W2NYW (PCARA). 27,945 points. Operators WA2MCR, NM9J.

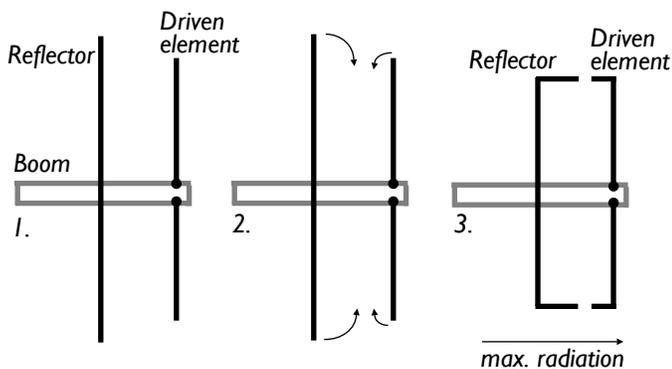
If you would like to take part in PCARA's 2016 effort in the NY State QSO Party on Saturday October 15, please contact Joe, WA2MCR for further details.

Make a Moxon

This article was inspired by a couple of happenings. The first event was when Lovji N2CKD brought his 440 MHz **Moxon Rectangle** antenna to a recent PCARA Foxhunt. The second trigger was the continuing weak signal from KWO35, NOAA Weather Radio for New York on 162.55 MHz. Their signal is nowhere near as strong as when the antenna was located at the RCA Building. Could I make a simple beam antenna to improve reception?

Modern Moxon

The Moxon Rectangle is a relatively modern design whose origin goes back to the investigations of U.K. amateur **Leslie A. Moxon, G6XN** (SK). It consists of a close-spaced 2-element Yagi with the ends of the elements folded 90° toward each other.



Derivation of the Moxon Rectangle. On the left is a close-spaced two-element Yagi with reflector and driven element. The ends of these two elements are folded over toward each other (2), producing the rectangular shape at right (3).

A little history

Les Moxon was first licensed in 1928. During the 1930s, he was responsible for broadcast receiver development at Murphy Radio Ltd. In 1941, after the break-out of World War II, he joined H.M. Signal School,

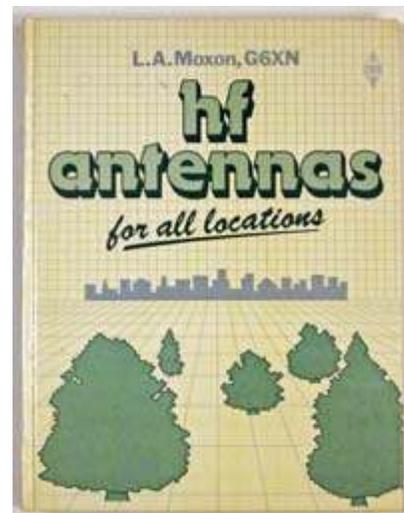


Leslie A. Moxon, G6XN (c. 1949)

Portsmouth, in charge of a section developing radar receivers for the Royal Navy. He continued this work after the war as a member of the Royal Naval Scientific Service. G6XN promoted the idea of “Stenode” reception, where a single-crystal filter can be used for phone reception by adding a tone-correction filter after the detector. (Wireless World, July 1962). His early interest in simple, two element antennas for amateur radio was described in a 1952 article:

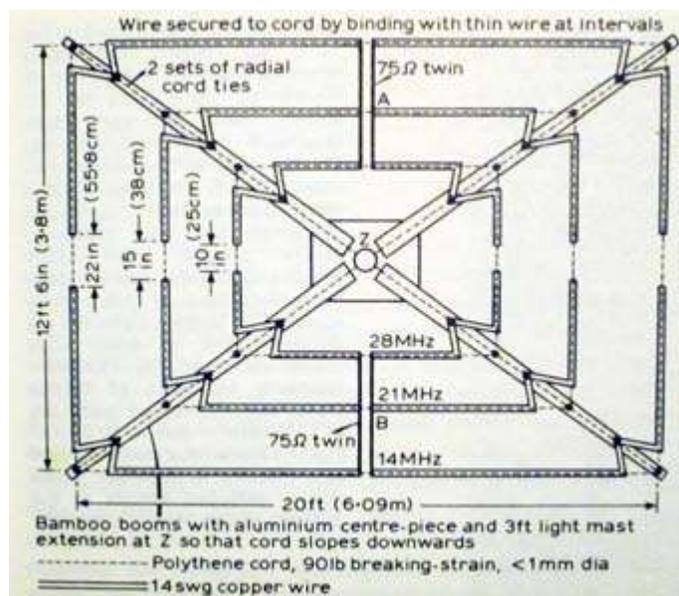
“Two-Element Driven Arrays” (*QST*, July 1952, p 28).

Les Moxon’s famous book “HF Antennas for All Locations” (RSGB, 1982) distilled many years of experimentation into practical antenna designs that really work. Writing about mutual coupling between closely-spaced antenna elements, G6XN said that his conclusions “... demonstrate the necessity of bending the ends of dipole elements inwards to increase capacitive coupling. This greatly improves the front/back ratio of two-element arrays and overcomes certain practical disadvantages of two-feeder systems.”



“HF Antennas for All Locations” by G6XN was first published by RSGB in 1982. The second edition appeared in 1993.

G6XN went on to describe a multi-band two-element beam for 14/21/28 MHz, based on an earlier design by VK2ABQ. In contrast to the square geometry employed by VK2ABQ, the G6XN beam has a **rectangular** shape. It is fed with 75Ω cable, and has the ends of the dipole elements bent toward each other to achieve critical coupling and improve the front/back ratio. As a result of this folding, the antenna is only 20 feet wide rather than the expected 33 feet for a full-size 20 meter dipole.



Tri-band wire beam antenna by G6XN, based on a design by VK2ABQ. The ends of the elements are bent toward each other in a rectangular shape.

Modeling the Moxon

Building on Les Moxon's work, during the 1990s antenna expert **L.B. Cebik, W4RNL (SK)** used computer modeling to **optimize** the basic design, going on to construct variations of the antenna with wire and tubing. His findings were published on the web site



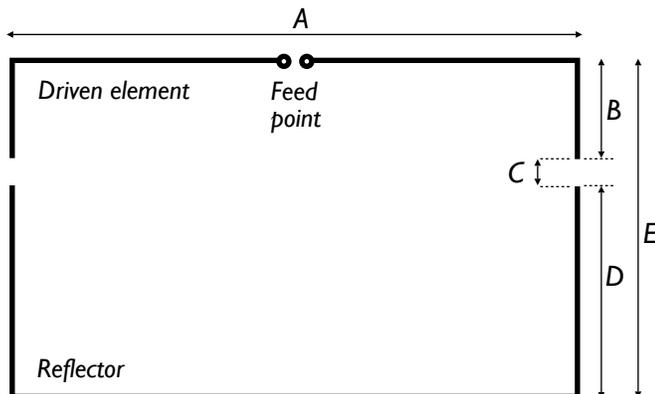
L.B. Cebik W4RNL.

<http://www.cebik.com>, which is now owned by Antennex and requires a subscription. However, if you keep your old magazines around or if you are an ARRL member with access to the Periodicals Archive*, you can read an excellent article by W4RNL free of charge. Look for the article "Having a Field Day with the Moxon Rectangle", June 2000 *QST*, p.38.

*The ARRL Periodicals Archive and Search page for members only is at: <http://www.arrl.org/arrl-periodicals-archive-search>.

In the *QST* article, L.B. provided dimensions of Moxon Rectangles for the 80 meter to 10 meter Field Day bands using 14 AWG bare copper wire. These antennas are optimized for maximum front-to-back ratio, maximum gain and direct feed with 50Ω coaxial cable. They have a rectangular shape which is only ~70% of the width of a full size dipole. For example:

Band	Freq	A	B	C	D	E
10 m	28.3 MHz	12.65'	1.90'	0.35'	2.36'	4.61'



Measurements for a Moxon Rectangle are usually given in terms of the dimensions A, B, C, D and E. The gap C between the bent over elements is a critical distance.

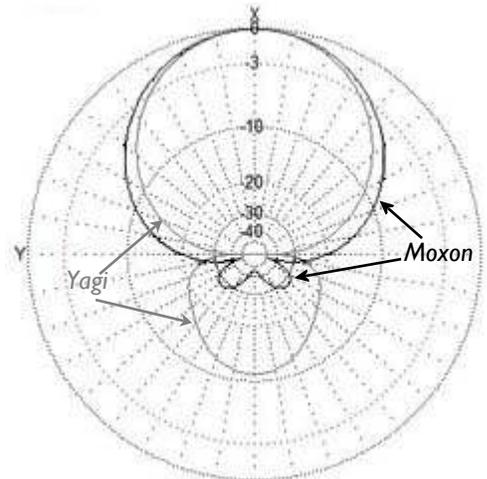
Note how this 10 meter Moxon Rectangle has a width (A-dimension) of only 12' 8" compared with 17 ft wide for a similar-spaced two-element Yagi.

Using the antenna modeling software MMANA-GAL, free-space gain of this 10 meter Moxon Rectangle is calculated at **6.03 dBi** (3.9 dBd), which is only a little down on the 6.47 dBi of a similar two-element Yagi. The front-to-back ratio of the Moxon can be in

excess of **40 dB** — which is far better than the typical 10 dB F/B of a two-element Yagi.

For more information about the free MMANA-GAL antenna modeling software, see *PCARA*

Update for June 2015, p 6 "A novel model".



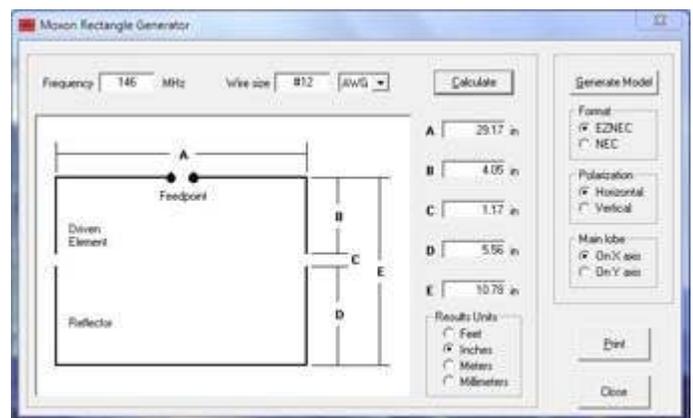
Polar diagram of a horizontally polarized 10 m Moxon Rectangle (black) compared with the equivalent 2-element Yagi (gray). Plots produced using MMANA-GAL.

Clever calculators

If you would like to build a Moxon Rectangle for a different band or with a different wire size, then you will need to re-calculate the dimensions. Dan, AC6LA was asked by W4RNL to supply a computer program to generate these numbers. **Moxgen.exe** is a small Windows executable based on the W4RNL algorithm that can be downloaded free from Dan's web site:

<http://www.ac6la.com/>.

An example of the output from Moxgen.exe is shown below for an antenna made from 12 AWG copper wire and a center frequency of 146 MHz.



Moxon Rectangle Generator program **Moxgen.exe** calculates dimensions of a Moxon antenna for any frequency.

For other operating systems, you can also calculate the dimensions by visiting the web site of Alan, AB1JX. His **Javascript**-based calculator is at:

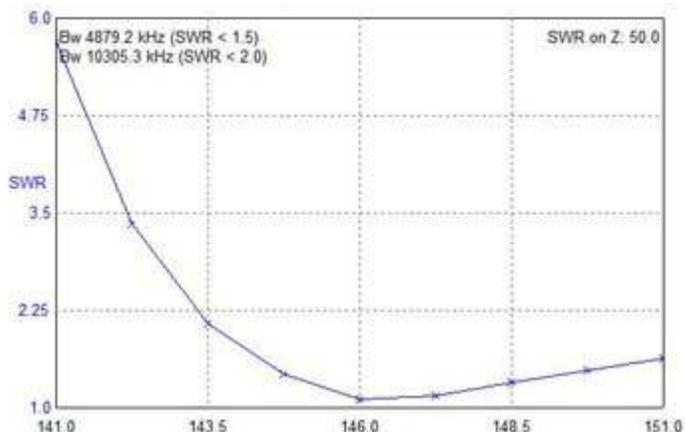
<http://ab1jx.1apps.com/ham/calcs/moxon/index.html>. This calculator has the advantage that calculated antenna dimensions can be exported in metric units to a .maa antenna file for use with the free antenna modeling software MMANA-GAL.

Here is the output from the Moxon calculators for

a 146 MHz center frequency and 12 AWG wire, converted to inches and fractions of an inch:

Band	Freq	A	B	C	D	E
2 m	146 MHz	29 1/8"	4"	1 1/8"	5 1/2"	10 3/4"

I transferred these dimensions to an existing Moxon model in the MMANA-GAL modeling software, which uses metric measure. The software predicted an impedance of $49.91 -j5.23 \Omega$, and an SWR of 1.11 to 1 at 146.0 MHz. Gain in free space was **6.01 dBi** and F/B ratio at 180° (directly behind) was **33.7 dB**.



SWR curve for the 146 MHz Moxon Rectangle as predicted by MMANA-GAL modeling software.

Practical part

With the dimensions calculated, it was time for some practical considerations. One of the essential points about a Moxon Rectangle is the spacing between element tips denoted by 'C'. This distance affects the mutual coupling between driven element and reflector and must be kept constant. The element ends cannot be left to flap around in the breeze!

Radio amateurs are a creative bunch and all sorts of practical designs have been suggested for Moxon Rectangles. I recommend a visit to the web site <http://www.moxonantennaproject.com> for diagrams and photographs of many mixed Moxons, major and minor in size. Scroll down the home page for a long list of "What's new" designs.

I was interested in a 2 meter horizontally-polarized Moxon Rectangle for possible foxhunt use. A Moxon would be less wide than my existing HB9CV foxhunt antenna (41" × 11") and the



10 meter Moxon antenna built from 1/2" and 3/8" aluminum tubing by Mark, MOMRR. [Pic: Moxon Antenna Project.]

Moxon's excellent front-to-back ratio might be helpful in pinpointing the fox.

My first attempt to build the antenna was on a flat sheet of plastic. I purchased a 20" × 32" clear acrylic sheet from Home Depot, then cut the sheet down to 12" × 32". The recommended method for cutting acrylic sheet along a straight line is to scribe it 5-6 times with a cutting tool, then position the scribed line over a table edge. Application of downward pressure on the shorter side should then produce a clean break. (Hint — wear eye protection and gloves during this procedure.)

I marked out the shape of the director and reflector on the protective cover of the clear acrylic sheet using a Sharpie pen. Dimensions were according to the Moxgen and AC6LA calculators shown previously. My intention was to use nylon ties to hold the antenna wires in place, so I drilled pairs of holes (7/64") at the ends and at the corners of the wires. I used a small reel of 12 AWG copper/aluminum wire from A.C. Moore which was easy to bend and cut, folding the three lengths into shape then mounting them onto the acrylic sheet with nylon cable ties.



Detail of the 146 MHz Moxon built on a sheet of acrylic plastic, showing how the Moxgen and AC6LA calculators shown previously. My intention was to use nylon ties to hold the antenna wires in place, so I drilled pairs of holes (7/64") at the ends and at the corners of the wires. I used a small reel of 12 AWG copper/aluminum wire from A.C. Moore which was easy to bend and cut, folding the three lengths into shape then mounting them onto the acrylic sheet with nylon cable ties.

I connected a length of 50 ohm RG-58A/U coaxial feeder to the center point of the driven element using a section of barrier strip. The feeder was then run down the center of a 2 ft length of 1/2" CPVC tubing fastened to the acrylic sheet in order to support the antenna.



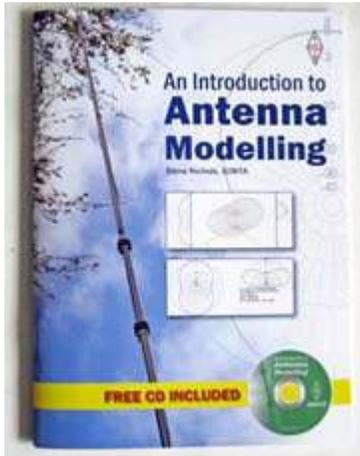
Moxon rectangle built on acrylic sheet.

Testing time

I connected the antenna to my MFJ-259 antenna analyzer and swept the SWR. MMANA-GAL had predicted A minimum SWR at 146 MHz, with a rapid rise on the low frequency side, but a much more gradual rise on the high frequency side. (SWR 5.7 at 141 MHz and 1.63 at 151 MHz).

The SWR pattern of my own antenna had a similar shape, but the resonant frequency was **much** lower than intended. My first Moxon had minimum SWR at a frequency of **138 MHz** — 5.5% too low!

In the RSGB book “An Introduction to Antenna Modelling”, Steve Nichols, G0KYA says that he also constructed a 2 meter Moxon from an online calculator, but then had to cut down the dimensions ‘drastically’ to get it to resonate on 2m. He thought this was due to the use of PVC-coated wire and its velocity factor.



My own wire was bare copper over aluminum — but it was attached to an acrylic sheet, which might also be reducing the velocity factor. For my next attempt, I would adjust the wire dimensions as suggested by G0KYA.

There was one more problem with the plastic sheet antenna — it was **unwieldy!** Swinging it around for direction finding purposes was not easy as the plastic sheet tended to bow and twist around the ‘boom’.

I did try reception of KWO35 on 162.55 MHz with this antenna and noted an improvement over my usual indoor dipole.

Moxon Mark II – the short version

My second attempt to make a Moxon Rectangle was largely based on material purchased from Home Depot. From the plumbing section I obtained five lengths of 1/2 in. x 2 ft. PVC Schedule 40 Pipe. In the same department I found six 1/2 inch PVC connectors: four 90° elbows, one PVC cross and one PVC tee. From the electrical department I picked up 25 ft of 6 AWG bare copper wire and a packet of nylon ties.



Raw materials for a Moxon — five lengths of 1/2 in. x 2 ft. PVC Sch. 40 Pipe, one tee, one cross and four 90° elbows.

Wire dimensions were calculated with the AB1JX online calculator for a frequency of 146 MHz and a wire size of 6 AWG. This gave an “A” distance of 2' 5" (29") — I then **shortened** all dimensions by 5% to allow for the velocity factor and other frequency-shifting effects. The revised measurements are shown in bold in the table below, rounded to the nearest eighth inch.

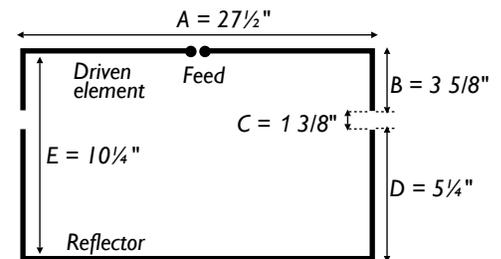
	Original size	Shortened 5%
A	29"	27½"
B	3 7/8"	3 5/8"
C	1 3/8"	1 3/8"
D	5 5/8"	5 ¼"
E	10¾"	10¼"

I cut three pieces of 6 AWG bare copper wire — two lengths of 17 3/8" for the driven element and one length of 38" for the reflector. Cutting and bending the 6 AWG copper wire is a lot more difficult than for 12 AWG!

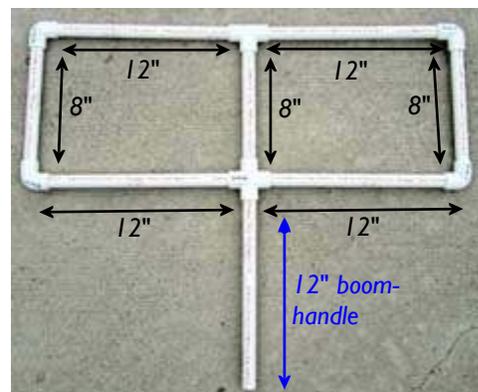
Next, the half inch PVC tubing was prepared. I divided two of the 2 foot sections in half

with a saw, producing four 12 inch lengths. I divided another 2 foot section into thirds, for three 8 inch lengths. Another 1 foot section was cut for the boom extension or carrying handle.

For initial testing, I force-fitted the pipes into the six plastic connectors. This produced quite a sturdy



Dimensions of the Moxon Rectangle for 146 MHz, after shortening the calculated wire lengths by 5%.



Cutting sizes for the eight lengths of 1/2 inch (inner diameter) PVC tubing, shown inserted into the PVC connectors.

assembly. The only joint that might need reinforcement with PVC cement is where the carrying handle fits into the cross — this connection has a tendency to twist apart during antenna handling.

The three separate copper wires were fastened to the PVC pipe assembly using nylon wire ties at each of the plastic connectors. This ensures that the majority of the bare copper wire is actually suspended in air, between the connectors. (See picture next page.)

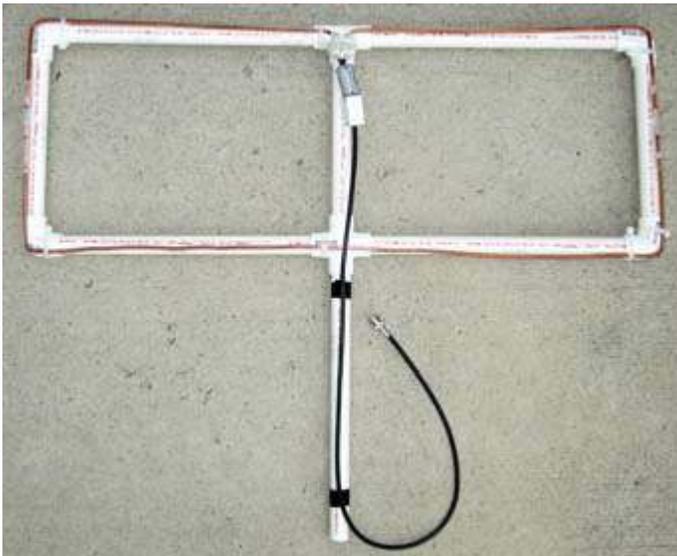
The critical gap between the ends of the bent-over conductors was secured using two clear plastic barrels from discarded ball point pens. With the ink tube removed, the narrow end of the barrel was cut off, the clear plastic was marked with the correct separation then the copper wires were pushed into opposite ends of the barrel. Short lengths of sleeving had been

applied to the wire ends in order to provide a force-fit into the barrel.



Close-up of 6 AWG copper wire fastened to PVC pipe with nylon ties. Element ends are inserted into a clear plastic ball-point barrel to maintain separation distance and alignment.

A short length of RG-58 coaxial cable was connected to the driven element feed point using a length of barrier strip. Ferrite chokes were clipped onto the coaxial cable to suppress currents on the outer conductor. The cable was then run back along the outside of the boom/handle for attachment to a radio.



Modified Moxon with shortened wire elements is shown with 50 ohm coaxial cable taped to the boom and ferrite chokes clamped over the coax to suppress outer-conductor currents.

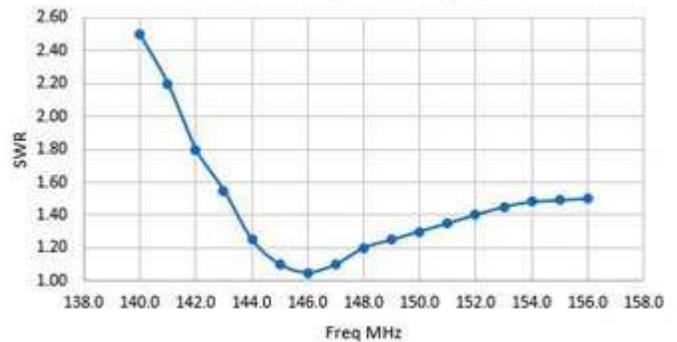
Short test

I attached the new antenna to my MFJ-259 antenna analyzer and swept the frequency while watching the SWR. This time, the antenna was resonant at exactly 146 MHz! Shortening the calculated lengths by 5% had worked exactly as desired.

I plotted the SWR between 140 and 156 MHz on an Excel chart – this showed a similar shape to the MMANA-GAL prediction with a steep rise below 143 MHz and a less steep rise from 148 to 156 MHz. (See graph, next column.)

The antenna was still working well at 162.55 MHz when I tried it out on my weather radio for reception of KWO35. A slanted position, oriented south toward New

2 meter Moxon Rectangle



Measured SWR of the modified Moxon Rectangle antenna. Shortening the dimensions by 5% successfully moved the minimum SWR from a frequency of 138 MHz to 146 MHz.

York City seemed to work best.

To test the directional pattern, I arranged a weak signal source on 2 meters by tuning my Bearcat BC175XL scanner to 157.370 MHz. The scanner's local oscillator then produces a steady carrier on:

$$157.370 - 10.85 (1^{\text{st}} \text{ I.F.}) = 146.52 \text{ MHz.}$$

I connected my handi-talkie to the Moxon antenna, tuned its receiver to 146.52 MHz then swung the antenna around outside the house, listening to the scanner's local oscillator as a signal source. This showed the expected pattern — a broad peak to the front of the antenna, far less reception off the back, and a deep null at 180 degrees from the front.

This Moxon antenna is still rather heavy for foxhunt use – around 1½ lb. For comparison, my HB9CV made of aluminum tubing weighs only 10 ounces. But this PVC-pipe Moxon could also work well on a portable mast or in a fixed station environment. For serious use outdoors, I would apply PVC cement to all the pipe connectors and put a dab of glue on each of the wire support points to prevent slipping. I would also substitute the clear-plastic cable ties with black, UV-resistant types and waterproof the junction between coaxial cable and the driven element.

Moxon conclusion

The small, two element Moxon Rectangle antenna originated by G6XN then further developed by W4RNL is a very effective design. The element lengths generated by online calculators may require some shortening to ensure correct resonance. The simple design and direct 50 Ω feed make it an ideal choice for home construction on the HF or VHF bands.

Can you improve on the plastic pipe design? If so, record your results, take pictures and send a report to the newsletter.

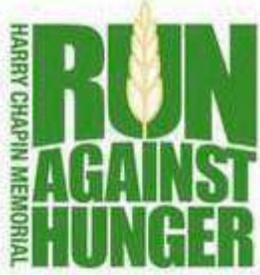
- NM9J

Run Against Hunger

Sunday October 16, 2016

Running again

Following our previous efforts in 2014 and 2015, organizers of the **Harry Chapin Memorial Run Against Hunger** have once again invited PCARA and WECA to provide communications support for their 2016 fund-raising efforts. The very first Run Against Hunger was organized in Croton-on-Hudson, in honor of singer-songwriter Harry Chapin who died in a July 1981 auto-accident. This year's race on Sunday October 16th will be the 36th annual Run.

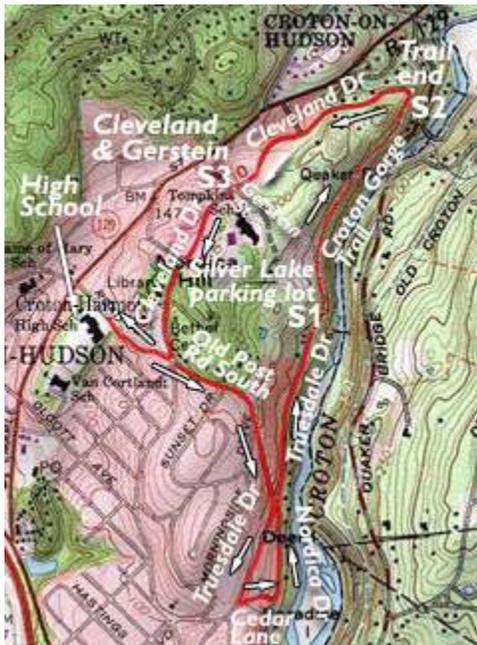


Race day schedule

As in previous years, there will be **three** events on the race calendar. Apart from the Fun Run, all start and finish lines are close to Croton-Harmon High School.

5K Run / Walk, 9:30 a.m. – 10:30 a.m.

From Croton-Harmon High School, along Old Post Road South, down Truesdale Drive, east on Cedar Lane, then north up Nordica Drive and Truesdale Drive, through Croton Gorge and returning to the High School on Cleveland Drive.



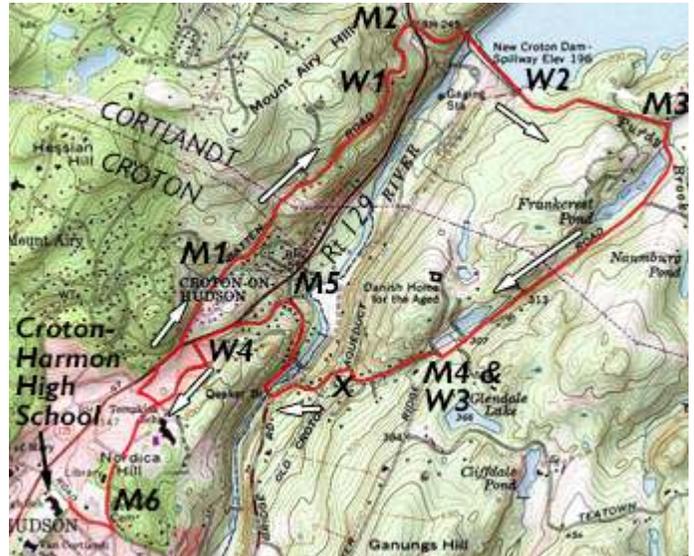
Course of the 5K Walk. S1, S2, S3 are the three radio stations.

One Mile Fun Run, 11:00 a.m. – 11:45 a.m.

The start point is on Cleveland Drive, just south of Veteran's Corners. North on Cleveland Drive to CET (Carrie E Tompkins) Elementary School on Gerstein Street, then back along Cleveland Drive, finishing at the High School.

10K Run, 12:00 noon – 2:00 p.m.

From Croton-Harmon High School, north on Cleveland Drive, left on Gerstein Street and right on Wood Road onto Rt 129. Left onto Batten Road, then across the New Croton Dam. Return is along Quaker Ridge Road, crossing the river at Quaker Bridge Road, then Rt.129 to Jacoby Street and returning down Cleveland Avenue to the High School.



Course of the 10K Run Against Hunger. M1 - M6 = Mile Points. W1 - W4 = Water Stops. X = Trail crossing.

Full details of all three routes are available at the Run web site: <http://www.runagainsthunger.com/course/>

Radio stations

At the time of writing, we anticipate that the Water Stops and Mile Points requiring radio support will be the same as in 2015. As well as Net Control and the Organizers' Shadow this will require three stations for the 5K Walk, one station for the 11:00 a.m. Fun Run and eight stations around the course for the 12 noon 10K Run.

5K Run / Walk, 9:30 a.m.

Station	Location
Stop #1, Start of Croton Gorge Trail	Truedale Drive, Silver Lake parking lot
Stop #2, End of Croton Gorge Trail	Trail end at Cleveland Drive
S3 Intersection	Cleveland Drive and Gerstein Street

One Mile Fun Run, 11:00 a.m.

Station	Location
Turn-around point	CET Elementary School, Gerstein Street.

10K Run Against Hunger, 12 noon

Station	Location
Net control	Croton-Harmon High School
Shadow	Croton-Harmon High School
Trail car	Following last runner
Water Stop #1	140 Batten Rd
Water Stop #2	East end of Croton Dam
Mile Point 3	Croton Dam Rd & Quaker Ridge Rd
Water Stop #3 / Mile 4	Danish Home
Mile Point 5	Quaker Bridge Rd & Niles Rd
Water Stop #4	Jacoby Street
Mile Point 6	Cleveland Dr & Alexander Lane

Some of these positions are not very far apart, from one race to the next. They could easily be fulfilled by the same mobile station, moving a short distance between events.

Join the crowd

If you would like to volunteer, please inform Greg, KB2CQE via mail@pcara.org or sign up at the October PCARA meeting. There will be more information available to participants nearer the actual date.



They're off! The 2015 10K Run begins from the starting point near Croton-Harmon High School.

Be prepared

If you decide to take part, here are some suggestions based on experience from previous years.

Arrive in good time! If you already have a position assigned, drive straight to your location *before* the event begins. Croton-on-Hudson Police Department will close streets *before* each race starts, making it

impossible to drive around the course at the last minute. If you do not have a position assigned, be aware that parking at Croton-Harmon High School becomes fully occupied by early on Sunday morning. Additional parking is available at the adjacent Middle School, but it is a long walk. It may be better to contact Net Control for your assignment rather than drive to the High School later in the morning.

Bring HT and mobile. For maximum flexibility, bring a mobile radio and a handi-talkie with external antenna — if you have them.

Preprogram your radios with the likely frequencies — 146.565 MHz simplex and 146.67 MHz duplex -0.600 MHz offset, PL 156.7 Hz. Some locations on the course do not have space for a vehicle, so park nearby and walk up to the point with your HT. Mile Point 3 at the corner of Croton Dam Road and Quaker Bridge Road is in a radio shadow and may need a combination of high power, external antenna and repeater to reach Net Control. Charge your HT, bring a spare battery and be prepared to reprogram your radio in case of interference or other change of plan. The Trail Car following the last runner requires a transportable station and mobile antenna.

Stay safe, warm and dry. Bring suitable clothing and sufficient provisions to keep yourself safe and comfortable during the event, which begins at 9:30 a.m. and could last until after 1:00 p.m. — especially if you are near the end of the 10K course. Last year, the weather was cold and snowy on the Sunday morning! An orange safety vest can be helpful to identify yourself on a busy highway.

Hungry for more?

For additional information, pay a visit to the organizers' web site, <http://www.runagainsthunger.com/>.

Under "Photos & Videos" you will find a link to their Facebook page where you can view photos from past years' events.

- NM9J



Net Control for 2015 operated from the Westchester County RACES Communications Vehicle.

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 Update Editor: Malcolm Pritchard, NM9J

E-mail: NM9J 'at' arrl.net

Newsletter contributions are always very welcome!

Archive: <http://home.lanline.com/~pcara/newslett.htm>

PCARA Information

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

Organization. PCARA meetings take place the first Sunday of each month* at 3:00 p.m. in Dining Room B of NewYork-Presbyterian/Hudson Valley Hospital, Rt. 202, Cortlandt Manor, NY 10567. Drive round behind the main hospital building and enter from the rear (look for the oxygen tanks). Talk-in is available on the 146.67 repeater. *Apart from holidays and July/August break.

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 Oct 2: PCARA Meeting, New York-Presbyterian Hudson Valley Hospital, 3:00 p.m.

Sun Oct 16: 36th Annual Harry Chapin Run Against Hunger, Croton-on-Hudson, NY.

Hamfests

Sat Oct 1: Mt. Beacon ARC Fall Hamfest, Employee Recreation Center, 83 Red Schoolhouse Rd., Fishkill, NY 8:00 a.m.

Sat Oct 8: Bergen ARA Fall Hamfest, Westwood Regional HS, 701 Ridgewood Rd., Twtnship of Washington, NJ. 8:00 a.m.

Sun Oct 9: Hall of Science ARC Hamfest, NY Hall of Science, 47-01 111th St., Flushing Meadows, Queens NY. 9:00 a.m.

Sun Oct 30: LIMARC Hamfest, Levittown Hall, 201 Levittown Parkway, Hicksville, NY. 9:00 a.m.

VE Test Sessions

Oct 1: Mt. Beacon Hamfest, Employee Rec Center, 83 Red Schoolhouse Rd., Fishkill, NY. 9:00 a.m. A.D. Schmidt, (845) 462-7539.

Oct 1, 8, 15, 22, 29: Westchester ARC Radio Barn, 4 LedgeWOOD Pl, Armonk, NY. 12:00. Pre-reg M. Rapp, (914) 907-6482.

Oct 8: BARA Fall Hamfest, Westwood Regional HS, Twtnship of Washington, NJ. 8:00 a.m., Donald C. Younger, (201) 265-6583

Oct 9: Yonkers ARC, Will Library, 1500 Central Ave, Yonkers, NY. 1:00 p.m. Pre-reg John, WB2AUL, 914-969-6548.

Oct 16: WECA, Westchester Co Fire Trg Cen, 4 Dana Rd., Valhalla, NY. 7:00 p.m. S. Rothman, (914) 949-1463.

Oct 17: Columbia Univ ARC, 531 Studebaker Bldg, 622 W 132nd St, New York. 6:30 pm, Alan Crosswell (212) 854-3754.

Oct 21: Orange County ARC, Munger Cottage, 183 Main Street, Cornwall NY. 6:00 p.m. Joseph DeLorenzo (845) 534-3146.



Peekskill / Cortlandt Amateur Radio Association Inc.
PO Box 146
Crompond, NY 10517