



PCARA Update



Volume 25, Issue 1 Peekskill/Cortlandt Amateur Radio Association Inc. January 2024

Looking back & forth

Looking forward to a New Year involves looking back on where we have been. Our *PCARA Update* archivist has provided a comprehensive summary for 2023 (one which I cannot improve upon), and I offer it as follows — prepare to be impressed:

Retrospective 2023

- Twelve V.E. Test Sessions at Putnam Valley Library and Putnam|Northern Westchester BOCES Tech Center plus one session at Field Day. Nine new Technicians, ten upgrades to General and two upgrades to Extra, plus several newly-licensed members were the result.
- Meet the Teacher night at PNW BOCES in October 2023.
- Annual Bring and Buy Auction in January 2023 at Cortlandt Town Center CUE Room.
- Presentations at Putnam Valley Library in February 2023 by Mike N2HTT on “3D Printing – a Ham Radio Perspective” and in March 2023 by Charles N2SO on “Morse Code – Ancient Technology or Vital Tool”. Mike’s presentation is available on YouTube courtesy of Rob AD2CT. (<https://www.youtube.com/@peekskillcortlandtamateur7670>)
- Grant received from Vivian and M.L. Roy Brand Trust.
- PCARA table at Orange County Hamfest in May 2023 – though several other Hamfests (Sussex/Mt Beacon/BARA) were affected by the weather.
- **Sad passing of Henry KB2VJP in April 2023 and Ed K2OHK in October 2023.**
- Field Day on June 24-25 was moved from the field

behind George Washington Elementary School to the canopy outside the front entrance because of the weather.

- POTA activation at K-2048 (Donald J. Trump State Park) on October 1.
- Support for Run Against Hunger on October 15, 2023. (See page 7 for news report.)
- Breakfasts both indoor and outdoor held at Uncle Giuseppe’s throughout the year.
- Foxhunts in May and October at FDR State Park.

We started December 2023 with the Annual

PCARA Holiday Dinner at Cortlandt Colonial Restaurant with an attendance of 24. This was followed by a V.E. Test Session at Putnam|Northern Westchester BOCES Tech Center on December 11, resulting in one new Technician and one upgrade to Extra for PCARA member Jasper KD2ZUD.



“Happy Holidays PCARA.”

The last official activity of 2023 was a well-attended breakfast at Uncle Giuseppe’s on December 16.

Moving forward it seems hard to imagine we can keep up the same momentum, but I have great confidence that we will.

Continued on page 2 ⇨



PCARA members, family and friends enjoyed the Holiday Dinner at Cortlandt Colonial Restaurant on December 3.

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Our **PCARA Breakfasts** continue, with the next scheduled for Saturday January 20, 2024 at 9:00 a.m. at Uncle Giuseppe's Marketplace in Yorktown Heights, NY. Come join us!

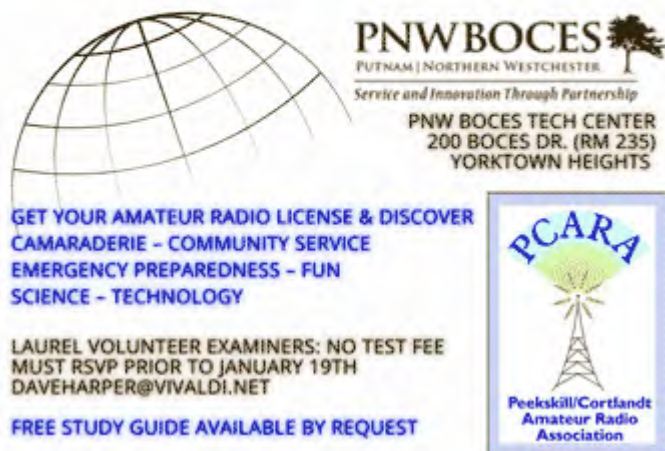


PCARA Breakfast on Saturday December 16 was in the festive surroundings of Uncle Giuseppe's Marketplace.

On Monday January 22, 2024 a **PCARA Laurel V.E. Test Session** has been scheduled at the Putnam | Northern Westchester BOCES Tech Center in Yorktown Heights, NY. The session will begin at 7:00 p.m. If anyone you know is interested in testing, please have them contact Dave KF2BD using daveharper@vivaldi.net.

TEST SESSIONS FOR FCC AMATEUR RADIO LICENSE

MONDAY JANUARY 22ND 7:00PM



PNWBOCES
PUTNAM | NORTHERN WESTCHESTER
Service and Innovation Through Partnership
PNW BOCES TECH CENTER
200 BOCES DR. (RM 235)
YORKTOWN HEIGHTS

GET YOUR AMATEUR RADIO LICENSE & DISCOVER
CAMARADERIE - COMMUNITY SERVICE
EMERGENCY PREPAREDNESS - FUN
SCIENCE - TECHNOLOGY

LAUREL VOLUNTEER EXAMINERS: NO TEST FEE
MUST RSVP PRIOR TO JANUARY 19TH
DAVEHARPER@VIVALDI.NET

FREE STUDY GUIDE AVAILABLE BY REQUEST

PCARA
Peekskill/Cortlandt
Amateur Radio
Association

Test Session graphic courtesy of Lou, KD2ITZ.

Because of construction at the Town of Cortlandt CUE Room, PCARA's **Annual Bring and Buy Auction** is being moved from January 7, 2024 to **later in the year**. Watch for a notice on the new date.

Our next regularly scheduled **PCARA Membership Meeting** should have taken place on the same day. If a location can be secured for the January meeting, details will be posted to the Google Groups list as soon as

possible. Whatever the date, I look forward to seeing each of you there! **LET'S KEEP THE MOMENTUM.**

- 73 de Greg, KB2CQE

PCARA Board

President:

Greg Appleyard, KB2CQE; kb2cqe 'at' arrl.net

Vice President:

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

Secretary:

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

Treasurer:

David Fredsall KD2EVI; joann davidss88 'at' verizon.net

Director:

Mike Dvorozniak, W2IG

Vice President Emeritus: Joe Calabrese, WA2MCR.

Net night

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

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

Mail forwarding and arrl.net

The *PCARA Update* newsletter is sent out by e-mail to 136 members, friends and neighboring clubs. When an e-mail address stops working your editor receives an "Undeliverable" notification, and the destination in the distribution list has to be changed to a valid e-mail address.

In the last few months, a different sort of error has been turning up. Several days after the newsletter is distributed, I will receive a message like this...

Delivery Status Notification

From: Mail Delivery Service postmaster@xxx.net

- These recipients of your message have been processed by the mail server:
nm9j'at'arrl.net; Failed; 4.4.7 (delivery time expired)
etc. etc.

The common factor for these notifications is that all the intended recipients had supplied '@arrl.net' forwarding addresses for their newsletters. If you previously gave an address '@arrl.net', please provide a 'real' e-mail address to the newsletter editor so we can avoid the problem in future.

- NM9J

Adventures in DXing

- N2KZ

Practical wireless

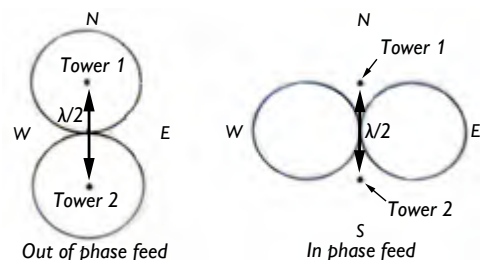
All good engineers long for success. My latest challenge: Bringing **Wi-Fi** to my entire house. Let me share some of my recent discoveries! Can I use my existing equipment to meet today's needs? After fishing around for a while I found a good byte!



Long consideration brings the obvious to light. Here are the basics: Most Wi-Fi devices employ *vertical polarization*. It is a matter of practicality and aesthetics. Within a home or business setting, room is at a premium. Notice that most Wi-Fi devices are indeed vertical in design. When you place a vertical device around your home a footprint akin to a printed book makes sense. It fits into the decor with the least amount of effort.

Self-contained Wi-Fi devices actually have their antennas incorporated onto a single printed circuit board inside a plastic case... and they are vertical. Laptop flat screens often contain necessary Wi-Fi antennas that are vertically polarized. Similarly, range extenders have one, two or more antennas that are designed to be vertical. Simply put, things just fit better that way and having a default polarity standard makes sense too!

Recall the designs of medium wave AM broadcast antennas: the same principles hold true for Wi-Fi. One self-standing antenna is omnidirectional. A **pair** of



Out of phase feed

In phase feed

Radiation patterns for two AM broadcast towers spaced a half-wavelength apart.

In a Wi-Fi scenario, more than two antennas can mean one of two things. Your device is either using a diversity system to capture the strongest signal possible and/or is operating as more than one single device employing a multiplicity of packet exchanges simultaneously. If you need more bandwidth than one channel can provide, you can team channels together to multiply your throughput.

Wi-Fi is quite different than legacy analog radio.



Linksys E8450 Wi-Fi 6 router with vertical design.

Digital data transmission and reception is *not* continuous by any means! Lightning-fast data packets are constantly being exchanged with extraordinary speed and with spaces in-between to aid sharing RF spectrum. Picture tiny blips of information only milliseconds long. If some packets are not received, they are called for again to complete a continuum. Essential are two protocols: CSMA/CA and CSMA/CD: Carrier Sense Multiple Access with Collision Avoidance — and — with Collision Detection. They act as the traffic cops to insure data is transferred in harmony. This is how extenders can receive and transmit on the same frequency simultaneously. Fancy stuff!



Collision avoidance.

Can't You Go Faster?

Let's talk about speed and wavelength. Our data demands are constantly growing to facilitate all the latest miracles of modern life. Yesterday's slow and compact data streams no longer can handle what we need to achieve today. There are two ways to meet these demands: You can use more RF bandwidth to push more data 'through the pipe' — and /or — you can keep using higher and higher data speeds. RF bandwidth is at a premium and a simple way to find new not-yet-used space is to go higher and higher in frequency. Unfortunately, there is a price to be paid for these expansions.

Electronic data is fragile. Tiny little bits of data have to retain their geometry as they are passed from place to place. The faster you send data — the easier it is to corrupt bit shapes. Nicely generated sharp ones and zeros become blurry and eventually unreadable as they exchange with greater and greater speed. The faster you go, the more fragile it gets!

Wi-Fi uses frequencies in the microwave range. Up here, the personality of RF is a combination of what we might expect of UHF television or legacy cellular telephones — and — visual light. Again, the higher you go in frequency, the more likely the possibility of continuity breaks. Propagation becomes more fragile and less reliable.

This is exactly the same predicament we are seeing during the roll-out of 5G cellular technologies. Tall cell towers appropriate for high UHF and low microwave frequencies that were covering relatively large footprints are not useful for 5G. Higher frequencies cover shorter ranges. Infrastructures need to be completely rebuilt for close-range data transfer. Now you need a string of transmitters instead of one big broadcaster high in the air. It is just like comparing a single legacy light bulb to a focused spotlight. They are two distinctly different creatures!

A practical example of this characteristic can be seen at home. Slowly chug along with an old 10 Mbps Wi-Fi system using just the 2.4 GHz range.

Data is reliable, forgiving, but quite slow. Update to a dual band system using both 2.4 and 5 GHz providing 300 Mbps or even gigabit speeds and life gets much less forgiving. (Cutting-edge technology now includes 6 GHz spectrum



Ye olde Linksys single-band wireless access point.

to buy even more room for faster and faster speeds.) When it works, the results are superb... *when it works!* You need to rethink your home installation and redesign it with thought and care. Ultra-fast fragile data requires competent installations to survive and serve well.

Make It Work!

How do you maximize the range and reliability of Wi-Fi around your house? Several factors are involved and you have to position and align them all carefully. Keep reminding yourself that Wi-Fi microwaves behave very much like visual light. Always use your creativity and imagination as you travel your journey.



At a good dark hour of the night, turn off everything that creates light in your house. Find yourself a good, bright, narrow-beamed flashlight. If you had to get some light into every space where you wanted to use your laptop computer, how would you shine your beam? Consider wisely and experiment by shining your light from many different places.

You'll see that the direct beam is quite powerful but it does leak some light away from its primary direction. Your walls and decor also reflect light in ways you might not imagine or expect. Strange dark null pockets will also become apparent. Some light might even reach to distant rooms and other unexpected places. Position yourself 90 degrees off the beam of a Wi-Fi source very close by and you might not see much signal at all!

Also notice that beaming your light from high places might not be advantageous at all! Think of your home's halls and doors as a set of microwave wave-guide plumbing. Your Wi-Fi signal will distribute itself most efficiently when the beam is centered in the passage. A good rule of thumb is to position your beam at about 4 feet above the floor through a clear passageway.

Try to find the very best compromise for your light. This might be a wonderful exercise for your

mind! Be creative and give it a lot of thought and trial. Excellent locations may not be in logical places. Remember the first time you installed a digital microwave link to your antenna site? Exactly!

Turn Up the Heat!

Make a simple pencil map of the area you wish to cover and record your best attempts and results. What you are creating is known as a *heat map*, graphically displaying your coverage and possible challenges to overcome. Look and consider your map for a while and think about new and different possibilities you might want to try.

Please remember that — unlike visual light — microwaves also act like radio transmissions. They can beam through some walls and structures where light cannot go — but their beam will be quite attenuated when passing through. Your beam could easily lose 20 dB of strength or more going through a wall. Metal doors, heating ducts, appliances and anything dense can shield microwaves nearly completely. You simply can not confidently know precisely how Wi-Fi signals will behave until you try it!

Batter Up!

One great step forward in Wi-Fi installation is the advent of the range extender. They can be a tremendous help... *but you have to learn how to use them!* You can fill in 'dead spots' with careful placement. The better the signal, the better the connection speed and overall performance. Good installations bring satisfying results and smiles from everyone!



TP-Link Dual Band Range Extender.

A majority of extenders are designed as all-in-one simple solutions to solve all your Wi-Fi dead spots wherever they may be. Now... if you were going to install a microwave relay professionally you would look for a place where you could see your target in the free and clear. At home, most all of your AC power outlets are at foot level and built into steel boxes. What are the chances that the outlet is in just the right place for signal reception? Even if it was, would you install a microwave device right up against a metal box and power line? You can do better than that!

Think baseball! Your self-standing black book Wi-Fi gateway is the pitcher and your extender is the catcher. *They need to face each other!* Chances are that your gateway's signal comes away off the edges of the 'book' and not the broadside of the chassis. The extender probably has twin little antennas giving you a bi-directional pattern focused straight ahead. Remember, just like pitching — very high or very low is not good!

Your signals need to be in the box. Face the pitcher to receive!

Position your gateway somewhere where it has the clearest shot to the extender at about 4 feet up and away from metal and power sources. Maybe a wood frame counter top or shelf? Point your gateway towards the extender. Here's the real challenge: Find a position for the extender — at a similar 4-foot height — where it faces the gateway — and — it is in the clear from attenuating circumstances like walls and metal objects. Give it your best shot!

My best tip: forget plugging Wi-Fi extenders directly into AC wall outlets especially at floor level. Use short extension cords to position your extender where it should be: Away from metal and obstructions and off the floor! Plug the extender into the AC extension cord instead of directly into an outlet. *Find a place where your extender faces your gateway and remember the 4 feet off the floor concept.* It works so much better!

At very long last, I found poetry! I experimented for weeks and finally chanced upon a nifty spot. Using a short extension cord, I sat my extender toward my gateway 4 feet up resting on the stairs leading to my upstairs bedrooms. There is a lot of free air in this spot — and no metal! A perfect place for coverage. I now successfully relay the gateway's Wi-Fi signal to the other end of



TP Link RE230 dual-band range extender sitting on Karl's stairs. [N2KZ pic.]

my house. The extender also leaks signal upwards and provides pretty good coverage to my two formerly troublesome upstairs bedrooms. Bingo!

Fine Tuning

Some other useful tips: At work, I once designed and built a head-end to receive over-the-air digital television for a client. One thing I learned very quickly: digital signals are not anything like legacy analog signals I grew up with. Signal lock only happens within a certain range of incoming field strength. Too weak a

SSID	BSSID	Char Band	Security	Vendor	Mode	Level (SNR)	Signal
☑️ [Hidden SSID]	5C:53:C3:6E:48:8A	11	2.4GHz	WPA2 Personal	Ubee	ax	-59
☑️ [Hidden SSID]	5C:53:C3:6E:48:8B	167	5GHz	WPA2 Personal	Ubee	ax	-60
☐ [Hidden SSID]	12:52:1C:41:E1:E5	11	2.4GHz	Open	12:52:1C	b/g	-66
☑️ [Hidden SSID]	40:3F:8C:87:6C:56	167	5GHz	WPA2 Personal	TP-LINK	ac	-65
☐ [Hidden SSID]	5E:53:C3:6E:48:96	167	5GHz	WPA2 Personal	5E:53:C3	ax	-
☐ [Hidden SSID]	7E:78:B2:66:F8:12	11	2.4GHz	WPA/WPA2 Personal	7E:78:B2	b/g/n	-
☑️ [Hidden SSID]	40:3F:8C:87:6C:57	11	2.4GHz	WPA/WPA2 Personal	TP-LINK	b/g/n	-50
☐ [Hidden SSID]	A0:04:60:1A:9D:3D	7	2.4GHz	WPA2 Personal	NETGEAR	b/g/n	-91

Sample display from NetSpot Wi-Fi Analyzer app. [Mac version, N2KZ pic.]

signal and your data gets corrupted with noise. Too strong a signal and your data will lose its symmetry and you can't resolve that either.

Take that experience and use it at home! I find that Wi-Fi range extenders work best when situated between about 25 and 40 feet from your gateway. Too close and you will be overloaded with signal. Too far away and you'll drop into 'the grass' — the noise floor where no data can go.

A wonderful analytical tool is an application called NetSpot. It is a free download at: <https://www.netspotapp.com/wifi-analyzer/>. See screen capture above.

Here you will see a spreadsheet that constantly samples all nearby Wi-Fi signals providing very detailed information: SSID (Service Set Identifier = name of the Wi-Fi network), BSSID (Basic Service Set Identifier, = MAC address of the access point), what channel and band it is operating on, the device manufacturer's name, what signal mode is being used, signal-to-noise ratio bar charts and more! You can walk around your house and see where your signal is going. It is like a new set of reading glasses! Using NetSpot's upgraded Home version, (\$49 fee) you can even design heat maps theoretically on your computer's desktop! Adopt a new motto: "Can my installation get any better? Let me give it some thought!"



Heat map produced by NetSpot's upgraded Wi-Fi Analyzer App. Coverage may be inadequate in areas colored dark blue or purple. [Windows version, credit NetSpot.]

One more thing: Always remind yourself that Wi-Fi is a miraculous and useful wonder — but — if you want a very secure and constantly reliable connection with the Internet, nothing beats a hard-wired feed! Most recent gateways include a couple of RJ-45 ports to host CAT5 or CAT6 cables for your utility. Run shielded cables from these ports to places where solid, fast and strong Internet is essential! Important Zoom calls or teleconferencing (or amateur radio remote stations) love a solid full-speed wired connection.



Ubee combined cable modem/router/Wi-Fi hub has two Ethernet ports on the rear panel (yellow).

May your data be perfectly square and crisp and your signal strength arrive right in the box. Get out your flashlight! Turn on your NetSpot and get to work! Share your experiences, questions and comments at: N2KZ'at'arrl.net. Until next month, 73 and dit dit from N2KZ 'The Old Goat.'



NE2Q presents

Pound Ridge resident Jay NE2Q gave a live demonstration of shortwave radio at Pound Ridge Library on Wednesday December 13. Jay had brought along his Icom IC-7300 transceiver as part of the presentation. Attendees were informed about modern devices they already have that make use of wireless technology, followed by the history and possibilities of worldwide radio transmission.



Jay NE2Q demonstrates shortwave radio to attendees at Pound Ridge Library on December 13. [Picture courtesy of Jennifer Coulter, Pound Ridge Library.]

WECA Extra Class

Westchester Emergency Communications Association will be conducting a free Amateur Extra FCC license exam preparatory class that will run for ten weeks starting on Tuesday, January 9th, 2024 and on Tuesday nights thereafter from 7:00 – 9:15 p.m. in-person at the Westchester Fire Training Center, 4 Dana Road in Valhalla, NY 10595 and via Zoom. V.E. test sessions are available in the area and at the Fire Training Center (\$15.00 testing fee).



The free interactive course will be taught by a team of knowledgeable Amateur Radio Operators from WECA. Instructors will be Amateur Extras or others who have special knowledge of specific subject areas. The class will review the test pool questions and answers and provide explanations of the accompanying concepts. There are more than 700 questions in the pool: 50 test questions; 37 correct (74%) to pass. All are welcome to attend who wish to gain additional knowledge of amateur radio subjects even if you do not expect to take the test or do not hold an amateur license.

Texts:

ARRL Extra Class License Manual 12th Edition w/link to Practice Exam Software

ARRL Extra Q&A 5th Edition

Both are available from ARRL at:

<https://home.arrl.org/action/Store/Product-Details/productId/120286>
<https://home.arrl.org/action/Store/Product-Details/productId/120287>

— or from local dealers and Amazon. Be sure to order the correct editions. Please purchase the *License Manual* and begin reading as soon as possible. The *Q&A* has answers and brief explanations for all pool questions — a worthwhile investment.

Subjects include: FCC regulations, operating procedures and practices, radio propagation, electrical principles, practical circuit components and design, modulation, emissions, antenna design, transmission lines and safety. Hands-on practical on-air HF exercises are included.

Registration

If you would like to upgrade to Amateur Extra, please contact WECA's Education Director Larry Sutliff, W2UL, e-mail: Education'at'WECA.org so you can be registered and provided with additional information.

Run Against Hunger –

News Report

The 43rd Harry Chapin Memorial Run Against Hunger took place on Sunday October 15, 2023. An initial report on the event appeared in the *PCARA Update* for November 2023, pages 7-10.



Westchester County RACES Emergency Communications Vehicle outside Croton-Harmon High School during the Run Against Hunger 2023.

In previous years, your editor would have been expecting a visit from Henry KB2VJF, bearing his end-of-year edition of *The (Croton) Gazette*, containing the official report on this annual event. Sadly Henry passed in April 2023, so I reached out to members living in Croton-on-Hudson and Todd N2MUZ very kindly provided the necessary documentation.

As expected, the Run Organizers had compiled their own report on the October races that take place in and around Croton, occupying several pages of the *The Gazette* for Dec 21 2023 – Jan 3, 2024. A short extract describ-

ing the radio support provided by PCARA and WECA members appears alongside, with the text by Race Director Mike Grayeb below.

“Local amateur radio groups joined us for the eighth year to aid communications and safety around the courses of all three of our events. Prior to race day, we had a Zoom meeting with Greg Appleyard (KB2CQE) of the Peekskill/Cortlandt Amateur Radio Association (PCARA) and Kathleen O’Keefe (KC2VCT), Public Service Director of the Westchester Emergency Communication Association (WECA), which provides the RACES mobile radio command center truck, and Capt. Ken Gileo, Jr. of Croton EMS to plan for race day. On race day, PCARA and WECA volunteers joined forces, with WECA member Alan (N2YGK) staffing the Net Control RACES truck at CHHS, while PCARA members took various roles and posts at the finish line and out on the race courses. Shifting course location posts for the various events were Greg (KB2CQE), Malcolm

(NM9J), Jared (KD2HXZ), who ran in the 5K, then manned Mile Point 5 in 10K with his son Josh

(KD2OHZ), Lou (KD2ITZ) with his son Vincent (KD2VAV), David (KD2EVI) and Masa (JR1AQN), who ran in the 10K. Volunteers from WECA included Kathleen (KC2VCT), Alan (N2YGK), Robert (N2TSE), Russ (N2AMP), Ramon (KC2ZJO) and Larry (W2UL).

“We thank each of the volunteers from PCARA and WECA for working together and providing us with excellent communications coverage for all three events. They also made sure that all the EMS units could communicate with the WECA truck from more remote parts of our 10K course.”

The full report concludes by noting that the 43rd Annual Harry Chapin Run/Walk Against Hunger achieved record-breaking success in the number of participants and funds raised. There were 1,226 registrants, 183 more than in 2022, and \$55,000 was distributed to non-profit organizations that fight hunger. They include the Croton-Cortlandt Food Pantry, Croton Caring, Caring for the Hungry and Homeless of Peekskill, Fred’s Pantry, Hillside Food Outreach and Feeding Westchester.

- NM9J

significant injuries or medical issues. Local amateur radio groups joined us for the eighth year to aid communications and safety around the courses of all three of our events. Prior to race day, we had a Zoom meeting with Gregg Appleyard (KB2CQE) of the Peekskill/Cortlandt Amateur Radio Association (PCARA) and Kathleen O’Keefe (KC2VCT), Public Service Director of the Westchester Emergency Communication Association



Organization filed after County. SSNY / be served. SSNY services. 575 White use: any lawful pur-

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Shelf of history II

WHSmith Model 56

Last month I described how I found an old portable transceiver for the U.K. 4 meter band on a basement shelf. This time, I'll cover another historic item from the same shelf, a WHSmith Multiband Receiver Model 56.

As you can see from the picture, this radio has a traditional look, with six push buttons along the top to select wavebands, a metal speaker grille on the left, and four rotary controls for tuning, fine tuning, tone and off/volume on the right side. The country of manufacture, Hong Kong, was a U.K. Crown Colony until returned to China in 1997.



WHSmith Multiband Receiver Model 56.

WHSmith

I should explain who W. H. Smith was... If you have ever visited the U.K., you may be familiar with the institution, which has been selling books, newspapers and magazines for more than two centuries. It was founded by Henry Walton Smith in 1792 and has high street stores in most towns — including my home town of Southport — plus shops in airports, railway stations and other transport hubs. When I was in college, I could walk down the stairs and purchase a morning newspaper from W. H. Smith's store, housed in the ground floor of the college building facing Market Hill.



WHSmith high street store. [Credit: Roger Cornfoot, CC BY-SA 2.0 Deed, cropped.]

The company advertises “a small range of Entertainment products in some stores” — my ‘Model 56’ may have been an early example.

How old?

I knew this radio dated back to the 1970s, but I was not sure *exactly* when I purchased it. The Radiomuseum web site (https://www.radiomuseum.org/r/whs_

[multiband_receiver_56.html](#)) gives an estimated date of “1979 ??” – but I was doubtful, based on examination of the front panel. The tuning dial shows wavelengths in metres (U.K. spelling) for AM stations, and is marked with the positions of European transmitters.

Wavelengths and frequencies

In the 1970s, United Kingdom domestic radio employed frequencies in the “Long Wave” (LW), “Medium Wave” (MW) and “Very High Frequency” (VHF) bands. In the USA there is no equivalent to long wave broadcasting, but medium wave is equivalent to AM, 530-1600 kHz and very high frequency is the same as FM, 88-108 MHz.

In the U.K., long wave and medium wave stations were primarily referred to by wavelength, rather than by frequency as in the U.S.A. That is why old radio dials were marked in “metres” rather than kilohertz.

When I was a youngster, the BBC Light Programme (U.K. spelling) was broadcast on 1500 meters / 200 kHz long wave from Droitwich in the Midlands, while the BBC Home Service for northern England came from the Moorside Edge transmitter site, using 464 meters, 692 kHz. With the arrival of its new pop/rock service in 1967 named Radio 1, the BBC renamed the Light Programme as Radio 2, the Home Service became Radio 4, while newcomer Radio 1 took over 247 meters, 1214 kHz.



BBC MF transmitting site at Moorside Edge, midway between Leeds and Manchester in northern England. [1982 G3VNO pic.]

Geneva Frequency Plan 1975

The Copenhagen frequency plan of 1948 re-assigned channels for postwar European broadcasters. Twenty seven years later, the number of AM transmitters had increased dramatically. The ITU arranged international meetings that led to the **Geneva Frequency Plan** of 1975. This agreement reorganized the long and medium wave broadcast bands for ITU Regions 1 (Europe/Africa) and 3 (Asia/Oceania). In addition to squeezing in more stations by sharing frequencies between different countries, the plan standardized channel spacing for *all* stations at **9 kHz**. (In the Copenhagen Plan of 1948, channels between 1546 – 1602 kHz had been spaced at 8 kHz). The Geneva Plan also standardized LW and MW channels on *exact multiples* of **9 kHz**. Most transmitters had to change frequency slightly, usually by moving 1 kHz higher.

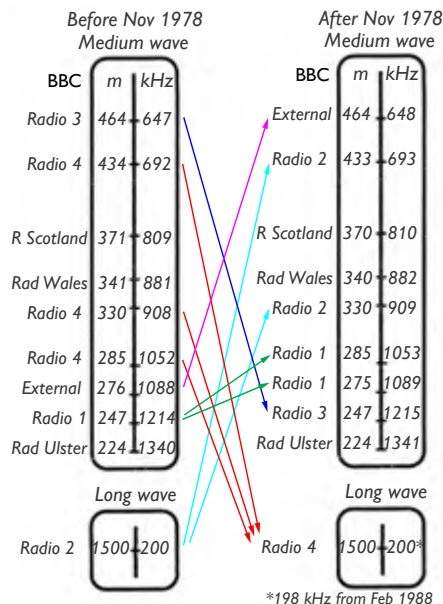
BBC frequency changes 1978

In the 1970s, VHF-FM car radios were a rarity, and a good deal of listening in Britain was still on long and medium wave. With the Geneva plan agreed, the BBC took the opportunity to completely rearrange its four national networks. BBC Radio 4, the spoken word network, moved from multiple medium frequencies (692/908/1052 kHz) to long wave where a single 400 kW transmitter at Droitwich on 200 kHz (later 198 kHz) covered most of England — and two smaller long wave transmitters would cover Scotland. BBC Radio 2, the light music service, moved from long wave to two medium frequencies, 693 and 909 kHz.

The newer pop/rock music service BBC Radio 1, had suffered badly for its first 11 years from being accommodated on a single medium frequency, 1214 kHz, originally intended as an auxiliary fill-in for cities where electrical noise made long wave reception difficult. Radio 1 on 1214 kHz was broadcast from 18 different transmitters (!) with terrible phase distortion in the ‘mush’ zones between adjacent sites. After the the Geneva plan, Radio 1 was assigned **two** new frequencies, 1053 and 1089 kHz.



Plan for moving BBC Radio 2 from long wave to two medium frequencies, 693 and 909 kHz.



Frequency changes for BBC national networks in November 1978.

noise made long wave reception difficult. Radio 1 on 1214 kHz was broadcast from 18 different transmitters (!) with terrible phase distortion in the ‘mush’ zones between adjacent sites. After the the Geneva plan, Radio 1 was assigned **two** new frequencies, 1053 and 1089 kHz.

Additional changes involved the BBC External Services and BBC

Radio 3, the classical music network, which gave up its 647 kHz frequency at the bottom end of the medium wave band — so External Services could have better coverage into Europe. Radio 3 was moved to the old, problematic Radio 1 frequency of 1215 kHz — with the sweetener that most of its music listeners preferred to use VHF-FM stereo .

This project was the largest frequency shake-up that the BBC had ever planned. Thirty-eight new transmitters had to be installed, along with 24 new masts and 28 multi-frequency antenna systems. The sound distribution network had to be reorganized. Much publicity was directed to listeners ahead of the big switch-over which took place on November 23, 1978, just 45 years ago. I even had a short article on the subject published in my local newspaper, the *Southport Visiter*. A 45 rpm record by the King’s Singers entitled “Some Enchanted Wavelengths” describes the changes *a capella*, see: <https://www.youtube.com/watch?v=KbSMMNVOT0o> . For a recording of the changes as they were taking place overnight in November 1978, see <https://www.youtube.com/watch?v=C7zY7cBO5u0> .

Dial-the-year

How did the 1975 Geneva plan and BBC wavelength changes help me date the WHSmith Model 56 radio? I already knew from the ‘cube’ logo on top that the set was manufactured after 1973. The front panel tuning dial for long and medium wave was calibrated in meters (“MTs”), with station names marked on the dial. It did not take long to spot that BBC stations, Radio 1, 2, 3 and 4, were printed in their **old positions** prior to the 1978 frequency reorganization. This was strong evidence that the set had been manufactured before November 1978.

There was an additional clue from four plastic stickers, still fixed to the dial. As part of publicity for the upcoming frequency changes, the BBC had distributed 22 million cards to U.K. households explaining the new wavelengths. Each card contained 16 flexi-



Analog tuning dial of WHSmith Model 56 receiver was marked with positions of BBC stations “Rad 1” to “Rad 4”.

As part of publicity for the upcoming frequency changes, the BBC had distributed 22 million cards to U.K. households explaining the new wavelengths. Each card contained 16 flexi-

ble stickers with diamond shaped logos. There were instructions to peel the stickers off then fix them to the radio dial to mark new tuning positions for Radios 1, 2, 3 and 4 plus one local station. A large sticker could be added to the side of the set as an extra reminder.



The BBC distributed cards to U.K. households explaining the frequency changes, with stickers to place on the radio.

So — my WHSmith radio was probably purchased around 1976-77. By then, I had started traveling to Europe and found it worthwhile to take a portable radio along for keeping up with news from the BBC on short wave. Back then, there was no satellite television, no Internet and no smartphones to help stay in touch with home.

Did it still work?

I cleaned dust and dirt off the WHSmith radio, slid the rear access door open and loaded four D cells into the battery holder. Unfortunately, there was no response when I



The battery compartment showed signs of corrosion at the positive connector.

switched on. I removed the back cover and traced the wiring from battery holder to circuit board, using a multimeter to check that 6V DC was reaching the power switch. There was a problem with the positive battery connector — which was showing signs of corrosion from a previous battery leak. I cleaned the positive contact with a small file, a fiberglass cleaning tool and Deoxit®. Now there was 6V reaching the on/off switch. I switched on and could hear crackles from the loudspeaker. Tuning around, the first signal I came across was WLNA 1420 kHz, with Perry Como singing ‘There’s No Place like Home for the

Holidays’ — just as though it was 45 years ago.

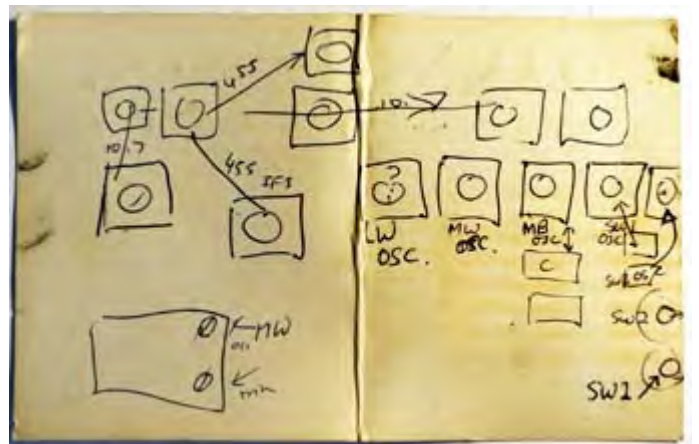
I checked coverage on the other wavebands. There were noises on long wave, but no broadcast stations on this side of the Atlantic. The ‘Marine Band’ (1.6 – 4.4 MHz) had no more ship-to-shore transmissions, though I could hear a strong AM signal from WRGR in Haverstraw on 1700 kHz. The two short wave bands (4 – 12 MHz and 12 – 26 MHz) had a few daytime AM broadcasters, mostly religious. More signals were audible at night. Performance was not great, with image and other spurious signals present — I doubt this set would rate very highly on Sherwood Engineering’s list of Receiver Test Data (<http://sherweng.com/table.html>).

A peek inside the radio showed typical construction of the 1970s. On A.M. the design was a single-conversion superheterodyne with 455 kHz IF and free-running local oscillator — hence the need for a fine-tuning control on short wave.



View inside the Model 56 multiband receiver with back cover removed. (Picture is rotated 180° to match sketch below.)

There were no integrated circuits and no surface mount devices, just discrete, plastic-encapsulated transistors for the radio frequency stages. Inside the case I came across a sketch that I made at the time, showing adjustment points for frequency alignment.



Postcard found inside the radio shows adjustment points for alignment of LW, MW, MB, SW1 and SW2 bands.

Portable short wave radios would soon take a great leap forward with designs such as Sony's ICF-2001

(1980) featuring up-conversion and frequency synthesis. I still have a microprocessor-controlled Sony ICF-7600D (1983) which kept me company on many a foreign trip.



Sony ICF-7600D FM/LW/MW/SW PLL synthesized receiver outperformed the WHSmith Model 56 in every respect.

Whatever happened to AM?

Some stations from the Geneva Plan of 1975 are still on the air today — but there has been a good deal of reassignment and attrition since the mid-1970s. Listeners in Europe have changed over from long wave / medium wave AM to VHF-FM — and more recently to Digital Audio Broadcasting (DAB) around 220 MHz plus Internet radio.

At the time of writing, the high-power long wave transmitter at Droitwich is still broadcasting BBC Radio 4 on 198 kHz — but its days appear to be numbered. The BBC announced in May 2023 that it would stop scheduling separate content on long wave — including the Shipping Forecast — in March 2024. This would be a preliminary step to switching off all the BBC's long wave broadcasts.



Droitwich transmitter currently radiates BBC Radio 4 with 500 kW on 198 kHz from the T-antenna strung between two 700 ft guyed masts. [Credit: Bob Nienhuis, released to public domain.]

The BBC medium wave transmissions from Moorside Edge that I used to tune in have also been transitioning. The 1215 kHz frequency that was handed over from Radio 3 to commercial 'Virgin Radio' in 1993 changed to 'Absolute Radio' then closed down in January 2023. The two 'new' frequencies for BBC Radio 1, 1089 kHz and 1053 kHz, were taken over by commercial 'Talk

Radio' in 1995. This service is now known as 'Talksport' and is still on-air.

The medium frequencies of 693 and 909 kHz previously employed for BBC Radio 2 were handed over in 1990 to a new BBC service for sports, children and educational programs called 'Radio 5'. This service transitioned to a rolling news and sports format known as 'Radio 5 Live' that is still on the air from the MF transmission sites.

But those sites no longer have a BBC sign at the entrance. In 1997 the BBC sold its domestic transmission network to Houston-based Crown Castle, who sold it on to National Grid in 2004. BBC World Service transmitters were sold to Merlin Communications, now part of Babcock International.

Despite being ejected from their medium frequencies, BBC Radio 1 and BBC Radio 2 are still available throughout the U.K. on VHF-FM, DAB and via the Internet.

Dark times for AM?

The future of long wave and medium wave broadcasting in Europe is in severe doubt. Many European countries have already abandoned long wave and are switching off their medium wave transmitters. Reception on VHF-FM and DAB has better fidelity and less nighttime interference... though the ability to tune in overseas broadcasts in English and other languages is limited. The answer to that complaint from broadcasters is — just use Internet radio.

But relying on the Internet can be problematic in times of conflict. Because of the crisis in the Middle East, the BBC World Service announced in November 2023 that it would provide an emergency radio service for Gaza on 639 kHz medium wave by reactivating the British East Mediterranean Relay Station on the island of Cyprus. This location is 230 miles north of Gaza across the Mediterranean Sea.



- NM9J

V.E. News

PCARA's latest Volunteer Examiner test session took place on Monday December 11 at Putnam | Northern Westchester BOCES. Three V.E.s supervised the testing of two candidates.

PCARA member Jasper KD2ZUD of Germantown, NY successfully upgraded from General to **Extra**. Well done!

Robert Hersey of Waccabuc, NY passed Element 2 and qualified for **Technician**. The FCC assigned his new call sign **KE2CIK** on December 16, 2023.

Volunteer Examiners taking part included Team Liaison Mike W2IG, Lou KD2ITZ and NM9J.



PCARA's December VE test session took place at Putnam | Northern Westchester BOCES Tech Center.

PCARA's next Test Session is scheduled for Monday January 22, 2024 at PNW BOCES Tech Center, 200 BOCES Drive, Yorktown Heights, Room 235, 7:00 p.m. This is a Laurel VEC session with no test fee. Candidates must contact Dave KF2BD, daveharper@vivaldi.net.

WA4ARB update

Readers may recall that Michael Stewart passed the Technician Exam at PCARA's Field Day on Sunday June 25, 2023 and was awarded call sign KE2BPF by the FCC. He subsequently upgraded to General in a remote V.E. Test Session administered by PARC Radio & Technology. He applied for his father's old call sign **WA4ARB** as a Vanity Call and this was granted by the FCC in July.

The latest news from Mike is that on December 18, 2023 he upgraded one more time at a remote V.E. Test Session conducted by the Walla Walla Valley VE Team and is now an **Extra Class** radio amateur. His upgrade was recorded by the FCC on December 19. Well done!

Question Pool changes

The National Conference of Volunteer Examiner Coordinators (NCVEC) has made two recent announcements about the Question Pools that it maintains for amateur radio examinations.

Deleted questions

On December 1, 2023 the NCVEC announced that two questions, G1C08 and G1C10, have been deleted from the 2023-2027 Element 3 Question Pool for the General Class license.

G1C08 (D)

What is the maximum symbol rate permitted for RTTY or data emission transmitted at frequencies below 28 MHz?

A. 56 kilobaud, B. 19.6 kilobaud, C. 1200 baud, D. 300 baud

G1C10 (C)

What is the maximum symbol rate permitted for RTTY or data emission transmissions on the 10-meter band?

A. 56 kilobaud, B. 19.6 kilobaud, C. 1200 baud, D. 300 baud

These questions have been withdrawn because of FCC's November 13 Rule Change regarding symbol rate restrictions on amateur radio digital emissions. From Jan 8, 2024, symbol rate restrictions on the HF bands will be replaced with a **bandwidth** limit of 2.8 kHz.

Extra Class Question Pool

On December 7 the NCVEC released a new Question Pool for the Element 4 Extra Class examinations. This pool will be in effect from July 1, 2024 to June 30, 2027 and contains 82 new questions. Here are a few examples.

E4C13 (D)

What is reciprocal mixing?

- A. Two out-of-band signals mixing to generate an in-band spurious signal
- B. In-phase signals cancelling in a mixer resulting in loss of receiver sensitivity
- C. Two digital signals combining from alternate time slots
- D. Local oscillator phase noise mixing with adjacent strong signals to create interference to desired signals

E8A02 (A)

Which of the following is a type of analog-to-digital conversion?

- A. Successive approximation
- B. Harmonic regeneration
- C. Level shifting
- D. Phase reversal

E9B07 (C)

What is the difference in radiated power between a lossless antenna with gain and an isotropic radiator driven by the same power?

- A. The power radiated from the directional antenna is increased by the gain of the antenna
- B. The power radiated from the directional antenna is stronger by its front-to-back ratio
- C. They are the same
- D. The power radiated from the isotropic radiator is 2.15 dB greater than that from the directional antenna

The new Extra Class question pool can be downloaded in Microsoft Word or PDF format from the NCVEC web site. See: <https://www.ncvec.org/index.php/2024-2028-extra-class-question-pool-release> .

Peekskill / Cortlandt Amateur Radio Association

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

E-Mail: mail 'at' pcara.org

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

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

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

PCARA Update Editor: Malcolm Pritchard, NM9J

E-mail: NM9J 'at' arrl.net

Newsletter contributions are always very welcome!

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

PCARA Information

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

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

PCARA Repeaters

W2NYW: 146.67 MHz -0.6, PL 156.7Hz

KB2CQE: 449.925MHz -5.0, PL 179.9Hz

N2CBH: 448.725MHz -5.0, PL 107.2Hz

PCARA Calendar

Sat Jan 20: PCARA Breakfast, 9:00 a.m., Uncle Giuseppe's, 327 Downing Dr. Yorktown Heights, NY.

Mon Jan 22: PCARA V.E. Test Session, 7:00 p.m., BOCES room 235, see below.

January meeting: Date and location to be announced.

Bring & Buy Auction: moved to later in 2024. Watch Google Groups for revised date.

Hamfests

Check with organizers before leaving.

Sat Jan 6 2024: Ham Radio University, back to an in-person event. LIU-POST, Hillwood Commons Student Center, 720 Northern Boulevard, Brookville, NY. See: <https://hamradiouniversity.org/>

Sun Jan 28: LIMARC Virtual Hamfest, <https://limarc.org/> for sign-up.

VE Test Sessions

Check with the contact before leaving.

Jan 11: WECA, Westch Cnty Fire Trg Center, 4 Dana Rd Valhalla NY. 7:00 p.m. Contact VE, robert.casino'at'verizon.net

Jan 19: Orange County ARC, Munger Cottage, 40 Munger Dr, Cornwall NY. 6:00 p.m. Contact: Joe DeLorenzo, w2bcc'at'arrl.net

Jan 22: PCARA, Putnam | Northern Westchester BOCES, Tech Center, 200 BOCES Drive, Yorktown Heights, Room 235.

7:00 p.m. Must contact VE. Dave KF2BD daveharper'at'vivaldi.net.



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