PCARA Update

Volume 25, Issue 5 Peekskill/Cortlandt Amateur Radio Association Inc. May 2024

May the fourth be foxy

The April PCARA **Membership Meeting** on April 20, 2024 at the Putnam Valley Free Library in Putnam Valley, NY had 17 in attendance!

PCARA Vice President Bob N2CBH provided an update on the repeaters up on the hill (146.670 MHz and 449.925 MHz). The machines are working well, and some tweaks were made to the 2 meter time-out-timer, extending the duration to 3 minutes. Please remember to occasionally allow the carrier to drop to reset the timer.

PCARA Secretary Lou KD2ITZ reported that he and Treasurer David KD2EVI, had been interviewed by a journalist from the local publication *River Journal North* (https://riverjournalonline.com/) for a general article on PCARA and Amateur Radio. Keep your eyes open for the upcoming story!

PCARA Treasurer David KD2EVI furnished a report on PCARA's finances. We are still in the black and will have no difficulties covering anticipated expenses for the year. Hmmm… maybe it's time to plan that junket DXpedition to a nice Caribbean Island? Keep your eyes open for membership renewals via snail mail.

PCARA Director Mike W2IG brought to our attention that PCARA has been conducting VE Test Sessions (ARRL and Laurel) at regular intervals since September 2018, nearly 6 years! Thanks to Mike W2IG and Dave KF2BD our VE Testing Coordinators, we've brought in quite a few new members to both the hobby and the club.

A brief demonstration was held of the TIDRadio Wireless Programmer Bluetooth Adapter (**TID-BL-1**), **Odmaster** application, and smartphone to program a Baofeng UV-17 Pro HT. The Odmaster app supports many similar genres of radios and eliminates the tedious process of programming by way of the keypad. Several PCARA members brought along their HTs for programming with a codeplug containing local repeaters and simplex frequencies (thanks to David KD2EVI). If you're interested in trying it for your radio, let me know.

The April 20 meeting at Putnam Valley Library was well attended.

At the April meeting Greg KB2CQE (center) demonstrated programming of a BaoFeng UV-17R Pro transceiver using the Odmaster app on a smartphone and TIDRadio's TD-BL-1 Bluetooth dongle.

PCARA will be celebrating its **Silver Jubilee** in 2025! PCARA was incorporated as a non-profit 501(c)(3) in 2000 but has been around as an association since 1992. How the time flies! This would provide an opportunity for a Special Event Station, POTA, or gala commemorating this significant milestone. Please share your thoughts and ideas.

An ARRL VEC **VE Test Session** was held after the meeting with two attendees, one of which upgraded to Extra.

Please mark your calendar *Continued on page 2* ⇨

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with these upcoming events:

- Monday April 29, 2024 at 7:00 p.m.: Laurel VEC VE Test Session at the Putnam | Northern Westchester BOCES Tech Center, Room 235, in Yorktown Heights, NY. Please contact Dave KF2BD to register.
- Saturday May 4, 2024 at 9:30 a.m.: PCARA Foxhunt at FDR State Park in Yorktown Heights, NY. The Fox is to be hidden by Vincent KD2VAV. The Foxhunt will be followed by "I Love My Park Day" cleanup. Details in this month's edition of the *Update*.
- Sunday May 5, 2024 at 8:00 a.m.: Orange County Amateur Radio Club (OCARC) Hamfest at the Black Rock Fish & Game Club in Mountainville, NY. For more information, please visit the OCARC website at https://ocarcny.org. PCARA will be sponsoring two tables. Please feel free to bring along anything you may want to sell.

Our next scheduled **PCARA Membership Meeting** is on Saturday May 18, 2024 at 10:15 a.m. at the Putnam Valley Free Library, 30 Oscawana Lake Road, Putnam Valley, NY. Please come and join us. I look forward to seeing each of you there.

- 73 de Greg, KB2CQE

PCARA Board

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Greg Appleyard, KB2CQE; kb2cqe 'at' arrl.net
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Vice President Emeritus: Joe Calabrese, WA2MCR.

Net night

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

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

Membership renewal

This is a reminder that our club's membership year is coming to an end and that, if you have not already done so, it is time to send a check to renew your membership. Shortly after you receive this edition of the *Update*, I will be sending everyone whose membership is expiring an e-mail asking you to renew.

As in past years full membership is $25.00, senior membership is $10.00, family $30.00. Student membership is free. Those of you who have joined us for the first time in 2024 will not be receiving a renewal request as your membership will expire in May 2025.

I will accept cash and checks in person if you see me at a club meeting or event — or you may mail your check, payable to PCARA, to:

PCARA
P.O. Box 146
Crompond, NY 10517

Thank you for your cooperation and support of our club

- 73 de David KD2EVI

VE Test Session

PCARA's latest VE Test Session took place on Saturday April 20, following the monthly meeting at Putnam Valley Library.

Two candidates had enrolled for the Extra Class examination and one was successful. Congratulations to Terrence KE2CKX of Westtown, NY who upgraded from General to Extra.


April 20 VE Test Session in the Putnam Valley Library 'fireplace room'.

Thanks to the six volunteer examiners who took part in this ARRL-VEC Test Session. They include Team Liaison Mike W2IG, Lou KD2ITZ, Ken W1YJ, Rob AD2CT, Joe W2BCC and NM9J.

PCARA's next VE Test Session is scheduled for Monday April 29, 7:00 p.m. at Putnam | Northern Westchester BOCES, Tech Center, 200 BOCES Drive, Yorktown Heights, Room 235. This will be a Laurel VEC session (no test fee), candidates must contact Dave KF2BD using daveharper'at'vivaldi.net. An additional ARRL VEC session is scheduled for the May 18 meeting.

Adventures in DXing
- N2KZ

Speak Digital Voice!

This article is about digital voice operation only as you might find on VHF and UHF. This does not pertain to digital data modes like FT8, PSK31, et al common on HF. We hope this article brings you incentive to investigate digital voice operations!

Challenges Met Yet?

What do you do if you want to create a chat network that could unite amateurs across a 120 mile swath of land and maybe even the entire world? You can only use a very limited amount of expense and equipment. It has to be beyond simple to operate and easy for those challenged by technology. Got any ideas?

My test bed is the county of Dumfries and Galloway in southwestern Scotland. The terrain is unbridled and varied — from seashores to mountainous peaks. Only one analog 2 meter FM repeater exists in the area — yet there is no Internet or landline availability at the site. If your signals are out of range — you are out of luck!

Location of the Dumfries and Galloway unitary council area in southwest Scotland.

Many local amateurs have no equipment and some have nowhere to install antennas. Today's complicated transceivers often prove confusing and impractical. A universal solution is needed allowing connectivity that anyone could achieve with a minimum of effort. **How can you unite these lonely amateurs cast out in every direction?** Maybe the answer is using digital voice!

In the year 2024, most people own either a smartphone or a computer — or both. Remote access amateur radio applications could be our holy grail — a common thread for all! Inquisitive research and development is required to verify our options. What application could everyone use to house a unified chat-group with unlimited access? Is digital voice the answer?

For years (even decades!) I have shied away from getting involved with any form of digital voice. I have concocted dozens of excuses confirming why DV is unnecessary. Now I have a reason to believe! If everyone could log-on together, on phones or computers, you would create a unified network. Only one problem: I needed to become instantly proficient about a world I knew nothing about. It was like trying to cram for a final exam for a class you never attended!

Admission to the world of digital radio requires great patience and fortitude. Leave your emotions of frustration at the door! Nearly every application you wish to experiment with requires another unique proprietary log-on, password and *ID number* that is issued by the administrator of that individual app. Expect a long series of steps to attain authority for most everything you want to do.

Finding your way into digital radio is like trying to assemble a Heathkit® without an assembly manual. You can obtain all the parts and pieces but you need to discover how it all goes together. Eventually you will! An adventure it is... Indeed. So let's start!

No Standard is Our Standard

There are three very basic 'standards' for amateur radio digital voice: DMR — Digital Mobile Radio (Motorola and others) D-Star (Icom and Kenwood) and C4FM/Yaesu System Fusion, 'YSF'. There are many other 'standards' (like P25) and they are all incompatible with each other!

PCARA's Yaesu DR-1X System Fusion repeater being reconfigured for use on 146.67 MHz in September 2022.

Some digital repeaters are capable of receiving multiple transmission 'standards' going in (even analog FM) — but — will only transmit one 'standard' going out. Your HT or base rig had better be able to decode the repeater's resultant transmission! Device configurations are not standard, either. Very frustrating!

The challenges are many. Introducing digital voice transmissions to your world could be problematic. You have always monitored the same analog repeater output frequency for decades. Suddenly, a multi-mode repeater is installed. You are OK if everyone sticks to analog — but — if anyone tries digital all the analog listeners will be blasted with digital data noise. This is a

Motorola DR3000 DMR repeater with Procomm MPX70/6H 6-resonator mini-duplexer in use by John GM4ZTO for GB7ZT repeater in Ballantrae, Scotland, 439.400 / 430.400 MHz. Note watchdog timer top left. [GM4ZTO pic.]

great way to lose a crowd! You might think you could employ an analog receive PL to filter out only the analog transmissions but in practice you still might hear small bursts of data noise after every digital transmission.

More incompatibility: not only do you need to pick a transmission standard; you also need to decide what variety of interlink you want to join. In Scotland, DMR users can choose either BrandMeister DMR or DV Phoenix DMR servers to create interconnects. It is very difficult to intermingle these different DMR server systems. Your best standard is the adopted standard of your geographic area or your local club. Stay close to home! Research your options long before you buy your gear (or buy a lot of different equipment to cover the standards you like!)

Are You Ready?

Are you ready to dive into digital voice? To join any new community you need a unique identity. Digital amateur radio is no different! When using DMR, your first challenge is to obtain a *DMR ID* for yourself. Yaesu System Fusion relies on your existing call sign. D-Star just requires registering with your call sign. (These IDs will establish your name, callsign and operating authority to the entire digital world.) It's like a futuristic sci-fi movie: you are a number. Don't use your name!

A DMR ID requires a couple of prerequisites: before you start to sign up, you must obtain an *original copy* of your FCC license. (The easy-to-obtain FCC *reference copy* is not acceptable.) Start the process at https://www.fcc.gov/wireless/support/knowledge-base/universal-licensing-system-uls-resources/how-obtain-official.

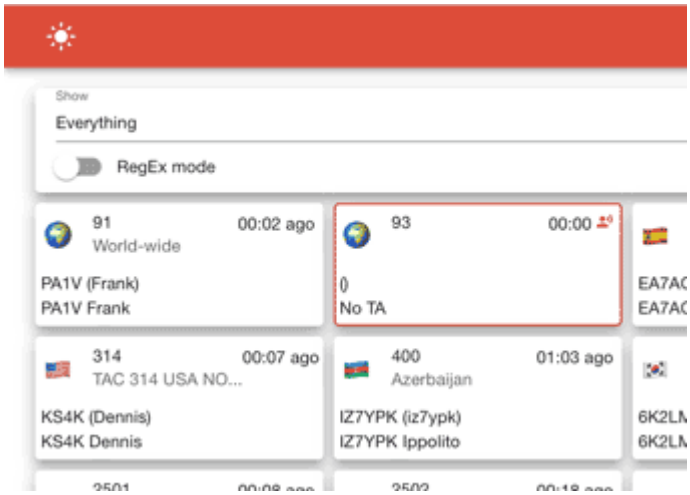
Follow the FCC's detailed instructions carefully. Make sure you have your FCC FRN number and login password handy before you start. Important tip: If you are using an Apple device, you must use *Chrome* as a browser for this task. Apple's *Safari* will not work!

After you have your original license copy as a downloaded Adobe Acrobat .pdf file, go to the Radio ID site at: https://radioid.net. Click on the upper right hand corner LOG IN/SIGN IN box to begin. Read the instructions carefully then scroll to the bottom to click a little red box and then press REGISTER ACCOUNT. You will then be asked to upload your original FCC license copy. For a RadioID step-by-step tutorial, go to: https://youtu.be/8FlGAMy0FkU?si=DQpGbkeMF1miYYCN.

When you complete the Radio ID sign-up procedure, you need to patiently wait until your new permanent number arrives in e-mail. Did you get it? Great!

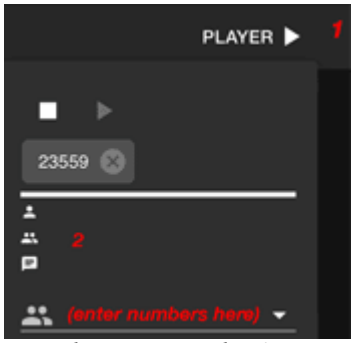
Get Your Feet Wet

Instant gratification can be found at: https://hose.brandmeister.network. You'll immediately link to a constantly updating user interface showing everyone around the world who is using BrandMeister DMR servers to interconnect. Tap or click on any of the myriad of rectangular QSO boxes to listen in.



Close-up of Brandmeister Hoseline screen showing talkgroup activity in real-time.

Using BM Hoseline, you can also use a scanner-like function to listen to just the chats that you desire. In the upper right hand corner, tap the word PLAYER. It will reveal an entry box so just tap the 'two-guy' icon. With your numeric keyboard you can enter your favorite chatrooms — or you can search for suggestions by typing in the name of a place: "New York." A four digit number is a wild card for all the clients within that range (i.e. 3136) or you



Brandmeister Hoseline's 'Player' control.

can stack specific chats like New York TAC 31366 or 31431. Remember to click to listen! One catch: You can only *listen* on BM HoseLine. No transmission privileges!

How about a little more DV vocabulary? Here is a listing for the nearby WECA DMR digital repeater:

Output: 438.7125 MHz
Input: 433.7125 MHz
Color code 14
TS1 — TG3136 (NY State Full Time.)
TS2 — TG311438 (WECA talkgroup full time)

What does it all mean? **Color code**? In the world of DMR, it is the equivalent of an analog PL tone. There are 16 available color codes.

TG is a **talkgroup** — a logical group of users who want to listen to the same thing, organized by geographic location, interest group, radio club and so on. **TS1** stands for time slot #1 within the DMR encoding system. Digital repeaters are capable of carrying more than one conversation simultaneously. TS1 is the first in line. TS2 can exist, too. See? Jump on the WECA digital repeater and you will be on talkgroup TG3136 New York State Full Time. You'll see mention of these identifiers when you view BM Hoseline.

*Which **color** code would you like for your radio?*

Looking for local DMR frequencies and numeric IDs? There are lists galore available for your reference:

WECA: https://www.weca.org/facilities

BrandMeister: https://brandmeister.network/?page=repeater&id=311438

NY Metro DMR Repeater Network (aka Bronx-TRBO): http://k2hr.com/Metro%20DMR.html

NJ-Trbo: http://cbridge.nj-trbo.org/NJTrbo/

For a very complete and printable list of our local DMR and analog, go to: https://w2lgb.net/radio-repeater-nformation provided by Larry, W2LGB our resident digital guru. Thank you! (BTW: Larry's URL shows no 'i' - only 'nformation.')

Local DMR simplex frequencies: 441.000, 446.500, 446.075, 433.450; 145.790, 145.510 MHz. All are CC 1, TS 1, TG 99.

When you develop a complex configuration containing all the information necessary for local use you can create a **codeplug**. *You can create your own standard configuration*. This saves many newcomers from trying to configure their DMR equipment by themselves. If your group can standardize on specific types of equipment to use, creating and uploading codeplugs for each type will get everyone up and running, with the exact same configuration. It is a real time-saver and a miraculous anxiety cure. The word 'codeplug' is the Motorola business radio term for a transceiver configuration file that defines frequencies, offsets and all the other settings needed for a radio's programmed channels.

Transmit Too!

If you are looking for full transceiver-like operation from your computer or phone, you can also try these two apps: *Echolink* and *Peanut*. Echolink (https://echolink.org/) is available for Windows, Android phones, Mac iOS and iPhones. You'll find a detailed introduction to the system on their website. I have used Echolink all over the world to join chat nets and also enjoy one-on-one QSOs. Get ready: This is another place that will ask for an original copy of your license for validation. After you are registered on Echolink and you download the application, you can link into amateur radio repeaters all over the world. Select what repeater you would like to try and connect with one tap. Another tap and you can transmit as if you were using a transceiver or an HT locally. Coverage is worldwide! I checked into the WECA 2 meter repeater from South Korea and Michigan. Amazing!

Peanut is another very nifty app. Look for a free download at: https://www.pa7lim.nl/peanut. It is only for Android 7 — or Windows 10 and higher. It will not run on iOS or iPhone. You will need your DMR ID to sign up; and in turn you will be issued a unique ID for just the Peanut app. This amazing simple-to-use application will give you full transceiver operation through a long list of interconnected repeaters around the world.

Peanut app running on Microsoft Windows 10.

The Peanut user interface resembles a digital voice transceiver. Peanut can connect to digital voice repeaters using DMR, D-Link and Yaesu System Fusion and choice single talkgroups. Peanut is a joy and works very well. Great fun is waiting for you. It is the closest thing to real digital voice transceiving without purchasing new equipment.

Caveat: When you use Echolink and Peanut you are limited to only the repeaters that are linked to these apps. If you have nothing else or you are away from home they can bring the world of amateur radio to your computer or smartphone. These apps can be a

hardy welcome home especially for older hams that are in retirement homes with restricted abilities to have equipment and outdoor antenna installations.

Echolink and Peanut can really make a difference — if you can create or find a host repeater or talkgroup for your group to call home. This is another big challenge to achieve. Luckily for the group in Scotland, a Brandmeister DMR talkgroup called Scotland West 23559 was already created. Scotties also use Scotland Chat 23550, 23551 and 23556. You can scan all of these to catch all the action. Of course, there is an alternate group: Scotland DV Phoenix (https://dvsph.net) with another vast set of options and different DV formats. The possibilities are endless. Take a look!

Site of the GB7DK repeater, Stranraer, Scotland. [M6EDB pic.]

The United States is served by a multitude of digital voice systems nationwide. It is best to research local clubs to find out what systems and talkgroups they have installed and then ask advice and strategize how to join in. Computer savvy Elmers are often a great saving grace for those who are beginning to learn all of these new age skills.

The bottom line: When it works — the results can be phenomenal. You can enjoy everything you expect from amateur radio now with new amazing refinements. Digital voice is a new experience. There is no fading, no static and very consistent results. On the flip side, when digital signals become weak the resultant audio becomes blurry and broken. When less than the minimum data is received the audio halts completely 'falling off a cliff.' With a solid connection, the possible connectivity is unparalleled. If you want to talk to any place in the world you simply need to discover where they are chatting on DV and join in.

Brand new Technician class amateurs and senior amateurs love digital voice. What a great way to gain access to contacts all over the world with a minimum of equipment. Combine digital voice access with a remote receiver (like a Kiwi SDR or similar) and you can have fantastic worldwide coverage combined with all the over-the-air HF reception you had as a kid with your very first general coverage receiver. Bringing back a full amateur radio experience to legacy hams that now have limited access could be the most rewarding gift a fellow 'Elmer' ham could ever provide!

Get Real

There are many other ways to design a workable DV system for your amateur radio community. If you are lucky enough to be within range of a digital repeater all you need is to get yourself a *digital HT* or a *digital mobile transceiver.* Very important: Make sure that your new gear operates with the same DV format the repeater accepts. It can be heartbreaking if you have a brand new D-Star digital rig and your local repeater only accepts System Fusion.

If you are outside the range of digital repeaters, you can use a *hotspot* to link to the Internet. Purchase a handheld *digital voice* HT and a hotspot. The HT can communicate via amateur radio to the hotspot. The hotspot can then deliver your digitized voice over the Internet to a server system. In essence, you are creating a mini digital repeater within your home. Another option is to use a USB stick to bring DV operation to your computer like a DVMEGA DVstick 30. (https://www.dvmega.nl/dvstick30/) Plug it into a USB port on the side of your computer and you suddenly have a digital voice transceiver at your fingertips.

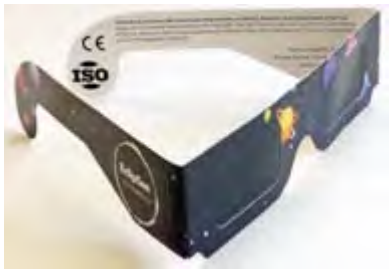
DVMEGA's DVstick 30 lets you make a digital voice QSO without a radio. All you need is a Windows PC with sound card, microphone, speaker and the BlueDV software. [DVMEGA.]

The world of digital voice gear, establishing talkgroups and linked server systems is worthy of a full article or two on its own. As I learn more and more interlinking skills I will share them here in *PCARA Update*. I hope this article will pique your curiosity about digital voice. Start to tinker with digital voice. It is quite an amazing and futuristic technology that I really think you would enjoy!

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

Eclipse effect on 20m propagation – N2MUZ

During the eclipse on April 8th, I wanted to do something other than stand outside staring at a small dot in the sky with free cardboard glasses of dubious lens quality, so instead ran a simple propagation test on 20 meters and 40 meters using WSPR, similar to the test that Mike N2HTT performed and reported for 80m. [See later -*Ed.*]



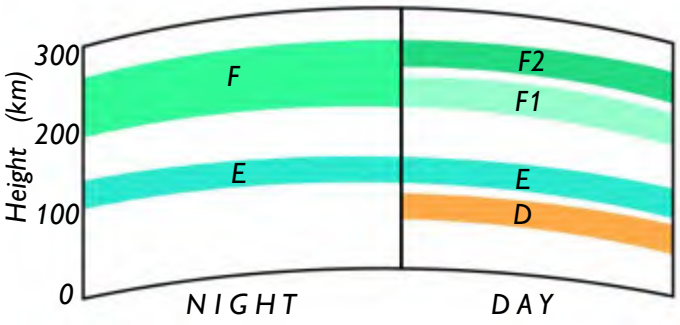
Eclipse glasses.

I chose 40 meters to use as my baseline, since its propagation characteristics are less affected by solar energy. I also chose 20 meters because it requires a solar ionized 'F2' layer for ionospheric propagation of radio waves.

Since, presumably, in a matter of 30 minutes, the eclipse would modulate solar energy from full daylight to full dark to full daylight again, it would quickly change ionospheric layers and propagation patterns.

It's the difference between day and night

The F layer is mostly responsible for the refraction of radio waves back to Earth, preventing them from escaping to space. The D layer forms during the day and the F layer splits into F1 and F2 layers. The D layer absorbs radio waves, increasing losses on lower bands, and since higher frequencies are absorbed less, bands such as 20 meters tend to perform better.



Layers of the ionosphere. D layer is formed by daytime solar radiation. E layer is also present, becoming weaker at night. F layer is important for long distance communication. Under the influence of daytime UV radiation F layer splits into two separate layers. [Credit: Wikipedia CC BY-SA 3.0 Deed]

The critical frequency identifies the maximum radio frequency that can be reflected by the F2-region of the ionosphere at vertical incidence.

At night there is no D layer absorption in the lower bands like 40 meters, but the critical frequency is lower, so higher frequency bands like 20 meters cannot utilize skywave propagation.

The critical frequency is typically lowest around dawn, when the ionosphere has been in the dark the longest, with the rule of thumb:

- 20 meters, being in the middle, works to some extent day or night.
- Lower frequency bands work best at night.
- Higher frequency bands work best during the day.

What is WSPR?
WSPR – or **W**eak **S**ignal **P**ropagation **R**eporter — is one of the protocols included within Joe Taylor K1JT's WSJT-X software suite. See: https://wsjt.sourceforge.io/. WSPR is designed to test propagation paths using low power FSK transmissions that encode each station's call sign, 4-digit Maidenhead grid locator and output power in dBm (decibels referenced to 1 milliwatt). Receiving stations can send their reception reports to Internet site http://wsprnet.org where the data is analyzed and mapped. Popular frequencies for WSPR transmission include: 3.5941, 7.0401, 10.1402 14.0971, 18.1061, 21.0961, 24.9261 and 28.1261 MHz. WSPR transmissions last 110.6 seconds and begin one second into an even UTC minute: i.e. at hh:00:01, hh:02:01. This needs the local clock to be set accurately to within ±1 second of UTC. A GPS receiver can provide accurate clock and location settings. For details of Todd N2MUZ's previous WSPR exploits, see *PCARA Update* April 2021, p7. Todd is now using a WSPR Desktop Transmitter from ZachTek, see: https://www.zachtek.com/1012 *-Ed.*

ZachTek Desktop WSPR transmitter as used by Todd. [Credit ZachTek.]

The propagation experiment

In the PCARA area, we experienced 89% totality at 3:25 p.m. from the eclipse. The experiment was conducted as follows:

- 20m and 40m WSPR Beacon started at 2:45 p.m. running every 2 mins
- 40m horizontal loop antenna was used for both bands
- Screenshots were taken of my WSPRnet.org map 20m and 40m propagation

These are the logical time groupings used:

3:30 for 1 hour (back to 2:30)	"before totality"	(1)
3:30 for 10 mins (back to 3:20)	"during totality"	(2)
3:40 for 10 mins (back to 3:30)	"following totality"	(3)
4:00 for 10 mins (back to 3:50)	"after totality"	(4)

Positions of "totality" during logical time groupings

Position of eclipse at the four time periods around totality.
[Base map credit: timeanddate.com and Open Street Map]

Summary of propagation experiment results

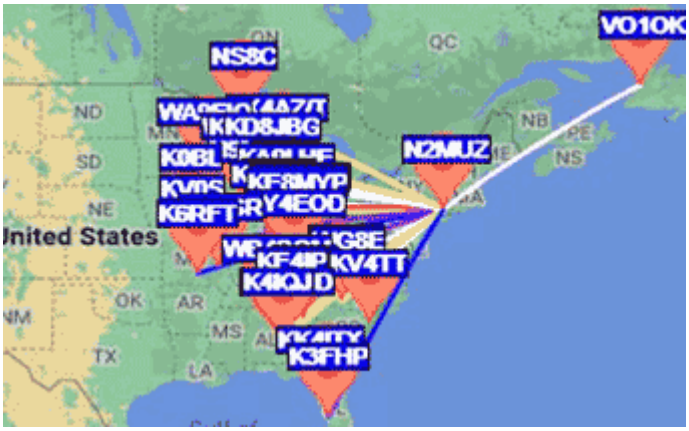
	(1) 2:30 - 3:30	(2) 3:20-3:30	(3) 3:30-3:40	(4) 3:50-4:00
	"before totality"	**"during totality"**	**"following totality"**	**"after totality"**
20m	**21**	**8**	**27**	**17**
	(20 near west and 1 near east)	(near west and south)	(25 way west, 1 east, 2 way east)	(13 west, 1 well west, 3 well east)
40m	**41**	**34**	**29**	**29**
	(35 near west, 6 near east)	(28 near west, 6 near east)	(24 near west, 5 near east)	(24 near west, 5 near east)

Take-aways

Twenty meters experienced **significant** variation throughout this period. The number of reported signals on 20 meters dropped off sharply from 21 before totality to 8 during totality, jumping back up to 27 after totality. Forty meters did not see much variation, so I did not include 40m detail maps in this article, instead focusing on 20m, and what we might glean from those maps of reported signals.

Where can you hear me now?

The following maps show propagation as reported by WSPRnet.org during the four grouping periods.



20 meters, 2:30-3:30 p.m., "before totality", grouping (1).
[All maps credit WSPRnet.org.]

20 meters, 3:20-3:30 p.m., "during totality", grouping (2).

20 meters, 3:30-3:40 p.m., "following totality", grouping (3).

20 meters, 3:50-4:00 p.m., "after totality", grouping (4).

Other observations

It should also be noted that the distribution of signal report locations varied significantly from east to west and back again during the eclipse, reflecting the changes in the location of the strong and weak areas of the F layer.

The magnitude of these results was a bit surprising to me, but this is what WSPRnet.org reported.

I look forward to lively conversations at future monthly breakfast meetings with this group and am interested in hearing your astute observations and takeways.

Life-lesson?

So, if it's ever predicted that a giant meteorite is coming from the direction of the sun, headed directly at and shadowing the earth, I've learned that you will likely be able to squeeze in a couple of amazing long distance DX contacts before impact, to complete most any exotic DXCC location on 20 meters, if you can time it right!

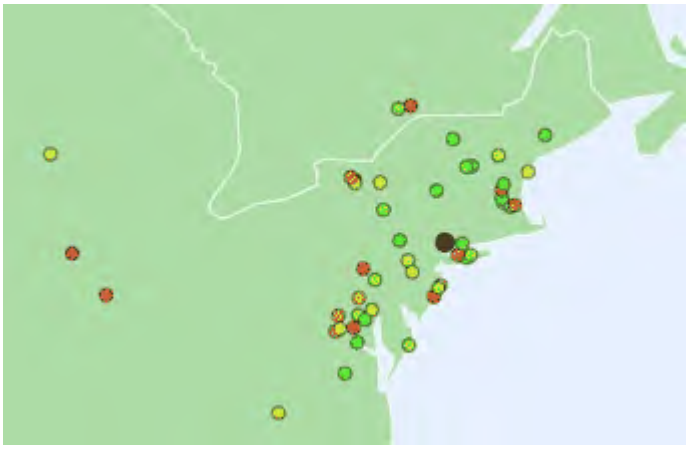
- Todd N2MUZ

More eclipse reports

Mike N2HTT sent the following report on the eclipse of April 8 via Google Groups.

"I also tried a brief experiment: set up WSPR on 80 meters. The attached GIF* shows the changes in propagation I saw during the eclipse — as we approached maximum, a number of reports appeared in the mid-west that were not there before, and the closer one picked up in signal strength. (red → green dots). Not too rigorous, but fun."

- 73 Mike N2HTT"



**Part of Mike N2HTT's 80 meter eclipse results. See Mike's April 12 Google Groups message for the animated GIF.*

Mike N2EAB was also monitoring during the eclipse.

"I casually experimented with radio propagation during the eclipse by monitoring 10 meter SSB from my car while parked at the Cortlandt Town Center. Only briefly heard two very faint signals but couldn't fully copy their calls. One was a PY from Brazil."

- 73 de Mike N2EAB"

Hamfest in Southington, CT - N2CKD

On Sunday April 7th, I attended a Hamfest in Southington, CT close to my new QTH in Prospect, CT. Lucky for me the Hamfest was very conveniently held at the Southington High School, about 15 minutes from home. Familiar vendors like KJI electronics (Gene) and local vendor Quicksilver Radio were there along with local hams selling old vintage gear. V.E exams were also being administered. It was a small Hamfest compared to others but still convenient to pick up a few items and to meet local area hams.

Quicksilver Radio was one of the vendors at the Southington Amateur Radio Association Flea Market on April 7. [N2CKD pic.]

Southington (SARA) and Meriden (MARC) both have very large memberships and share active repeater weekly nets locally. MARC conducts four weekly nets, including 6 meter SSB (50.175 MHz) on Mondays at 8:00 p.m., 2 meter FM (147.36+ MHz) on Tuesdays at 7:00 p.m., 10 meter SSB (28.375 +/- QRM) on Tuesdays at 8:00 p.m., 2 meter Tech Net (147.36+ MHz) on Thursdays at 7:30 p.m. In general, New England repeaters are very well connected over quite an extensive area.

Amateurs selling vintage gear at Southington. [N2CKD pic.]

At the hamfest, I was very pleased to meet Gary WB2HNA from our PCARA club who drove all the way from Mahopac.

- 73 de Lovji N2CKD

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Coax memories

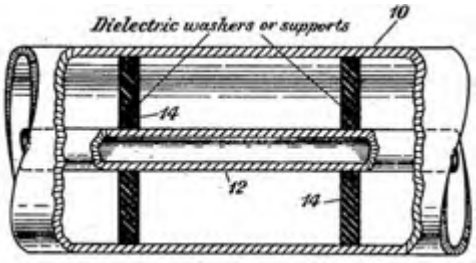
During a recent Old Goats Net, Bob N2CBH asked a question about feeding a dipole antenna with 50 ohm coaxial cable. Why might the SWR become *higher* when the length of coax feeder was *shortened*? This triggered memories of my own use of coaxial cable in the U.K.

The coming of coax

The history of coaxial cable has been covered previously in this newsletter — see "Coaxial chronicles", *PCARA Update*, May 2011 pp 4-7.

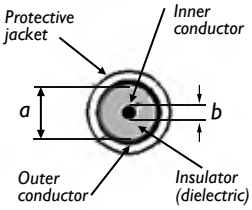
Two engineers working at AT&T developed coaxial conductors to carry multiple telephone circuits over long distances. Lloyd Espenschied and Herman Affel were granted U.S. Patent 1,835,031 "Concentric Conducting System" in 1931. They described an outer tubular conductor made of copper with a second conductor mounted concentrically inside. The inner conductor was supported by spaced dielectric washers made of glass or ceramic.

This type of cable could carry telephone voice signals in both directions using single sideband modulation of multiple carriers in the range 0-1 MHz and 1-2 MHz.



Longitudinal section of coaxial cable from US Patent 1,835,031 "Concentric Conducting System" by Lloyd Espenschied and Herman Affel of AT&T.

Espenschied and Affel carried out further work at Bell Labs in the 1920-30s to determine the **most efficient impedance** values of coaxial cable. Characteristic impedance is related to the size of conductors and dielectric constant of the insulator by the following formula:



$$Z_0 = \frac{138}{\sqrt{\in_r}} \times \log_{10}\left(\frac{a}{b}\right)$$

— where Z_0 is the characteristic impedance in ohms, a is the inside diameter of the outer conductor, b is the outside diameter of the inner conductor, and ε_r is the dielectric constant of the insulating material between inner and outer conductors.

Optimum dimensions for lowest attenuation produced a coaxial cable with characteristic impedance of **77 ohms**. An impedance of **30 ohms** was the best choice for high power (high current) while for high peak voltages, **60 ohm** impedance was best. Unfortunately, 30 ohm cable is difficult to manufacture, so for practical applications we now have the standard values of **50 ohms** for RF power transmission and **75 ohms** for signal reception, including domestic TV, FM radio and cable distribution.

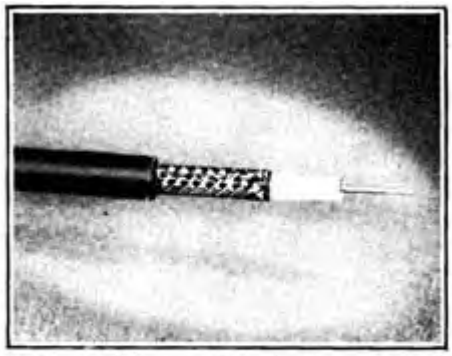
Back to Britain

BBC's Alexandra Palace TV transmitter.

In 1936 the British Broadcasting Corporation began 405-line TV transmissions from Alexandra Palace in north London on Channel 1, 41.5 MHz sound carrier and 45 MHz vision. After World War II, additional transmitter sites were constructed to cover the entire United Kingdom on VHF channels 1 to 5, 41.5 – 66.75 MHz.

Independent Television (ITV) arrived in 1955, broadcasting on high-VHF channel 9 (194.75 MHz) from Croydon in south London. The Independent Television Authority built additional sites in the 1950s and 60s to cover the entire country using VHF channels 6 – 13, 176 – 215 MHz.

Flexible coaxial cable developed during World War II was supplied for domestic TV reception by manufacturers such as Aerialite, Belling & Lee and B.I.C.C. Ltd. "Standard TV feeder" had an outer diameter of ¼-inch, and an impedance of 75 ohms. A low capacitance version was available for fringe areas using a semi-airspaced dielectric in place of the solid polyethylene insulator. Belling & Lee also supplied coaxial plugs and sockets that became standard on receiving equipment.



L600. Solid coaxial feeder. Stands up to severe weather conditions even by the sea. P.V.C. outer cover. See above illustration.

Belling-Lee's L600 ¼ inch diameter, 67-80 ohm coaxial cable, 1/6d per yard in 1950.

UHF TV broadcasting began in 1964 with 625-line transmission of BBC2 on channel 33 (567.25 MHz) from Crystal Palace in London. Northwest England was served by the Winter Hill transmitter on Channel 62, 799.25 MHz. Standard quarter-inch coaxial cable was too lossy at such high frequencies, so manufacturers had produced a thicker, **low-loss** cable using foamed polyethylene as dielectric. Outer diameter was 0.3 inch.

Low-loss 75 ohm TV coax from the U.K. with solid copper inner conductor, foamed polyethylene dielectric, braided copper outer conductor and flexible PVC sheath.

Here are the characteristics of standard and low-loss TV feeder as published by the RSGB in several handbooks and reference volumes.

Type of cable	Nominal Impedance Z_0 ohms	Centre conductor (inch)	Outer dia. (inch)	Velocity factor	Atten dB - 70 Mc/s	- per 100 - 145 Mc/s	- feet 430 Mc/s
Standard TV feeder	75	7/.0076	0.202	0.67	3.5	5.1	9.2
Low-loss TV feeder	75	0.048	0.290	0.86 approx	2.0	3.0	5.4

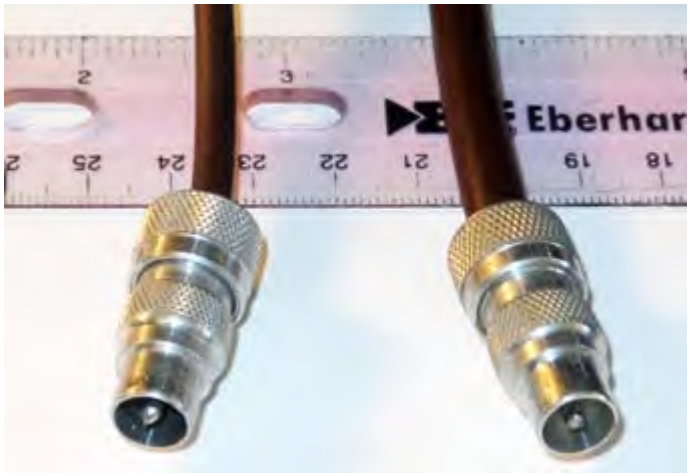
From November 1969, the VHF transmissions of BBC1 and ITV were duplicated on **UHF** in 625-line color. This allowed all three TV services to be received with a small UHF Yagi antenna on a single-standard 625-line receiver. As a result low-loss 75 ohm coaxial cable became the standard for TV reception.

Amateur radio

When I was first licensed in Britain as G3VNQ, coaxial cable for television reception was the only type readily available. Amateur radio equipment made in the United Kingdom such as the KW2000 HF transceiver and TW Communicator MF/VHF transceivers had Belling-Lee L604/S coaxial sockets mounted on the chassis for connection to the 'aerial' (=antenna). Radio amateurs used the same connectors for their own construction projects — including the G2DAF SSB transmitter and receiver as featured in RSGB publications. (Dick Thornley G2DAF worked at Belling & Lee, so perhaps this was not so surprising.)

My own projects — from small test equipment to full size transmitters, receivers and transverters — all featured Belling-Lee coaxial sockets mounted on the chassis. Short patch cables were made from ¼ inch standard TV cable, with Belling-Lee 75 ohm plugs on each end. Longer lengths of coaxial cable feeding outdoor antennas employed "low-loss TV feeder", terminated with Belling-Lee plugs. These antennas covered the range from LF (160 meters) to UHF (70 cm / 432 MHz.)

Home-built attenuator incorporated a Belling-Lee 75 ohm coaxial socket mounted on the aluminum chassis.



Quarter-inch standard TV feeder (left) and 0.3 inch low-loss TV feeder (right) terminated with Belling-Lee L734/P/AL connectors.

Pluses

The main advantage of using 75 ohm low-loss coaxial cable intended for TV reception along with Belling-Lee plugs and sockets was that all these components were readily available from local radio/television dealers or from component suppliers who advertised in U.K. magazines such as *Practical Wireless* and *Television*. Thanks to mass production, prices were relatively low and the components performed reliably over the entire frequency range from LF to UHF.

ACCESSORIES FOR COAXIAL

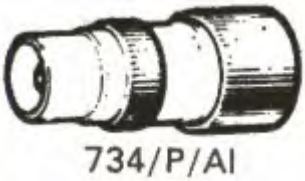
L604/S	Coax chassis socket ...	1/4
L616	Coax line coupling ...	1/6
L725/P	Coax outlet, padded ...	11/–
L725/T	Coax outlet, terminated	12/6
L729	Coax line attenuators ... ea.	5/9
L734/P/AL	Coaxial plug ...	1/3
L735	Coaxial outlet box ...	5/–

TRANSMISSION LINES

L336	Twin balanced 80 ohm ... yd.	6d.
L600	Coaxial ¼ in. dia. ... ... yd.	1/3
L688	Coaxial low capacitance ... yd.	2/3
L1221	Twin balanced, screened yd.	1/6

Prices of Belling-Lee coaxial cable and accessories (1950s).

Belling-Lee L734/P/AL coaxial plugs were well-designed for easy assembly. The center contact was hollow for insertion of the cable's center conductor. The metal of this pin was silver-plated with a thin dipped solder spill for easy soldering. Solder had to be applied swiftly as the center pin was held in a solid polyethylene or polypropylene insulator — too much heat and the plastic insulator would melt.



The coaxial cable's copper braid outer conductor was held under a special collet clamp that also gripped the cable outer insulator, holding it securely in place. The correct method of assembly was to cut and fan out

Top: Belling-Lee L734/P/AL polished aluminum coaxial plug disassembled. Below: Low-loss TV coaxial cable cut to length ready for soldering inner conductor to L734 center pin. Collet clamp grips cable and traps outer braid.

the braid around the collet ring where it would be trapped against the polished aluminum outer body. Some TV engineers bunched up the outer braid *inside* the collet clamp, while others actually soldered the braid to the collet ring. A clever aspect of the collet clamp was that it could be tightened to fit any diameter cable from 0.125" to 0.312".

Minuses

Unlike BNC and N-types, Belling-Lee L734 coaxial connectors were *not* constant impedance. Specifications of the L734/P/AL plug were:

> Nominal impedance of 60-70 ohms
> VSWR less than 1.2:1 up to 250 MHz.

(Domestic TV technicians were never too worried about SWR.)

The L734/P/AL connector with its polished aluminum body was **not** waterproof and was **not** intended for outdoor use. Instead of using outdoor plugs and sockets, connection of the coaxial cable at the antenna end was accomplished with a braid-clamp and inner-conductor screw, all protected inside a flexible, waterproof connector boot.

Waterproof cable cover for a Jaybeam VHF antenna.

If a Belling-Lee connector did become wet, its aluminum shell would corrode, becoming coated in white aluminum oxide, while the steel collet clamp would show signs of rust.

Low-loss TV coaxial cable of the 1960s and 1970s was not perfect. The cables were produced by extrusion of molten plastic compound over copper wire. The first step was to melt polyethylene compound inside the heated extruder screw then inject dry air or nitrogen. This produced a molten polyethylene foam that was extruded over the inner conductor's copper wire at the die. The next step was to weave the outer braid from thin copper wire over the dielectric layer. The third step was to extrude molten, plasticized PVC (polyvinyl chloride) around the copper braid as an outer jacket.

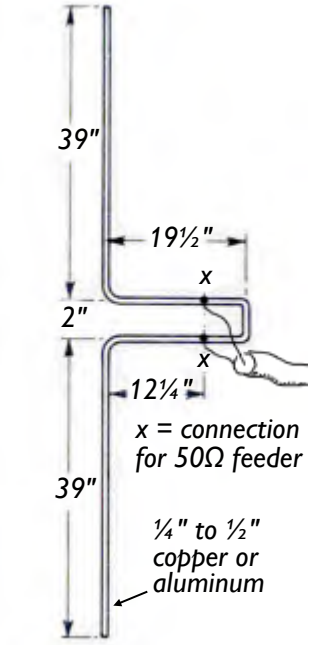
Actual impedance of the cable depended on the proportion of air or nitrogen injected into the polyethylene dielectric. 1960s technology could not control the amount precisely, so there was some variation in actual impedance. (For a short video of a modern coaxial cable production line see: https://youtu.be/a6W1XXQH8_8)

Low-loss TV cable was prone to damage if bent excessively. The inner conductor would move closer to the outer braid, causing an impedance bump. The cable could also be damaged by **water entry**, either through a poorly terminated outdoor connection or through a break in the PVC outer jacket. The copper braid and foam polyethylene would then act as a giant wick, attracting water down the length of the cable.

As time went on, cheap "contractor" UHF TV antennas appeared, along with cheaper versions of low-loss TV coaxial cable. When the outer PVC sheath was removed, the weave of the outer copper conductors showed more 'hole' than braid, revealing the dielectric beneath. These cables were more prone to interference.

Dampening effect

My own chastening experience with low-loss TV cable came during the 1970s. I had constructed a gain antenna for two meters consisting of a vertical *full-wave* dipole, fed with 75 ohm low-loss TV cable. Matching was accomplished by tapping the cable an adjustable distance along a quarter-wave shorted stub. This antenna was mounted on a pole in the back yard.



Vertical antenna for 144 MHz with two half-waves in-phase. Coaxial cable feed was tapped on the quarter wave stub at points 'x' - 'x'. [After RSGB VHF-UHF Manual, 1972.]

Over time, I noticed that the antenna's performance was deteriorating, even though VSWR was almost perfect at 1.0:1. I took the connector off the end of the coaxial cable and was shocked to find the foam dielectric was soaking wet, with the surrounding copper braid covered in green corrosion products. As a result, the coaxial cable was now *absorbing* RF along its entire length instead of sending

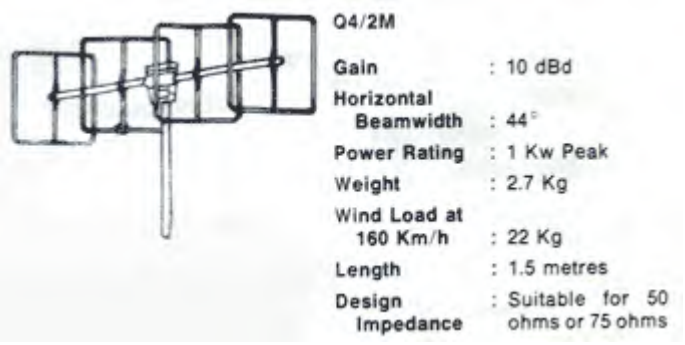
it to the antenna — it was acting as a 50 foot long, water-cooled dummy load.

Finally fifty

During the mid-1970's, U.K. amateur radio equipment transitioned from 75 ohm TV coax and Belling-Lee connectors to 50 ohm coaxial cable with Amphenol PL-259 plugs and SO-239 sockets. This was a result of imported equipment from the USA and Japan being equipped with SO-239 sockets and VHF radiotelephones manufactured by Pye Telecommunications adopting the same standard in place of Pye's own coaxial plug/socket design. (Pye UHF equipment employed 50Ω BNC connectors.)

Pye Cambridge VHF mobile radiotelephone with Amphenol SO-239 antenna socket (arrowed) on the left side. Surplus Pye equipment was popular with U.K. radio amateurs in the 1970s.

Britain's main manufacturer of amateur radio antennas, Jaybeam Limited, made the transition from 75 to 50 ohm designs in the 1970s, while keeping a few models in their catalog designed for 61 ohms. This intermediate value was suitable for 50 ohm *or* 75 ohm feeders. (Geometric mean of 50 and 75 = $\sqrt{(50\times75)}$ = 61.2 Ω.)



Jaybeam Q4/2M four-element quad antenna for 2 meters was designed for an impedance that was suitable for either 50 ohm or 75 ohm coaxial cable. [Jaybeam catalog.]

I had my own long-term project in the radio shack to change from 75 ohm to 50 ohm cable and connectors. This took a good many years and a shack move, but it was finally accomplished in the early 1980s.

Far and wide

Belling-Lee style connectors were adopted for radio and TV equipment in several countries beyond the borders of the United Kingdom. If you travel abroad, you might come across "PAL" or "IEC" coaxial connectors in several European countries, in Australia and in parts of Asia.

On this side of the pond, you might think that British cable and connectors would have little relevance. TV sets in the USA have employed "F-connectors" for decades, with the solid center conductor of the RG-6 or RG-59 coaxial cable forming the center pin of the male plug. Similar F-connectors are also employed on cable TV and satellite systems.

One place you might find a Belling-Lee type connector in the USA is on imported radios and audio equipment that includes an FM tuner. The limited market for this type of equipment means that manufacturers are not inclined to add hardware variations for different markets.

Grundig S350 AM-FM-SW receiver has a Belling-Lee style antenna socket (arrowed) for the FM antenna connection.

If your existing coaxial cable from the FM antenna incorporates an F-connector, just search on Amazon for "F to PAL" for a selection of suitable adapters.

F-to-PAL adapter.

- NM9J

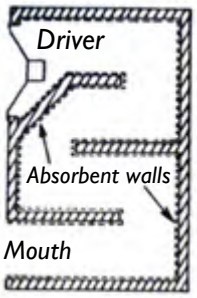
Less bass please

For years I have woken to the sound of a New York City radio station, courtesy of a **Bose Wave Radio**. This expensive alarm clock has the advantage of a good AM/FM digital radio along with a stereo speaker system that covers a much wider frequency range than typical clock-radios.

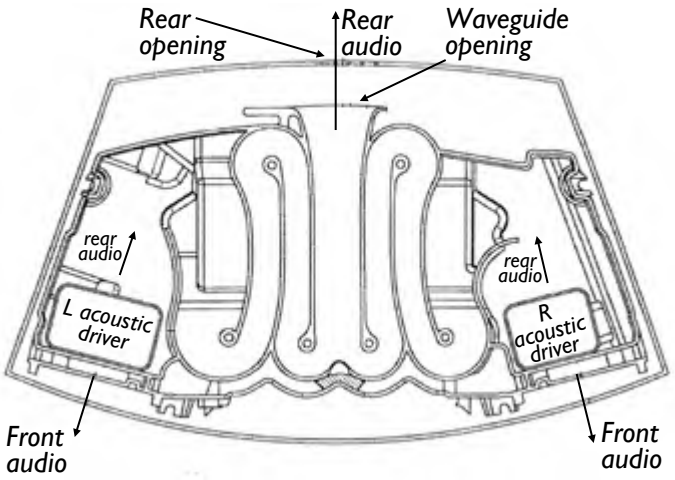
Bose Wave® Music System III.

The music goes round and round

The extended bass response in these table-top models is provided by what Bose describes as an "Acoustic Waveguide Speaker". This is an outgrowth of the acoustical labyrinth speaker developed in the 1930's where the rear of the speaker cone drives a long, folded tube, lined with sound absorbing materials. The other end of the tube then exits from the speaker cabinet. Bose reduced the size of this arrangement so that two 26" folded labyrinth tubes could be contained inside a tabletop radio design, along with a pair of stereo drivers.



Acoustic labyrinth loudspeaker.



Bose Wave Radio incorporates an "Acoustic Waveguide" driven by the rear faces of the left and right acoustic driver units. In this design, the combined rear radiation emerges from the back of the radio. [After USP 7,584,820.]

Put a sock in it

My current radio is a Bose Wave Music System III, dating back to 2012 and received as a gift. Right from the start I noticed that the bass response was excessive, bad enough for music but especially annoying when listening to talk-based NPR stations. I followed advice online and inserted a rolled-up white sports sock into the acoustic waveguide tube that exits from the back of the radio. The sock brought some benefit, but the bass response was still too loud for my liking.

Bass reduction device by Wilson.

Some years later, after the warranty had expired, I found that Bose had made a software update available for the radio. I ordered the update, which arrived on a Bose CD-ROM. After installation, there was a new item on the "Setup Menu" allowing selection of "BASS – NORMAL" or "BASS – REDUCED". The "reduced" setting improved reception of NPR stations — but there was still too much bass.

Bose software update CD-ROM.

I tried adding more damping, with additional sports socks pushed into the acoustic waveguide and speaker felt added in the spaces behind the two driver units. But to my ears, NPR still sounded muffled, with heavy bass overpowering the weak treble.

Filter it out

My latest improvement came after searching for "bass filters" on Amazon. I discovered a selection of bass-blocking filters, intended for wiring in series with automobile tweeters. They are… "designed to enhance the performance and power handling of tweeters and midrange speakers by removing frequencies beyond their capabilities."

The filters I ordered were "Audiopipe BB-99". The package contained a pair of 99μF non-polarized capacitors. They are claimed to block frequencies of 0-400 Hz for 4-ohm speakers. This sounds reasonable as the impedance of the capacitor at 400 Hz should be $1/(2\pi fC) = 4.02$ ohms. At 40 Hz, Z would be 40 ohms. So — roll off should be -3dB at 400 Hz, with increasing attenuation as the frequency drops.

Audiopipe BB-99 bass-blocking in-line filters.

Under the cover

I removed the ABS plastic cover from the top of my Bose radio, then unscrewed the left and right channel driver units. The existing cables had been wire-wrapped around the speaker terminals, so I unwrapped one wire, then soldered a filter capacitor in series with each speaker. All solder joints were carefully covered with shrink-wrap tubing so there was no chance of a short circuit when the loudspeakers were screwed back into their plastic case.

Bose Wave Radio with top cover taken off and left-hand acoustic driver unit unscrewed then lifted out.

Success! Bass reduction with the filter capacitors was significantly better than all my previous efforts. I could now listen to NPR on 93.9 MHz without the previous muddy sound. I compared the audio with several other receivers as a check and the Bose system now sounded more like a good-quality stereo receiver.

Bass-less claims

If you have a problem with excessive bass from *any* equipment, and there is no other way to adjust the frequency response, these filter capacitors might be just what you need. One example I have come across in the past is an FM scanner receiver that is connected to a large external speaker. If filtering of the PL tone is inadequate, a loud low frequency tone will be heard accompanying received signals. Solution — add one of these non-polarized filter capacitors in series with the loudspeaker connection. Another example might be when 60 Hz AC line hum is finding its way into audio equipment and ground loop filtering does not help.

Excessive bass response is not conducive to good speech comprehension. Remember that our own SSB transmissions are usually confined to a frequency range of 300 Hz – 3000 Hz.

- NM9J

Foxhunt May 4th

PCARA's next Foxhunt is scheduled for 9:30 a.m. on Saturday May 4. The rules will be similar to PCARA's previous Foxhunts in FDR State Park. When the hunt is finished, PCARA members are invited to join in the "I Love My Park Day" clean-up event which takes place in FDR Park that same morning.

FDR State Park. *[Base map: NYS Parks].*

Here are the Foxhunt rules courtesy of Lou, KD2ITZ:

- Transmission: FM simplex on 146.565 MHz.
- Transmissions start at 9:30 a.m.
- All are welcome to participate.
- Participants must start in the Pool Parking Lot.
- Participants are not allowed to enter FDR Park before 9:15 a.m.
- Depending on the number of participants, the start times may be staggered.
- Depending on the number of participants, some participants will be invited to start from a different location.
- The transmitter will be hidden within the confines of FDR Park.
- Please be mindful of other events scheduled in the Pool Parking Lot and Parking Lot 2.
- Once the event begins, participants must remain on foot, without assistance of vehicles of any kind.
- Participants are encouraged to work in groups of two or three.
- Participants who locate the transmitter should discreetly inform the event coordinator who will note the time. Avoid revealing the site to other participants who are still hunting.
- The participant who locates the transmitter in the least amount of time will be invited to assume the role of fox at the next event.
- Any changes due to weather or unforeseen circumstances will be posted to the PCARA Google Group and Facebook Page.

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/@peekskillcortlandtamateurr7670

***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 May 4: PCARA Foxhunt, 9:15 for 9:30 a.m. Start at FDR State Park, Yorktown Hgts., followed by "I Love my Park Day" clean up. (See p. 15).
Sun May 5: PCARA tables at Orange County ARC Hamfest, Black Rock Fish & Game Club, Mountainville, NY. See below.
Sat May 18: PCARA monthly meeting, 10:15 a.m. Putnam Valley Library, 30 Oscawana Lake Rd, Putnam Valley, NY.
Sat May 18: PCARA VE Test Session, 11:30 a.m. Putnam Valley Library. See below.
Sat May 25: PCARA Breakfast, 9:00 a.m. Uncle Giuseppe's, 327 Downing Dr., Yorktown Heights NY.

Hamfests

Sun May 5: Orange County ARC Hamfest, Black Rock Fish & Game Club, 5 Pleasant Hill Rd., Mountainville, NY 8:00 a.m. **Club tables**.
Sat May 18: S. Berkshire ARC Hamfest, Goshen Fairgnds, 116 Old Middle St (Rt 63) Goshen CT. 8:00 a.m.

VE Test Sessions

Check with the contact before leaving.
May 4, 11, 18, 25: NYC-Westchester ARC, 43 Hart Ave, Yonkers NY. 12:00 noon. Must contact VE, k2ltm'at'aol.com.
May 6: Orange County ARC Hamfest, Montainville NY, 9:00 a.m.
May 9: WECA, Westch Cnty Fire Trg Center, 4 Dana Rd Valhalla NY. 7:00 p.m. Contact VE: N2dgy'at'weca.org.
May 17: Orange County ARC, Munger Cottage, 40 Munger Dr Cornwall NY. 6:00 p.m. Contact VE: w2bcc'at'arrl.net.
May 18: PCARA, Putnam Valley Library, 30 Oscawana Lake Road, Putnam Valley Library, NY, 11:30 a.m. (Google groups for details).

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