PCARA Update

Volume 23, Issue 4 Peekskill/Cortlandt Amateur Radio Association Inc. April 2022

Spring and bring

We closed out February 2022 with another encore presentation of **Magic of Amateur Radio** on Monday February 28, 2022, at 7:00 p.m. at the Putnam Valley Free Library. Todd N2MUZ had four in-person attendees with another six attending via Zoom. Thanks to Todd and the Putnam Valley Free Library for hosting the program. The Magic is working!

Todd N2MUZ presents more "Magic of Amateur Radio" at Putnam Valley Library.

The **PCARA Bring and Buy Auction** held on Saturday March 5, 2022, at 9:00 a.m. at the Cortlandt Town Center Community CUE Room was attended by approximately twenty folks. With sadness, we were joined by Helene, widow of Mitch AD2CF. Helene brought along some of Mitch's significant collection of gear for sale and donated $250.00 in his memory.

Masa JR1AQN checks equipment on offer at PCARA's Bring and Buy Auction.

NM9J requests bids for an Ameritron ATR-30 antenna tuner at the Bring & Buy Auction. *[Pic by KB2CQE.]*

Thank you Helene. We also quickly covered some club business during which we learned from Dave KD2EVI, that we had 68 members — an all-time high! Another item was that PCARA will be taking a table at the Orange County Amateur Radio Club's (OCARC) Hamfest on Sunday May 1, 2022. As always feel free to bring along any items you want to sell and place them on the table. You may end up with a few extra dollars in your pocket and less "stuff" to carry home!

We held our monthly **PCARA Breakfast** on Saturday March 19, 2022, at 9:00 a.m. at Uncle Giuseppe's Marketplace in Yorktown Heights, NY. As is usual both the turnout and discussions were amazing! Personally, the breakfast is one of the highlights of my monthly activities. Give it a try and you just might agree!

The breakfast was followed *Continued on page 2* ⇨

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at 11:00 a.m. by a **PCARA V.E. Test Session** administered by the **Laurel ARC** VEC at the Putnam Valley Free Library in Putnam Valley, NY. There were two candidates in attendance, and this was the first time we utilized the Laurel VEC to administer the exams. The session was coordinated by Dave KF2BD and went smoothly. Thanks to Dave for conducting the session, our V.E.s, and the Putnam Valley Free Library for allowing PCARA use of their facilities. The next PCARA V.E. Test Session is scheduled for Wednesday April 27, 2022, at 7:00 p.m. at the Putnam | Northern Westchester BOCES Technical Center at 200 BOCES Drive (off Pines Bridge Road) in Yorktown Heights, NY. Just a note that a successful candidate from the previous session at BOCES, Dr. Joe DeCicco, has been awarded call sign **KD2YVY**. Congratulations Joe! PCARA will be working closely with Joe on developing the Amateur Radio curriculum at the Tech Center.

The next **PCARA Breakfast** is on Saturday April 9, 2022 at 9:00 a.m., at **Downing Park** pavilion in Yorktown Heights, NY. Plans are in the works for an upcoming "Beacon Hunt Challenge" and "Advanced Foxhunt University".

Also stay tuned for the next PCARA Membership Meeting — watch the PCARA website, Google Groups, and the PCARA Facebook page for details. I hope to see all of you soon at our upcoming events. Until then, stay safe!

- 73 de Greg, KB2CQE

PCARA Board

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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.

More PCARA apparel

In the November 2021 *PCARA Update,* p21 there was a description of jackets that could be embroidered with call sign and the PCARA logo.

"For outerwear, a "Three Seasons Jacket" by Game Workwear is available in sizes SM-to-5XL. The jacket is wind and water resistant with a nylon shell and polyester fleece lining. The front zipper has a storm flap, pockets are also zippered and the jacket is machine washable. Colors available include black, dark green, maroon, navy blue, royal blue or red. Cost with embroidered logo and call sign would be in the region of $65.00."

Rob AD2CT in the 'Three Seasons Jacket'

Rob AD2CT recently ordered one of these "9400 THREE SEASONS" jackets embroidered with call sign and PCARA logo. He is pictured at the March "Bring & Buy Auction" in the Cortlandt Town Center CUE Room.

Rob ordered his jacket directly from local supplier, **Rescuestuff Inc.**, in color Black and size Large.

If you are interested in a similar jacket, we suggest contacting Rescuestuff for the current supply situation, sizes and pricing.

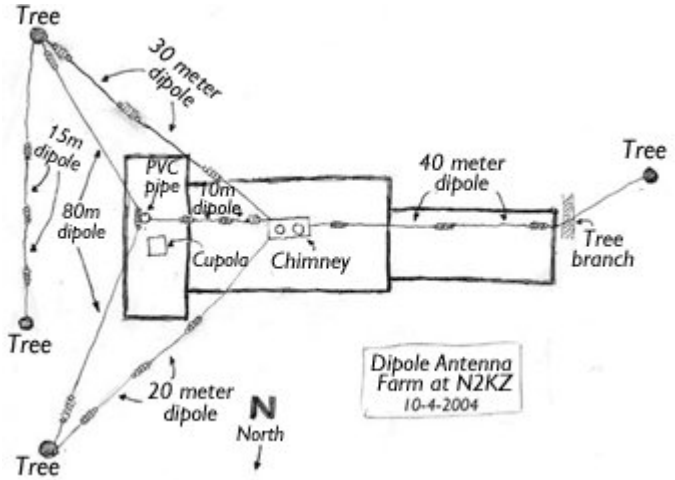
Rescuestuff Inc.
962 Washington Street
Peekskill, NY 10566

Tel: 914 293-7239
E-mail: sales'at'rescuestuff.net
Web: https://rescuestuff.net/

Adventures in DXing
- N2KZ

Building New

After twenty years of service my antenna farm was tired. Standing wave ratios began to rise. Ropes constantly snapped. Dipole T connections turned into gummy goo. Crazy flash-overs marred my hopes of operating on 20 meters. It was a mess!



Karl's antenna farm as described in PCARA Update, Dec 2004 with wire dipoles for each band, 10 - to - 80 meters.

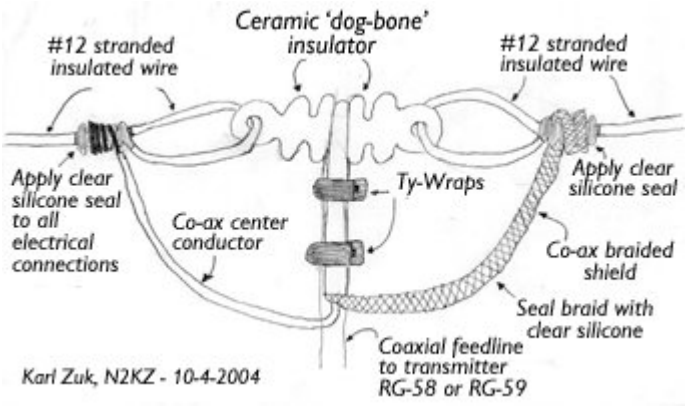
Alas, I was getting older, too. I honor and appreciate the fact that my balance is not what it used to be — and — that my feeling of secure footing while climbing on my roof has diminished. It was time to cut the ropes and get the remains of my antennas down to earth. Off the roof! Can I find a way to use a single antenna to quench my quest?

It was mid-winter and it was cold and windy nearly every day. My roof was constantly covered in snow, ice or slick, nearly-frozen rain. The soil was frozen solid and hard as a rock. I had plenty of time to think, plot and conspire! I anxiously waited for the warm days of spring.

My opening move was to purchase an antenna matching network that could compensate for a broad variety of impedances. My Yaesu FT-dx1200 transceiver was originally released in April of 2013 — a full nine years ago — and accessories for it were becoming scarce. Thankfully, their matching outboard FC-40 antenna tuner was still available. I was relieved when I received one promptly after my order so I was a step closer to new adventure.

Yaesu FTdx-1200 transceiver covers 10-160 meters and 6 meter band.

A lot of procrastination went into my project strategy. What did I want to do? Fortunately, or unfortunately, it began involuntarily! My 80 meter dipole snapped over a year ago. The 20 meter dipole's ropes rotted and let go in the last couple of weeks. My 10 meter and 30 meter antennas are holding on literally by a thread. The 40 meter dipole decayed to a high SWR.



Dipole center insulator with wire joints coated in clear silicone sealant as described by Karl in PCUD, Dec 2004.

Most quizzical was the 20 meter dipole. I was experiencing a very odd flash-over where the antenna would go full short intermittently. Upon bringing it completely down to earth, I noticed my protective clear silicone seal waterproofing was coal black on the 'hot' side. It looked like it had been blasted by car exhaust. When my hand browsed against the weathered silicone seal, I immediately noticed that the once-cured and solid and clear latex had turned into a blackened acidic goo. This was doubly odd since it was below freezing outside. I would love to know how this happened! A friend suggested that it may have been a lightning hit. I saved the ceramic dog-bone insulators and wrapped up the remainder for recycling.

[Room-temperature vulcanizing or RTV silicone sealants with an acetoxy-based cure system release acetic acid when exposed to moisture. These sealants with a vinegar smell and oxime types can attack copper while curing. A better choice is alkoxy cure systems that only release methanol or acetone. See PCUD, July 2010 pp 4-7. Some RTV silicones may release cyclic dimethyl polysiloxane ***vapor*** *that contaminates metal contacts with non-conducting silica. -Ed.]*

Setting Goals

Analysis of my operating habits answered a lot of my questions. I am primarily a QRP operator. A majority of my contacts are domestic or short-range DX ragchews. Although I appreciate the miracles of 20 meters and above, I have always been drawn to low bands — 40, 80 and 160 meters. 160 meters remains a specter to me. Listen often, I do, but I have never had a

transmitting antenna for the band. This is the band where amateur radio really started and this is where I should be!

I also studied and researched all sorts of antenna designs, especially the favorites used by friends. A common thread these days seems to be finding one antenna that can be loaded up on all bands. Off-center fed dipoles, G5RVs, full wavelength horizontal loops and end-fed long wires are all in vogue. Food for thought! Would a 75 foot wire to a tree work? A 177 foot inverted-L for 160 meters? A 300 foot loop like Bob, N2CBH uses? I did a lot of outdoor measuring. Will this design fit? The possibilities are endless!

One ultimate answer seems to be a full wavelength loop cut for 160 meters. For Top Band CW at 1800 kHz and above, it would be a leviathan 544 feet or so. I have two friends in Michigan that have turned this trick. One installation is supported by tall farm buildings and silos at an average elevation of about 60 feet. The other is draped between tall trees along the edges of a wide and open meadow. That's a lot of wire, amigo! This is a great favorite of Jay, NE2Q who also suggests always using black Dacron rope for antenna supports. "It lasts forever!"

Shaun N8SOB's station-with 160 meter 'skyloop' at 60 feet is available on remotehams.com.

I can actually operate one of these stations using the RemoteHams RCForb application. I can bear witness that full wave loops are magnificent performers. They are very, very quiet antennas with extraordinarily low noise floors — and — they produce signals that are unparalleled. The 'ears' they provide are what dreams are made of. Looking at radiation plots, you will see that full wave loops are nearly omnidirectional. All you need is some rope, a lot of wire and even more land!

Starting Small

As a first test of my new FC-40 'antenna tuner', I hung a 77 foot wire up to a nearby tree and jury-rigged a counterpoise. The tuner seemed to work fine, albeit a bit noisy, when it tuned to a frequency. Following some advice I had seen online, it seemed to require an LDG RU-4:1 Unun transformer when matching end-fed wires. I discovered I had a lot to learn.

LDG Electronics RU-4:1 200 watt pep Unun is intended for 43 ft vertical and end-fed antennas.

Being a QRP CW person, I had always kept my antenna farm simple and sweet. I constructed carefully pruned and tuned single-band dipoles for each and every band I used. Using tiny amounts of power, I would forgo any sort of baluns or chokes to maximize my radiation and preserve every milliwatt. This approach worked famously for years and years.

Getting off the roof equated to one thing: New antenna designs and new approaches to embracing the ether. Lesson one was a primer course regarding matching transformers and chokes, antenna system impedances and the world of counterpoises and grounds. There must be clever answers to these specifications. I just had to ask the right questions!

Long Ago Beginnings

This wasn't the first time I had encountered these challenges. I grew up working in broadcast radio during my college years and beyond. Anyone who had engineering chores knew all about 'dog houses' — the little huts at the bottom of your towers that would hold matching coils, current meters, phasing cabinets and the unfortunate, occasional dead squirrel, snake or other beastie that engaged with your feedline or matching coil while you were on the air. What a mess that was to clean up!


Doghouse at AM station KBOZ.

My experience was wide and varied. Your topics of conversation as a broadcast engineer will drift to tower voltage and current distribution, Austin ring transformers, painting towers (tie the brush to your belt!) and tales of laying 120 long radials using a wire plow. My casual reading bible was the NAB Engineering Handbook. I will be forever grateful to former WFAS Chief Engineer Jack Pearson (W2JDE - SK) for all the lessons I learned from him, especially when performing overnight proofs-of-performance on Secor Road.

I brought my newfound knowledge home and tried my own experiments with tiny unlicensed mini-transmitters on medium wave known as MedFERs (Medium wave Frequency Experimental Radio.) FCC Part 15 regulations define these limits: no more than 100 milliwatts of input power and an antenna, transmission line and ground lead not to exceed 3 meters while operating between 510 and 1705 kHz. This could be the ultimate QRP challenge!

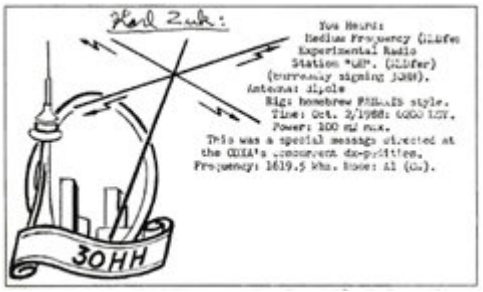
I built a short vertical out of Home Depot copper pipe featuring a very impressive four-way capacitive hi-hat on top and constructed an enormous matching coil on white PVC pipe to become resonant. I had the narrowest Q ever created but I was heard! Using a tele-

phone square-wave test oscillator for audio and a tiny mechanical surplus octal module containing a slow running motor and a micro-switch, I began transmitting an audible CW signal of *Y 1 2* over and over again. A little wheel attached to the motor would spin slowly around and around while little tabs of metal would manipulate the switch. The module originally rode aboard a Japanese fishing vessel as the heart of a beacon identifier! What did *Y 1 2* originally mean? I will never know.

Y 1 2 loading coil.

From my then QTH in the northern end of Croton-on-Hudson, I picked up my milliwatt signal broadcasting on 530 kHz as far north as Stillwater Pond in Fahnestock State Park along the Taconic State Parkway in Putnam Valley. I was so proud of my results!

Soon afterwards, I discovered I was a minor leaguer! At home one night, I was scanning the AM broadcast band for new catches and heard the wisp of a signal up on 1620 kHz sending a long message in amplitude modulated CW. (This was before the band expanded to 1700 kHz for broadcasting use.) After several minutes of desperately trying to pull out every word I realized that my catch was a MedFER all the way from Canada, on the air as part of a convention of the Ontario DX Association. Needless to say, both station operator and DXing station receiver were thrilled with the results! A cherished home-brewed QSL followed. A moment always to remember!



QSL card from Experimental Station 'OH' running 100mW on 1619.5 kHz.

BalUns and UnUns

Getting back to amateur radio, I recently refreshed my memory and now have new practical experience matching wire antennas. To begin, everything is based on adapting your design to the amateur impedance standard of 50 ohms. Transformers and chokes all have specific windings for the chore they are meant to complete. *Quick vocabulary: **bal**un (balanced to unbalanced transformer) and **un**un (unbalanced to unbalanced transformer.)*

Learning the complexities of voltage, current and inductance requires detailed thought, understanding and practical experience. Indeed, this world revolves around *base 50*. Understand the impedance that your antenna design provides and adapt and conform it to 50 ohms to gain the acceptance of your rig. Take a nominally 75 ohm wire dipole and adapt it to open wire feeder with a 4:1 transformer. Adapt the same 75 ohm dipole to a 50 ohm feedline? Use a 1.5 to 1 device.

A wide band end-fed random wire may average 500 ohms impedance so choose a 9:1 device. Resonant end-fed wires producing very high impedances around 2500 ohms may require a 49:1 transformer to bring into the fold. 1:1 chokes will inhibit RF from diving into your shack. (Let's avoid those wisps of white smoke when you lean a finger the wrong way on your straight key!) Just like all the choices inside your tool box, you need to begin to understand which appropriate device is needed for every job.

Palomar Engineers slip-on sleeve choke BA-8-5 consists of five large ferrite beads wrapped in heat shrink.

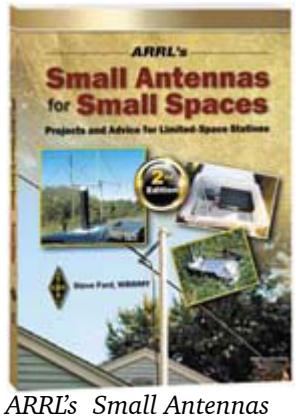
Now the big challenge: Find a length of wire that could provide a useful match on a multitude of bands. Rest assured! It can be done! Back when amateur radio was first being established, our allocated operating bands were chosen to be harmonically related. 160 meters (1800 to 2000 kHz) doubled would be 3600 to 4000 kHz. Sounds familiar? A portion of the 80 meter amateur band relates to 40 meters: 3500 kHz to 3.65 times two is 7000 to 7300 kHz. In theory, this arrangement prevented sloppy transmissions, filled with harmonics, to do little damage to other over-the-air transmissions.

These harmonic frequency associations are the heart and soul of all-band end-fed antenna designs. If you calculate and cut the wire just so, you can provide usable impedance matches to cover several bands. If you have a lot of property, good supports and a lot of wire and a lot of patience, you can cover all of the traditional bands from 160 meters all the way up to 6 meters. Amazing!

If you are looking for the definitive details on this subject, search 'random wire antenna lengths' and you will find these two helpful sites: Mike AB3AP's https://udel.edu/~mm/ham/randomWire/ and Jack, VE3EED's conclusions at: https://www.hamuniverse.com/randomwire-antennalengths.html.

Take some time and read both sites carefully. Jack came up with these select golden lengths for you to try (in feet:)

29 35.5 41 58 71 84 107 119 148 203 347 407 423 ft.



ARRL's Small Antennas for Small Spaces by Steve Ford, WB8IMY.

Also read LDG's BalUn user guide (pdf file): https://ldgelectronics.com/wp-content/uploads/2019/06/LDG-Balun-Unun-Manual.pdf and the ARRL's *'Small Antennas for Small Spaces'* book: https://www.arrl.org/shop/Small-Antennas-for-Small-Spaces-2nd-Edition/. After these quick reads you will be ready for action!

If all of this seems too complex, start small! A most simple antenna kit is offered by The QRPGuys group at: https://qrpguys.com/qrpguys-end-fed-wire-antenna. This tiny little project board will fit in the palm of your hand, yet serves as a compact matching unit for your very first end-fed wire antenna attempt. You'll find a full color assembly guide at this link. Take a look! Designed for QRP CW operators, it is rated at up to 20 watts of power.

QRPGuys portable no-tune end-fed half wave antenna kit. (You provide the wire.)

Prune and Tune

These lengths may be good places to start when trying to find the ultimate one-length-serves-all for your new antenna. If you have ever built a home-brewed antenna, you know that the final step is the most time consuming. For instance, the old adage of

$$\frac{468}{\text{frequency (MHz)}}$$

to determine half-wavelengths (in feet) only goes so far. Your particular type of coaxial feedline, ground conductivity and height above ground will all effect your perfect point of resonance.

One great pruning trick is bending over wire at a trial length instead of physically cutting it. Try several lengths — longer and shorter — to find your best performance to meet your needs. Electronically, the wire length is measured to where you bend it back — not the overall length of the wire unraveled. *Find the sweet spot length before you cut your wire.* It saves a lot of time and improves accuracy. Also remember that standard household solid or stranded electrician's wire is bound to stretch a little bit as time goes by. If you are a little high in frequency... just wait a while! A little trim, one way or the other, can make a big difference in the performance of an all-band end-fed.

Regarding antenna matching devices ('tuners,') Harry Elwell, K3HRO, from Ham Radio Outlet in New Castle, Delaware shared with me his experience with antenna matching networks:

The Yaesu FC-40 'antenna tuner' is only slightly wider in compensation than the built-in tuner incorporated in a Yaesu FT-dx1200 transceiver. The LDG tuner is a better design with remote control and power being phantom powered and controlled over just the co-ax feed to the device.*
[That would be the LDG RT-100* ***Remote* *Tuner -Ed.]*

(The Yaesu tuner also requires a multi-conductor control cable fitted with cumbersome mini-DIN connectors. The LDG design does it all through a single coaxial cable that also carries your transmitted RF.) In Harry's experience, the MFJ antenna tuning units have the widest tuning range around and may be the best buy.

One other quite important ingredient in 'single wire' antenna designs is the necessity of a *counterpoise.* Every circuit requires two wires to make a connection and antennas are no exception. The other half of your antenna circuit could be the opposing wire of a simple dipole. With verticals and other 'single wire' designs, the ground — also known as the earth — provides the other half of the system. For medium wave AM radio broadcast stations, the standard is 120 ground radials fanning out with three-degree spacing completely surrounding a vertical antenna tower. For amateur radio use, a handful of underground or just above ground wires will suffice. For a nice concise tutorial on this subject, try: http://on5au.be/content/gp/cps.html. *[Tutorial by W4RNL -Ed.]*

All of my learning, my endless procrastination and consideration and consultation with friends old and new are not in vain. Creativity and the quest for greater knowledge always bring positive energy. Just think of how many people I have had thoughtful chats with. Add all the new faces and voices I met polling the world for new thoughts. I found rejuvenation and inspiration. Spring has begun. Now, it is time to develop and experiment. New antennas are in my future. Let's see what will transpire. Hand me that 9:1 Unun and that current choke! Stay tuned for progress reports!

My thanks to everyone who patiently listened to my woe and ideas and shared their expert advice: Malcolm NM9J, Bob N2CBH, Joe WA2MCR, Jay NE2Q, Paul AC2T, Barry WB2EVC, Chris KC8ZMN, Noble KC8PGG, Shaun N8SOB and Harry K3HRO.

Until next month, 73 and dit dit (and stay off the roof!) de N2KZ 'The Old Goat.'

V.E. Test Session March 19

PCARA's latest Volunteer Examiner Test Session took place on Saturday March 19 at the Putnam Valley Free Library, 30 Oscawana Lake Road, Putnam Valley, NY. The session began at 11:00 a.m., shortly after PCARA Breakfast ended at Uncle Giuseppe's in Yorktown Heights.

Putnam Valley Free Library.

Water was flowing swiftly down Oscawana Brook in front of the library as the V.E. Team arrived. This was to be PCARA's first V.E. Test Session under the auspices of the **Laurel ARC VEC**. Two advantages of working with Laurel VEC are that amateur radio examinations are *free* and submission of results to the Coordinator is electronic, with rapid forwarding to the FCC, resulting in quick granting of licenses and upgrades.

By mid-week two candidates had pre-registered and things were looking positive for a productive Test Session. Unfortunately by Saturday both candidates had pulled out and it looked as though our first Laurel Test Session was going to be candidate-free.

Fortunately, Lou KD2ITZ exercised his persuasive powers and convinced two General Class members at Breakfast that they should try for an upgrade to Extra. The V.E. Team expresses its thanks to these brave souls for being good sports, for taking a test without much preparation and for allowing a first-time trial of the Laurel VEC procedures.

Lou KD2ITZ and Laurel Team Leader Dave KF2BD made sure that sufficient Volunteer Examiners had been certified by the VEC. Some of the Laurel paperwork is generated on-site so Dave had brought his notebook computer and a small Epson printer-scanner. A backup computer was supplied by Verle W2VJ.

Candidate details were entered into the computer system — as soon as call signs were entered, the Laurel software populated other fields via local Wi-Fi connection to the Internet and FCC database.

Test papers were still in printed form and candidates chose their answers in the traditional manner by marking letters on a paper answer sheet. Grading was carried out as usual with a perforated plastic overlay.

There were no upgrades and no CSCEs to print on March 19, but the Test Session did provide an opportunity to test procedures, including electronic submission of results. At this point, the Library Wi-Fi lost its connection, but Dave KF2BD had a Plan B, using his Smartphone as a personal hotspot, so e-mail could go through to Laurel's Regional Coordinator.

Dave KF2BD enters details into the LARC VEC computer software.

Thanks to the Volunteer Examiners who participated in this session including Lou KD2ITZ, Dave KF2BD, Rob AD2CT, Larry AC2QH, Joe W2BCC, Verle W2VJ and NM9J. Thanks also to Greg KB2CQE and Joe WA2MCR who stopped by to observe the session — and to the Putnam Valley Library for use of their large, airy room.

PCARA's next V.E. Test Session is scheduled for Wednesday April 27th, 7:00 p.m. at Putnam|Northern Westchester BOCES Tech Center, Room 226, 200 BOCES Drive, Yorktown Heights, NY. Candidates should contact Dave Harper KF2BD, (914) 432-2639, daveharper'at'Vivaldi.net.

FCC Application Fee

On March 23 the Federal Communications Commission issued a Public Notice advising that new application fees would come into effect on **Tuesday April 19, 2022**. A $35.00 fee will then be required for a new Amateur Radio license application. The fee also has to be paid for license renewal, sequential call sign change requests and vanity call sign applications.

When the FCC receives examination results from a Volunteer Examiner Coordinator (VEC), it will e-mail a link with payment instructions to successful candidates who will then have 10 days to pay. After the fee is paid and the FCC has processed the application, candidates will receive a second e-mail with a link to their official license. That second link will be good for 30 days.

ARRL is offering to pay the first FCC Application fee for successful candidates under 18 who test with ARRL-VEC. Under-18s will also qualify for a $5.00 reduced test fee with ARRL-VEC. Further details are available at: https://www.arrl.org/fcc-application-fee.

Anytone® AT-578UVIII review – DMR/FM transceiver

Last month I described reception of **amateur DMR** transmissions using the Uniden BCD996P2 digital voice scanner (*PCARA Update*, March 2022, "DMR / P25 scanner for the Manor"). The article included a brief description of DMR technology with a list of nearby repeaters. After monitoring local activity, I decided to purchase a DMR-capable mobile transceiver.

Anytone AT-D578UVIII has dual-receive on 144, 222 or 440 MHz.

I checked availability at various vendors such as BridgeCom Systems, Powerwerx and Ham Radio Outlet, then settled on **Connect Systems Inc**. There was a reason behind this choice.

The Connect connection

In July 2017, I was leaving the Sussex County Amateur Radio Club Hamfest when I heard from former colleague Matt KD2WRU that I had won a door prize. Hurrying back to the main pavilion, I found that the prize was a BFDX **CS-580** UHF DMR transceiver. I visited the booth of prize sponsor **KB Cubed LLC**, an authorized reseller for Connect Systems Inc., where Kai Chen K2TRW provided a complimentary code-plug for my new radio.

CS-580 HT.

I spent a couple of weeks learning about DMR, updating firmware, programming and re-programming the CS-580 until I finally heard the "Parrot" reply from a nearby repeater. Coverage was limited for a UHF HT.

As part of the SCARC door prize, I was added to Connect Systems' Mailing List and began receiving e-mails from CEO Jerry Wanger, KK6LFS. Recent messages explained pandemic supply chain problems and how several radios were now back in stock — including the **Anytone® AT-D578UVIII BASIC** and PLUS mobile DMR transceivers.

That "BASIC" model is not available from many dealers. It covers the same amateur bands as the "PLUS" model but without GPS, APRS, Bluetooth or Airband capability. The "BASIC" price is roughly $150 cheaper than the 'PLUS'. I did not need the expensive extras for a fixed station, so placed an order for the "BASIC" model with Connect Systems Inc., https://www.csi-radios.com/. Three days later a package arrived from Encino, CA containing the new radio.

Inside the box

The box was labeled "Anytone DMR Digital Mobile Radio, Model AT-D578UVIII, Frequency 144-148 MHz, 420-450 MHz, 222-225 MHz." Alongside the FCC and CE approval logos was the manufacturer: "Qixiang Electron Science & Technology Co. Ltd, MADE IN CHINA".

Inside the box was the transceiver itself, a large PTT microphone with RJ-45 8-pin connector, mobile mounting bracket, mounting hardware, fused 12 volt cable with T-style connector, USB cable with type-A and micro-B connectors, microphone clip and spare fuses. There was a printed "Operating Manual" and two adhesive labels.

Contents of the Anytone AT-D578UVIII Basic box.

The transceiver body is quite small, external dimensions are 5½" w × 6¾" d × 1½" h. There is a 2¼" diameter loudspeaker set into the top heatsink. The color liquid crystal display is *tiny*, only 1½" w × 1⅛"h. On the rear panel there is a single SO-239 antenna connector, cooling fan and a pair of 3.5mm jack sockets for external speakers. The SMA connector for an external GPS antenna was missing from my "BASIC" model.

Rear panel connections.

The PTT microphone is quite large, with backlit buttons. There is a small loudspeaker incorporated.

Initial setup

The first task was to crimp a pair of Anderson Powerpole® connectors on the end of the supplied 12V DC cable. The copper conductors were thin compared with other FM transceivers — possibly causing a volt-

age drop when transmitting at full power. The red and black wires were separated, so I fastened them together with nylon ties.

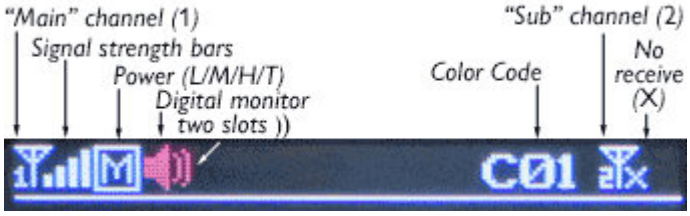
AT-578UVIII transceiver at first switch-on.

At first switch on, the display showed "Calibrate Date" — waiting for date and time to be entered. The Anytone logo then appeared, followed by the standard display with VFO A frequency on top and VFO B below.

The front panel channel knob on the right adjusts VFO frequency in 12½ kHz steps — step size is programmable. A front panel button labeled "Menu" brings up a "Main Menu" on the display with "Talk Groups", "Messages", "Call Log" and "Zone" choices displayed. The highlight can be moved with the channel knob then selected by pressing the knob inward.

The tiny display is a problem — some of the lettering is microscopic and displayed in black on a dark blue field. The top line of the display contains a number of important symbols, but is partly obscured by the front panel's plastic molding when viewed from above. In my opinion, this display is unsuitable for mobile operation where the transceiver could be mounted some distance away and below the driver's line of vision.

Standard display with VFO A on top, VFO B below (actual size).

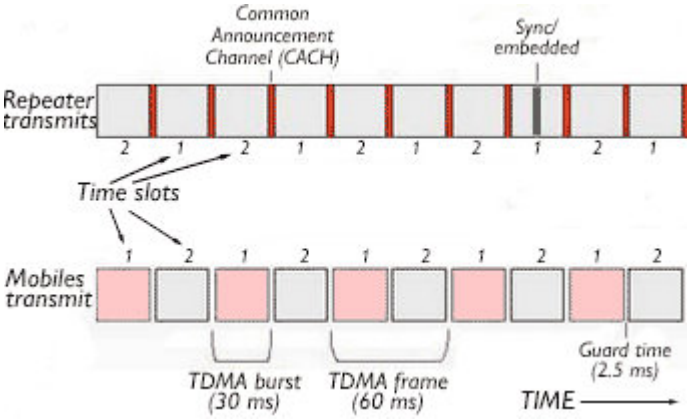


Icons along the top of the AT-578UVIII color display.

In addition to the "Menu" button there is an "Exit" button and six programmable buttons labeled P1 – P6. On the left side of the front panel are two rotary volume controls for the "A" and "B" receivers, plus an on/off button.

Power output

With a power meter and dummy load connected, I checked output at the transceiver's low, medium, high and "turbo" power settings. On analog FM the figures were 1 watt, 10W, 24W and 55W (VHF) or 42W (UHF). On digital DMR the apparent reading dropped to 0.4W, 3W, 6W and 12W. The lower figures are due to DMR's two slot TDMA (time division multiple access), where the mobile transmitter is pulsed on and off 16.66 times per second with a duty cycle of ~ 45%.



Two-slot TDMA transmissions from mobiles on time slots 1 and 2 (pink/gray). Repeater transmits continuously with Common Announcement Channel (CACH) data sent during the 2.5 millisecond uplink gap. CACH is for low speed signaling and channel management. [After Hytera]

I checked the voltage drop down the thin, 12 volt cable during full power FM transmission — the voltage fell 1.0 volt from 13.7V to 12.7V, a good reason for upgrading the supplied cable. The rapidly pulsed transmitter means that external amplifiers might be unsuitable for DMR — they might not switch fast enough for what amounts to "full break-in" operation.

Version check

I checked the version of firmware installed in the new transceiver. This information is available from the front panel using Menu → Settings → Device Info, revealing firmware version 1.15c. A check on Connect Systems' and Anytone's sites showed this was the latest release at the time of writing.

CPS must match

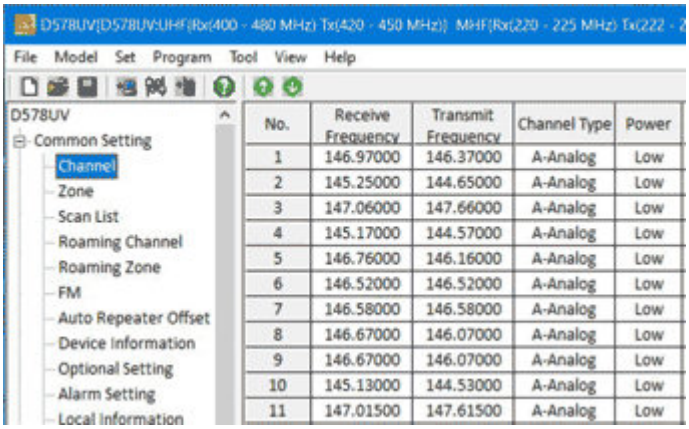
Configuring memory channels and settings on a DMR transceiver usually requires a Windows PC with programming software called "**CPS**" (Customer Programming Software). The version of Anytone's CPS *must* match the version of the radio firmware. I downloaded the appropriate Zip file from Connect Systems' web site, https://www.connectsystems.com/, then began installation on my Windows 10 notebook. There were multiple warnings from the malware protection, but apparently many people have installed the software without a problem — so I went ahead.

Software setup

With the CPS software installed, I connected the supplied USB cable between radio and computer. With the radio switched on, Device Manager reported under "Ports COM & LPT" that the radio was recognized as "USB Serial Device (COM5)".

I started the CPS programming software then used menu choice: Set → Set COM, to allow "Comm Port: COM5" to be selected. With communication established, the next step was to download all data from the radio using: Program → Read From Radio. I saved to disk in case I ever needed to restore factory settings.

The CPS software has a great many parameters accessed via the left panel that can be intimidating at first glance. I found the most help from "Anytone Programming Guide" written by Trygve Svärd KD0PNQ for the companion AT-D868 / AT-878 handi-talkies and available as a PDF from Connect Systems' web site: https://www.csi-radios.com/support/anytone/. This tutorial dates from 2019 and may not cover all capabilities of later firmware.



Anytone's CPS software showing "Common Setting" → "Channel" with some analog frequencies already entered.

What is a codeplug?

Morse code plug?

We know that modern FM transceivers can have their memory channels and other settings configured using software, with data safely stored to local disk. In the world of **DMR**, frequency channels, talkgroups, timeslots and other settings can be configured through software, with data stored in a single configuration file known as a **codeplug**. Commercial radio shops can then use the codeplug to program a whole fleet of mobile radios.

You might be able to obtain a codeplug with local repeater details already entered. If not, the Internet can provide examples from other parts of the country.

If you do find a codeplug, my advice is — proceed with caution. There are many differences between radios, firmware versions and repeater coverage that might make someone else's codeplug incompatible with your own circumstances. Feel free to inspect other people's codeplugs for suggestions on how to organize channels, zones and talkgroups, but be aware that downloading their data to your own radio could cause problems. The best approach is to start from scratch and build your own.

Step by step

There is plenty of advice on the Internet explaining how to program a codeplug. I'll summarize a few points that I found helpful while using Anytone's CPS software to configure the AT-D578UVIII.

DMR ID: You will need a **DMR ID** before you can do anything on-air. This was previously handled by DMR-MARC, but nowadays radio amateurs should register for an ID at https://www.radioid.net/. The ID will be in the form of a 7-digit number associated with your call sign and should be entered in the CPS "Radio ID List".

Correct order: Because of dependencies, there is a recommended order for entering DMR data into the CPS software. I would suggest entering: (1) Radio ID, (2) Talkgroups, (3) Channels, (4) Zones, (5) Scan Lists.

Analog channels: In order to familiarize yourself with CPS, navigate in the left panel to "Common Setting" → "Channel", then double-click on the first row of channel data to open the "Channel Information Edit" window. Enter a few FM frequencies with Channel Type: "A-Analog". Analog channels do not need specific talkgroups and should be set up with Band Width "25K" (25 kHz) for adequate deviation. Digital DMR channels will default to "12.5K". If you are not sure what a particular parameter is for, keep an eye on the context-sensitive help at the bottom of the window.

DMR Talkgroups: Once you have a couple of analog FM channels working, proceed to DMR. Begin with a *small* number of talkgroups and channels to make sure you are entering data correctly, then build up slowly. A list of DMR-MARC talkgroups is available from https://dmr-marc.net/. Brandmeister talkgroups are available from: https://brandmeister.network/?page=talkgroups. For talkgroups in use on the NYDMR network see repeater list at http://k2hr.com/2017%20Repeater%20page.html.

Mt. Beacon, NY NY4Z 441.450 + 5. MHZ CC7
Time Slot
#1 - Group Call TG 347639 Disney - FT
#1 - Group Call TG 9998 = Parrot, Audio Test Server - PTT
#1 - Group Call TG 9 Local Talk Group - FT
#1 - Group Call TG 31361 = Upstate NY - PTT
#1 - Group Call TG 333 = DMR Plus Reflector 4604 (NY) PTT
#1 - Group Call TG 311037 Boca Raton ARA Local Talk Group -PTT
#2 - Group Call TG 444 NY Metro System Wide - FT

Talkgroup list for one of NYDMR network's repeaters.

Talkgroups listed as static, permanent or **FT** (full time) are carried continuously by the repeater involved. Talkgroups listed as dynamic, on-demand or **PTT** are *not* carried full-time and can only be activated for a limited period by a local transmission on the input using the desired talkgroup. All traffic on the talkgroup is then carried by the local repeater for a limited time, typically 5 or 15 minutes. The timer can be reset by another local transmission.

Talkgroup names and channel names are limited to 16 characters on the AT-578UV. Use lower case where appropriate to save space on the radio's tiny display. Parrot talkgroups are for test purposes and should re-transmit your audio back after a short delay. The North America Parrot on talkgroup 9998 should be set up as a **Group Call**, like other talkgroups. The Brandmeister Parrot on TG 9990 should be set up as a **Private Call**. Don't be disturbed if the Parrot does not reply — just try another repeater.

Amateur Radio DMR IDs: Modern DMR radios can store a full list of DMR IDs, amateur radio call signs, names and other data. You can download an up-to-date list from https://www.radioid.net/database/dumps. The large file (12 MB) can take a long time to read from disk and write to the radio. There is no need to include it in your codeplug until everything else is working correctly.

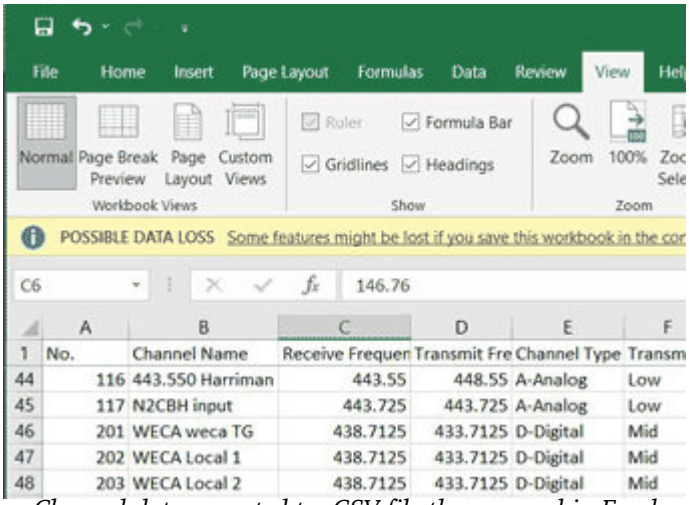
Save: After each change in CPS, save your codeplug to disk with a new filename. This will allow recovery in case a future revision causes problems.

Editing the code

Anytone's CPS software presents data in a spreadsheet-like format of rows and columns — but without the convenient data-editing tools of software like Microsoft Excel. Data cannot be entered into the individual cells, instead you have to double-click on the row and a new Edit window appears for data entry.

You can program a few talkgroups and channels in CPS, but it soon grows old. If you have Microsoft Excel or similar software on your computer you can export an item in the left pane to a table that is more easily edited using the spreadsheet software.

1. Always start by **exporting** the desired table from CPS using Tool → Export, choosing the relevant item then producing a .CSV (comma separated variable) file.
2. Open the .CSV file in Microsoft Excel or similar spreadsheet software, then edit the contents. Save the modified file in .CSV format.
3. Return to the CPS software and **import** the .CSV file back into the desired table using Tool → Import.



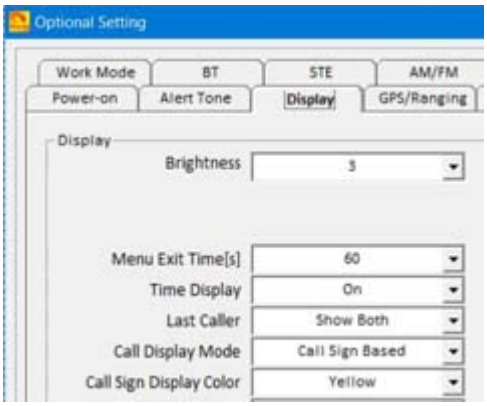
	A	B	C	D	E	F
1	No.	Channel Name	Receive Frequen	Transmit Fre	Channel Type	Transm
44	116	443.550 Harriman	443.55	448.55	A-Analog	Low
45	117	N2CBH input	443.725	443.725	A-Analog	Low
46	201	WECA weca TG	438.7125	433.7125	D-Digital	Mid
47	202	WECA Local 1	438.7125	433.7125	D-Digital	Mid
48	203	WECA Local 2	438.7125	433.7125	D-Digital	Mid

Channel data exported to .CSV file then opened in Excel.

I found it necessary to repeat this procedure until I had Channels and Talkgroups to my liking. I was able to use various Excel techniques such as filling a range, highlighting duplicate cells, concatenating strings etc. You may find YouTube videos that demonstrate these techniques, e.g. https://youtu.be/vLIsw_Yqgj0

Radio settings

Many settings for the AT-587UVIII transceiver can be modified using CPS. Choose the left panel item: Common Setting → Optional Setting to see the multi-tabbed editing window. The "Anytone Programming Guide" provides an explanation for the different tabs. Here are a few of the modifications that I found useful.



Part of the "Optional Setting" window showing the "Display" tab.

Display

Brightness: The default was too high, reduce from 5 to 3.

Menu exit: The default time was too short, increase to 60 seconds.

Call sign display color and A/B Channel name color: Change to yellow for maximum visibility.

A/B Zone name color: Change to orange.

Last caller: Show both

CH Switching keeps last call: On

Key Function

Short key P1: VFO/MR	Long key P1: Channel Type Switch
Short key P2: Scan	Long key P2: Ch Name
Short key P3: Digital monitor	Long key P3: Main CH Switch
Short key P4: Power (LMHT)	Long key P4: Reverse (analog)
Short key P5: Nuisance delete	Long key P5: Sub CH On/Off
Short key P6: Monitor (analog)	

Alert tone

Key tone: Reduced from 4 (too loud) to 1.

You can prepare a printed label to summarize functions of the programmable buttons P1 – P6.

There is much good advice on setting hold times for scanning and many other topics from Jason Reilly, VK7ZJA at his web site: http://members.optuszoo.com.au/jason.reilly1/578mods.htm

Critique

The Anytone AT-D578UVIII is quite an achievement for its Chinese manufacturer — this DMR/FM radio can be configured for FCC Part 90 (Private Land Mobile Radio Service) *or* for amateur radio in different parts of the world. It is a close relative of the dual-band Anytone AT-D878UVII handi-talkie. The amateur radio configuration allows adjustments from keypad and front panel that would be prohibited for a Part 90 commercial radio. Amateur radio call signs and names are displayed for DMR contacts. Scanning for *any* talkgroup or timeslot is possible using "Digital Monitor", sometimes known as promiscuous mode. Various improvements have been incorporated since the model was introduced in 2019. Apart from the badge-engineered Alinco DR-MD520 there is nothing comparable from other amateur radio manufacturers.

Call signs and names can be displayed if the list of DMR IDs has been loaded.

BUT if you compare the Anytone with mobile radios from the 'big three' — Icom, Kenwood and Yaesu — there are some **rough edges**. You should be aware of the following before handing over your money for an AT-D578UVIII…

- Boot-up takes about 14 seconds from switch-on before the radio is ready.
- There are occasional clicks and thumps from the loudspeaker during operation and as controls are adjusted.
- The front panel push buttons need a firm push to activate. Buttons occasionally need more than one press. The long-press 'Off' button may become inactive.
- Turning the channel-select rotary control sometimes causes a step in the wrong direction.
- The connection between computer and radio can be lost whenever the radio reboots because of a device timeout. One solution is to pull out the USB cable, wait a few seconds then plug it in again.
- The radio reboots itself occasionally.
- Scanning of memory channels is terrible compared with other amateur radio transceivers. Scanning is not possible until a Scan List has been defined. The scan rate is slow. Maximum delay on an active channel is only 5 seconds. Stopping the scan causes the frequency to jump to the *starting* channel instead of staying on the current channel. Restarting a scan frequently causes the warning "Scan List No Select!" The fix for this requires pressing Menu → Scan → Scan List, selecting the desired list, then scrolling down until you reach "Select Cur List". Select this item then press "Exit" four times to back out of the menu. *Now* you can start to scan again! Would Icom, Kenwood or Yaesu put you through all this?

Dreaded message when scanning will not start.

- The two 3.5mm sockets on the rear panel for external speakers are too close together for two standard jack plugs to be inserted. Only the upper socket cuts off the internal speaker.
- The squelch control for analog FM reception is still rather tight at its lowest setting of "1".
- The tiny color display and thin power cord have already been mentioned.
- The front panel cannot be detached for mobile installation.

Conclusions

A glance at the latest ARRL Repeater Directory will show more DMR repeaters than other digital voice modes. Rough ratios for NY repeaters are FM 68%, DMR 18%, Fusion 9%, D-Star 4%. It looks as though DMR is here to stay, despite the unique audio quality and the Land Mobile specification being an awkward fit with amateur radio — where we like to listen to everything going on.

Since PCARA is contemplating a UHF DMR repeater, this might be the time to acquire a compatible radio. A UHF handi-talkie would have limited range in our hilly terrain. A mobile radio with 12 volt power supply and external antenna should be more effective for fixed station use. Unless you want to purchase an expensive commercial radio by Motorola or its competitors, the Anytone AT-D578UVIII BASIC might be a good choice.

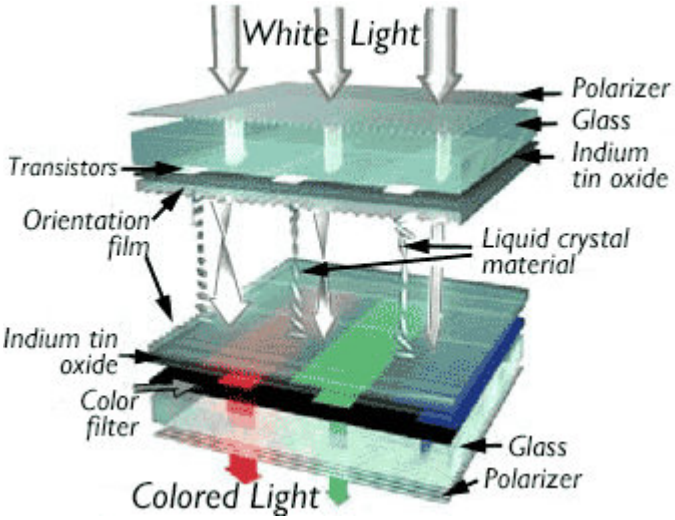
Anytone AT-D578UVIII receiving Jefferson Valley repeater.

QST review by VA2PV, June 2020, p38.
Practical Wireless review by GW4VXE: March 2020 p10 (link)
- NM9J

Deuterium on display

Late last year LG Display, the South Korean company that makes OLED panels used by LG Electronics, Sony, Vizio and other TV manufacturers announced a new type of OLED display named “OLED EX”. The large, extra bright display contains the hydrogen isotope **deuterium** and will be controlled by a special algorithm to supervise energy input. According to LG, “EX” stands for “Evolution and Experience”.

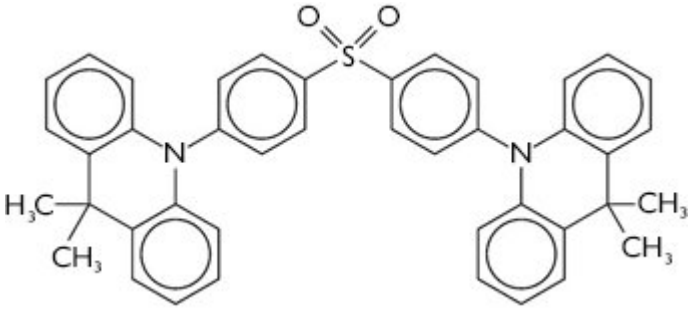
Standard color televisions, monitors and similar devices are based on liquid crystal displays (LCD). As explained in “Essential$_2$ Radio”, *PCARA Update*, July 2006, pp 7-9, a liquid crystal device contains layers of organic compounds that twist back and forth when subjected to an electric field, rotating the plane of polarized light. The layers are held between sheets of polarizing film, with a color filter layer so that individual pixels for red, green and blue light can be turned on and off by applying appropriate voltages.



Structure of a single pixel of a color liquid crystal display Red and green elements are transmitting light through their color filters, while the blue element has a voltage applied to line up its LC molecules and prevent light transmission through the blue filter. [After Merck KgaA.]

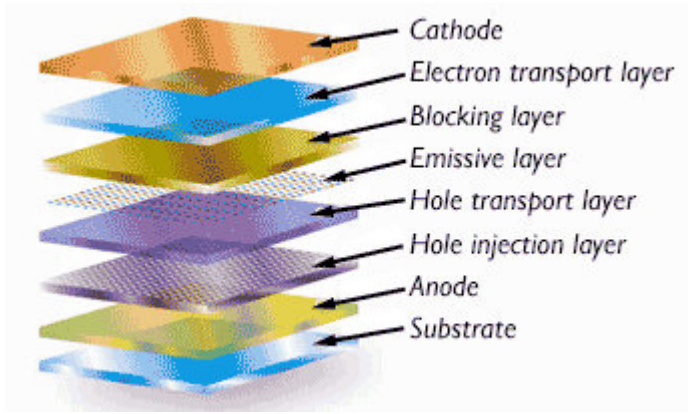
Liquid crystal displays have to be **backlit** with a light source. Early displays used a cold cathode fluorescent light (CCFL) as the source. (*PCUD*, October 2019, pp 10-13). In more modern displays the CCFL is replaced by a white or RGB light emitting diode backlight. In either case, the liquid crystal panel acts by dimming the strength of the backlight as the crystals twist and turn with applied voltages. Maximum brightness is limited and deep blacks are difficult to achieve. Viewing the display through polarizing sunglasses may result in an apparent black screen.

More recent display technology is based on a panel of individual light-emitting diodes that emit their own red, green or blue light. These LEDs are based on **organic** materials rather than the **inorganic** compounds such as gallium arsenide phosphide or gallium nitride used in conventional LEDs. (In the realm of chemistry, “organic” means compounds based on carbon, usually containing hydrogen and other elements — and not the naturally occurring products found in the supermarket organic aisle!)



Structure of diphenylsulfone dimethyldihydroacridine, as used to emit blue light in OLEDs.

Organic LEDs (OLEDs) feature compounds such as diphenylsulfone dimethyldihydroacridine, a blue light emitting OLED material developed at Kyushu University in Japan. A typical OLED consists of several layers of material sandwiched between an anode and a cathode. When a voltage is applied across the OLED, electrons flow from cathode to anode, adding electrons to the emissive layer and removing electrons, creating ‘holes’, at the anode. When electrons meet holes they



Structure of an Organic LED [after Universal Display, Ewing NJ]

combine, forming an "exciton" (excited state) molecule which relaxes to a lower energy state, emitting a photon of visible light.

The organic compounds in OLEDs are sensitive to oxygen and moisture, so OLEDs have to be manufactured under a nitrogen atmosphere then encapsulated to exclude water and air. They can be fabricated using inkjet printing technology to build up the individual pixels of the display.

Active Matrix OLEDs are already in use for small displays such as Apple's iPhones and SmartWatches. Samsung employs OLED displays in its Galaxy smartphones. These portable devices normally have their screens lit for short periods of time. In amateur radio, OLED displays appear on some MMDVM Hotspots.

Duplex MMDVM Hotspot with OLED color display.

Use of OLEDs in larger devices such as computer monitors and televisions has been limited so far. These screens are switched on for longer periods of time and are subject to the old problem of "burn-in" where a fixed image such as a task bar or background wallpaper can result in visible degradation — even when the display is switched off. Another problem is the organic compounds that emit visible light will slowly degrade over time. This is especially true of the blue light emitters, resulting in a diminution of overall brightness and a color shift toward red/green. OLED monitors are expensive, for example the LG 32EP950-B 32" Ultrafine UHD OLED Pro Display has a list price of $4,000.00!

OLED displays should find a natural home in televisions where high contrast, high refresh rates, low power consumption and thinness are all attractive. The only company manufacturing large OLED screens for televisions at present is LG Display. Their own products command high prices, for example the LG OLED65C1PUB 65 inch 4K Smart OLED TV has a list price of $1850.00. Prices of LG's new OLED series for 2022 have just been announced, ranging from $1,400 for the 42 inch C2 to $6,500 for the 83 inch G2 model.

According to LG's press release, when their new **OLED EX** technology enters production in Korea and China it will provide a 30% increase in brightness rather than longer lifetime. This is achieved by replacing hydrogen atoms in the OLED emissive layer by deuterium atoms. Hydrogen atoms have a nucleus containing a single proton, while deuterium atoms have twice the mass thanks to addition of a neutron to the nucleus. The "kinetic isotope effect" makes carbon-deuterium bonds stronger than carbon-hydrogen bonds, increasing the molecule's stability.

C&E News reports that the deuterated compound in LG Display's blue-emissive stack is being supplied by **DuPont** and has some — but not all — of its hydrogen atoms replaced by deuterium. This strengthens the weaker C – H bonds that would previously lead to degradation. The heavy water (D_2O) from which DuPont derives its deuterium isotope is normally employed in nuclear reactors for moderating neutrons.

Deuterated compounds are also used in drugs, with hydrogen atoms in the drug molecule replaced by deuterium. After being administered, the kinetic isotope effect reduces the rate of drug metabolism, allowing lower doses and increasing drug lifetime.

- NM9J

TX Factor 28

The latest episode of UK video program "TX Factor" was released in mid-February 2022, over a year since the previous episode, thanks to COVID restrictions. The new episode features Bob McCreadie G0FGX and Mike Marsh G1IAR constructing a low-cost MMDVM (multimode digital voice modem) Hotspot. This employs a Raspberry Pi Zero and MMDVM module kit purchased through eBay. The Hotspot provides access to amateur radio Digital Voice networks for D-Star, Yaesu Fusion and DMR without needing to be in range of a repeater. The second section contains a review by G0FGX of the Icom ID-52E 5W handi-talkie with color LCD screen and D-Star support.

Bob G0FGX and Mike G1IAR build a low-cost Hotspot.

For more details, pay a visit to the TX Factor web site, http://www.txfactor.co.uk/. Episode 28 is also available on YouTube at https://youtu.be/QnLCZkR8ENk.

Peekskill / Cortlandt Amateur Radio Association

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Newsletter contributions are always very welcome!
Archive: http://nm9j.com/pcara/newslett.htm

PCARA Information

PCARA is a **Non-Profit Community Service Organization**. PCARA meetings take place every month (apart from July/August break). See http://www.pcara.org for current details.

PCARA Repeaters

W2NYW: 146.67 MHz -0.6, PL 156.7Hz
KB2CQE: 449.925MHz -5.0, PL 179.9Hz
N2CBH: 448.725MHz -5.0, PL 107.2Hz

PCARA Calendar

Monitor PCARA's Google Group and websites for additional activities. Masks and Social Distancing may be required.
Sat Apr 9: PCARA Breakfast, 9:00 a.m., Downing Park Pavilion, Route 202 (Crompond Rd), Yorktown Heights.
Wed Apr 27: PCARA V.E. Test Session, 7:00 p.m., Putnam|Northern Westchester BOCES Tech Center, Rm 226, 200 BOCES Dr., Yorktown Heights. See below.

Hamfests

Check with organizers before leaving.
Sat Apr 2: New Jersey ARC Hamfest, Parsippany Police Athletic League, 33 Baldwin Rd, Parsippany, NJ. 8:00 a.m.
Sun May 1: Orange Cnty ARC Hamfest, Wallkill Community Center, 7 Wes Warren Dr, Middletown, NY. 8:00 a.m. **Club Table**.

VE Test Sessions

Check with the contact before leaving.
April 2, 9, 16, 23, 30: NYC-Westchester ARC, 43 Hart Ave, Yonkers NY. 12:00 noon. Must contact VE: k2ltm'at'aol.com.
April 14: WECA, Westchester County Fire Trg Center, 4 Dana Rd Room 3, Valhalla NY. 7:00 p.m. Must contact: wa2nrv'at'weca.org.
April 15: Orange Cnty ARC, Munger Cottage, 183 Main Street Cornwall NY. 6:00 p.m. Must contact Joseph J. DeLorenzo, (845) 534-3146, w2bcc'at'arrl.net
April 27: PCARA, Putnam|N Westchester BOCES, Tech Center, Rm 226, 200 BOCES Dr., Yorktown Hgts. Contact Dave Harper KF2BD, (914) 432-2639, daveharper'at'vivaldi.net.
April 30: PEARL, Mahopac Public Library, 668 Route 6, Meeting Rm 3rd Floor, Mahopac NY. 10:00 a.m. Contact Mike W2AG (845) 225-4650, carmelink'at'aol.com.

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