



PCARA Update



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Well-dressed ham

The PCARA Annual Bring and Buy Auction was very well attended and Malcolm NM9J did a marvelous job as Auctioneer and MC. The best deal of the day was snagged by Corey W2CST — he picked up a mint-condition Kenwood TS-830 for \$100! Our very generous members donated approximately \$180 to the PCARA coffers. Thank You!



Bring and Buy Auction at the January meeting. [N2SO Pic]

Lou KD2ITZ and Mike W2IGG gave a brief report on their visit to Ham Radio University that they attended on Saturday January 6, 2018 at LIU/Post in Brookville, NY. Lou KD2ITZ became a bit of a celebrity by being interviewed by and quoted in *Newsday*. Lou mentioned that this was his second time he attended Ham Radio University and was quoted as saying that:



Newsday article, January 6 2018.

“he enjoyed the hands-on learning during the Cable Theory and RF Connectors workshop, where he learned about the different characteristics of the cables used in ham radios.”

Lou further stated that *“despite having what he*

described as basic radio equipment... he was ‘amazed’ ham radio allowed him to connect with people over far distances — the farthest people he’d ever talked with were in New Caledonia, a collection of French Islands in the South Pacific.” KD2ITZ concluded by adding, *“To think that I can get a signal from New York to New Caledonia with just the minimal equipment, to me, it’s a magic trick.”* I think that’s what it’s all about for those of us who love Amateur Radio, the **Magic**. Congratulations Lou!

Twelve members attended the PCARA Breakfast on January 20th at Turco’s in Yorktown Heights, NY. As usual, the venue provided an excellent forum for less formal discussions and much brain storming. Barry K2BLB was among those in attendance and he had some samples of items embroidered with the PCARA logo. They looked really sharp! There soon should be an order form on the PCARA Yahoo! Groups website that can be printed, filled out, and mailed in with your payment to *Something for All 33, Inc.* Thanks Barry, for all your efforts. [See p.13 -Ed.]

Our next regularly scheduled meeting is **Sunday February 4, 2018** at 3:00 p.m. at New York-Presbyterian / Hudson Valley Hospital in Cortlandt Manor, NY 10567. I look forward to seeing each of you there.

- 73 de Greg, KB2CQE

Contents

Well-dressed ham - KB2CQE	1
Adventures in DXing - N2KZ	2
Smart meters mesh - NM9J	7
K44 CW keyboard review - NM9J	9
PCARA club apparel	13

PCARA Officers

President:

Greg Appleyard, KB2CQE; kb2cqe at arrl.net

Vice President:

Joe Calabrese, WA2MCR; wa2mcr at arrl.net

Net night

Peekskill/Cortlandt Amateur Radio Association holds a weekly net on the 146.67 MHz W2NYW repeater on Thursdays at 8:00 p.m.

Adventures in DXing

- N2KZ

Paradise

Imagine a resolute place where nearly every HF signal arrives from at least 2,500 miles away. Very few signals will reach you by ground wave. You won't hear the familiar daily *mêlée* of stations operating within 1,500 miles of your QTH clogging up the bands! Afternoon and early evening opportunities into Europe will be missing. Even trans-equatorial skip — providing those easy contacts into South America on the high bands — is squelched. In a nutshell, a QTH where the entire band from 3 to 30 MHz provides nothing but long-haul DX.



In a DXer's dream, heaven doesn't stop at HF. [N2KZ pic¹.]

Heaven doesn't stop at 3 MHz. You won't recognize medium wave either. Draw a line about 250 miles long. Only 30 broadcast AM stations are scattered along that line and nowhere else... surrounded by an ocean of water that extends forever all around you. Water certainly helps carry these signals a long way on medium wave!

A good radio can hear all 30 stations along this line in the daytime from one end to the other. Beyond this there is complete radio silence. No stations are on the air north, south, east or west of you... at least until nightfall. By the way, while the sun is out, every station is on a clear channel. No need to worry about co-channel interference in heaven!

From dusk until dawn, more medium wave miracles appear. Way beyond the blue horizon, there are thousands and thousands of AM radio stations broadcasting from the real world, longing to be heard. You'll need a very sensitive radio and a good antenna, but they are out there! Again, the closest ones are about 2,500 miles away. Across the endless miles between lies a vast ocean of water to aid this long journey. Find yourself a good spot along the shore and tune in to

medium wave in the middle of the night. You will be amazed with all you hear! Karl, does a place like this really exist?

Reality

All I describe is not culled from a DXer's best dream. This place really, really does exist. I know. I have been there! Heaven is easy to find if you know where to look. One of the most isolated locations in the entire world, it is America's 50th state. Welcome to Hawaii!

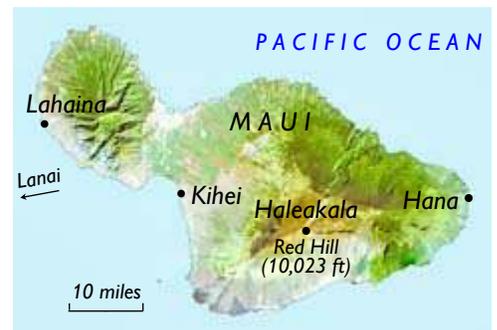
This was my first visit to The Aloha State and I had a lot to learn. My family and I took three connecting flights to arrive at our first destination on the island of Maui. We were a long, long way from home. New York was snowy and freezing. Hawaii provided nearly endless tropical sun with temperatures hovering around 80°F (27°C.) A very welcome rescue from a frigid environment!

I may have been dropped into an equatorial wonderland but I was still surrounded by 21st century humanity. My New York QTH is out in the country where trees are in the majority and houses are far between. I make a vigilant effort to keep my home in electromagnetic silence. No fluorescent or new-fangled lighting. A bare minimum of switching power supplies. CPU-driven noisemakers, like flat screen TVs and appliances, remain off until absolutely necessary. It's electronically quiet and I like it that way.

Maui was the opposite! Our bed-and-breakfast, located in the seashore community of Kihei (pronounced key-hey,) gave me a whole new perspective. I now understood, loud and clear, what the entire world has been complaining about for years.

Don't let the lush tropical setting fool you! Inside the cottage we rented, a set of seven little LED projector lights in a bay window produced what sounded like a 50 watt broadband noise generator. The flat screen TV also created an enormous racket. I ventured out and took a quick ride in our rental car. The RF noise plague was widespread and rampant. Interference thrived everywhere! Isn't Heaven supposed to be quiet?

Lesson two was also an eye-opener. I have always enjoyed DXing long wave broadcasts. In this part of the world, all you will hear on long wave are NDBs - Non-Directional Beacons. Most all of them operate with modulated CW — literally broadcasting a loop of



Relief map of Maui.

Morse letters. During my first quick band sweep, the long wave band was ravaged by many, many AM broadcast signals. Quite a surprise!... but why?

Spurious responses in a receiver are caused by powerful signals mixing together. On this island, there



Broadcast tower for KCIK 740, KMVI 900 and 15 kW KUAU 1570 kHz was only four miles from Karl's cottage in Kihei.

are plenty! On AM alone, there are five 5 kilowatt stations and one 15 kilowatt station on the air all within ten miles of our cottage. One of the towers was only four miles away from me, shared by two 5 kW stations along with the 15 kW station. My guess is that the stations use high power to reach the communities behind the two large peaks on the island. The resulting bath of RF completely desensitized my little Sony model SRF M37W 'ultralight' portable and gave my Sony ICF-SW7600GR communications receiver a run for its money too!

A few interesting signals did pull through. For example: I found a very powerful long wave beacon on 353 kHz LLD broadcasting from the island of Lanai within eyesight of Kihei.

With 2000 watts, LLD could be heard most everywhere I wandered in Hawaii — even inside the first floor of an airport hotel in Honolulu!



Sony ICF-SW7600GR AM/FM/SW/LW receiver in a tropical setting.

All was not lost! Later in my visit to Maui, we spent two nights in the remote village of Hana on the very far east tip of the island. Here all of the local Hawaiian AM stations I encountered down in Maui's central valley were tucked and hidden away behind steep, dense volcanic terrain. Our location, directly adjacent to the ocean, was a welcomed plus.

It is not easy to reach Hana. A subject of local tourist folklore, *the road to Hana* is a mysterious and foreboding drive to those who have never come before. With plenty to see and do, most first-time tourists set aside a full day for a round-trip. Fortunately, we stayed at a resort in Hana for two days after we arrived.



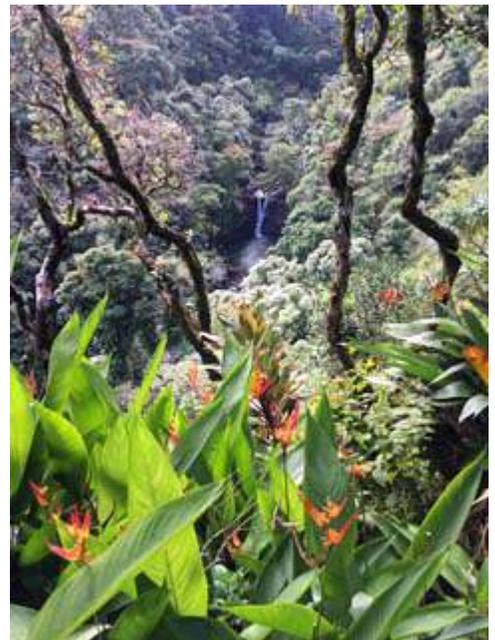
The road to Hana [Pic by Sarah].

The road to Hana is a spectacular drive featuring majestic waterfalls, unique stunning vistas, fascinating botanical gardens and black lava rock beaches complete with remarkable black (or even red) sand. As you find your way, you'll make a daring journey following one-lane passages precariously hanging from intimidating steep hills. Look out to see heart-stopping views to entertain and soothe you. Look up and you'll gulp at the perfectly

vertical cuts of stone and soil rising hundreds of feet above you, just inches away from your car that will intimidate and amaze!

A lush, dense rain forest constantly surrounds you. Exotic plants, trees, birds and wildlife greet you every time you stop.

You'll marvel at immense eucalyptus trees with beautiful rainbow colored bark, perfectly sculpted tall Norfolk pines, hibiscus blooms and sleek mongoose running through the bushes! When you need refreshment, there is no shortage of food trucks and souvenir



Rain forest on road to Hana. [N2KZ pic.]

stands offering quite a varied menu of barbeque delights, fresh fish and warm-from-the-oven banana bread.



Palm tree cell tower.

A couple of very strange structures caught my eye while driving. Back home in New York, we have become accustomed to very odd and unnatural looking tree substitutes that not so carefully try to mask cell towers from becoming eyesores. Hawaii had their own take on this concept: mechanical looking *almost* palm trees with integrated cell tower cabling and panel antennas. If nothing else, it made me smile.

Another unusual structure raised my curiosity even further. Picture a telephone pole with no wiring connecting it to the outside world. A solar panel is present to provide power to the pole and a Yagi antenna is side-mounted

waiting to receive commands. Everyone looks at the top: A series of forest green or beige/white disks that almost look like flying saucers. These creatures could be props from a 1950s sci-fi movie. In reality, they are incredibly loud emergency warning sirens! Older tower poles are still labeled with a Civil Defense sticker from long ago. At first glance, you really might think we are trying to invite extra-terrestrial visitors!

After a long day of touring and wonderful meals, we were all ready for bed. Completely jet-lagged by traveling six time zones to the west, I found myself wide awake at 2:30 in the morning. With ear pods in place, I turned on my Sony ICF-SW7600GR receiver and was rewarded with some astounding medium wave DX. The stage was set: the ocean was just a few hundred feet away directly east. A nice big volcanic mountain blocked me from local AM stations to the west. Magically, in the middle of the night, the outside world finally found me!

Midnight to dawn proved to be a great time to listen to the radio while in Hana. I pulled in KFI 640 and KNX 1070 Los Angeles, KNBR 680 San Francisco and KFBK 1530 Sacramento — all about 2,500 miles



Emergency warning siren.

away. The next night I was delighted to hear many of the same stations adding KTKZ 1380 Sacramento and KSL 1160 Salt Lake City to my catches. Salt Lake City was almost 3,000 miles away! Considering I was using the built-in ferrite loop antenna and nulling out the cacophony of man-made noise found in a modern hotel room, my catches were miraculous.

In the world of Hawaiian DXing, I am a rank beginner. You should meet Gary DeBock, one of the most enthusiastic and talented DXers to ever visit Hawaiian shores. Gary is most famous for building simply phenomenal passive loop antennas based upon a circular stack of Russian surplus ferrite rods. The amount of signal these fascinating



Gary DeBock holds ferrite rod antennas on a DXpedition to Kona.

works of art can capture, combined with its very high-Q design that acts like an extremely narrow front-end filter, can make whispers of signals into easily readable and entertaining DX.

Gary has collected so many exotic and fascinating stations into his logbooks. His recordings create an aural travelogue of all the islands of the Pacific Ocean and throughout Asia and beyond. Set aside some time to investigate and learn about his work! Start here with details of his amazing loop antennas:

<https://dxer.ca/articles/92-gary-debock>. Follow his travels and hear some of Gary's amazing recordings at:

<https://swling.com/blog/tag/gary-debock/>. Not only are his studies remarkable, they are also inspiring!

Gary mentioned recently that there is a fake boat sitting between the Royal Kona Resort and the Hale Kona Hai on Kahakei Road in the Wai'hai area of Kona on the Big Island of Hawaii. I understand that Gary used it as a home base for some of his legendary AM broadcast DX catches. This spot faces south towards dozens and dozens of stations across the South Pacific and beyond. For DXing towards due west, Gary tells me the island of Kaua'i is prime. You see, it's all about *location!*

The favorite spot for FM transmitter sites on Maui was the omnipresent Mount Haleakalā rising over 10,000 feet dominating the east side of the island. Leading the pack is the premier broadcaster of the entire state: Hawaii Public Radio. HPR provides two services statewide called HPR-1 (news/talk and classical) and HPR-2 (more casual talk, classical and ethnic.)

Up and down the dials about 30 FM stations can be heard around Maui making the band filled with a wide variety of listening choices.

FM repeaters and translators fill in the coverage holes in difficult-to-reach areas, especially to the far west near Lahaina and the far east near Hana. Using the built-in attenuators in both my receivers I could calm down the oppressive FM signal barrage reaching my sets. The island of Maui has only about 150,000 permanent residents. I would love to know how all of these stations can make a good business model serving so few people. I can only guess they must!

My most refreshing listening experiences came from three independent public broadcasters opening their facilities to the communities they serve. I chanced upon Mana'o Radio on 91.7 FM during the 'Sweet Mama Dee' blues, soul and R&B show hosted by Renee DeAhl. A long-time broadcaster and performer, Dee demonstrated her musical background, mixing set after



Hawaii Public Radio's Haleakalā transmitter site.



set of very sweet listening. You can hear her show Sundays from 7:00 p.m. to 10:00 p.m. Eastern time at the station's web site: <https://manaoradio.com/>. Mana'o Radio is a polished yet eccentric blend of block programs that will refresh your listening habits. Give it a spin! Maui also offers an open-mic public access broadcaster: 88.5 KAKU Maui Com-

munity Radio and an all Hawaiian music station over on the east tip of the island: 96.3 KOKO-LP (low power) from Hana.

Professional Amateurs

Great big volcanic mountains can create amazing local DXing opportunities. Amateur radio experimenters delight in climbing up the tallest peak in all of the

state of Hawaii — Mauna Kea on the big island of 'Hawaii' standing 13,802 feet. On VHF and UHF, HT users have contacted other hams 180 to 200 miles away on simplex while perched at the summit. Contesters delight at this site and have sometimes even reached the California mainland - about 2,500 miles on VHF tropospheric skip! The summit offers a variety of hiking trails attractive to DXpeditions. Mauna Kea is a very challenging hike but height is everything and this spot is hard to beat!

In all my time in Hawaii, I only heard two amateur radio conversations. My first encounter was a wisp of a QSO on 14185 kHz USB at 2:00 p.m. local time with several hams in English but not enough to ID. The second gab-fest was heard a couple of days later on 7150 kHz LSB. Mike, K6MYC was holding court with a variety of fellow hams from 6 and 7-land on the American west coast.

I sent Mike a reception report and he explained his great big signal: "I am lucky enough to have good antennas and a good QTH. The coil-loaded Yagi sits on a ridge with a 1000 foot drop off to the west... and of course I was running 1500 watts, so there you go!" Mike really likes Hawaii too: "We had a home there on the Kona side of the Big Island. We were at 2,300 feet up overlooking Kailua Kona. Talk about a great radio location! I can tell you stories!" Mike, I bet you can! Does Mike know his antennas? Mike was one of the principals in KLM Electronics and the founder of M² Antenna Systems!



Mike, K6MYC with his 6 meter and 2 meter EME arrays.

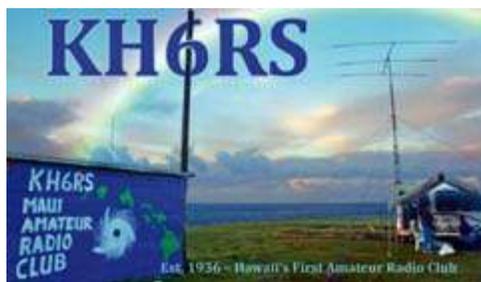
Some basic lessons were learned about operating in Hawaii: Find a good location always with geographical exposure in mind. Select a vista where you can see your targets high, free and clear. Volcanic mountains and rock create extraordinary RF shields. Use them to your advantage! Bring a big stick and lots of might. You want to span thousands of miles reliably! A good antenna and a full 1500 watts will make all the difference. This is a land where nearly everything you'll hear is far distant DX! Enjoy!

DXing in Hawaii can be challenging. Salty sea air

is everywhere and it can slowly attack your antenna system and gear. Keep your rigs indoors, if possible, and in a dry environment. If you venture out onto a beach, avoid sand! Just a handful of grains lost in a chassis can make a radio operator weep. Beaches and public parks may prove to be excellent places to retreat away from the endless drone of electronic noise. Low pass filters might also abate noise. Experiment and see for yourself!

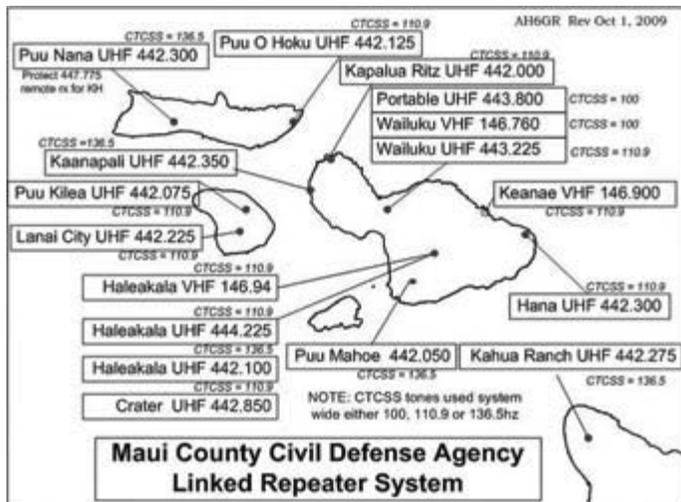
Hawaiian hams offer this advice: Try to use antennas that are not dependent on external grounding. Ground conductivity in Hawaii varies widely. Volcanic rock does not hold water and tropical rains can change ground moisture from one extreme to another instantly. Yagi antennas and vertical dipoles are preferred. Although traditional verticals, with low take-off angles, may seem desirable, maintaining a ground plane may take effort. Water your lawn for best results!

Want to see the best of ham radio in Hawaii? Check out the Maui Amateur Radio Club KH6RS. Look for <http://www.kh6rs.com> and see a Field Day site that



dreams are made of. There is nothing like Yagis by the sea! I would love to see their log books. The Maui club has

built and developed a comprehensive repeater network and emergency service plan to serve their island 'when all else fails.'



Maui Amateur Radio Club's county network plan.

Mark your calendars: If you have always wanted to work The Aloha State, the next Hawaii QSO party begins at 0700 UTC August 25th ending at 2200 UTC August 26th, 2018. This might be an excellent opportunity to touch base with the 50th state!

Long and Short

Tuning into shortwave broadcasts was equally eye opening. Prime time for SW listening was during the morning from dawn until nearly noon time with best results found on 49 and 41 meters, filled with stations along the Pacific Rim. My old friend Radio New Zealand International managed to pull through at nearly any hour. China Radio International (formerly known as Radio Peking / Beijing) was prominent in English mid-mornings on 6100, 6165 and 7435 kHz in parallel. Many stations were broadcasting every morning in a myriad of Asian languages filling up these two bands, especially 41 meters. Time signals from WWVH on the far west island of Kauai were heard best on 2500 kHz nights and 5000 kHz during the day.

On long wave, I heard four beacons: LLD 353 from the island of Lanai could be heard nearly everywhere. Maui also had VYI 327 'Valley Island' near the airport in Kahului on the north shore of the valley. POA 332 from Pahoehoe on Big Island could be heard in Hana. HHI 373 was obvious from Waikiki Beach when I visited Oahu near Honolulu.

There is so much to see and do in Hawaii, you might even be tempted to stop listening! Take time to go whale watching or snorkel and dive among the majestic sea turtles. Try the Pa'ia Fish Market for lunch and have a big cone of shave ice for dessert. Celebrate a dawn or a sundown from a



Karl and Sarah team with a turtle.

mountain peak. Marvel at the exotic birds like the cattle egrets, spotted doves, red crested cardinals and common mynas. (Highly recommended book: 'Hawaii's Birds' from the Hawaii Audubon Society.)

Spend a day or two on the north shores of Oahu and Maui to enjoy the legendary surf and surfers riding towering waves. Visit Pearl Harbor for a memorable history lesson and pay your respects. Taste real Hawaiian pineapple – so subtle and sweet. More than anything, spend time at the beach and wonder how so much beautiful water can be perfectly transparent and perfectly refreshing! Hawaii really is heaven! Until next month, *mahalo* de N2KZ 'The Old Goat.'



[¹ - Karl's dream picture on page 2 is a *Vista of Maui.*]

Smart meters mesh

In December 2017, homes in the Peekskill / Cortlandt area served by Con Edison received a postcard announcing that **Smart Meters** would be coming in a few months. Con Edison described the advantages as follows...



- **Control Costs:** Manage your costs with online access to detailed daily usage information.
- **Faster Restoration:** Smart meters will notify Con Edison when your power goes out. That means faster restoration.
- **Easier Activation:** Remote activation means easier service transfer or activation.
- **Greener Choices:** Use information from your smart meter to make wiser energy decisions that help the environment.
- **Connect to solar:** Smart meters will make it easier to integrate solar energy with the grid.

Smart Meter installations began on Staten Island in July 2017 with Westchester following in September 2017. Work should continue throughout the city and suburbs until 2022.

Initial postcards were mailed out to consumers three months before installation, then a letter should arrive 45 days before the actual changeover. Meter installation is said to be quick and easy, with only a brief interruption to electrical power. ConEdison will leave a note advising that the meter has been changed, with a reminder to reset clocks and appliances.

In the past, utility meters were read manually by an employee or — more recently — by short-range wireless transmission from meter to a remote vehicle that is driven past once a month. (See 'Radio H₂O on 33 cm', *PCARA Update*, Sept 2004, p 4.)

So what technology is Con Edison using to achieve its new aims? According to the Con Ed web site: "Smart meters communicate over a secure wireless communication network using the same type of extremely low-frequency (*sic*) radio signals that allow you to use your smart phone, listen to the radio, or watch TV. Your meter



Con Edison Smart Meter.

transmits data to a system of access points on utility poles, which send your usage information to us." (<https://www.coned.com/en/our-energy-future/technology-innovation/smart-meters>)

The system being employed by Con Edison will be supplied by California-based **Silver Spring Networks**, a company that was recently acquired by Itron Inc. Silver Spring signed a contract in February 2016 with Consolidated Edison to deploy a combined 5.2 million smart gas and electric meters for New York's Con Edison and Orange & Rockland Utilities as part of the utility's Advanced Metering Infrastructure (AMI) program. The electricity meters will be supplied by Aclara Technologies, which acquired General Electric's smart meter business in November 2016. The meters are 'smartened' by including Silver Spring's radio networking technology.



GE/Silver Spring smart meter in operation. Item to right of LCD is the IR optical port.

According to a report on RF Field emissions prepared for Pacific Gas & Electric, Silver Spring incorporates two low power RF transceivers within the ANSI-standard glass meter bowl. (These days the clear meter cover is more likely to be made of polycarbonate.)

One of the two transmitters is used for automatic meter reading (AMR), sending data back to an **Access Point**



Access Point mounted on a utility pole.

mounted on a utility pole or light pole, from where data is transmitted back to the utility via wireless wide area network. The AMR

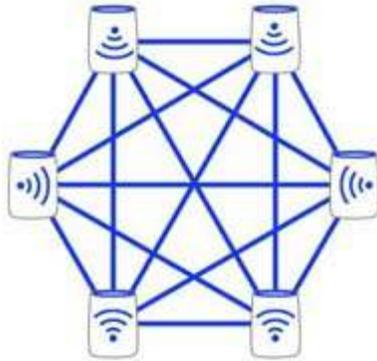
transmitter is rated at one watt maximum power output, operates within the license-free frequency band of 902 to 928 MHz, and uses an antenna inside the meter having a nominal gain of 0 dBi. Use is made of frequency-hopping spread spectrum (FHSS). That "license-free" 902 to 928 MHz band happens to use the same frequencies as our 33 cm amateur band.

The second transmitter contained within the clear cover operates in the license-free 2.40-2.4835 GHz fre-

quency band to provide potential communication with a home area network using “Zigbee” WiFi technology that the customer may employ to monitor power consumption. This second transmitter has an output of approximately 0.1 watt and also uses an internal antenna with a nominal gain of 0 dBi. Needless to say, 2.40-2.4835 GHz partly overlaps with our amateur 13 cm band.

In earlier implementations, the 1 watt automatic-meter-reading transceiver on 902-928 MHz was configured to transmit data to the utility once every four hours. For the Con Edison deployment, this cycle is being shortened to once every 15 minutes. The 2.4 GHz ‘Wi-Fi’ transceiver is designed to transmit only when instructed to by the customer’s home network.

In the event that the smart meter cannot reach its designated access point directly, the transceiver inside each meter can communicate through other nearby power meters in a **wireless mesh network** to forward data to the access point. The Silver Spring design allows up to ~6 hops between a smart meter and its access point. Communication is two-way, with the access point using the same mesh network to communicate



Wireless mesh network.

back to more distant meters.

In the case of an isolated house having no RF path from Smart Meter to Access Point because of distance or terrain, it is possible to install a **Relay** on a utility pole in order to bridge the gap.

Data from each power meter must eventually get back into the Utility’s management system. Each **access point** contains a **cellular modem** transceiver similar to an AirCard (as used with a



Wireless relay mounted on a utility pole.

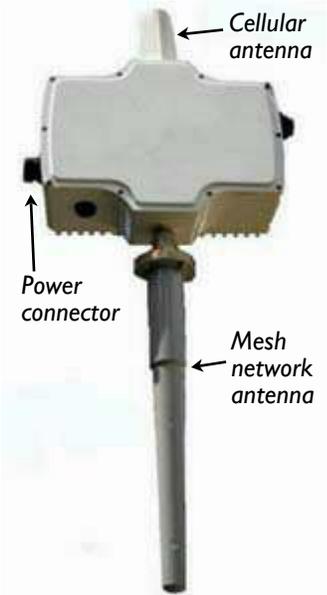
notebook computer) for wireless connection to a cellular carrier’s wide area network. The cellular transmitter will operate in the band used by the chosen cell-phone company for wireless WAN service. This will likely be in the range 800-900 MHz or 1.9 GHz. The access point supports integration across multiple wireless carriers to enable automatic WAN failover. As an alternative to cellular connection, the access point can also make use of wired Ethernet or even satellite.

If an access point should fail, the smart meters’

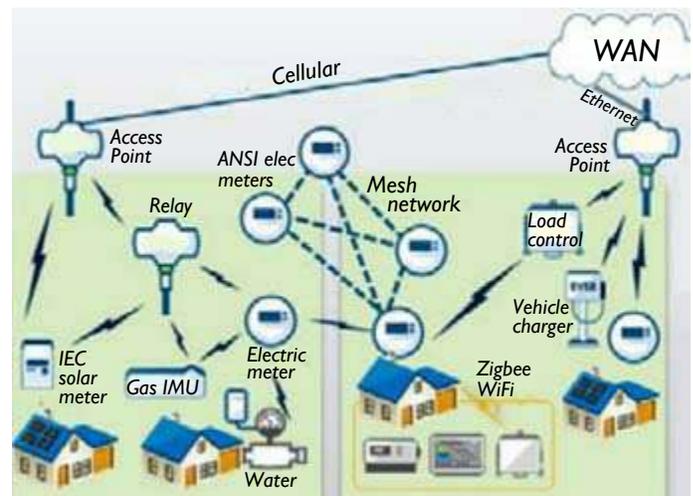
mesh network has the ability to reroute to an alternative access point.

All wireless communication is encrypted using multiple layers of security. One of the capabilities of a smart meter equipped with a service switch is to turn the household load on and off under remote control — so it is really important that security is watertight.

Processing of the incoming data is carried out at the utility company. In November 2017, Siemens announced that Con Edison and Orange & Rockland Utilities had begun deployment of Siemens’ EnergyIP meter data management software, just in time for the first meters going live in July 2017. The system enables Con Edison to query smart meters every 15 minutes to retrieve consumption data and prepare it for billing of power and gas customers. The Siemens platform employs sophisticated data analysis software to ensure that power outages can be localized and eliminated faster than before.



Silver Spring Networks wireless access point for installation on a utility pole or light pole.



Smart meters are connected to the wide area network via optional relay, wireless mesh network and access points mounted on utility poles. [After Silver Spring Networks].

Each smart meter, with installation, will cost Con Edison roughly \$270.00 apiece. The entire program, planned for rollout over an eight year period, will cost approximately \$1.5 billion. Con Edison’s plan was approved by the New York Public Service Commission in March 2016 — so you may already be paying for it on your gas or electricity bill. - NM9J

K44 CW keyboard review

PCARA's entry for the New York QSO Party took place in October 2017 from the location of Joe, WA2MCR. Charles N2SO brought along his brand new **K44 CW Keyboard** — this is a self-contained memory keyer and CW reader. I was impressed with Charles' unit and decided to acquire one for myself.



Charles N2SO brought his K44 CW keyer (arrowed) to the NY QSO Party.

Company history

The K44 is a product of **K1EL Systems** and **Hamcrafters**. K1EL Systems is a New Hampshire company founded in 1995 by Steve Elliot, K1EL. Its first product was the **K8** keyer, implemented on a single eight-pin microchip PIC™ microprocessor. (PIC stands for **Programmable Interface Controller**.) With a few additional components, the K8 provided paddle input, sidetone, speed control, simple memory and output to key a transmitter.

The K8 integrated circuit was superseded by the K9, K10+, K12 and current K16 chip. The company designed another series of keyer ICs for use with a Windows PC. The Winkeyers communicate through a PC's serial port or USB port, generating accurately-timed CW to key the transmitter.



K16 keyer kit based on the K16 chip.

While Steve K1EL handles the engineering aspect of these products, Art Hambleton, K1BX takes care of kit production and distribu-

tion through his company Hamcrafters, <http://www.hamcrafters2.com/>.

For constructors who prefer a complete kit of components, Hamcrafters currently has the K16 keyer kit and the WKUSB-SMT Winkeyer3 kit, complete with circuit board, parts and a metal enclosure.



Winkeyer3 kit.

Keyboard keyers

Use of a Windows computer for CW operation has its drawbacks. The computer can take a long time to start up and shut down. Constant updates are required to the operating system and security software. USB and serial connections can be problematic.

Instead of using a full-blown Windows computer to control the keyer, K1EL designed a unit that only requires a computer keyboard. The **K20** CW keyboard kit had inputs for a PC-AT keyboard as well as a paddle. The K20 was followed by the **K40** which had optional CW decoder and RTTY modules. The **K42** keyboard kit integrated the CW reader onto the main circuit board. K1EL's current model is the **K44**, with an improved CW reader for better copy and faster lock.

To build or not to build?

The K44 is available from Hamtronics as a fully assembled unit for \$149.00 or as a kit complete with metal enclosure for \$129.00. I decided to order the kit and have the fun of assembling it myself. Six days later a small cardboard box arrived by Priority Mail, containing all the components.



A small Priority Mail box contains the entire kit.

Taking a look at contents of the box, there was an attractive two-part metal enclosure painted black with white lettering. Two

circuit boards — main and display — were included with the surface mount components already installed. Non-SMT components for the main circuit board were packed in a heat-sealed plastic bag. There was also a rotary encoder for the front panel control with its own circuit board. Finally there was a small 'wall-wart' power supply rated at 6.0V/250mA — from the weight it felt like a conventional transformer-based unit.



Contents of K44 keyer kit removed from the shipping box.

Assembly time

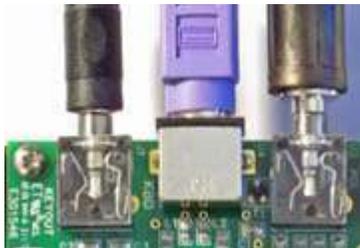
I started assembly of the K44 on a quiet day with nothing urgent taking place. To keep costs low, there is no documentation included with the kit, so the first task is to download the Assembly Guide and User Manual from <http://www.hamcrafters2.com/K44.html>.

These documents are supplied as Adobe PDF files. You can refer to the instructions on a computer screen — but my preference is to print them out double-sided, then store in a ring binder.

The Assembly Guide is well-written with numerous color photos to illustrate the steps. The instructions state that “assembly requires reasonably good soldering skills” and assumes that “you have electronic kit building experience and can identify different types of electronic components.”

I’ll add a few observations of my own, gathered during the assembly process. The first suggestion is to have a small, open container on the workbench to hold all the components. Once you have freed these items from their plastic packaging, they have a tendency to get scattered and fall on the floor.

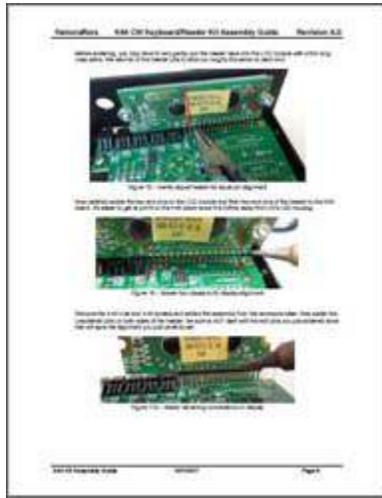
One item that needs to be installed on the main circuit board is the 6-pin mini-DIN connector (J4) for the PS/2 style keyboard. I had to straighten the pins of this connector with long-nose pliers before it would fit the holes on the circuit board.



Mini-DIN PS/2 connector needed pins straightening.

Another item that needed a little adjustment was the set of four green LEDs plus one red LED that protrude through the front panel to provide the tuning indicator. K1EL’s instructions advise careful alignment of these LEDs for the best appearance. My experience was that careful alignment is also essential to make sure the LEDs will fit correctly through the rectangular slot in the front panel.

The K44 has a 2-line × 16 character liquid crystal display to indicate current status and show what is being received or typed. This display is fully pre-assembled on its own circuit board — which has to be mounted at right



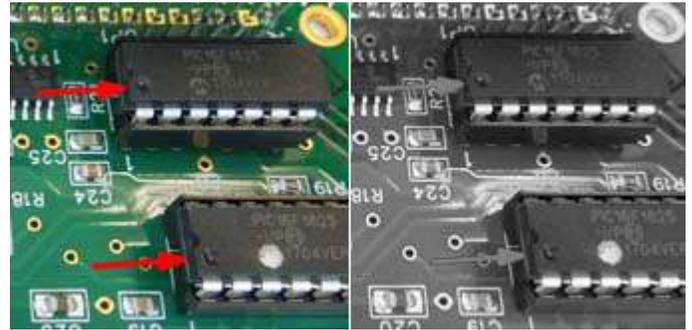
Sample page from the K44 Kit Assembly Guide.



Five LEDs need careful alignment to fit through the front panel.

angles to the main board so it fits squarely behind the front panel cut-out. There are five pages of instruction for this part of the assembly — I would suggest reading through everything before applying the soldering iron.

One final warning — three IC sockets have to be soldered onto the main board. Later on, three integrated circuits have to be installed in these same sockets. It is important to mount both sockets and chips the correct way round, so that pin 1 aligns with the figure “1” on the circuit board.



Red arrows on the illustration for orienting ICs in sockets almost disappear when printed in black and white (right).

If you are working from a black and white copy of the Assembly Guide (like I was) the red arrows in the pictures pointing to the IC notches may not be very clear. Check the color version!

First test

With everything soldered in place, I carried out a visual check for solder bridges on the circuit board using a hand-held magnifier.

After taking care of doubtful soldered joints, I fol-

lowed instructions in the Assembly Guide to mount the circuit board in the enclosure ready for initial testing.

The initial test procedure requires several connec-



Main circuit board and LCD board mounted in the metal enclosure ready for initial testing.



Rear panel connections for the K44 keyer.

tions to the back of the K44, including DC power from the wall-wart, audio input from a receiver,

manual input from a paddle and — most importantly — a **PS/2-style** computer keyboard to be plugged into the mini-DIN socket. Audio-in, paddle-in and key-out connections all require 1/8" stereo jack plugs at the K44 end of the cable.

The User Manual recommends a modern PS/2-style keyboard with **low current draw**. I had a genuine IBM PS/2 keyboard in the basement that I wanted to try. It was an original “Model M” IBM keyboard, the type that is built like a battleship with a positive “click” action while typing.



*Genuine IBM ‘Model M’ keyboard complete with PS/2 mini-DIN connector. Do **not** use this type of keyboard!*

Unfortunately, that old IBM keyboard did not work with the K44. The initial power-up test was a failure. I found out that typical current draw for the Model M keyboard is around 120mA — too high for the regulated 5 volt supply available from the K44.

I had another hunt around the basement and found a more recent 104-key PS/2 keyboard, from the early days of Windows XP. This keyboard was rated at 5V/20mA — which brought about an immediate improvement — everything on the K44 started to work correctly!

Modern computer keyboards are usually supplied with a **USB** connector, but you can still find PS/2-style keyboards through specialist vendors. The 104-key keyboard from the basement was too wide for my operating desk so I replaced it with an “Adesso ACK-595PW” PS/2 keyboard from Amazon. This mini-sized keyboard is only 11 1/8" wide, but still contains a full complement of navigation keys.

With a suitable keyboard connected, initial testing of the K44 was 100% successful. After power-on, the five LEDs on the front panel lit up in sequence. The backlight for the liquid crystal display illuminated and the display showed the software version of the processor chips. Typing



The K44 powered up for its initial test.

on the keyboard resulted in CW being generated, as indicated by internal side-tone and typed letters appearing on the display. With a paddle plugged into the “PDL” socket I could also generate CW by hand. The opto-isolated keyer output was able to key my HF radio when plugged into the radio’s ‘straight key’ jack. Finally, with the transceiver’s headphone outlet connected to the keyer’s audio input jack, I could tune-in CW signals using the front-panel LEDs, then see Morse decoded and displayed on the front panel.

Keyer connections

Before moving to a full evaluation of the K44, I made improvements to the cabling, eliminating adapters wherever possible. One change worth making is to move the audio input from the transceiver’s headphone or speaker jack over to a fixed-level output. On my Icom radios this output is available on pin 12 of the 13-pin DIN ‘ACC’ connector, located on the rear panel. Kenwood radios have a similar fixed output on pin 3 of their 13-pin DIN ‘ACC’ connector. West Mountain Radio manufactures a cable suitable for connecting radio to keyer. (Fixed level audio + FSK for Icom DIN-13 to 1/8" stereo jack, part # 58129-995).

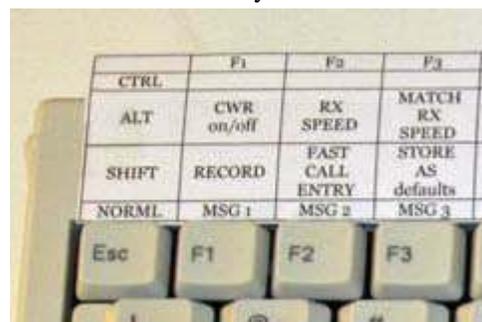


West Mountain Radio fixed level cable for 13-pin DIN connector.

Keyer in practice

With the initial test completed, Hamcrafters recommends picking up the User Manual and becoming familiar with the commands and capabilities of the K44. Thanks to all the functions available, this is no small task.

With more than 60 keyboard commands, I decided that a keyboard template was necessary. I designed templates for the F1-F12 function keys and for the cluster of navigation keys to the immediate right of the QWERTY keyboard. Many of these keys have different meanings depending on whether <Shift> or <Alt> is being held down. I employed a multi-row table in Microsoft Word to show all the different key



You can design a keyboard template for the function keys using Microsoft Word.

actions with Alt, Shift and 'Normal'.

The K44 has a built-in sidetone oscillator with a default frequency of 800 Hz. That default setting was too high for my ear, so I reduced sidetone frequency to 726 kHz to match the peak of the CW Reader's audio filter. I noticed an oddity with the built-in sidetone — after power-up the sidetone volume is quite loud, with a rough note, but after adjusting audio frequency using <Alt>-<↑> or <Alt>-<↓>, the sidetone volume is reduced and the note sounds much better.

Keying speed for paddle or keyboard can be set by adjusting the rotary control on the front panel. Sending speed is immediately displayed top left on the liquid crystal display. In addition, there are 'preset' speeds available by pressing one of four fast speed change keys, <Shift>-<F9> to <Shift>-<F12>. Default speed settings for those four keys are 13, 15, 18 or 20 words per minute. Those defaults are fine by me — but there is also an option to change the preset speeds to suit your own preference.

Tnx fer the memories

The main point of a memory keyer is the ability to store frequently-used messages in non-volatile memory for replay whenever needed. For example, just before a contest you might record your station callsign, the contest exchange and a CQ call in three different messages. This is surprisingly easy to do on the K44. Just press <Shift>-<F1> followed by the function key where you want to store the message and type away.

For example to store the message "de W2NYW" in slot **F2**, press <Shift>-<F1> followed by <F2>. The Caps Lock light on the keyboard illuminates to indicate



Entry of message "DE W2NYW" into message slot **F2**, referred to as **(b)** on the display.

that the K44 is in 'record' mode. Type "de W2NYW" on the keyboard and those same characters appear on the front panel LCD. Should you make a typing error, the message can be edited using arrow keys ←, →, <Backspace> and . When all is well, just press the <Enter> key and the Caps Lock LED will extinguish. The message is now stored in the K44's non-volatile memory and will be available whenever you press the <F2> key.

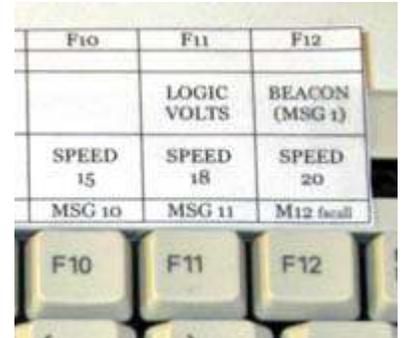
This procedure for storing messages is a lot easier than with my earlier Logikey keyers which did not employ a keyboard. (See: <https://www.hamsupply.com>.)

My own preference for messages stored in keyer memory is to keep the 'canned' messages as simple as

possible and fill in details manually using the paddle. Some contest enthusiasts take another approach, filling multiple key slots with all the messages that might occur during a CW contest (AGN AGN; CALL?; RPRT?; WKD; NR?; TU etc.) That way you can take part in a contest without touching anything apart from the function keys. The K44 is ideal for this approach with its twelve message slots.

F12 is a special message slot on the K44. You can quickly store a short message in slot F12 by pressing <Shift>-<F2>. This is intended for entry of callsigns on the fly — for example you might want to store the callsign of a station you are about to reply to.

There is another use for the F12 key and that is for **beaconing**. Whatever text is stored in slot F1 can be transmitted continuously by pressing <Alt>-<F12>. The message will then cycle for ever and ever — even after switching the K44 off and on. You can stop beaconing and any other messages in progress by pressing the <Esc> key.



The <F12> key is used to send the fast message stored in slot F12 and — when combined with <Alt> — for beaconing the message stored in slot F1.

CW Reader

The K44 CW Keyboard contains a functional CW reader that can display incoming messages on the built-in 2-line × 16 character display. The CW Reader requires an audio feed from receiver or transceiver. As previously mentioned, a fixed-level audio output is preferred over one that varies with the Volume setting.

From the K44 keyboard, press <Alt>-<F1> to toggle the CW Reader on. With the receiver tuned to a CW signal, you should see the K44's green LEDs start flickering. Tune your receiver carefully to illuminate the rightmost green LED and characters should begin appearing on the K44 display, decoding the incoming Morse Code.

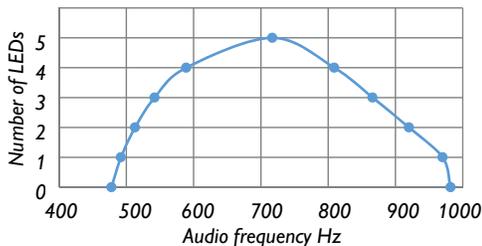


K44 CW Reader decodes incoming Morse from W1MK on 40 meters.

I carried out a comparison of the K44's CW reader with the well-known digital mode software **fldigi** that is installed on my notebook computer. Performance at decoding the same incoming CW stream was quite similar. Both systems lost copy at about the same time when a signal faded into the noise and both had diffi-

culties with hand-sent CW when there was unusual spacing or a peculiar dot/dash ratio. To be fair, **fldigi** also has an excellent waterfall display — which makes it easier to pick out a particular CW signal on a busy band.

For best results, I would suggest adjusting the receiver's AGC hang time to match the speed of the incoming code. If your radio has variable DSP noise reduction capabilities (NR), adjust the control to reduce background noise without distorting the CW signal.



Nose bandwidth of K44 SCAF (switched capacitor audio filter) is only ~200 Hz.

The K44 has a built-in audio filter with a bandwidth of approximately 200 Hz at the nose, so tune your receiver slowly and carefully to peak the signal in the middle of the K44's filter.

I have one minor complaint about the CW Reader's audio filter, with its center frequency **fixed** at 725 Hz. That frequency is a little too high for my ears — I normally have my HF transceiver set to an audio frequency of 600 Hz for CW. In order to work with the K44, I had to increase the radio's "CW PITCH" control from 600 Hz to 725 Hz.



Icom CW Pitch Control.

So — if there was a future refinement for the K44, I would ask for the audio filter frequency to be lowered or made adjustable. Another suggestion would be to include a display with more than 2 lines × 16 characters — though that particular display size is a good compromise, given the diminutive dimensions of the K44's enclosure.

More capabilities

The K44 CW Keyboard is described on the K1EL web site as "the Swiss Army Knife of CW keyers" because of its multiple capabilities. There are more functions that might interest you — for example, the keyer can **switch its display** automatically to the sending window then display keyboard or paddle text as it is being sent.

The keyer can also be set up for **Morse Code practice**, with variations in the character groups sent and the way you respond to them.

Another plus is the capability to compose **complex CW messages** and store them in memory. For example

a message in slot F1 could call a second message in slot F2 and so on. A message in slot F3 might include an incrementing serial number for use in contests — e.g. 5NN 001, followed by 5NN 002 etc. Delays, loops, pauses for input and speed changes can also be inserted into a stored message.



Hamcrafters K44 alongside ACK-595PW mini-keyboard.

Conclusions

The K1EL / Hamcrafters **K44 CW Keyboard** makes a fine addition to any amateur radio station with a CW-capable transceiver. The K44 kit is relatively easy to assemble, or you can pay a little more for the fully assembled unit. Make sure you have a low-current PS/2-style keyboard plus a full complement of connecting leads and you will be ready for some well-sent CW.

- NM9J

PCARA club apparel

Club apparel with name, call sign and PCARA logo is being made available by Barry K2BLB and "Something for All 33 Inc." (<http://www.sfa33.net/>)

Barry brought a selection of items to the Jan 20th PCARA breakfast. Caps, shirts, jackets and briefcase can be embroidered with the refreshed PCARA logo plus the name and call sign of the owner. Laser-engraved call sign badges are also available.

"PCARA Wear" order forms were handed out at the breakfast. Additional forms are being distributed to the Yahoo! Groups readership. Fill out the form, make sure to include name and call sign — spelled exactly as they should appear — then mail with payment to the address on the form.



Peekskill / Cortlandt Amateur Radio Association

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

E-Mail: mail 'at' pcara.org

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

PCARA Update Editor: Malcolm Pritchard, NM9J

E-mail: NM9J 'at' arrl.net

Newsletter contributions are always very welcome!

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

PCARA Information

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

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

PCARA Repeaters

W2NYW: 146.67 MHz -0.6, PL 156.7Hz

KB2CQE: 449.925MHz -5.0, PL 179.9Hz

N2CBH: 448.725MHz -5.0, PL 107.2Hz

PCARA Calendar

Sun Feb 4, 2018: PCARA meeting, New York Presbyterian - Hudson Valley Hospital, 3:00 p.m.

Sat Feb 17, 2018: PCARA Breakfast, Turco's, Yorktown Heights. 9:00 a.m.

Hamfests

Sun Feb 25: Long Island Hamfest and Electronics Fair, Levittown Hall, 201 Levittown Parkway, Hicksville, NY. Doors open 9:00 a.m.

VE Test Sessions

Feb 3, 10, 17, 24: Westchester ARC Radio Barn, 4 Ledge-wood Pl, Armonk, NY. 12:00. Pre-reg M. Rapp, (914) 907-6482.

Feb 6: West Point Cadet ARC, Jefferson Library, 758 Cullum Rd, Rm JH401, West Point NY. 6:30 PM . Pre-reg with Matthew Sherburne (845) 938-5580.

Feb 8: WECA, Westchester Co Fire Trg Center, 4 Dana Rd., Valhalla, NY. 7:00 p.m. S. Rothman, (914) 949-1463.

Feb 11: Yonkers ARC, Will Library, 1500 Central Park Ave, Yonkers NY. 1:00 pm. Pre-reg. John WB2AUL, (914) 969-6548.

Feb 16: Orange County ARC, Munger Cottage, 183 Main Street, Cornwall NY. 6:00 p.m. Contact Joseph J. DeLorenzo (845) 534-3146.

Feb 19: Columbia Univ ARC, 531 Studebaker Bldg, 622 W 132nd St, New York. 6:30 pm, Alan Crosswell (212) 854-3754.



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