



PCARA Update



Volume 6, Issue 3

Peekskill / Cortlandt Amateur Radio Association Inc.

March 2005

D is for Dam

We have been assigned the callsign **W2D** for the PCARA 5th Anniversary Special Event Station to be held on May 14, 2005. This year we will be commemorating the 100th anniversary of the completion of the Croton



New Croton Dam

Dam. The location of the event is still to be finalized.

You may have noticed that some of our members are sporting new fashions with the PCARA logo embroidered on them. This

is due to the efforts of Jim, W2JJG who had the logo digitized by a local merchant so that it could be embroidered onto hats, sweatshirts, jackets, etc. If you're interested in ordering any items of clothing with the PCARA logo, contact Jim.

A foxhunt is still scheduled for Saturday June, 4, 2005 at 3:00 PM. The hunt will begin at the Beach Shopping Center with the foxes being played by Ray, W2CH and Marylyn, KC2NKU. After the hunt, we will be getting together at a local restaurant. Consider joining us for some fun.

As always, I hope to see each of you at the March 6th meeting at Hudson Valley Hospital Center. Please come by and share your thoughts and ideas!

– 73 de Greg, KB2CQE

Repeater news

At the February meeting, Bob N2CBH explained how the W2NYW 2m repeater on 146.67 MHz has been suffering interference from intermodulation. Strong RF carriers present at the repeater site mix with the repeater's carrier in the transmitter P.A. stage, producing unwanted signals close to the repeater input frequency. Bob recently installed a terminated **circulator**



Bob N2CBH explains upgrades to the 2m repeater.

and **low pass filter** on the 146.67 transmitter output. The circulator has a resistive load to absorb RF energy travelling down from the antenna toward the power amplifier. As a result, the background "crackles" and other interference have been greatly reduced.

Bob went on to say that the next step in improving performance would be to test a preamplifier for the repeater's receiver.

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PCARA Officers

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Jim Grefig, W2JJG; w2jjg at arrl.net

Adventures in DXing

– Karl Zuk, N2KZ

HDTV Update: The world of HDTV is maturing in the New York metropolitan area. It's come a long



Channel Master CM4228A 8 bay bow tie UHF array used by N2KZ for digital TV reception with a LG 3100T set top box.

way during the past year. Nearly every analog station now has a digital signal on the air. Many are multicasting with more than one program stream. Here's a summary of how the band looks today:

WCBS DT56 broadcasts unique gray side panels when it is transmitting traditional 4×3 perspective material. Its signal continues to be the most powerful in our area. WNBC DT28 broadcasts two digital channels and, at long last, is at full power. Channel 4-1 presents the HD version of regular Channel 4 NBC programming. NBC's Weather Plus appears on 4-2 with an automated system portraying weather graphics and maps continually. WNYW DT44 has Channel 5's programming in



NBC's Weather Plus service as broadcast by WNBC-DT on UHF channel 28, virtual channel 4-2.

recently begun a new service called WABC+ on 7-2. WABC+ is a mix of Channel 7's newscasts and features along with old western TV shows from the 1960s. Until very recently, 7-2 was broadcasting an ABC TV Network feed called ABC News Now which was forced off over-the-air distribution due to a dispute with NABET, a technician's labor union. NABET claimed that since ABC News Now was an over-the-air service it fell under their jurisdiction and should be manned with union

employees. ABC claimed that it was a temporary experiment and not a proper widely watched broadcast. ABC News Now is still available, by subscription, over the Internet. It was an interesting service to watch. It was a cross between what you would expect on C-Span and long-form programming that would not fit within a traditional broadcast schedule. It also served as spring training for up-and-coming correspondents to test their talents. I hope it someday returns.

WWOR DT38 has finally come on the air with their HD version of Channel 9 programming on 9-1 and a low resolution version of WNYW on 9-2. WPIX DT now broadcasts on two channels. Its low power DT is still on the air via Channel 12. Their new high power digital transmitter is on Channel 33. WPIX broadcasts HD on two identical virtual channels, 11-1 and 11-2, with an interesting wide zoom of their 4×3 material when they are now in 16×9 HD mode. They pre-zoom the 4×3 material so no black side panels are apparent at any time. WNET allegedly broadcasts with very low power as DT61, but I have never seen a sign of it. They have entered the HD market by distributing their programming primarily to cable companies. WNYE analog 25 is not yet on the air with a digital signal. They are allocated channel 24 for their use, but nothing has been seen. WPXN DT30 rebroadcasts sister analog station 31 with low resolution digital programming only. A similar situation can be seen on DT40 WXTV's Spanish language Univision network. WNJU DT36 has also been testing in low resolution digital using virtual channel 71-1 with their Telemundo Spanish schedule. Was this done to allow them to test without public notice? Why virtual channel 71?

New Jersey Public Television pumps out a hefty signal on DT51 as virtual channel 52. NJPTV broadcasts a quadcast during the day. 52-1 is the programming you would see with an analog TV. 52-2 is PBS-KIDS.



52-3 is PBS-YOU, a self-help you-niversity via video. 52-4 is dedicated to New Jersey public affairs programming. Between 8 pm and midnight, 52-2, 52-3 and 52-4 go off the air to make way for the PBS HD Network feed on virtual channel 52-5. They present very crisp and beautiful HD pictures which are a treat to watch. Telefutura's DT53, also in Spanish, is in low resolution digital on virtual channel 68-1.

WTBY, based in Poughkeepsie, is widely available with a low resolution religious quadcast on DT27. Their DT54-1 is the Trinity Broadcast Network also seen on their analog channel 54. 54-2 is The Church Channel with many shows presenting masses and prayer. 54-3 is JCTV with ultra-hip Christian rock videos. 54-4 is TBN's Enlace USA in Spanish. Finally, religious Family Radio's



WFME (Channel 66, West Milford) 29-3 test frame on digital UHF channel 29.

is an audio only feed of Family Radio. 29-6 is a relay of NOAA weather radio from New York City. 29-10 is another audio feed with right channel only. 29-11 is the same audio as left channel only. What fun! An historical note: WRNN, the all news and infomercial Regional News Network from Kingston, New York, has become one of the first channels to return their analog license and go exclusively digital. RNN's analog channel 62 is now silent and dark. They now rely solely on their digital signal seen on channel 48. Their analog repeater, operating from Pleasantville, New York on Channel 57, now relays WWOR programming full-time.

It will be very interesting to see how this book will end. Currently, most TV stations are operating on two channels. One channel carries the traditional analog broadcasts. Their new channel carries their digital signal. Eventually, broadcasters will have to scale back to operating on one single channel. Will broadcasters continue to operate on their new channels or will they revert to operating digital transmitters on their old analog channels? Time will tell.

S-Band propagation: Satellite radio is a quizzical new world to newcomers like me. For 95% of the area I cover traveling in my car, XM Radio reception is solid as a rock. Some areas prove troublesome and inconsistent. Rocky passages, with enormous rock mounds and hills blocking the view to the southwest sky, will interrupt S-band reception from time to time. One day, I can ride through a valley and have solid reception. Another day will hold almost non-existent reception. Other days may be spotty. I haven't noticed any correlation with weather, temperature or time of day. Mobile operation encourages the bit error rate and carrier to noise level to be marginal at times. (Nothing beats a fixed home installation with a high gain antenna!) I'm trying to discover more about



2005 Honda Accord Hybrid has a combined AM/FM/XM antenna.

WFME DT29 rebroadcasts their regular analog programming on virtual channel 29-2. Channel 29-3 is a test frame asking for reception reports. 29-5

this, but it isn't easy! S-band waves behave like microwaves with similarities to the properties of light. Does reception vary with the position of the sun in the sky? What other things can vary signal strength? I'd love to know. I guess much research is ahead of me. I'll share my results if I reach any conclusions! One thing is certain: The speed you are driving is proportional to higher bit error rates. I have noticed much better reception, through marginal areas, when I pass through as slowly as possible.

If you are looking for a kooky new way to DX, try WiFi DXing! Very inexpensive hardware has encouraged computer users to establish low power wireless LANs in their homes allowing roaming use of laptop computers, printers and other devices. I discovered a freeware program called Net Stumbler (available at: <http://www.netstumbler.com/downloads/>) that allows you to continually scan the WiFi frequencies for wireless LAN signals. My laptop already contains a WiFi card, so I was ready to DX! I launched Net Stumbler and took a short drive to my local library a few miles away. The computer went wild with reception catches! I had dozens and dozens of hits in just a few minutes. Most entertaining were the names some people chose for their transmitters. I caught Cat Palace, Tall Couture, Max's LAN, 2Cute, SunEDay and a host of others. Many displayed their default names: Linksys or Netgear. Net Stumbler also indicates the amount of bandwidth available and if the wireless LAN signal is locked by encryption. You can also see relative field strength via a bar graph display. Just like the analog wireless telephones popular in the 1980s and 90s on 46 and 49 MHz, these devices really do broadcast! I was amazed at the long distances some WiFi transmitters can be "seen." Beware! These stations are very difficult to QSL!



The Ultimate QRP: How far can you lower your power and still be heard? Very, very low! John Ceccherelli, N2XE, recently demonstrated that nearly any signal can be heard hundreds of miles away. He began experiments with a beacon transmitter operating with a few milliwatts on 80 meters. Using laboratory quality attenuators and power metering, John's beacon consisted of his Elecraft K1 QRP transmitter, heavily attenuated, broadcasting from dusk until dawn. He would announce, via an Internet reflector, when and where to look on a particular evening. During the weeks of the test, John's beacon appeared on several frequencies in the 40, 80 and 160 meter bands.



Every night, a new Elecraft K1 QRP CW transceiver.

code word would be used to verify reception of the mini-beacon. Dozens of hams would try to pull through a message like: VVV DE N2XE/B WATT WATT WATT. If you were lucky and skillful enough to snag the beacon, you would send what password you copied to John for verification. Then, he would post the results the next day along with instructions for receiving the next evening's beacon. Quite a bevy of hams gathered and listened over a period of about six weeks. Although his Wappingers Falls QTH is just over 20 miles from my home, I managed to copy his beacon when operating with as little as 50 milliwatts. Some hams obviously had much better "ears" than mine. The very best reception of N2XE/B was credited to Bill Tippett, W4ZV, in New London, North Carolina 546.8 miles away. He copied N2XE/B when John was operating at 40 microwatts! Bill copied the code word OMAHA using a Ten Tec Orion transceiver and a 1000 foot Beverage antenna. On this historical night, John, N2XE, was using an 80 meter off-center-fed dipole to transmit his beacon. Wow!

To put this in perspective, 1000 milliwatts equals one watt of power. It takes 1000 microwatts to make one milliwatt. John's beacon was operating at 40 microwatts! If you calculate the amount of distance covered by John's flea power it equates to 13,467,980 miles per watt! It's absolutely amazing! Read all about it at: <http://mysite.verizon.net/n2xe/id2.html>. John is a very active member of the QSY Society based in Dutchess County. A fun club of active hams!

Take a look at their web site:
<http://www.qsl.net/qsy/>

Until next month, keep CWN!
I'm on 30 Meters waiting for your call!



— 73 de N2KZ "The Old Goat" dit dit.

Marconi time

The time is approaching for **International Marconi Day** — when radio amateurs around the world celebrate the birthday of wireless pioneer Guglielmo Marconi. Marconi Day takes place on the Saturday closest to Marconi's birthday — April 25, 1874. For 2005, that Saturday falls on April 23 — and amateur radio stations will be operating from historic sites associated with Marconi's radio achievements such as Poldhu in Cornwall, Chelmsford in Essex and Glace Bay, Nova Scotia. The Cornish Amateur Radio Club offers special Award Certificates for radio amateurs contacting authorized International Marconi Day Stations. For further details, see the following web site: <http://www.users.globalnet.co.uk/~straff/>.

I have been reading a book about the early years

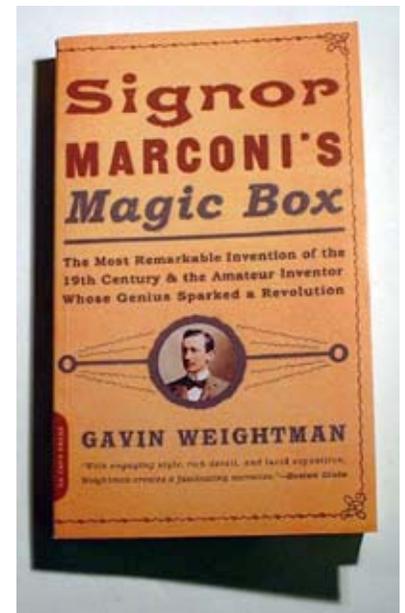
of Marconi, from his arrival in London in 1896 to the outbreak of World War I. *Signor Marconi's Magic Box* by filmmaker and journalist Gavin Weightman is a fascinating read that fills in the personal story between the technical details of Marconi's achievements.

Marconi cannot be said to have "invented" radio — that distinction probably belongs to Scottish physicist James Clerk Maxwell, who derived the theoretical underpinnings of electromagnetic radiation — and to Heinrich

Hertz, the German physicist who first produced approximately meter-wavelength radiation from electric sparks in 1888 and showed that the waves could be reflected and refracted just like light rays.

As mentioned earlier, Guglielmo Marconi was born in 1874, the second son of Annie Jameson and Giuseppe Marconi. Annie Jameson was Irish, from the well-known family of whisky distillers, while Giuseppe Marconi was a rich, Italian widower. Twenty years later, as a young man, Marconi was reading about Heinrich Hertz's work and in the family home at Bologna, Italy he was able to repeat Hertz's short range detection of waves from a spark gap. Marconi was determined to increase the range of these waves — his first step was to change the detector from a second spark gap to the "coherer" — a glass tube filled with metallic filings invented by Oliver Lodge. By careful experimentation, he improved the sensitivity of the coherer, then he increased the size of the conductors attached to the spark gap and to the detector. These longer conductors increased the radiated wavelength and extended the range to more than a mile. Along the way, Marconi not only used Morse code to send messages but also invented the vertical wire antenna fed against ground, which still bears his name today.

Marconi offered his invention to the Italian Ministry of Posts and Telegraphs but was turned down. He traveled to London with his mother in 1896, carrying a black box that contained his apparatus. He successfully demonstrated the equipment to the British Post Office, the War Office and Admiralty officials, and later gave a demonstration to the public and press. The following year, a company was registered and later



renamed as “Marconi’s Wireless Telegraph Company Limited.” Marconi continued experimenting to improve the range of his equipment, concentrating on reception at sea. The ability to communicate with ships beyond the horizon was a great advance and Marconi’s equipment was installed in warships and other vessels. This led to Marconi’s success at Signal Hill, St. John’s, Newfoundland where he received the first transatlantic signals from his company’s Poldhu, Cornwall transmitting station in December 1901. Later, all large passenger liners were routinely fitted with Marconi apparatus, manned by a Marconi operator, who could contact shore stations or other ships. The *Titanic* was fitted with Marconi equipment, and its use by the young Marconi operators Harold Bride and Jack Phillips was credited with saving 700 lives after the vessel struck an iceberg in April 1912.

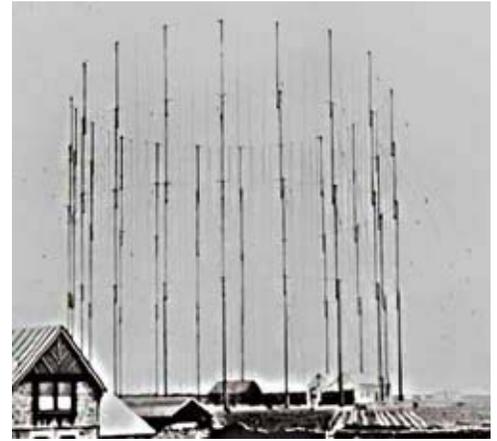


At the age of 22, Guglielmo Marconi arrived in London, bringing wireless telegraphy equipment he had developed at the family home in Italy.

How and why: I sometimes wonder what it would be like if today’s radio amateur could travel back one hundred years to the era when Marconi was developing his craft. The first thing to realize is that transmissions at the beginning of the twentieth century were broad-band. There were no crystal oscillators or VFOs... just a high powered spark gap connected to the radiating elements. The second thing to realize is that there was no means of amplifying the weak received signals. The receiving antenna was connected directly to the detector, whose output was taken to headphones or to a relay driving a morse inker. The “coherer” perfected by Marconi cannot have been a very efficient detector – radio frequency signals imposed on a bunch of metal filings in a glass tube, caused them to “cohere”, reducing the DC resistance between the electrodes at each end of the tube.

Given these limitations, it is a miracle that Marconi heard anything from Poldhu during those first transatlantic receiving tests at Newfoundland, 1800 miles away. The Poldhu station was generating foot long sparks from a 25 kilowatt alternator, connected to an antenna that consisted of an inverted wire cone, 200 feet high. The Signal Hill receiving station was forced to use a kite-born antenna and an untuned ‘self-restor-

ing coherer’. Some people believe the three dots (“S”) heard by Marconi and his assistant George Kemp were no more than static, while others have suggested that the low frequency emissions (around 150 kHz) intended



Marconi’s first antenna at Poldhu was a giant cone of 400 wires suspended from a ring of twenty 200 ft wooden poles.

to cross the ocean from Poldhu were accompanied by copious amounts of high frequency short-wave harmonics that really made the leap across the Atlantic, courtesy of the ionosphere.

Another question worth asking is why Marconi was so successful when others working on wireless telegraphy were less so. The combination of Hertz’s spark transmitter with large, wire antennas and Morse code as the means of communication seem to have been key. Marconi’s approach of empirical improvement to the overall system, followed by long term adoption of a reliable design is reminiscent of successful companies today. In addition, Marconi concentrated on marine applications, with coast stations using vertical antennas close to the sea. Marconi surrounded himself with excellent people — his Chief Assistant was George Kemp, an ex-Navy Petty Officer who was well versed in the rigging of masts and stays, while Ambrose Fleming, Professor of Electrical Engineering at University College London, designed the high power electrical generating plant. Readers may recall that Fleming was also inventor of the first electron tube, the thermionic diode (see *PCARA Update* August 2004.) Finally, Marconi spoke perfect English thanks to his mother’s side of the family, had a calm, unassuming manner and established his reputation for solid achievement backed by reliable witnesses at a time when others were making outrageous claims.



For more details of Marconi’s achievements, read “*Signor Marconi’s Magic Box*” by Gavin Weightman, published by Da Capo press in the U.S.A., or visit the Marconi Calling museum at <http://www.marconicalling.com/museum/html/archivehome.html>.

- Malcolm, NM9J

Club couture

PCARA's Treasurer Jim, W2JJG, explains how you can now acquire your very own personalized club apparel.

The PCARA logo has been digitized and can be embroidered on articles of clothing. Shown here is the club hat with logo embroidered on the front and callsign on the back. For the hats, only the tower and PCARA are embroidered.

Hats are available for \$25 and the small to XL sweatshirts are available for \$37.50 For XXL and above they are \$39.50.

If you want to have your very own, send me an e-mail. Let me know your callsign, if you want a hat (one size fits all), a sweatshirt (please specify size) and for the sweatshirt your preferred color for the callsign.

The most important step is to mail a check for the correct amount. Make the check out to PCARA and mail it to:

PCARA,
PO. Box 146,
Crompond, NY 10517-0146.

When I get the check, I'll place the order. Orders can be picked up at our regular monthly meetings.

- 73 de Jim W2JJG



PCARA hat with club logo embroidered on front and your callsign on the back.



Jim's sweatshirt is embroidered with the full PCARA logo plus callsign in yellow. The callsign could also be in black or blue.

Nassau visit

Ray W2CH and Marylyn KC2NKU have been on their travels again. Here Ray reports on their recent trip to Nassau, capital of the Bahamas.

We returned from Nassau on February 18. I had taken just my Yaesu FT-817ND QRP transceiver and the "Miracle Whip" antenna for all-band listening from the Bahamas. Nonetheless, the Transportation Security Administration left a message in my suitcase saying that they had checked what I had inside it.

On the amateur bands, I was able to monitor the Maritime Mobile net on 14.300 MHz with Clyde, KG4BVR, net control, in Mobile, Alabama. Later in the week I copied the DX Net on 14.251 MHz with Jose, KP4BME, in Puerto Rico as net control.

On the Miracle Whip I heard ZS6GHK in South Africa, and on a couple of afternoons, I heard VK's coming in fairly well too. I could hear W2 stations from back in NY-NJ, but only with moderate signal strength. I also listened to MW broadcast stations, with WCBS-AM coming in sometimes. Again a lot of the broadcast stations received were from South America and the Caribbean. There were some FM broadcast stations — one was the "ZNS" Bahamas government station on 104.5 MHz. There was a religious station on 101.9 MHz and other stations had music on 94.9, 97.9, and 100.3



Ray W2CH on the balcony of the Sandals Resort in Nassau. Photo by KC2NKU.



Ray's portable station consists of a Yaesu FT-817ND QRP transceiver and Miracle Whip antenna.

MHz. Commercial FM stations have only been broadcasting since 1997. On the MW broadcast band there is ZNS-1 on 1540 kHz with 50 kW and other "ZNS" stations on 1240 kHz and 810 kHz with lower power levels than ZNS-1. Needless to say the weather was mostly sunny and fairly warm.

Back in Cortlandt Manor, I had some QRP contacts on HF with my new Spi-Ro AS-2 All-Band Antenna. This antenna, reviewed on page 55 of Dec 2004 *QST*, is only 70 feet long with two "shorteners" and is fed with 450 ohm ladder line. At 1948 UTC using the Yaesu FT-817ND I worked HK4CYR, Marco, in Medellin, Columbia on 14.245 MHz during the DX net. He was 59 here and I was 34, using SSB at 5 watts. Then, at 2028 UTC I worked V31LZ, Ruman, in San Ignacio, Belize on 18.141 MHz. He was 59 and my report was 56. I called CQ on 18.130 MHz, and at 2043 UTC was called by Bob, N4UVC, in Florida. He was 59+ here and my report was 59. So it was good to do some QRP operating with a full-size, outdoor antenna that afternoon.

– de Ray W2CH

Travels of WA2WGJ

PCARA member Charlie, WA2WGJ is shown in the accompanying picture during a visit to Brazil in September 2004. The statue of Christ the Redeemer, arms spread to welcome the world, sits atop Rio de Janeiro's Corcovado mountain, 2,330ft above sea level. Since being placed on the mountain in 1931, the figure has become one of the most famous symbols of Rio. It stands 100 ft tall on a 20-ft pedestal, weighs 700 tons, and is visible day and night from most parts of the city. The summit is reached by miniature train that runs from the Cosme Vehlo District to the foot of the statue. The summit offers spectacular views over Rio. Charlie also visited Buenos Aires, Argentina on this trip.



WA2WGJ in Brazil.

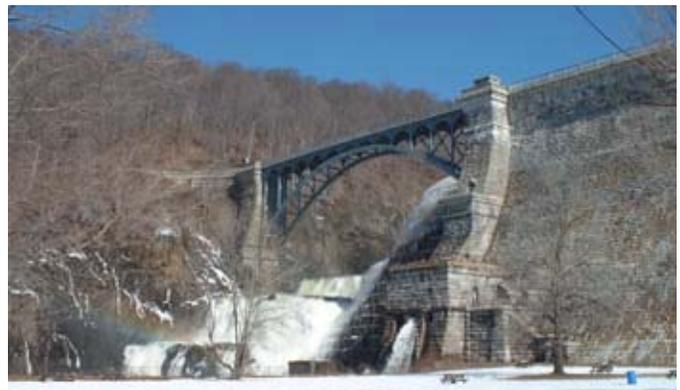
More dam information

On Saturday May 14, PCARA will be celebrating the hundredth anniversary of completion of the Croton Dam. Here is a copy of the announcement scheduled to appear in the May edition of *QST*.

Cortlandt Manor, NY: Peekskill Cortlandt Amateur Radio Association, W2D. 1400Z-2100Z May 14. 100th Anniversary of completion of Croton Dam. 28.450 21.350 14.250 7.250 MHz. Certificate. PCARA, PO Box 146, Crompond, NY 10517. <http://www.pcara.org>.

Read on for some fascinating facts about the famous dam in our own backyard.

The New Croton Dam replaced the **Old Croton Dam** which was completed in 1842. The previous, fifty-foot high rock-filled structure was the first large masonry dam in the United States. Water from the old dam was carried to the growing City of New York along the Croton Aqueduct, 38 miles long.



New Croton Dam in the Town of Cortlandt.

The city's thirst outgrew the first reservoir and in 1893 work began on the **New Croton Dam**, on land purchased from A.B. Cornell. The Quaker Bridge site is 4 miles downstream from the old dam, which was eventually flooded over by the new reservoir.

The new dam is still the second largest hand-hewn masonry structure in the world after the Great Pyramid in Egypt. It rises 200 feet above the valley and is faced with Peekskill granite. Most of the labor was provided by Irish and Italian immigrants. By 1890/91 water was flowing to the Central Park Reservoir, though the dam was not completed until 1905-1907.

The New Croton Aqueduct, 30.5 miles long, supplemented the flow of the original Croton Aqueduct. Deep underground tunnels, including one under the Harlem River, channel water to the city.

The Croton reservoir system supplies New York City, parts of the Bronx and Westchester County with 300 million gallons of water per day. Nowadays the Croton Reservoir is supplemented with water from the Catskill and Delaware River systems.

Peekskill / Cortlandt Amateur Radio Association

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Newsletter contributions are always very welcome!

Archive: <http://home.computer.net/~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 the Hudson Valley Hospital Center, Route 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.

PCARA Repeaters

W2NYW: 146.67 MHz -0.6, PL 156.7Hz

KB2CQE: 449.925MHz -5.0, PL 179.9Hz

(IRLP node: **4214**)

N2CBH: 448.725MHz -5.0, PL 107.2Hz

PCARA Calendar

Sun March 6: March meeting, HVHC, 3:00 p.m.

Sat May 14: Special Event Station W2D.

Hamfests

Sun Mar 5: Splitrock ARA Hamfest, Parsippany PAL Bldg, Smith Fld, Rt 46 and Baldwin Rd, Parsippany NJ. 8:00 a.m.

Sun Apr 10: Mt Beacon ARC Hamfest, Tymor Park, County Route 21, Unionvale, NY. 8:00 a.m.

Sun Apr 24: Southington ARA Hamfest, Southington HS, 720 Pleasant Street, Southington CT. 9:00 a.m.

VE Test Sessions

Mar 5: Splitrock Hamfest, Parsippany PAL Bldg, Smith Fld, Rt 46 and Baldwin Road, Parsippany NJ, 8:45 a.m.

Mar 6: Yonkers ARC, Yonkers PD, 1st Precinct, E Grassy Sprain Rd, 8:30 a.m. Contact D. Calabrese, 914 667-0587.

Mar 14: Split Rock ARA, Hopatcong HS, Hopatcong NJ. 7:00 p.m. Contact Sid Markowitz, 973 724-2378.

Mar 18: Bergen ARA, Westwood Reg HS, 701 Ridgewood Rd., Washington Twnshp NJ. 7:00 p.m. Contact Donald Younger 201 265-6583.

Mar 21: Columbia Univ ARC, Watson Labs, 612 W 115th St. New York, NY, 6:30 p.m. Contact Alan Crosswell, 212 854-3754.

Apr 23: PE.A.R.L., Putnam Co BES, 112 Old Rt 6, Carmel NY, 9:00 a.m. Contact NM9J.



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