



PCARA Update



Volume 15, Issue 11 Peekskill/Cortlandt Amateur Radio Association Inc. November 2014

Run for dinner

We've had quite an eventful month. In last month's newsletter (October), I placed an appeal for donations towards the purchase of a new Stationmaster antenna for the 449.925 MHz repeater due to the fact that the current antenna was in poor condition. At the October meeting \$1,000 was donated towards the cause through contributions by Ray W2CH & Marylyn KC2NKU, Joe WA2MCR, and Malcolm NM9J. This will provide for a sorely needed upgrade for the UHF machine. Thank you all for your generosity!

The 34th Annual Harry Chapin Run Against Hunger took place on Sunday October 19 in Croton-on-Hudson with volunteers from PCARA, WECA and Stamford ARA positioned around the course to assist with race communications. See page 5 for a full report. Thanks to all who stepped forward and assisted with this event, which benefits local organizations combating hunger.

PCARA was represented in the New York QSO Party through the efforts of Joe WA2MCR and Malcolm NM9J on October 18, 2014.

PCARA also sponsored a plaque this year for "Non-New York Low Power". Thank you Joe and Malcolm!

In just over a month, it will be time for the annual PCARA Holiday Dinner. This will be the second time that we celebrate the Holiday Season at the Cortlandt Colonial Restaurant in Cortlandt Manor, NY. The dinner will be held on December 7 and will begin at 5:00 pm. The cost is \$30.00 per person which includes an entrée, dessert (cake), gratuity, and tax. Soda and drinks are extra. Look for the menu in this edition of the *PCARA Update*. As always, **all are welcome**.



Greg KB2CQE 'shadowed' officials at the Run Against Hunger.



Cortlandt Colonial Restaurant will be the location for the PCARA Holiday Dinner in December 2014.

Our next meeting is on Sunday November 2 at 3:00 pm, at Hudson Valley Hospital Center in Cortlandt Manor, NY. I look forward to seeing each of you there — *after* you remember to move the clocks back.

- 73 de Greg, KB2CQE

PCARA Officers

President:

Greg Appleyard, KB2CQE, kb2cq at arrl.net

Vice President:

Joe Calabrese, WA2MCR; wa2mcr at arrl.net

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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. Join net control Karl, N2KZ for news and neighborly information.

Adventures in DXing

- N2KZ

One Great QSO

30 meters is a great little band. It is a nice hybrid of the wonders of 40 meters along with the DX marvel of 20 meters. You just never know what to expect and it certainly is a ton of fun. You'll hear a lot of CW and lots of digital data modes, too. I've had more than a few miracle moments here. I'd recommend it to anyone.

My rig of choice for 30 metres is my trusty Oak Hills Research OHR-100A — a QRP kit I built about ten years ago. Its mighty 5 watts radiates to the world via a homebrew dipole antenna up about thirty feet pointing northeast / southwest.

With AF and RF gain controls and adjustable receive bandwidth, it is more than just a simple QRP project. It was designed by an old friend, Doug DeMaw, W1FB, so the rig has a special place in my heart.

One afternoon a few weeks ago, at about 5:30 pm, I had my OHR on and listening casually while doing chores. My ears perked up when I heard an interesting callsign on 10.120 MHz. Really strong signals were rolling in from VE9WW calling CQ at a slow pace obviously using a straight key. "Can you excuse me for a few minutes?" I asked my wife. This one was just too good to pass up. We connect immediately.



Karl operating the OHR-100A

from Moncton, New Brunswick, Canada. For decades and decades, Moncton was the home of a powerful clear channel CBC Radio outlet on 1070 kHz AM. Radio Canada International used to broadcast right outside of Moncton from a swampy marsh in Sackville where RCI's enormous antenna farm and multiple thunderbolt



Oak Hills Research OHR-100A QRP CW transceiver.

shortwave transmitters dominated the HF airwaves. It was Canada's Radio Central all through the 20th century. Moncton is just a very cool place to be!

Will is using a transceiver he really likes: A Kenwood TS-430 at 100 watts also feeding a dipole. It's a nice armchair QSO and Will has a seasoned fist. He's 73 years old and has been a ham "only" 42 years. We chat a little about New Brunswick and Ontario and what it's like to live in Moncton. I'm noticing the pace of the code is beginning to accelerate.

Both of us have full break-in QSK and I hear quite a lot of activity around us on 30 this evening. A couple of enormous pile-ups were holding court earlier down the band and the chatter goes on and on. I catch someone asking QRL? nearly zero beat with Will and I. This request is quickly answered by a blazingly fast coder but I continued to continue. My ears can certainly filter out this noise and our conversation continues. I didn't know until later that the speed-demon reply actually came from Will!

Now we are talking about all sorts of QRP rigs. Will has a classic Small Wonder Labs SW+30. I mention my SW+40 and SW+20 and my nifty little Tuna Tin II. I really knew something was up when Will mentioned he had a whole bunch of straight keys and 30 or more semi-automatic bugs, paddles and keyers. I'd say our chat speed is now up to maybe 20 wpm! I'm really starting to wonder why we started out sending so slowly.

Time flies when you are having fun and we are already an hour into our QSO. I hear a dinner call from across my house and I apologize to Will and give my 73. VE9WW is now in full gear and jumps onto one of his bugs. I guess I took him by surprise. He asks me where you can get OHR rigs and I reply "Morse Express dot com. - Gotta run!"

Now Will has ramped up to supersonic speed and asks if there are any other suppliers. He is *flying*. Is he secretly a Russian ham sending at 50+ wpm? You



VE9WW discusses aspects of his semi-automatic bug key collection with visitors to the Shediac, NB Fleamarket.

gotta laugh! We both sign and send our dit dits. I'm glad there are no speed limit signs along 30 meters! What a blast! What fun!

Close Down and Open Up

What a busy time for changes on the radio dial! 50,000 watt WQEW 1560 AM 'Radio Disney' in New



York City is being sold and will probably become a Family Radio affiliate. Family Radio currently operates the old WVIP-FM facility on 106.3 MHz FM based in Mount Kisco.

For decades, religious broadcaster Family Radio had a dominant FM station covering the New York metro from New Jersey on 94.7 FM. It was recently sold and became country music 'NASH FM.' By purchasing WQEW 1560, Family Radio will once again have a dominant and strong signal serving all of New York City during the day and, with a little help of sky-wave, covering most of the East Coast at night. Disney is divesting themselves of their entire nationwide over-the-air radio network. Radio Disney will continue to deliver its unique sound via the Internet and on satellite radio SiriusXM Channel 79.



Pawling Public Radio supporters remove their FM antenna from the CVS Building roof.

roof of their studio building to a more desirable location in Pawling to increase coverage until the station's

Up in Dutchess County, Pawling Public Radio continues to work out the details of their recent FCC construction permit. They will eventually go on the air as WPWL-LP on 103.7 FM but need to find a good tower location for their new station. Recently, their current Part 15 transmitter and vertical antenna was moved off the

new FCC-licensed transmitter and antenna become operational. You can hear all of their terrific local programming over the Internet at <http://www.pawlingpublicradio.org/>.

Next door to us in Connecticut, public radio station WSHU is building a new local service dedicated specifically to serve listeners in Fairfield County. FCPR can be heard on a troika of AM stations: WSTC 1400 Stamford, WNLK 1350 Norwalk and WSHU 1260 Westport and now on a new FM translator W293AU from Bridgeport on 106.5 FM. You can also hear it if you have an HD Radio and tune to 91.1 FM WSHU HD-2 from Trumbull. Internet listeners can hear FCPR at <http://wshu.org/>



Outside of the New York area, Canadian short-wave survivor CFRX on 6070 kHz in the 49 meter band has returned to the air. Once again, repairs to the legacy transmitter have been made after being silent for several months. CFRX was recently testing on



dummy load and now their transmitter is finally on the air. CFRX relays Toronto's CFRB 1010 AM with a news/talk format 24 hours a day. It may be the easiest way to hear a Canadian shortwave

broadcaster in the year 2014! Try it! QSL requests should be sent to: odxa@at.rogers.com or via snail-mail to: Ontario DX Association, 3211 Centennial Dr., Apt. 23, Vernon, B.C. V1T 2T8, Canada.

The big news from across the pond is the closing of quite a giant. Ireland's public broadcaster RTÉ Radio One is ending operations of its monster long wave transmitter on 252 kHz on Monday, 19 January, 2015. The facility was built in 1988 as the home of independent broadcaster Atlantic 252. Its 300 kilowatt signal, augmented by a rather nice ground mat and fine ground conductivity, gave the station amazing coverage.



RTÉ Radio One 252 kHz long wave transmitter site at Clarkstown, Co. Meath. The guyed mast is 813 feet tall.

I heard RTÉ 252 day

and night near Paris this summer. RTÉ Radio One offers quite a variety of programming and it was a welcome companion for English speaking tourists all over Europe as well as on the Irish mainland for 10 years. It will be sorely missed. Listen to all of RTÉ Ireland's services online at <http://www.rte.ie/>.

Finally, your TV may have a new station, too. If you still have a working TV antenna, you'll probably be able to see a new digital TV station on Channel 3: WJLP-HD. Their beautiful Harris transmitter is on-the-air from Times Square with a potent signal that covers the entire New York City metropolitan area. It's an affil-



Harris digital TV transmitter for WJLP-HD, transmitting on VHF channel 3 from 4 Times Square, New York.

iate of the nationwide ME TV network offering a virtual time tunnel of television with shows like M*A*S*H, Gilligan's Island, Cheers, Dragnet and Bonanza. Re-scan your TV for over-the-air stations and look for ME TV on virtual Channel 3-10.

Until next month, Happy Halloween and have a great Thanksgiving.
– Karl 'The Old Goat', N2KZ



Icom 50th anniversary

[Press release] 2014 is a very special year for the Icom family as it marks the 50th Anniversary of the founding of ICOM Inc.

Founded in 1954 by Tokuzo Inoue the company has grown into a world-renowned manufacturer of Business radio, Amateur radio, Marine radio, Aviation radio, Navigation products and Communications Receivers. The company continues to look forward and recently the company has moved into digital Amateur radio products (D-STAR), digital two way radio products and systems including NXDN, dPMR and P25 products under its IDAS digital brand.

ICOM products, across the globe, have a reputation for unsurpassed quality and reliability ...so important when so many ICOM customers depend on its products for their livelihood and safety. ICOM radios are tested to

pass rigorous in-house tests as well as environmental tests to the US Military standard 810 specifications. Over 50 years of engineering and production excellence is built in to every ICOM product. ICOM's Research & Development is renowned for developing groundbreaking equipment. In recent years ICOM developed waterproof, buoyant radios for the marine market, advanced digital & HF radios for the Business and Amateur radio marketplaces. To show its commitment to design and innovation, just check out the touch screen IC-7100 HF radio or Icom's new Licence-free WLAN radio system.



ICOM is located in Osaka, Japan and is a rare example of an electronics manufacturer who has not shifted production to lower cost countries, it has kept its production base 100% in Japan and that commitment to quality is one of the founding precepts of the brand. The Wakayama Icom plant has an advanced production system to produce the entire range of multi-mode wireless communication products. Design and manufacture processes are certified to ISO9001/ ISO9002 quality and ISO14001 environmental procedures.

Today ICOM looks very different to what it was 50 years ago. ICOM Inc is now a publicly held Japanese corporation; its stock is traded on the Tokyo and Osaka Stock Exchanges. The company has an international sales and service network around the world, today selling in over 80 countries around the World. Subsidiaries can be found in the US, Australia, Germany, Spain and China.

TIMELINE

1954 Tokuzo Inoue founded Inoue Seisakusyo in Kyoto Prefecture, Japan.

1964 INOUE COMMUNICATION EQUIPMENTS CORP. established with Tokuzo Inoue as President.

1976 Icom (Europe) GmbH, established in Dusseldorf, Germany.

1978 Name changed to Icom Incorporated.

1979 Icom America Inc. established in Bellevue, WA, USA.

1982 Icom (Australia) Pty., Ltd. established in Melbourne, Australia.

1986 Hirano Plant completed.

1987 Thanet Electronics changed name to ICOM (UK) Ltd

1987 Tokyo R&D Centre established.

1988 Wakayama Icom Inc. established in Wakayama Prefecture, Japan.

2006 Mr. Tokuzo Inoue assumed the position of Chairman. Mr. Tsutomu Fukui assumed the position of President.

2014 Icom Inc. celebrates 50th Anniversary.

Icom is celebrating with anniversary editions of several products, including the ID-51A dual-band D-Star-ready handi-talkie and the IC-7850 version of their top-end IC-7800 HF transceiver.

Run against Hunger

LA Times Crossword, Sat Oct 18, 2014.

12 down clue: Prep for a marathon

Answer: TENK

Sudden request

In September PCARA's President Greg, KB2CQE received a request from Mike Grayeb, Assistant Race Director for the 34th "Harry Chapin Memorial Run Against Hunger". The request was for communication support during the race event scheduled for Sunday October 19 in Croton-on-Hudson.

Origins

Singer-songwriter Harry Chapin is best-known for his hits including "Taxi," "W*O*L*D," and "Cat's in the Cradle". He died in an auto accident on Long Island in 1981. During his career, he raised money to combat hunger, donating much of his income and performing at benefits.

After his death, a group of concerned citizens in Croton-on-Hudson created an annual race in his honor to raise funds to fight hunger and to provide food for children and adults in need. They helped to establish the Cortlandt Emergency Food Bank, which continues to fight hunger locally. The annual race contributes to this organization, plus others in our

own area — and around the world. For more details, see: <http://www.runagainsthunger.com>.

Getting ready

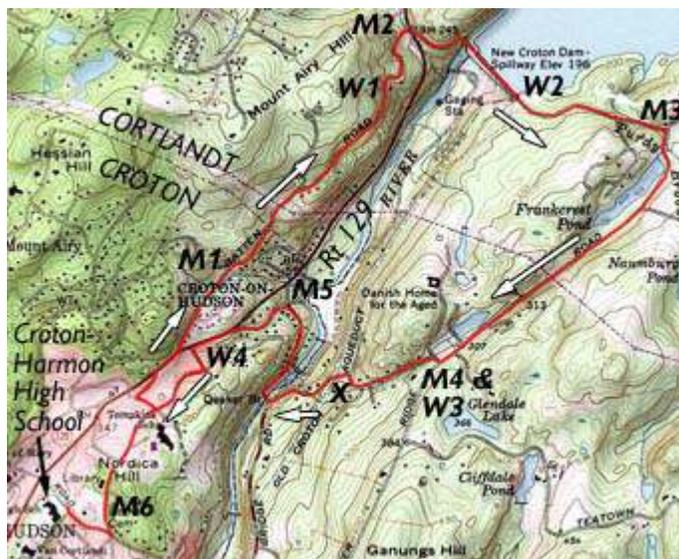
PCARA met twice with race organizers Mike Grayeb and Jud Ramaker to understand what was required and to explain what amateur radio could offer. Henry KB2VJP joined the first meeting in Croton. Westchester Emergency Communications Association (WECA) had also been approached, but they had a prior engagement for October 19, providing communications for an equestrian event in Sleepy Hollow. Nevertheless, Education Director Larrie W2UL offered WECA's assistance, with Public Service Director Kathleen KC2VCT attending the second meeting.

We were told that the "Run Against Hunger" had grown into *three* events, with a **5K Walk** along the Croton Gorge Trail starting at 9:30 a.m., followed by a one mile '**Fun Run**' at 11:00 a.m., leading up to the main event, a **10K Run** starting at 11:45 a.m. The 10K run begins and ends at Croton-Harmon High School, crossing the New Croton Dam at the north end of the



For the 5K Walk, Ray W2CH and Marylyn KC2NKU are positioned at the head of the Croton Gorge Trail, which follows Croton River Ravine for one half mile. [W2CH pic]

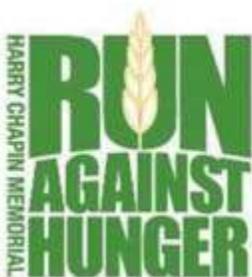
course. In past years, the race organizers had found cell phone coverage around the course was poor — so they were hoping for radio communication from two "Water Stops" along the 5K Walk — followed by four "Water Stops" plus three "Mile Points" around the 10K Run.



Course of the 10K Run against Hunger, which starts and ends at Croton-Harmon High School. **M1**, **M2** etc. are Mile Points. **W1**, **W2** are Water Stops. **X** = trail crossing.

Survey

Since the center of activity was to be Croton-Harmon High School, Greg and I carried out a short radio survey on October 5, with NM9J in the school parking lot (150 ft. asl) and KB2CQE/M driving around the 10K course. We found 2 meter simplex coverage would be quite adequate for most of the way, with one exception — east of the Croton Dam, along Croton Dam Road then southwest along Quaker Ridge Road, the simplex signal was quite weak. The area is shielded by higher ground (390 ft) near the Danish Home for the Aged. Fortunately, the PCARA 2 meter repeater on 146.67 MHz provides alternative coverage in this area.



Sunday morning sunshine

On October 19, a cool but sunny Sunday morning, radio participants began assembling in the parking lot at the rear of Croton-Harmon High School. We had been warned that this area would soon fill up with runners, so maps were consulted and course positions assigned, allowing the mobiles to move out in good time.

A short walk

For the first event — the 5K Walk through Croton Gorge — Bill WA2WOJ took his mobile station to the first Water Stop at the end of Truesdale Drive, while Ray W2CH/M and Marylyn KC2NKU ‘manned’ the second Water Stop at the end of Cleveland Drive. Greg, KB2CQE acted as “Shadow”, using his 2 meter handi-talkie, for liaison with the Run organizers who were down on the front lawn of the High School.



Greg, KB2CQE acts as radio “Shadow” for the run organizers in front of Croton-Harmon High School.

Net control was established from the NM9J mobile using a similar setup to past Foxhunts — I had my Radio Shack HTX-242 mobile transceiver running off a separate 12 volt battery on 146.565 MHz simplex, while my permanent mobile radio was monitoring the 146.67 MHz repeater. The simplex antenna was a Larsen NLA-150 $\frac{5}{8}$ λ mag-mount from a past PCARA Auction, mounted high atop a nearby steel fence. Simplex communication was quite satisfactory around the short, 5K course, and our mobile stations proved useful in reuniting a youngster with his accompanying parent after he raced ahead of her early in the walk.

Main event

Back at the High School, the parking lot was filling up in preparation for the day’s main event, the 10K Run. Greg and I had been concerned that PCARA would not have sufficient volunteers to provide radio stations at all seven positions around the course, as



They’re off! The 34th Harry Chapin Run against Hunger 10K race begins at Old Post Road South, near the High School. [Pic. courtesy Run Against Hunger site.]

requested by the organizers. Fortunately, we also had volunteers arriving from WECA, Stamford ARA, Greater Norwalk ARC and Greater Bridgeport ARC encouraged by Larrie W2UL, Kathleen KC2VCT and Jon WB2RYV.

Station	Location	Operator
Net Control	Croton-Harmon HS	NM9J
Shadow	Croton-Harmon HS	KB2CQE
Trail car	Following last runner	Larrie, W2UL
Water 1	140 Batten Rd	Woodie, KCIATE
Water 2	E. end Croton Dam	Bill, WA2WOJ
Mile 3	Croton Dam Rd & Quaker Ridge Rd	Henry KB2VJP
Water 3 / Mile 4	Danish Home	Jon WB2RYV and Tina KBIUOB
Mile 5	Quaker Bridge Rd & Niles Rd	Paul WB2JVB
Water 4	Jacoby Street	<None>
Mile 6	Cleveland Dr & Alexander Lane	Woodie, KCIATE relocated

Table of stations and locations for the main 10K Run.

We were able to use 2 meter simplex from most of the 10K locations, with the exception of Mile 3 where (as anticipated) Henry KB2VJP had to rely on the 146.67 repeater. Out on the front lawn of the High School, Greg KB2CQE was kept very busy informing the organizers of events on the course, reporting the lead ‘bib numbers’ from the Mile Points and coping with a deafening public address system that alternated race commentary with music by Harry Chapin.

By 1:23 pm, roughly 100 minutes after the race began, W2UL reported from the Trail Car that the last of 247 runners had crossed the 10K finish line in front of the school. At that point the race was over, and all stations who had not already left the course were stood down.

We learned some valuable lessons from PCARA’s first participation in the Harry Chapin Run Against Hunger and will no doubt be able to offer better support next time we are asked. The organizers esti-

mated that about 900 people had taken part in the three separate races and the figure raised for combating hunger was in excess of \$30,000.



Plenty of activity on the High School front lawn.

Sequel suggestions

Your editor was seated at Net Control most of the time, so could not visit positions around the course or take photos as the event unfolded. Nevertheless, a picture emerged of our presence being valuable for passing necessary traffic, and as a reassurance that help could be summoned from anywhere on the course if necessary.

Robbie Burns has pointed out: “The best laid schemes o’ Mice an’ Men, Gang aft agley*...” On any event like this, you can plan ahead to the n^{th} degree, but you will still encounter surprises. We found that our plan to relocate stations from an earlier point on the 10K course to a later position was not fully effective — because the fast runners complete the entire course in about 35 minutes, before the last runners have passed the first Water Stop. But thanks to KC1ATE for covering *both* the Water 1 and the Mile 6 positions.

We were grateful for all the volunteers who arrived with their two meter radios. The best equipped stations came with *both* a mobile *and* a portable radio such as a handi-talkie. Another asset was an external mag-mount antenna that could be attached, for example, to the Trail Car. We noted some radios could be more easily set to a different frequency in the field, while others needed a computer and programming cable. There was some QRM from the city on our chosen simplex frequency, so there is always the possibility of a frequency change part-way through the proceedings. And even though the Croton River valley is not exactly intermod-alley, some radios were better than others at coping with strong signals nearby. As Bob, N2CBH has observed... you get what you pay for!

A big thank you to all who took part. We could not have done it without you.

- NM9J

* “The best-laid plans of mice and men,
Often go awry...”

New York QSO Party

The New York State QSO Party took place on Saturday October 18 over a period of 12 hours, from 10:00 am to 10:00 pm Eastern. This year, two plaques were sponsored by PCARA, the “New York Multi-One” plaque which was carried over from 2013, plus the “Non-New York Phone Low Power” plaque.

Joe, WA2MCR hosted this year’s club entry for the QSO Party. Joe had set up a special contest station in the sun-room with a seasonal view of tall trees and falling leaves. Joe’s Yaesu FT-1000MP transceiver was feeding a G5RV antenna. On the computer was the NYQP version of N3FJP’s logging software, for a similar feel to Field Day.

Your editor joined Joe for a few hours on Saturday afternoon, October 18 and found the new operating position quite an improvement compared to the previous year. The new location also had a beneficial effect on the number of contacts and overall score when all the multipliers were figured in. (Note — CW contacts count for two points.)



New operating position for PCARA’s 2014 entry in the New York State QSO Party, with NM9J at the microphone of club station W2NYW.

Results last year were as follows: “W2NYW made 300 QSOs, for 345 points. There were 83 multipliers (NY Counties, States and Canadian Provinces) for a final score of 28,980.” (*PCARA Update*, Nov 2013.)

Those numbers should be compared with the 2014 score as calculated by the N3FJP software. W2NYW made 463 QSOs for 548 points. There were 100 multipliers for a final score of 54,800.

Band split was: 223 QSOs on 40 meters, 121 on 20 meters and 119 contacts on 80 meters.

Some adjustment might be needed to these initial figures. Results should be available soon on the Rochester DX Association web site, <http://www.rdxa.com>.

- NM9J

Blue light special

Glittering prizes

When I was employed in the chemical industry, one of my tasks was to keep an internal web-site updated with company news and other items of interest. During October, there was always a good story from the announcements about Nobel Prizes for Physics and Chemistry. Apart from the chance that one of our colleagues might have been taught by a professor who was now a Nobel laureate (it did happen), there was a strong connection between the company and Swedish chemist Alfred Nobel (1833-1896), founder of the famous prizes. Over the years, several of Nobel's original companies had been stirred into our own, through a history of mergers and acquisitions.



Alfred Nobel

Blue light

Long-time readers of the *PCARA Update* may remember an article published in the December 2008 edition entitled “**LED Lamps**”. Here is an extract:

Essential₂ white

White LEDs are based on work by Shuji Nakamura of Nichia Corporation in Japan, who developed a bright blue LED in 1993 based on the semiconductors gallium nitride (GaN) and indium gallium nitride (InGaN). You may have seen these blue LEDs as backlights and indicators for recent electronic devices. With a bright source of blue light available, it was possible to coat the LED junction with a special phosphor that would convert some of the narrow-band blue light to a broad-spectrum yellow light. The yellow phosphor employed in white LEDs is usually cerium-doped yttrium aluminum garnet (Ce:YAG) — you can easily see this yellow phosphor if you inspect the individual LEDs closely.

How many physicists?

How many physicists does it take to change a lightbulb? As far as the Nobel Prize in Physics for 2014 is concerned, the correct answer would be *three*.

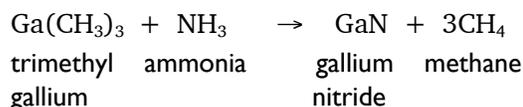
Isamu Akasaki and **Hiroshi Amano** are two Japanese physicists who were working together at Nagoya University in Japan in the 1980s and early 1990s. Isamu Akasaki had previously worked on the manufacture of Gallium Nitride at Matsushita Research Institute where he decided that “metalorganic vapor phase epitaxy” would be the best approach for growing semiconductor crystals. In this process, also known as “metalorganic chemical vapor deposition” (MOCVD), the thin layers that make up a semiconductor device

are created by chemical reaction of volatile compounds acting on a solid substrate rather than by physical deposition. Amano and co-workers grew thin films of gallium nitride (GaN) on a sapphire substrate using a buffer layer of aluminum nitride (AlN).



Isamu Akasaki and Hiroshi Amano

The usual precursor chemicals for growing thin layers of these semiconductors are two volatile organometallic compounds — **trimethyl gallium**, Ga(CH₃)₃ as the source of gallium and **trimethyl aluminum**, Al(CH₃)₃ as the source for the aluminum. Ammonia gas (NH₃) is used as the source of nitrogen. The reaction takes place at high temperature (500 – 1000° C).



(Incidentally, my former employer is a leading manufacturer of the two organometallic precursors trimethyl gallium and trimethyl aluminum, supplied from a recently-expanded plant in La Porte, TX.)

In 1989, Akasaki and Amano created a p-type layer on top of their gallium nitride crystal by doping with zinc or magnesium. They noted that when the layer was irradiated with electrons in a scanning electron microscope, emission of blue light from their LED was increased — indicating an improvement in the p-type doping.

Shuji Nakamura, is the third Nobel prize winner for Physics in 2014. He is a Japanese-born electrical engineer, currently Professor at the Materials Department, University of California, Santa Barbara. It was Nakamura's work on blue-light LEDs that was mentioned in the December 2008 *PCUD* article.

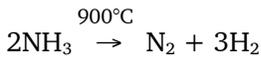


Shuji Nakamura

In 1992, while working at Nichia Chemical Industries in Tokushima, Shuji Nakamura devised an alternative method for creating blue-light LEDs based on gallium nitride. Instead of using a buffer layer of aluminum nitride like Akasaki and Amano, Nakamura replaced it with a thin layer of gallium nitride formed at a lower temperature. On this he deposited a top layer of gallium nitride, grown at a

higher temperature. Nakamura then prepared the p-type gallium nitride needed for the p-n junction by post-thermal annealing of magnesium-doped material under ammonia-free nitrogen.

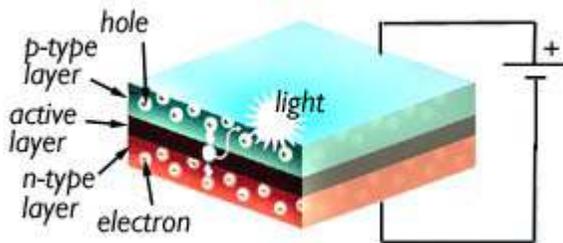
Nakamura was also able to explain the improvement in LED performance observed by Akasaki and Amano when their p-type layer of gallium nitride was irradiated with electrons. Hydrogen formed by dissociation of ammonia gas...



...was forming complexes with the magnesium and zinc dopants in the layer, passivating them as acceptors. The electron beam disrupts these hydrogen complexes, restoring their acceptor properties.

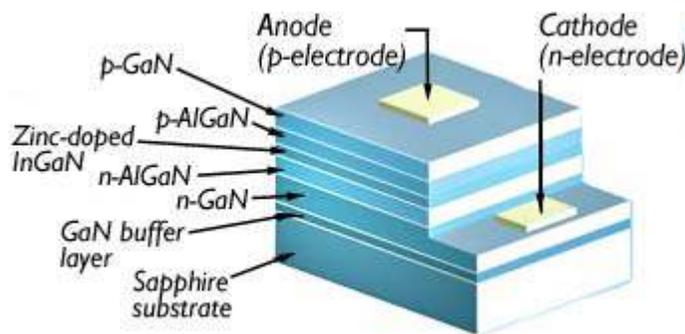
Further developments

In a light emitting diode, light is created at the p-n junction when electrons driven from the n-layer recombine with holes driven from the p-layer, creating a photon.



A light-emitting diode consists of layers of semiconductor material. Electrical voltage drives electrons from the n-layer and holes from the p-layer to the active layer, where they recombine and light is emitted.

By 1992-93, initial work of the two groups in Japan had resulted in blue-light gallium nitride LEDs with quantum efficiencies (ratio of photons to electrons) around 0.2%. During the early 1990s, efficiency was improved by developing alloys of gallium nitride



Structure of a blue light-emitting diode, consisting of several different layers of gallium nitride (GaN). By mixing in indium (In) and aluminum (Al), the Laureates succeeded in increasing the LED's efficiency. [After Royal Swedish Academy of Sciences.]

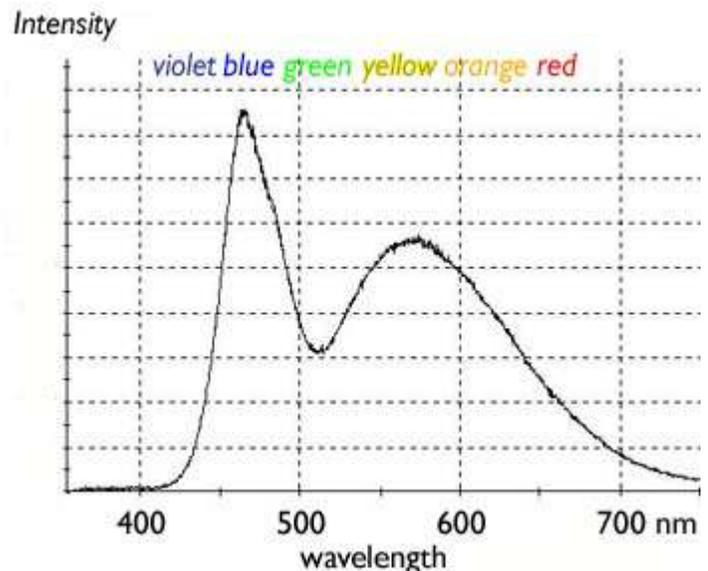
with aluminum and indium (AlGaIn, InGaIn) and by creating more complex semiconductor structures. By 1994, Nakamura had achieved a quantum efficiency of 2.7% using the structure shown with a double hetero-junction of indium gallium nitride (InGaIn) and aluminum gallium nitride (AlGaIn). Efficiencies continued to improve and blue laser emission from GaN was reported in 1995-1996. Violet-light (405 nm) laser diodes based on indium gallium nitride grown over a bulk gallium nitride substrate are the basis of Blu-ray disk players, introduced commercially in 2006.

Brighter times

The original article in the *PCARA Update* for December 2008 reported on the shortcomings of "white light" LED lamps as follows:

The combination of a yellow phosphor with a blue light emitting diode produces visible light which approximates white, but with very little green and almost no red content. The spectrum shows a spike at a wavelength of 465 nanometers (blue light), with a dip at 500 nm (green) and tailing off badly at 650 nm (red light). Compared with the broadband radiation from the sun or from an incandescent lamp, these white LED lamps produce poor color rendering. An additional red phosphor is sometimes included to provide a "warm white" LED.

It is still early days for these 120 volt white LED lamps. We do not know the lifetime of the low cost units, and there is still work to be done on improving the color and directionality of the light. Right now, I would say these lamps already have practical application as small spotlights and floods. With further improvement, their future could be very bright.



Spectrum of light from a white-LED lamp. Sharp blue peak is from the gallium nitride LED, broad yellow peak is from the YAG phosphor.

Since those words were written, there have been notable improvements in LED lighting. See the article "Goodbye to Tungsten" in *PCARA Update* Jan 2014, and earlier articles in March 2010 and October 2011. If you take a walk around a Home Depot store today, you will find a wide variety of LED lamps available from various manufacturers. My favorite brand is still Philips, since their lamps combine good color rendering with lower levels of RF interference.



Philips 75 watt-equivalent white-light LED lamp.

Bright future

As noted by the Swedish Academy of Sciences in the Nobel Prize announcement, the work on blue-light LEDs by Akasaki and Amano at the University of Nagoya and by Nakamura at Nichia Chemicals has triggered a fundamental transformation of lighting technology. The blue-light LED is an essential component of white-LED lamps which are longer-lasting and much more efficient than their predecessor incandescent bulbs and fluorescent tubes. The latest LED lamps produce 300 lumens/watt compared to a luminous efficiency of 70 lm/W for fluorescent bulbs and 16 lm/W for incandescent lamps. White light LED lamps are now being used for domestic lighting purposes, for vehicle lights, for backlights in computers, tablets and phones, for flashlights and for solar lamps that provide white light in remote locations where regular power is unavailable.

Last word

We cannot leave the topic of blue light and the 2014 Nobel Prizes without also mentioning the Prize for Chemistry, awarded to Eric Betzig, Stefan Hell and **William Moerner**, who also holds the callsign **WN6I**. The prize celebrates surpassing the normal resolution limit of an optical microscope, as set by Abbe's diffraction formula. This predicts a best resolution of approximately $\lambda/2.8$ or $0.2\mu\text{m}$ (200 nm) for green/yellow light. Some improvement is possible by using shorter wavelengths such as UV and X-Rays, but for biological investigation, such highly-energetic radiation may damage the cell being studied. Other methods such as electron microscopy require special preparation and killing of the cell.



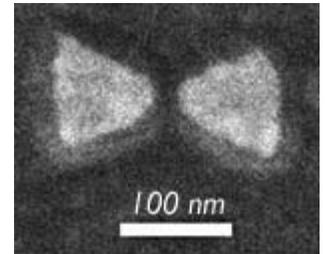
William Moerner, WN6I

The Nobel laureates arrived at two different methods for overcoming the Abbe limit that depend on fluorescence of one or more small molecules adjacent

to the structures being studied. This has provided clear images of cells and their inner protein molecules using optical microscopes.

Several papers by W.E. Moerner's team at Stanford describe the use of gold bowtie nanoantennas, for example: "Large single-molecule fluorescence enhancements produced by a **bowtie nanoantenna**". This makes me think that amateur radio might be influencing the work of WN6I. According to *Stanford News*:

"The bowtie nanoantenna consists of two triangular pieces of gold, each about 75 nanometers long, whose tips face each other in the shape of a miniature bowtie. The device operates like an antenna for a radio receiver, but instead of amplifying radio waves, the bowtie takes energy from an 830-nanometer beam of near-infrared light and squeezes it into a 20-nanometer gap that separates the two gold triangles. The result is a concentrated speck of light that is a thousand times more intense than the incoming near-infrared beam."



Scanning electron microscope image of a bowtie nanoantenna, as used by W.E. Moerner's team.

CQ 830, CQ 830, CQ 830 nanometers...

- NM9J

Eastern radios

At the October PCARA meeting, Ray, W2CH brought along two FM radios from China that he recently acquired.

The first model was the Leixen VV-898 dual-band mobile transceiver, which covers the 144 and 440 MHz bands. This is a tiny, lightweight radio, not much larger than an old-style handi-talkie. Power output is 10



Leixen VV-898 dual-band mobile transceiver only measures $4\frac{3}{4}'' \times 1\frac{1}{2}'' \times 3\frac{3}{8}''$.

watts, and it would fit nicely into a small space such as a vehicle ashtray. Scanning is confined to VHF or UHF channels, not both. Ray reports that programming the radio is not easy, with or without the programming

cable — and the programming cable may or may not be included, depending on the vendor. R&L Electronics sells a similar Jetstream JT270M model *with* cable for around \$140.00. Ray has experienced problems with transmissions from Leixen and Jetstream models, possibly as a result of overheating, so he has been running the radio on low power into an amplifier.



Ray W2CH demonstrates the tiny Leixen VV-898 mobile radio at the October meeting.



Wouxun KG-UV8D dual-band handi-talkie.

The second radio that Ray brought for show-and-tell was the new Wouxun KG-UV8D. This is a dual-band handi-talkie (146 and 440 MHz) with output power of 5 watts and dual-band receive —VHF/UHF, VHF/VHF plus UHF/UHF . The most noticeable feature of this radio is the large, back-lit dual-color display (black/blue). Power is provided by a high-capacity 1700 mAh Li-ion battery, for around 15 hours operating time. An FCC-approved version of the KG-UV8D with drop-in charger is available from vendors such as Powerwerx for \$130.00 - \$160.00.

Holiday Dinner

The 2014 PCARA Holiday Dinner will take place on Sunday December 7th at the same location as last

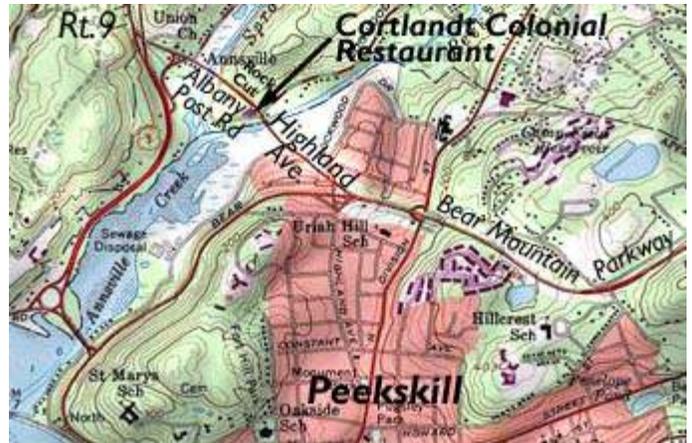


Cortlandt Colonial Restaurant

year — the Cortlandt Colonial Restaurant in Cortlandt Manor. Start time is 5:00 p.m.

The Cortlandt Colonial Restaurant is located at 714 Old Albany Post Road, Cortlandt Manor, NY. Directions to the restaurant are available at their web site: <http://www.cortlandtcolonial.com/pages/directions.html> .

Basic instructions from the Peekskill-Cortlandt area are to join the Bear Mountain Parkway, then exit at Highland Avenue, heading north. Make a right turn from the exit ramp and proceed down the hill. Cross the bridge, then Cortlandt Colonial Restaurant is immediately on the left, just before the “rock cut”.



Menus were discussed at the October meeting and the choice was the same “Dinner Package Number Three” that proved popular in 2013, along with the Custom Cake. This package includes:

Open Soup and Salad Bar
Coffee/Tea
 ~~~~~  
*choice of:*  
*Prime Ribs of Beef*  
*Grilled New York Sirloin Steak*  
*Broiled Sea Scallops*  
*Jumbo Shrimp with Crabmeat Stuffing*  
*Chicken Marsala*  
*Penne à la Vodka*

Cost will be \$30.00 per head including service, but not including any additional soda or alcoholic drinks that you choose to add.

## Fall back

Remember to put all your clocks back by 1 hour on Sunday morning, November 2, when Daylight Saving Time comes to an end. Otherwise, you might be too early for the PCARA meeting,



# 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.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. \*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 Nov 2:** PCARA meeting, Hudson Valley Hospital Center, 3:00 p.m. Eastern **Standard** Time.

**Sun Dec 7:** PCARA Holiday Dinner, Cortlandt Colonial Restaurant, 5:00 p.m.

## Hamfests

**Sun Nov 16:** Jersey Shore ARS Hamfest by the Shore, Riverwood Park, Riverwood Drive, Toms River, NJ. 8:00 a.m.

**Fri Nov 28:** Fair Lawn Amateur Radio Club, Ham Radio Auction, Fair Lawn Senior Center, 11-05 Gardiner Road, Fair Lawn NJ. 6:00 p.m.

**Sat Dec 13:** Boy Scout Troop 139 Hamfest/Flea Market, Conlon Hall, 19 North William St., Bergenfield NJ. 7:00 am

## VE Test Sessions

**Nov 1:** Yonkers PAL Ham Radio Club, 127 N Broadway, Yonkers. 2:00 p.m. Michael Rapp (914) 907-6482.

**Nov 3:** Yonkers ARC, 1st Police Precinct, E. Grassy Sprain Rd, Yonkers, NY. 8:30 am. John Costa, (914) 969-6548.

**Nov 13:** WECA, Westchester Co Fire Trg Cen, 4 Dana Rd., Valhalla, NY. 7:00 pm. S. Rothman, 914 831-3258.

**Nov 17:** Columbia Univ VE Team ARC, 531 Studebaker Bldg, 622 W 132nd St, New York. 6:30 pm. Alan Crosswell, 212 854-3754.

**Nov 21:** Orange County ARC, Munger Cottage, 183 Main St., Cornwall NY. 6:00 p.m. Contact Thomas Ray 845 391-3620.



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