# PCARA Update

Volume 22, Issue 5 Peekskill/Cortlandt Amateur Radio Association Inc. May 2021

## On the radar

Things are beginning to appear like UAPs* on the PCARA radar screens for 2021. April started off with a **PCARA Breakfast** on April 3 at Downing Park in Yorktown, NY. Approximately 10 souls were in attendance with a cold start that eventually warmed up in the morning sunshine. The next PCARA Breakfast is **tentatively** scheduled for early May, watch for a Google Groups message for date and time. It should be a bit warmer — please plan on joining us!
[*UAPs = Unidentified Aerial Phenomena.]

We had an excellent turnout for the chilly **April 17 PCARA Membership Meeting** with a total of 17 attendees on the front lawn of the John C. Hart Memorial Library in Shrub Oak. Among topics covered were:

- Results of the **2020 New York QSO Party** for which PCARA sponsored two plaques. PCARA's combined entry was 12th in the Club High Score results. Thank you to all the stations that participated. Well done! A full report can be found in this month's edition of the *Update*.
- Plans for PCARA's participation in the **Hudson River Radio Relay** organized by the Hudson Valley Digital Network were discussed. We will now be setting up on Saturday June 12, 2021 at the Hudson Highlands State Park / Annsville Creek Paddlesport Center adjacent to Annsville Circle in Cortlandt Manor. PCARA will operate from 1:00 p.m. to 5:00 p.m. under the Special Event callsign of N2N. For complete details on the Hudson River Radio Relay please visit: https://hudsonriverradiorelay.com/index.html.
- **2021 ARRL Field Day** arrangements were considered. PCARA has received the go-ahead from Lakeland Central School District for use of the grounds of Walter Panas High School in Cortlandt Manor, NY for the weekend of June 26-27, 2021. This year there is a bit of a wrinkle. Work on moving the upper ball field and construction of a new parking lot may have begun and we would have to use the soccer field on the west side of the building. In that case, we would not have access to light poles and baseball dugout. Details to follow.

*Continued on page 2* ⇨

*Members moved out into the sunshine during PCARA's April 3 breakfast, held at Downing Park in Yorktown.*

*Hudson Highlands State Park Preserve /Annsville Creek Paddlesport Center.*

## Contents

- We welcomed **three new members** who attended our March 2021 PCARA V.E. Test Session. They are Robert KD2WCL, Don KD2WCM and Charles KI5PET. Welcome to PCARA!
- An **on-foot PCARA Foxhunt** in FDR State Park in Yorktown was talked about. Lou KD2ITZ has been in discussion with FDR Park Management for a foxhunt in the park. Please watch for a Google Groups message for possible scheduling.
- New PCARA hats were distributed to those who had ordered them. If you are interested in ordering an embroidered PCARA hat with or without your call sign please let us know at the next meeting or use: mail'at'pcara.org. Price is $24 with a call sign and $20 without. See the April 2021 *PCARA Update,* p.11 for a description of available hats.
- A **PCARA V.E. Test Session** followed the PCARA Membership meeting at 11:00 a.m. on April 17, which saw 3 candidates qualify for General Class. Among the recipients of a CSCE was Robert KD2WCL. We continue to have a good turnout of candidates at our test sessions. Our next V.E. Test Session will be held on Saturday May 15, 2021 at 11:00 a.m. at the John C. Hart Memorial Library. Please spread the word! Once again, a very big **thank you** to the John C. Hart Memorial Library for their continued support and use of their facilities.

Our next scheduled **PCARA Membership Meeting** is at 9:00 a.m. on Saturday May 15, 2021 at the John C. Hart Memorial Library in Shrub Oak, NY. I look forward to seeing each of you there. Until then be careful and stay safe!

- 73 de Greg, KB2CQE

# PCARA Board

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# Net night

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

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

# Updated RF exposure rules

On April 13, ARRL sent out a news bulletin regarding the date on which FCC's updated RF Exposure rules become effective. Radio amateurs can no longer avoid performing an exposure assessment by staying under a power limit of 50-100 watts. Here is a short extract.

**ARLB011 Updated Radio Frequency Exposure Rules Become Effective on May 3**

The FCC has announced that rule changes detailed in a lengthy 2019 Report and Order governing RF exposure standards go into effect on May 3, 2021. The new rules do not change existing RF exposure (RFE) limits but do require that stations in all services, including amateur radio, be evaluated against existing limits, unless they are exempted. For stations already in place, that evaluation must be completed by May 3, 2023. After May 3 of this year, any new station, or any existing station modified in a way that's likely to change its RFE profile — such as different antenna or placement or greater power — will need to conduct an evaluation by the date of activation or change.

The Amateur Service is no longer categorically excluded from certain aspects of the rules, as amended, and licensees can no longer avoid performing an exposure assessment simply because they are transmitting below a given power level.

In his professional capacity **Bob N2CBH** is very familiar with the FCC rules on RF exposure. A newsletter article explaining the new requirements would only scratch the surface, so Bob has offered to present a Zoom talk for radio amateurs based on safety training that he has provided for broadcast organizations. Watch for details of the date and time.

# Adventures in DXing
**- N2KZ**

### Three to See

Most of us are familiar with the two major ham radio magazine monthlies: *QST* and *CQ*. They have been a part of our lives for generations. Archives of back issues have become a carefully kept chronicle of how the world of radio progressed throughout the passage of time. Where do you go for more good reads? Is it time for wider variety? Here are some suggestions!

A long, long time ago dinosaurs lived and breathed on the surface of the Earth. Shortly thereafter (in 1989) yours truly began writing professionally — first for *Popular Communications* and later for *Monitoring Times*. Both of these publications eventually disappeared from the radio hobbyist scene. Where did their avid audience turn?

Pop Comm and MT may be gone but their writers live on! Monitoring Times enjoyed quite a fraternal community of dedicated scribes all pursuing labors of love. We didn't just write. We lived our column's specialties. The camaraderie of the MT crew fueled our passions. We were quite a group!

During the 1980s and 1990s, I traveled all over North America professionally for ABC News and Sports. My wife and I love to ski and nothing would stop us from visiting ever more fascinating and exotic locations. Our travels quickly took on an alternate purpose. I would always try to arrange a station tour or interview with broadcasters wherever we would go. What a great opportunity to discover the world... and then write about it. To this day, whenever I take a trip, I take my readers with me!

One particularly memorable adventure was attending the very first *Monitoring Times* convention in Knoxville, Tennessee in 1990. Without enough money for a plane ticket and a rental car, it quickly became a legendary road trip for myself and radio roustabout Allan Weiner, now the owner of shortwave station WBCQ 'The Planet.'

*Monitoring Times for November 1990, (Allan Weiner left, who is that on the right?)* *[N2KZ pic.]*

At the last minute, a medium wave broadcast DXers group, The International Radio Club of America (IRCA,) had no home or host for their yearly convention. The Monitoring Times crowd welcomed their presence. What a radio conference this would be!

We arrived at the Knoxville Hyatt-Regency and immediately discovered we were sharing the hotel with another annual gathering literally filled with clowns! Imagine 300 DXers mingling with lots of people sporting big orange wigs, outrageous costumes, enormous fly-swatters, noisemakers and (of course) red noses! What an appropriate pairing of groups. Our *Monitoring Times* group enjoyed a lot of fun!


*Allan Weiner connects with a Knoxville convention clown.*

*Monitoring Times* would continue on for more than 20 years. Eventually times changed and the economics of printing and mailing monthly hard copies to subscribers became impossible to maintain. Both Pop Comm and MT called it a day in the year 2013. Where would radio listening enthusiasts go for their news?

### Not Dead Yet!

A fellow MT alumnus, Ken Reitz, KS4ZR, quickly created an asylum for both the writers and readers of the radio enthusiast press aptly named *The Spectrum Monitor* and launched it promptly in January 2014. Not a month was missed! I asked Ken how it went: "There's not much to tell about the transition from MT/Popcom to TSM. Most writers wanted to continue after both publications ceased publishing and, since I was the editor at MT at the time, and no one else wanted to start a publication, I did and we're now in our eighth year." To keep operating overhead at a minimum, *The Spectrum Monitor* is published and distributed electronically over the Web.

*'The Spectrum Monitor' for April 2021.*

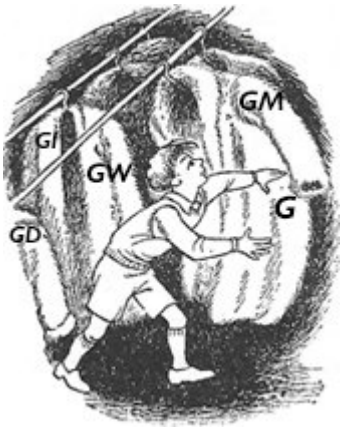
*The Spectrum Monitor* is an incredibly fresh approach including everything (and more!) for radio listening hobbyists. They have it all: satellites, long wave, digital HF, antennas, propagation, astronomy, radio restoration, federal and military air and naval listening, utility DXing, scanning, maritime and marine ship communications, shortwave broadcast DXing — the list goes on and on!

Although many *Spectrum Monitor* columnists are amateur radio licensees, the perspective they convey is refreshingly divergent. Their common thread? They are all exceptional *listeners!* So much is going on outside the confines of the amateur radio allocations and they see it all. I am amazed at all the new areas and interests you can enjoy if you just think outside the box!

Fear not! There is *plenty* of amateur radio content within TSM. In their April 2021 edition, the features included new battery technologies, two articles about SDRs, amateur radio astronomy, a new Icom D-STAR portable HT, restoring a WRL Globe modulator, harmonic antenna designs and more. New ideas and thoughts are refreshing. Give it a try! You'll find the whole story at: https://www.thespectrummonitor.com .

**Beyond the Sea**

In the past year, I have become acquainted with the world of amateur radio across the pond in the United Kingdom. You would think you were passing through the wardrobe doors into Narnia! I don't think C.S. Lewis was ever a DXer but the effect is quite similar. They have all the basics we do — Icom, Yaesu, Kenwood, FT8, Yagi antennas and the rest. My fascination is with what they do with them and all the products and procedures that are unique to their situations and applications. While you are enjoying a cup of tea with them, you can gain great knowledge!




A wise elder once said that one path to success is to surround yourself with experts and create a collaborative team. This is good advice! If you get to know all of the people you work around the world on amateur radio, you are bound to discover thoughts and perspectives you would never dream of by yourself!

**Two for You**

Two British independent monthlies cater to radio enthusiasts. *Practical Wireless* has been around for 90 years, now tightly focused on everything in amateur radio. In the last few years, its popularity has rivaled, if not surpassed, the Radio Society of Great Britain's *QST* equivalent called *RadCom*. Page through a recent issue and you will understand why! Within you will find a lot of simply very useful information.


*'Practical Wireless' for May 2021*

Each edition of PW reports on a long list of topics. The insight and advice they offer is indeed *practical.* May 2021's issue assesses the latest version of QRP Labs' QCX+ 5 watt QRP transceiver, informative features on passive radar, two FT8 discussions, designing Class A amplifiers, experimenting with linked dipoles, the NanoVNA, a beginner radio receiver project and a useful crystal tester and much more. In this age of ever-thinning monthly volumes, *Practical Wireless* appears to be value added.

**On the Radio**

*Practical Wireless* has a sister publication focused on radio *listener* enthusiasts and people who like to follow the very latest in technology breakthroughs and offerings. It's called *Radio User* and, indeed, it is targeted towards radio users! It is masterfully designed to be informative, enticing and exciting to read. The topics you will find here are diverse and almost hard to predict. You should call it 'the idea book' because that's what it really is.


*'Radio User' for April 2021.*

You'll find *Radio User* filled with reviews and views of the complex electronic world that surrounds us with a refreshing British viewpoint. Here's a sample of the topics to be found in the April 2021 edition: Software to help you hear NDB beacons, detailed lists of shortwave stations, book reviews, a new column on European business radio, a study of the new ELAD SDR radio, maritime and air band tips for listening, an essay about a beloved English physicist and details on how to build your own long wave receiver. Believe it or not, this is only the beginning. One

edition could keep you reading for months!

You'll find complete information about both *Practical Wireless* and *Radio User* at: https://www.radioenthusiast.co.uk. Isn't it about time that you added some new perspective and interests to your radio hobby? Your invitation is here!

**Digital Future**

Mark your calendars for Monday, May 24th! A new world is coming to Secor Road in Hartsdale. WFAS 1230 is retiring from good old AM radio broadcasting and converting to an all-digital signal with a conservative talk format. You will need a radio equipped with HD Radio circuitry to resolve their signal forevermore.

Here is the official statement from WFAS owner Cumulus Media:

*WFAS tower at Secor Road, Hartsdale, is visible from the Sprain Brook Parkway.*

*"In October 2020, the Federal Communications Commission adopted a new rule allowing AM radio stations to operate using all-digital broadcast signals. 1230 WFAS AM, licensed to White Plains, New York, has notified the FCC of its intention to switch from its current analog operation to all-digital beginning on May 24th 2021.*

*Once WFAS has switched to an all-digital operation, only radios equipped with HD Radio technology will be able to receive and play the station programming. WFAS will no longer be available on analog-only radios. Broadcasting in digital will eliminate annoying static and interference, improve the sound quality to equal FM radio and streaming and extend the range of clear reception.*

*If you don't have an HD-equipped radio, you can also listen to WFAS online by visiting am1230digital.com, by using our mobile app (search WFAS AM on the iOS and Android app stores) or by enabling your favorite smart speaker to play the skill. For more information, visit am1230digital.com to view our FAQs."*

It will be interesting to see just how far WFAS will be heard broadcasting a 1000 watt full-digital signal.

1230 kHz is one of seven 'local' AM frequencies just packed with short-range stations from coast-to-coast. Can you imagine 154 stations sharing 1230 kHz alone? If you look at the FCC's predicted day and night coverage maps for WFAS you would simply be amazed at how far (in theory) the station should be heard. At my QTH in Northern Westchester, I currently hear a rather noisy signal from them during the day and nothing but a cacophony of distant signals at night. It should be a very interesting experiment. The fun begins on Monday, May 24th. Stay tuned!

*WFAS-AM 1230 kHz FCC service contours for daytime coverage (top) and highly optimistic night-time coverage (below).*

Until next month, enjoy the Spring! 73 es dit dit de N2KZ "The Old Goat" *

# NY QSO Party 2020

The most recent New York QSO Party took place on Saturday October 17, 2020. As reported in *PCARA Update* for November 2020, COVID-19 concerns prevented a traditional team operation from Joe, WA2MCR's location. Instead, six PCARA members operated their own stations and submitted entries so the combined scores could be included in the New York Club High Score Award.

On April 9-10 2021, full results of the 2020 New York QSO Party were published on the NYQP web site http://nyqp.org/wordpress/. PCARA had six individual entries whose scores were combined. Apart from N2SO and N2HTT, remaining entries were all in the NY single operator, low power, mixed mode class. David K2WPM combined his NY QSO Party operation with Parks on the Air activations in Westchester and Putnam Counties. Here are **final scores** for the six PCARA members who took part.

| Call sign | QSOs | Counties | Total score |
|---|---|---|---|
| K2WPM | 250 | 31 | 18,500 |
| WA2MCR* | 167 | 30 | 13,041 |
| *(*operating as W2NYW)* | | | |
| N2SO | 119 | 17 | 11,186 |
| *(high power CW)* | | | |
| NM9J | 55 | 21 | 2,542 |
| KD2ITZ | 15 | 10 | 360 |
| N2HTT | 2 | 0 | 4 |
| *(QRP phone)* | | | |

Looking at all groups that combined individual scores together, overall winner of the New York Club High Score Award was the Niagara Frontier Radiosport group (NF2RS), with 17 individual entries and a grand total of 1,017,176 points. PCARA's combined score placed us **twelfth** out of 111 club entries. Here is a list of the top twelve **Club Score** results:

| Position | Group | QSOs | Logs | Total score |
|---|---|---|---|---|
| 1 | Niagara Frontier Radiosport | 7,067 | 17 | 1,017,176 |
| 2 | Hudson Valley Contesters and DXers | 8,076 | 18 | 983,227 |
| 3 | Rochester (NY) DX Assn | 7,022 | 24 | 830,501 |
| 4 | Frankford Radio Club | 3,897 | 12 | 456,055 |
| 5 | Order of Boiled Owls of NY | 2,591 | 7 | 312,084 |
| 6 | Southern California Contest Club | 1,504 | 5 | 198,292 |
| 7 | Yankee Clipper Contest Club | 1,757 | 13 | 146,120 |
| 8 | Lancaster Amateur Radio Club | 778 | 2 | 110,496 |
| 9 | Minnesota Wireless Assn | 1,043 | 10 | 93,431 |
| 10 | Binghamton Amateur Radio Assn | 429 | 1 | 60,680 |
| 11 | Potomac Valley Radio Club | 878 | 10 | 46,290 |
| 12 | Peekskill / Cortlandt ARA | 639 | 6 | 45,633 |

Scoring in the NY QSO Party is based on number of QSO points times the number of multipliers. Phone contacts score 1 point, CW contacts 2 points and RTTY/digital contacts score 3 points. For New York stations, the multiplier is the count of U.S. states (max. 50), NY Counties (62) and Canadian Provinces (9) worked: For non-New York stations the multiplier is the number of NY counties worked (max. 62).


*NY QSO Party map shows the 62 counties of New York State.*

One of the two plaques sponsored by PCARA is for the "New York Multi-One Low Power" category, meaning a New York station with multiple operators but only a single transmitted signal at a time, running 5-100 watts. The plaque was awarded this year to Southtowns Amateur Radio Society (WB2ELW) of Hamburg, NY. Operating as W2E their three operator entry scored 275 QSOs and 18,792 points. Well done!


*The New York Multi-One Low Power plaque for 2018 was awarded to PCARA for the club's entry from WA2MCR's home.*

PCARA's second sponsored plaque, for "Non-NY SSB Low Power" was awarded to Arthur, N3AAA of Washington PA, with a score of 4,712 points.

The next NY QSO Party should take place on the third Saturday in October – October 16, 2021. Here's hoping that COVID restrictions are sufficiently relaxed by then to allow a traditional multi-operator club effort.

- NM9J

# V.E. Test Sessions

### March session

The V.E. Test Session that followed PCARA's meeting on March 20th resulted in three candidates passing Element 2, the Technician examination. New licenses were granted by the FCC on April 1, 2021. Congratulations to Robert KD2WCL of Montrose NY, Donald KD2WCM of Jefferson Valley NY and Charles KI5PET of Burnet TX.

Robert and Charles were issued with new Technician licenses, while Don (ex-N2VMO) qualified for a **General** license as a result of FCC Rule 97.505 (a) – see tinted cells below.

§ 97.505 Element credit.

(a) The administering VEs must give credit as specified below to an examinee holding any of the following license grants:

| Operator class | Unexpired (or within the renewal grace period) | Expired and beyond the renewal grace period |
|---|---|---|
| (1) Amateur Extra | Not applicable | Elements 3 and 4. |
| (2) Advanced; General; or Technician granted before March 21, 1987 | Elements 2 and 3 | Element 3. |
| (3) Technician Plus; or Technician granted on or after March 21, 1987 | Element 2 | No credit. |

### April test session

PCARA's latest test session took place on Saturday April 17, immediately following the monthly meeting outside John C. Hart Library. Three candidates took tests, and all three were successful. New member Robert KD2WCL (who qualified for his Technician license at the March session) successfully upgraded to General. Well done! Mitchel Stein of Cortlandt Manor, who previously held Novice license WN2ZUA, passed Elements 2 and 3, qualifying for a General license. John Schettino of Yorktown Heights also passed Elements 2 and 3 for our third General of the morning.

*PCARA's VE Test Session of May 17 was conducted on the front lawn of John C. Hart Library in Shrub Oak, NY.*

Thanks to the Volunteer Examiners who took part on April 17 including PCARA's VE Team Liaison Mike W2IG, Joe WB2BCC, Verle W2VJ, Lou KD2ITZ, Stan WA2NRV, Larry AC2QH and NM9J.

### Next test session

PCARA's next V.E. Test Session will take place on Saturday May 15, 2021. Location is once again outdoors at the John C. Hart Library in Shrub Oak, NY. The session, scheduled to follow the monthly meeting, will start officially at 11:00 a.m. Candidates are requested to contact VE Team Liaison Mike W2IG before the session using e-mail address w2igg'at'yahoo.com.

# Missing chips & ships

### The cupboard is bare

During a hunt for a new transceiver, I was surprised by the number of popular radios that are out of stock at many amateur radio dealers.

**Ham Radio Outlet:** "Out Of Stock - Delivery Will Be Delayed!"
**R&L Electronics:** "This item is currently out of stock."
**Gigaparts:** "Reserve yours now! (Ships In 30+ Days)"
**DX Engineering:** "Estimated Ship Date: 5/13/2021 (if ordered today)"


Why so few radios, what was going on? I raised the question during a recent PCARA Roundtable, and was reminded that electronic shortages are not confined to amateur radio equipment — and there are several reasons for the limited supply.

### Demand is high

With large numbers of people confined indoors by COVID-19 lockdowns, the search has been on for rewarding hobbies that can be pursued from home. Many licensed amateurs have decided to update their old equipment and — with a return to V.E. Testing — newly licensed amateurs are looking to buy their first radios.

### Chip shortages

During 2020 with millions of people confined to home and travel highly restricted, automobile manufac-

turers cut back on vehicle production worldwide. Modern vehicles have a plethora of integrated circuits for engine management, vehicle safety, cameras, entertainment and navigation systems. Meanwhile there was a surge in demand for notebook and tablet computers that could be used for working from home, remote education and gaming. Chip manufacturers switched production of ICs from automobile devices to consumer electronics.

As lockdown restriction were relaxed in late 2020, demand for new cars recovered — and vehicle manufacturers placed new orders for the integrated circuits they needed. Unfortunately, chip manufacturers' capacity was already committed and IC manufacturing lines could not be rapidly changed. Vehicle manufacturers such as Ford, General Motors, Volkswagen and Jaguar-Land Rover have had to shut down production lines in North America, Mexico, Asia and Europe due to a shortage of semiconductors.

**Fire in the silicon hole**

On October 21, 2020, the Japanese company Asahi Kasei Microsystems (AKM) reported that a fire had broken out at its semiconductor Plant "Fab2" in Nobuoka, Japan. It took three days for the fire to be extinguished. Production stopped completely and recovery was estimated to take a half year or longer. The plant produced large-scale integrated circuits for home appliances, temperature compensated crystal oscillators (TCXO) plus analog-to-digital and digital-to-analog converters (ADC/DAC) used in audio and radio equipment.

*AKM's Nobuoka semiconductor plant after the October 2020 fire.*

Some of those ADC/DAC chips and clock oscillators found their way into amateur radio products from the big three — Icom, Kenwood and Yaesu. Icom said its new ID-52A/E is delayed by critical parts shortage while the IC-7100 is delayed as parts are discontinued. Yaesu's FTM-7250 is out of production and the FTDX-3000 is discontinued. Kenwood's DH-74 is also discontinued.


*Icom ID-52A/E dual band FM and D-Star HT.*

**Slow boat to China**

Even if your amateur radio equipment is still being manufactured, delivery could be affected by COVID-19-related international shipping delays. The Port of Los Angeles and others on the west coast have had long lines of ships from Asia waiting offshore to unload. There is a shortage of shipping containers in Asia with empty containers being held in the USA for lack of a return cargo. Almost 400 ships were caught up in the closure of the Suez Canal in late March. By mid-April ships were only just arriving at destination ports in Europe and on the east coast of North America.


*The 220,000 ton 'Ever Given' container vessel was wedged across the Suez Canal for six days during March 2021, then impounded by the Egyptian Government. Is your new transceiver somewhere in those 20,000 containers?*

Small items previously shipped by air freight have also been affected. Commercial passenger flights carry significant amounts of cargo, stowed in the space under the passenger compartment. With passenger traffic reduced by 50% or more, capacity and timeliness of air freight has deteriorated.

**Bottom line**

Even if you find a desirable piece of amateur radio equipment — or anything else electronic — on a dealer's shelf, be prepared for price hikes. The cost of components is increasing as demand for scarce items rises and the cost of international shipping is also going up. Don't delay… place an order while you can.

- NM9J

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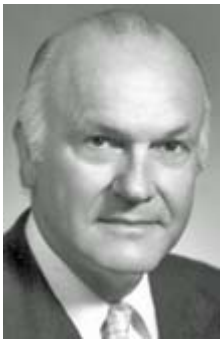
# Essential$_2$ Super


Have you ever broken an item made of metal, ceramic or brittle plastic? Don't throw the pieces away — instead, reach for your container of **Super Glue**… also known as **cyanoacrylate**. These products are solvent-free, rapid curing, one-part adhesives that bond rapidly to a wide variety of materials. But do you know how this miracle material came about? Or how to remove it from places where it shouldn't be?

### Cornell Chemistry

Dr. Harry W. Coover Jr (1917-2011) was brought up in his home town of Newark, Delaware and went on to gain a BS in Chemistry from Hobart College in Geneva, NY in 1942. He moved to Cornell University in Ithaca, NY where he received his Master's (1942) followed by a PhD (1944) in Chemistry for the synthesis of Vitamin B6. During WWII he was working at Eastman Kodak's Chemical Division in Rochester, NY with a team that was developing optically-clear plastic materials for precision gunsights. Cyanoacrylates were considered for this role but proved far too sticky. "The d*mn problem was everything was sticking to everything else," Coover said in 2005. "We had a hard time using it in molds."


*Harry W. Coover.*

### Prism problem

In 1951, Harry Coover was transferred to Kodak's chemical plant in Kingsport, Tennessee. The site had been established by George Eastman in 1920 to produce raw materials such as methanol and acetone from wood products.

Harry Coover was in charge of a team of chemists researching heat-resistant polymers for jet airplane canopies when technician Frank Joyner famously tried to measure the refractive index of ethyl cyanoacrylate by spreading a layer between a pair of refractometer prisms. The prisms became firmly glued together, ruining an expensive instrument.

Frank Joyner was probably using an *Abbé Refractometer* to measure refractive index. The instrument relies on critical angle — the smallest angle of incidence at which total internal reflection of light occurs as it passes from a glass prism into a medium of lower refractive index. Your editor has memories of using a similar instrument to measure the properties of essential oils.

Frank Joyner was concerned about the damage, but his boss realized the value of a material where a single drop could have such a rapid, strong adhesive effect with many different materials. "It suddenly struck me that what we had was not a casting material but a super glue," Dr. Coover said in 2005.

In November 1952 Harry Coover and Newton Shearer applied for a patent entitled "Adhesive compositions containing alkyl esters of cyanoacrylic acid." U.S. Patent 2,794,788 was granted in June 1957. The invention mentions methyl, ethyl, isopropyl and isobutyl esters of α-cyanoacrylic acid as being particularly effective and suggests the addition of a small amount of sulfur dioxide to act as stabilizer for the monomer until the product is applied.

### S9 + 10

In 1958 Eastman Kodak began marketing "Eastman #910" based on 100% methyl cyanoacrylate. It was designed for bonding metal surfaces and provided excellent strength with steel, aluminum and other metals. In a 1959 demonstration, Dr. Coover displayed the new product on live TV show "I've Got a Secret," where he used a single drop between two steel cylinders to lift host Garry Moore off the floor. The tag for Eastman 910® was that you only needed to count from 1… to **9**, **10** and the bond was made. At the time Dr. Coover said the product was "very expensive and is only available for industrial users".


*"I've got a Secret."*

In 1960 Harry Coover had another application in mind when Eastman Chemical teamed up with Johnson and Johnson subsidiary Ethicon to investigate cyanoacrylate adhesives in medicine. During the Vietnam War, butyl cyanoacrylate adhesives were used on the battlefield. Combat medics carried a spray version of the glue that could be applied to close open wounds. "There are lots of soldiers who would have bled to death," Dr. Coover said in 2004. "It saved a lot of lives."

Eastman 910 was not a total success for Kodak. The product was difficult to prepare and package, with an unpredictable shelf life. Eastman Kodak made a licensing deal with Hartford-based Loctite Corporation which remarketed the product in 1964 as Loctite® Quick Set 404. Loctite later became a subsidiary of Germany's Henkel Corporation in

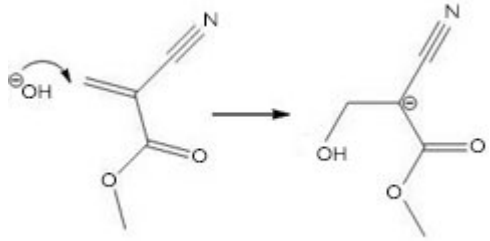
1997 and after a long career at Eastman, Harry Coover eventually went to work for Henkel. “Kodak had the original patent on super glue and sold it to the Loctite Duro brand," Coover said. “In the early ‘70s, the patent expired and Loctite’s Super Glue trademark slipped into the public domain.”

*Loctite Super Glue by Henkel.*

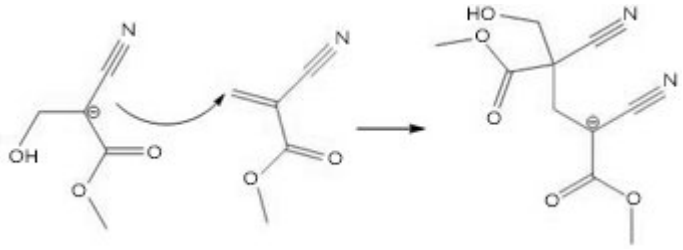
With the expiration of Kodak’s patents, Loctite Corporation and several Japanese Companies began introducing **improved** cyanoacrylate adhesives. These products soon became popular for household use, as well as their previous industrial applications. Well known trademarks include Taogosei Inc’s **Krazy® Glue** — distributed in the U.S.A. by Elmer’s Products Inc. — and National Starch and Chemical’s **Permabond®**, a name chosen when National Starch purchased Eastman Kodak’s cyanoacrylate business, consolidating it with existing activities in Bridgewater, NJ.

## How does it work?

Rapid curing of cyanoacrylate esters is brought about by **water vapor** in the air. Polymerization is catalyzed by the negative hydroxyl ion ($OH^-$), present in the thin film of moisture on the surface of items to be joined. The negative hydroxyl ion acts as an **initiator**, attacking a cyanoacrylate molecule, which then forms a new carbon-carbon bond with a second molecule… and so on until a long polymer chain has been built up.



*Initiation step — a negative hydroxyl ion $OH^-$ attacks the C=C double bond of a cyanoacrylate monomer.*



*Propagation step — anion formed in the initiation step attacks another cyanoacrylate monomer at the C=C double-bond. [After Univ of Bristol Molecule of the Month.]*

Pure cyanoacrylate esters are low-viscosity liquids which readily penetrate into the surface of items to be glued together. Once the cyanoacrylate polymerizes, it changes from a liquid to a tough solid, forming a bond not just between surfaces but down into the body of the substrate material.

Low viscosity is good for surface penetration, but it can cause problems when adhesives are applied to vertical surfaces, with liquid dripping off before the parts can be brought together. One fix is to add a **gelling agent** to the liquid monomer such as fumed silica or polymethyl methacrylate to increase viscosity.

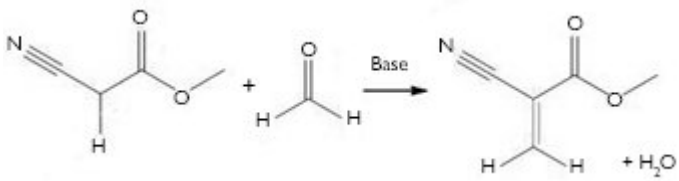
*Loctite Super Glue **Gel** for “no drip/no mess.”*

Fluorocarbons and polyolefins such as polyethylene and polypropylene are some of the few materials not readily bonded by cyanoacrylates — one reason for employing these materials in Super Glue containers. Pre-treatments are available for polyethylene and polypropylene to allow use of Super Glues — for example a primer containing tertiary aliphatic amines can diffuse into the polyolefin surface, initiating polymerization when the adhesive is applied.

Premature polymerization of cyanoacrylate adhesives while in storage can be avoided by addition of an acid, or a substance that forms acid with water. Sulfonic acids can be used along with Dr. Coover’s earlier patent suggestion of sulfur dioxide.

## Manufacture

The main process for manufacturing cyanoacrylate esters is a Knoevenagel reaction in which an alkyl cyanoacetate is reacted with formaldehyde in the presence of a basic catalyst under a nitrogen blanket. An exothermic condensation reaction takes place with elimination of water, forming (for example) methyl cyanoacrylate.



*Methyl cyanoacetate and formaldehyde are reacted to form methyl cyanoacrylate.*

Unfortunately the same reaction conditions of heat and base encourage polymerization of the cyanoacrylate ester. This partial polymer then has to be ‘cracked’

or broken down by heating, followed by distilling off the pure monomer from the crude mixture.

**Future**

Improved processes for manufacturing cyanoacrylate esters are being developed that should increase yields and provide alternative products with better properties than the commonly-used methyl and ethyl esters. They include products such as 2-methoxyethyl cyanoacrylate for reduced odor and blooming, and *n*-butyl cyanoacrylate for lower toxicity.

**In practice**

Cyanoacrylates have wide use in the electrical and electronic industries. Examples include adhesives for loudspeaker cones, wire tacking adhesives for speaker voice coils, products for securing copper wire to a ferrite core and for fixing motor windings. Cyanoacrylates can provide strain protection for leads and plugs, can allow assembly of multi-part control knobs and provide the dab of glue under surface mount components to hold them in place prior to soldering. *QST's* "Hints and Kinks" suggests a drop of Super Glue between laminations of a noisy power transformer to cure the buzz.

*Nordson dispensing equipment applies cyanoacrylate adhesive to an electronic assembly.*

I have had several occasions to use Super Glue around my own shack. One incident concerns a Kenwood TS-870 transceiver — one of the first HF SSB transceivers to incorporate digital signal processing at the I.F. stage back in 1995. Top right on the front panel are two rotary controls for adjusting the high and low frequency limits of the digital I.F. passband filter. Unfortunately, the gray plastic push-on knobs only lasted a couple of years before the plastic cracked. I carried out a repair with Super Glue and ordered replacement knobs from Kenwood. Unfortunately, the replacement knobs **also** cracked after a year or so — a black mark against Kenwood's quality control in my book.


*LO and HI filter control knobs on the Kenwood TS-870 transceiver.*

Another repair was necessary with a Mobil Speedpass™. (See: "Passing of Speedpass", *PCARA Update* March 2019.) After many years of use, the Speedpass transponder broke apart at the hole in the plastic housing where the vehicle key-ring passes through. Fortunately I was able to fix the broken parts together with Super Glue. The transponder survives to this day — unfortunately Mobil's Speedpass equipment has all been removed and replaced with modern credit card readers.

*Mobil Speedpass repaired with Super Glue.*

Staying with the mobile theme, I once had a bad experience with a vehicle wing mirror while in a hurry to exit the garage. The wing mirror hit the garage door — and plastic fragments broke off from the housing. Fortunately Super Glue came to the rescue and I was able to repair the damage then complete my journey.

One final suggestion — if you make use of Anderson PowerPoles®, but don't like the way paired connectors can slide apart, add a drop of Super Glue between the red and black plastic bodies to hold them in place.

**Short life**

One of the problems with Super Glue is limited shelf life. Manufacturers suggest that even with an unopened container, useful life can be as short as 12 months before the liquid contents thicken and solidify. Once a container has been opened — perhaps to remove just a single drop of adhesive — lifetime of the remainder can be as short as 1 month, thanks to entry of moisture.

One suggestion from Richard KN7SFZ reported in ARRL "Contest Update" is to store an opened container **upside down** to keep air away from the glue's 'outbound' surface. Storing glue in the refrigerator also lengthens life — let the container warm up before use.

My own solution to hardening of opened containers was to switch to Krazy® Glue "All Purpose Singles". Each packet contains four tiny tubes of adhesive — stored upside down. Take out a single tube and screw the applicator tip into the top of the metal tube to break the seal, then when liquid adhesive is flowing you can apply to the contact surfaces. Afterwards the single-use tube can be discarded.


*Krazy Glue All Purpose Singles.*

**Be super careful!**

There are some well-known hazards associated with Super Glue. The vapor can irritate eyes, nose and throat, so arrange adequate ventilation. The adhesive will stick immediately to human skin and the bond is *very* strong. My advice — keep the material well away from hands, face and eyes. Wear polyethylene gloves while working with cyanoacrylates, use eye protection and watch for drips. If your skin *does* get stuck, acetone (nail polish remover) or cooking oil can be used as solvents, or you can soak hands and fingers in warm soapy water. Take your time and roll or peel the skin apart.


Do not rely on Super Glue for bonding polyethylene or Teflon. Do not place bonded items in an oven or on a stove, as the adhesive will fail. And do not allow cyanoacrylate adhesives to contact cotton or cotton wool, as a violent reaction may occur.

- NM9J

# LED lights are on, *Shh!*

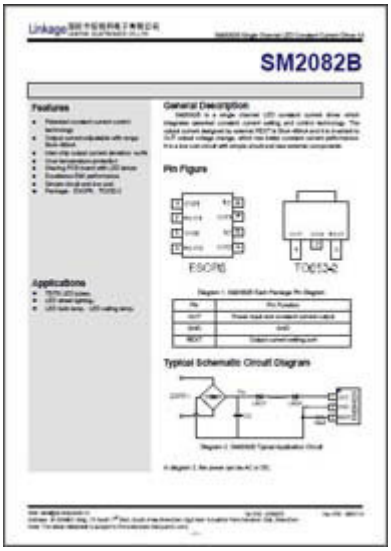
Have you been thinking about changing your incandescent bulbs or compact fluorescent lamps (CFLs) for LED types but were concerned about radio frequency interference? Shhh! Here is some more information for a radio-quiet life.

The subject of CFL and LED lamp bulbs has been covered in these pages before. See for example "Farewell to tungsten", *PCARA Update* January 2008; "LED lamps" December 2008 and "Light my wire", January 2016. The problem for previous LED lights has been the switch-mode power supply in the lamp base, running at frequencies of 50 - 150 kHz. Harmonics of the rapidly-switched output waveform can affect nearby radio receivers on low frequency (LF) through MF, HF and beyond.

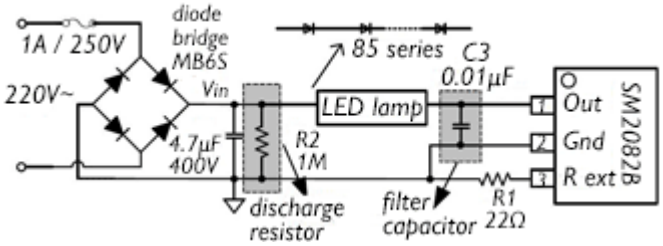

*Early LED lamps like this Philips 75W equivalent came in peculiar shapes with heavy heat sinks.*

Apart from RF interference, LED lamps have had other problems… early varieties had terrible color rendering and some designs had peculiar shapes which were difficult to fit into a standard enclosure. As light output increased, heavy heat sinks had to be incorporated that could run very hot to the touch. Take care while unscrewing!

Lou KD2ITZ passed on information about a family of integrated circuits for driving LED lamps. The SM2082B by Goston Electronics, China is an LED constant current driver which combines adjustable setting of the LED current with control technology to decrease output when temperature exceeds 105°C, in order to protect the LEDs. The device is intended for T5/T8 size LED tubes (fluorescent tube replacements), LED street lighting, LED lamp bulbs and ceiling lamps.




The following schematic for a 220V AC LED lamp, included in the data sheet, shows a very simple circuit:




*Application circuit from the SM2082B data sheet for measurement of RF interference level.*

The incoming AC supply is fed directly through a fuse to the diode bridge rectifier which is followed by a 4.7$\mu$F 400V electrolytic capacitor to filter the rectified output — a component that might cause some long-term reliability problems. The resulting DC voltage of approximately 300 volts is then applied to a long string of LEDs in series with the constant current driver chip. The desired current through the LED string can be set by external resistor R1 to anywhere in the range 5 to 60mA.

There is no switch mode power supply so there should be little or no RF interference. The data sheet claims "Excellence EMI performance" (sic) and includes an EMI test report.

**Where are they?**

Where can you find quiet LED lamps built to this design? There is a clue in teardown articles and videos available on the Internet. A series of videos on the YouTube channel of "BigClive.com", https://www.youtube.com/c/Bigclive/videos includes disassembly of several LED lamps.

One promising type of lamp is the so-called "filament" or "retro" type which mimics the look and size of

a classic incandescent bulb. The bulbs usually contain two or more strings of LED emitters. Individual LEDs are mounted on a substrate, connected in series and encased in a rubbery layer of silicone resin mixed with yellow phosphor. The phosphor modifies light emitted by the blue LEDs for an overall white color. Some red LEDs may be included on the substrate for further warming of the color. The substrate could be circuit board (chip-on-board, COB) or glass (chip-on-glass, COG). Each end of the filament has a metal tab for subsequent assembly.

*These LED 'filaments' from Handsontec are each rated 1 watt, with a forward voltage of 70 - 80V DC, and a current of 13mA.*

The filaments are supported using a glass column with cross arms, mounted above the stem of the soda-glass envelope — a direct copy of incandescent lamp design. It is quite possible that these bulbs are assembled in China on the same production lines that previously manufactured tungsten lamps.

*This Philips clear A19 bulb is rated at 8W (60W replacement) and has four LED 'filaments' angled around the glass support for all-round even illumination.*

Compared with previous LED lamps that required a substantial heat sink to remove heat from a small number of high-power, high-current LEDs, the "retro" design reduces heat generation by under-running a larger number of smaller LEDs. A special gas mixture inside the glass bulb conducts heat away from the LED strings to the surface of the glass. Argon or helium in the gas mixture improves thermal conductivity. The glass envelope then runs slightly warm to the touch.

The soda-glass bulb can be left completely clear or coated with silica on the inside for a frosted, diffuse effect. Angled layout of the multiple LED filaments and lack of a large heat sink allows emitted light to be almost omnidirectional.

## On the hunt

If you are hunting for this type of light bulb in the store, look for characteristic yellow filaments inside a clear glass bulb. If the bulb is frosted, it should still be made of glass, extending **all the way down** to the Edison screw base. Overall **weight** should be much lower than older-style LED lamps, thanks to the missing heat sink.

*Philips frosted glass globe lamp after the glass envelope was accidentally broken, reveals four LED filaments inside.*

## Trust but verify

There is no *guarantee* that lightweight LED lamps are using a simple constant current regulator, with its promise of low RF interference. Another alternative for driving strings of LEDs is the buck boost DC-to-DC converter, where a high voltage is generated by rapidly interrupting current through an inductor.

A good test for an RF-quiet LED lamp is to hold an AM transistor radio nearby, tuned to an unused frequency. Switch the lamp on and off — there should be no change in the amount of noise picked up by the radio.

*Using a portable LW/MW/SW AM/FM portable radio to monitor RF interference from a GEC LED lamp. (No RFI detected.)*

My favorite brand of LED lamp is still Philips. The company has a long history of innovation, reliable operation and low RF noise.

Philips Lighting Division was spun off from Royal Philips N.V. in May 2016 and is now an independent company named "Signify". They manufacture dimmable LED lamps in China with clear glass and frosted glass envelopes — labeled "Classic Glass Design". Light output is 450 – 800 lumens with prices of $2.00 – $3.00 per bulb.


- NM9J

# Peekskill / Cortlandt Amateur Radio Association

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

### PCARA Information

PCARA is a **Non-Profit Community Service Organization**. PCARA meetings take place the first Sunday of each month (apart from holidays, July/August break and pandemics). 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
**N2CBH:** 448.725MHz -5.0, PL 107.2Hz

### PCARA Calendar

**Masks and Social Distancing are required.**
**Sat May {TBA}:** PCARA Breakfast, 9:00 a.m., Downing Park Pavilion, Rt 202, Yorktown. *Monitor Google Groups email for date.*
**Sat May 15:** PCARA Membership meeting, 9:00 a.m., John C. Hart Memorial Library, 1130 E Main St., Shrub Oak, NY. Outdoors, bring your own chair.
**Sat May 15:** PCARA V.E. Test Session, 11:00 a.m., John C. Hart Memorial Library, Shrub Oak. Outdoors, see below.

### Hamfests

**Check with organizers before leaving.**
**Sat May 15:** Splitrock ARA - N Jersey Tailgate Hamfest, Roxbury Sr Cntr, 72 Eyland Ave, Succasunna, NJ. 8:00 a.m.
**Sat May 22:** Southern Berkshire ARC Hamfest, Goshen CT Fairgrounds, 116 Old Middle St., Goshen, CT. 8:00 a.m.

### VE Test Sessions

**Check with the contact before leaving.**
**May 1, 8, 15, 22, 29:** Westchester ARC, 19 Hunts Bridge Rd, Yonkers NY. 12:00 noon. Must contact VE, (914) 237-5589.
**May 1, 8, 15, 22, 29:** NYC-Westchester ARC, 43 Hart Ave, Yonkers NY. 12:00 noon. Must contact VE (646) 225-8600.
**May 15:** PCARA, John C. Hart Memorial Library, 1130 E Main St., Shrub Oak NY. 11:00 a.m. Contact Michael W2IG w2igg'at'yahoo.com, (914) 488-9196. **Call ahead**.
**May 21:** Orange County ARC, Munger Cottage, 183 Main Street, Cornwall NY. 6:00 p.m. Contact Joseph J. DeLorenzo, (845) 534-3146, w2bcc'at'arrl.net

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