



PCARA Update



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Moving upstream

The annual PCARA Holiday Dinner will take place on December 1, 2013 at the Cortlandt Colonial Restaurant in Cortlandt Manor, NY. The dinner will begin at 5:00 pm and the cost is \$30.00 per person which includes an entrée, dessert (cake), gratuity, and tax. Soda and drinks are extra. If you are planning to attend, **please let us know ASAP**, since the restaurant requires a **headcount** in order to host the dinner. Send your information to *mail@pcara.org*.



PCARA's Holiday Dinner moves to the Cortlandt Colonial Restaurant, Old Albany Post Road, in Cortlandt Manor. Location is at the end of Highland Ave, near the "rock cut".

Another date to highlight on your calendars is Sunday January 5, 2014. On that date the 2014 edition of the Bring and Buy Auction will be taking place at 3:00 pm at Hudson Valley Hospital Center in Cortlandt Manor, NY. So, start going through your collection of treasures now and choose a few that you might be able to do without, and bring them along to the January meeting. You might be lucky enough to take home a few treasures of your own.

PCARA is scheduled to hold a Ham Radio Introduction and Demonstration to Cub Scout Pack 118 on January 24, 2014, 7:00 pm at Furnace Woods Elementary School in Cortlandt Manor, NY. We need members to help accomplish this. If you're interested in helping out, please let us know by sending a note to *mail@pcara.org*. This will be a topic of discussion at the January 5th meeting.

After the Holiday Dinner, our next regularly scheduled meeting is on Sunday January 5, 2014 at



Furnace Woods Elementary School is the venue for an upcoming Amateur Radio demonstration to Cub Scouts.

3:00 pm at Hudson Valley Hospital Center in Cortlandt Manor, NY. I look forward to seeing each of you there.

- 73 de Greg, KB2CQE

PCARA Officers

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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. (No net on Thursday Nov 28 - Thanksgiving Day.)

Adventures in DXing

- N2KZ

AM Alive!

Just how far can you hear on an AM radio? As the leaves begin to fall and the weather turns cold, low band DX really heats up. Now is the time to work the Pacific Rim on 40, 80 or 160 meters. Great DX also happens way below the amateur bands, too. Let me show you where to look!

If I told you it was possible to hear two dozen states in one evening on a simple AM radio, would you believe me? Take a look at our list of stations on page 3 and give it a try! Good old medium wave is amazing. Think about how far our signals travel on 160 meters with 1,000 watts or less. There are medium wave broadcast stations operating with two million watts! The possibilities are endless.

Here the name of the game is not necessarily capturing weak signals. Being able to null strong signals (to hear the good stuff underneath) and escape from man-made interference is all-important. Good equipment and clever antenna arrays certainly aid the process. And don't forget to heed the advice of any good real estate agent! Everything depends on location, location, location!

Years and years ago, I experienced some of my best medium wave DXing at Jones Beach on Long Island's south shore. Off-season, the parking lots are empty and available for experimentation. Enjoying the freedom provided by owning my first car, I would ride down to the beach to study and to listen to radio stations far, far away.



Jones Beach, on the southern flank of Long Island.

If you rode around the huge Jones Beach parking lots, you could find sweet spots where cold water or sewer pipes ran under the ground. These pipe runs could be miles long, creating an unintentional and miraculous ground plane. My car radio would soar with reception when I coupled with the pipes just right.

Analog car radios from that era were no slouches. My first cars all had AM-only radios featuring nifty tuned RF stage designs. These tuned-RF-stage superhets were amazingly selective and sensitive. With the aid of my Dad's metal-working expertise, I lengthened the stock whip antennas with longer metal rods with a threaded base. With a little retuning of the antenna trimmer capacitor found under the radio's tuning knob, I had a supercharged DX catcher in my dashboard.



AM car radios could be amazingly selective and sensitive.

Daytime reception was not disappointing. If you knew what frequencies to check, you could hear from Maine to The Carolinas and maybe beyond! You never knew what you might hear. Conditions would change daily with a new jumble available every visit. I only wish I had been introduced to longwave beacon reception back then. I didn't own a longwave receiver until the early 1970s. Longwave beacons were in their heyday. I can't imagine what I might have logged.

Times do change and reception changes with it. All sorts of new challenges face us in the 21st century. Computers, switching power supplies, new-fangled light bulbs, fiber-optic interfaces and modems and flat-screen televisions all contribute to the QRM din. The advent of IBOC digital transmissions on AM was a huge setback. You need to really get away from civilization to find remarkable AM radio reception.

Again, the more things change the more they stay the same. A quick solution is easy! How do you get away from all the noise? Get in your car! Most cars still feature formidable AM radio receivers with good selectivity, sensitivity and filtering. If you can avoid overhead power line noise and other ills, some fun DX can find its way to your speakers nearly every night.

I can tell you from personal experience, getting up before the crack of dawn and driving to work does offer one advantage. It is a fantastic time to DX. Very long DX is often heard in the depths of the night. As dawn arrives, very interesting greyline skip takes over, opening up a whole new set of avenues for you to try. You can hear all sorts of things, if you know where to look.

Everyone likes instant gratification and a feeling of achievement. If you are adept and lucky, you can hear 22 states on AM radio in just one night. Not bad for a little effort! I offer my list of tangible targets for your use. These stations are strong and consistently available for your listening pleasure. You should be able to hear most of them with little effort. Try differ-

ent times at dusk, during the evening and dawn. Good luck!

AM Radio Station List

Two Dozen Quick Catches on AM Radio:

State/Province	Call	Freq kHz
Connecticut	WTIC	1080
Georgia	WSB	750
Illinois	WLS	890
Iowa	WHO	1040
Kentucky	WHAS	840
Louisiana	WWL	870
Maryland	WBAL	1090
Massachusetts	WBZ	1030
Michigan	WJR	760
Minnesota	WCCO	830
Missouri	KMOX	1120
New Jersey	WVNJ	1160
New Hampshire	WFEA	1370
New York	WCBS	880
North Carolina	WBT	1110
Ohio	WTAM	1100
Pennsylvania	WPHT	1210
Rhode Island	WPRO	630
Tennessee	WSM	650
Vermont	WVMT	620
Virginia	WRVA	1140
West Virginia	WWVA	1170
District of Columbia	WFED	1500
Ontario	CHML	900



Let this not be the end of your adventures! All sorts of stations could find their way to your speakers. My good friend Pat Martin could tell you all about it. Pat is a locksmith over in Seaside, Oregon right on the Pacific shoreline. His home is surrounded by vast cow pastures with nearly endless fence posts. What a wonderful place to install very long wire Beverage antennas!

Pat's receptions are legendary. His primary receiver is a Drake R8. A world class receiver combined



Drake R8B communications receiver covers 10 kHz to 30 MHz.

with a magnificent location and collection of Beverage antennas brings the world to his door. Pat has heard

AM broadcast stations from places as far away as India. Reception from all along the Pacific Rim is a nearly daily occurrence.

Some people will go long distances to hear spectacular and rare medium wave DX. Two places are true favorites in the medium wave DXing community. If you want to listen in North America, venture a visit to Cappahayden, Newfoundland. It is a tiny village south of St. John's, the capital city of the province known as The Rock. It is a wonderful spot where few local broadcast stations crowd the band. The local topography aids your receiver's outreach by blocking powerful North American stations arriving from the south and east. DXpeditions to this site often produce loggings from Africa, the Middle East, Europe, South America and beyond.

Possibly the best spot on the planet is the tiny town of Sheigra in north-west Scotland, just a little bit south of Cape Wrath. Medium wave DXers come here to hear the world. In a recent DXpedition, three members of the British DX Club, Alan Pennington, Tony Rogers and Dave Kenny took their AOR AR7030 Plus receivers and hooked up to three 1500 foot Beverage antennas. These lengthy wires rested upon tall canes planted in the rolling hills that surround their hut. The results were simply astounding.



Sheigra is on the northwest tip of the Scottish mainland.

Can you imagine having stations like this in your log: How about the Armed Forces Network station from Okinawa on 648, Radio Pakistan in Peshawar on 1260 and The Philippines on 1350? Alan, Tony and Dave heard dozens of exotic stations during their two week stays.

Their logs from North America would be amazing at your QTH, but they are thousands of miles further away! Their radio's ears were big capturing meek stations literally all over the world. Central and South America



AOR AR7030 communications receiver has excellent strong-signal handling and very good selectivity.

were well represented with new loggings of Caracol Radio in Columbia and stations from Paraguay, Ecuador, Brazil and Argentina. One sweet catch was Radio Carraviz in Juliaca, Peru on 1570. The possibilities are endless!

The wonder of deep medium wave DX is not limited to dream locations, receivers and long, long antennas. One early evening, a few days ago, I read Internet postings of huge signals coming into Cape Cod from Arabia. It was the BSKSA's station from Qurayyat, Saudi Arabia on 549 kHz and Radio Diffusion Algerienne in Ain Beida, Algeria on 531 kHz.

Although I couldn't hear audio, I heard unmistakable one kilohertz heterodynes tuning my car radio to 530 and 550. Folks close to the ocean heard these stations like locals. A regular catch is the Saudi Arabian powerhouse on 1521 kHz that also places a firm one kilohertz heterodyne on WWKB 1520 Buffalo around dusk almost nightly. Try for it! It's actually pretty easy to hear!

Here are some useful resources to aid your quest: What's that station? Try the FCC's detailed and authoritative database called AM Query. It contains nearly everything you ever wanted to know about American radio stations, <http://www.fcc.gov/encyclopedia/am-query-broadcast-station-search>. Also check out the handy Radio Locator site at <http://www.radio-locator.com>.

Two DX clubs also offer lots of information about medium wave: The National Radio Club (<http://www.nrcdxas.org>) and The International Radio Club of America at <http://www.ircaonline.org/index1.html>. Is AM radio dead? Not in the eyes of DXers! The world can be yours as you learn to dig down and find your way through the thousands of signals available. Give it a try tonight!



Dave Kenny of the British DX Club suspends a Beverage receive antenna on multiple canes at Sheigra, Scotland.



Silence is Olden

An update on two stations missing in action: Still off the air are NOAA Weather Radio KWO35 162.55 MHz and shortwave stalwart CFRX 6070 kHz.

KWO35 suffers a difficult mixing problem. Their signal combines with another powerful government transmitter in New York City producing an unacceptable product on an essential emergency marine frequency. Engineers are still seeking a solution to return this popular service to the air.

Steve Canney, QSL Manager for CFRX and mother station CFRB 1010 Toronto, hopes repairs will return it to the air soon. CFRX is one of the last survivors of a bevy of shortwave broadcast repeater stations that served Canadians in outlying areas for decades during the 20th century. CFRB is a popular station in the greater Toronto area featuring a live and local news-talk format.

Happy Holidays

From all of us at PCARA Update to all of you — have a happy holiday and New Year! Don't miss Straight Key Night on New Year's Eve and Day! Read all about it at: <http://www.arrl.org/straight-key-night>.

73s and good DX de N2KZ 'The Old Goat.'



Holiday dinner

Just a reminder that PCARA's 2013 holiday dinner is scheduled for 5:00 pm on Sunday December 1st. The location is new — at the Cortlandt Colonial Restaurant, 714 Old Albany Post Road, Cortlandt Manor, close to the old "rock cut".

Directions: from Route 202 or Route 6, take Bear Mountain Parkway west and exit at Highland Avenue. Make a right off the exit ramp and proceed down the hill. Cross the bridge, then Cortlandt Colonial Restaurant is immediately on the left, before the "rock cut".

The menu choices are:

*Prime Ribs of Beef
Grilled New York Sirloin Steak
Broiled Sea Scallops
Jumbo Shrimp stuffed with Crabmeat Stuffing
Chicken Marsala*

The package includes open soup and salad bar. Inclusive club price will be \$30.00 per person, apart from soda and alcoholic drinks.

If you will be attending, and you have not yet informed Greg, KB2CQE, **please send an e-mail with the number of guests** to Greg at the PCARA mailbox, mail@pcara.org, **as soon as possible**.

Field Day results

Full results from Field Day 2013 have now appeared in December's *QST* and on the ARRL web site. See http://www.arrl.org/results-database?event_id=47575.



PCARA Field Day 2013 took place in June alongside the ballfield at Walter Panas High School.

You may recall that as a result of diminished resources this year, Joe WA2MCR and Greg KB2CQE decided to reduce the number of HF stations from two to one, while maintaining the 'free' VHF station that is still allowed by Class 1A. PCARA's score in Class 1A was in line with the provisional total score reported in the July newsletter (see bold column below):

Peekskill/Cortlandt ARA, W2NYW, Class 2A

	2002	2003	2004	2005	2007	2008	2009	2011	2012
QSOs:	718	733	968	853	1019	1109	694	879	968
Power	2 (<150W)								
Partcpts:	15	11	12	10	14	10	10	14	15
Tot scor:	2,096	2,328	2,996	2,798	2,906	3,460	2,746	2,602	2920

Peekskill/Cortlandt ARA, W2NYW, Class 1A

	2013
QSOs	768
Power	2 (<150W)
Partcpts	14
Tot score:	2,040

PCARA President Greg KB2CQE observed that the score of 2040 points was "most respectable considering we worked 1A". ARRL's publication of results now allows a comparison of scores with neighboring groups in the ENY section and the Hudson Division.

In Field Day 2013, PCARA was...

- **'First'** out of only one entry in Category 1A, ENY section.
- **Eleventh** out of 25 entries in the entire ENY section.

- **Second** out of 2 in Category 1A, Hudson Division.
- **37th** out of 80 in the entire Hudson Division.
- **45th** out of 138 in category 1A nationwide.
- **907th** out of 2548 entries total.

Here's how PCARA fared compared with some of our friends and neighbors in the East New York (ENY) section of ARRL's Hudson Division:

# Call	Points	Cat	QSOs	Club
1 N2SF	7236	4A	2003	WECA
2 K2CT	6874	3A	1981	Albany
3 K2QS	5798	3A	1218	QSY Society
4 WD2K	4844	3A	1117	Rip Van Winkle
5 K2AE	4346	5A	943	Schenectady
6 K2DLL	3716	3A	1034	Saratoga Cty
7 W2HO	3670	5A	875	Orange County
8 NQ2W	2460	1B1B	221	(Low power mult)
9 N2TY	2246	3A	545	Troy
10 W2YRC	2064	3A	372	Yonkers
11 W2NYW	2040	1A	768	PCARA
12 K2DXU	2024	2A	556	Happy Hams
13 W2EGB	1920	2A	735	East Greenbush
14 K2KGJ	1860	1E	161	(Low power mult)
15 W2BK	1760	2D	805	
16 W1BAA	1754	3A	224	Southn Berkshire
17 K2PUT	1598	3A	202	PEARL

Compared with our previous entry in 2012, we had fewer contacts — down from 968 QSOs to 768 — and our score dropped from 2920 to 2040 — but this is to be expected with only one HF station instead of two. Neighboring clubs moved around somewhat — congratulations to QSY Society, who moved up to 3rd place from 6th.

Overall, this was a pretty good performance for PCARA's reduced-resource Field Day, with most people still enjoying themselves. *QST* compared Field Day 2013 with the very first Field Day, 80 years ago in 1933. The following paragraph from *QST* sums it up for today's PCARA!

"But Field Day is all about making adjustments. Plans go awry, equipment malfunctions, and power sources mysteriously run out of juice. You devise another operating plan, the malfunctioning gear is repaired, and the generator fires up again. Clubs come together, work out problems, and keep on making QSOs."



QST also reported that — compared with 2012 — Field Day 2013 saw a small drop in entries to 2548 and a reduction in participants to 36,560. With this year's change of Category from 2A to 1A, we would need a statistician to rate PCARA's score against past years, and a crystal ball to forecast what might happen in 2014.

– NM9J

Antenna shoot out - W2CH

Ray W2CH provides a hands-on comparison of two different multiband (HF/VHF) mobile antennas.



MFJ-1699T multi-band mobile antenna [photos by W2CH]

I purchased the MFJ-1699T earlier this year for about \$70.00. It is a 10-band HF/VHF antenna, about 65 inches long at maximum length, with a fairly slim profile. I ordered the “S” version, which is how it was labeled, so it should have had a PL-259 or M Connector — but it came with the 3/8 inch stub. I used a Comet adapter with an SO-239 receptacle to my Diamond K-400 trunk mount. The MFJ-1699T is rated for 200 watts on 75/80 meters to 2 meters. It has a wander lead to change bands and a top whip whose length has to be adjusted, based on a table in the instruction sheet. So two adjustments are required when changing bands. I wrapped the excess wander lead around the antenna to take up the slack.

The Moonraker MD-7400 was recently purchased from the UK dealer, <http://www.moonraker.eu>, who shipped it here by Royal Mail in about a week. In US currency it cost about

\$164.00, based on an introductory price of £99.95 in the UK, plus £25 to ship it here, or another \$41.00!

The antenna is 1.77 meters long, nearly 6 feet, when fully extended. This is about the same size as the MFJ antenna, with a similar slim profile. It has a PL-259 connector at the base.

The MD-7400 is rated for 130 watts, so it is adequate for most mobile operations, and covers 40 meters to 70 cm, a bit different from the MFJ-1699 model. I found that with my LDG tuner and Yaesu FT-857D mobile set-up, I could tune it on 75/80 Meters in addition to its specified frequencies.

To change bands with this antenna, one loosens the retaining nut on the black plastic tube then slides the tube over the metallic

mast, which is calibrated from 0 to 27 cm, setting the position according to the chart in the instruction sheet — then one tightens the retaining nut again. As one goes lower in frequency, the longer the antenna becomes. For band changes there is no need to readjust the whip antenna as with the MFJ-1699T.

Now with my on-the-air-tests... I started with 40 meter SSB and on comparable signals the results were similar, using the transceiver with the LDG tuner. I then performed a comparison on 20 meters SSB, and the signal strengths were similar on receive. Next I went to 10 meter SSB, and again it was close. The big difference was evident on 10 meter FM repeaters. The received FM signals were stronger with the MFJ-1699 than for the Moonraker MD-7400.

With the MFJ antenna on 29.66 MHz, I could key up the Dallas-Ft Worth Repeater — but not with the Moonraker. Results were similar on other repeater frequencies, with received strength being much higher using the MFJ antenna. I worked K6LLL in Northern California, simplex, on 29.60, with good signals both ways with the MFJ antenna.

So — while results in my comparison receiving tests on several HF bands were similar, one antenna was better than the other on 10 meter FM. I have found that when it comes to 2 meters, the MFJ-1699 was not as good in performance as a regular 2 meter antenna, and a UK review I read about the Moonraker stated that it was not that good on 2m and 70 cm, which I have not tried.

A big point with both antennas, is that to change bands, unlike with my larger and more expensive Diamond SD-330 screwdriver antenna, one has to stop one's auto, get out and re-set the antenna before moving on again with different settings for another band. However, for the price, they do the job.



Close-up of Moonraker MD-7400 mobile antenna with the black plastic inductor tube raised to show the metallic mast that slides inside.



Moonraker MD-7400 mobile antenna.

- Ray, W2CH

Repeater visit

On Sunday November 3, Bob N2CBH and your editor paid a visit to the repeater site to investigate some recent problems. The grass had been cut since our previous visit, so the PCARA equipment was not too difficult to approach.



Bob, N2CBH checks operation of the 2 meter repeater on November 3.

signal *might* be due to cable egress, possibly from FiOS equipment.)

Bob noted a change in receiver sensitivity when moving the antenna input cable. This was traced to a faulty right-angle adapter on the receiver input. Fortunately, we had a spare adapter and when this item was replaced the sensitivity stabilized.

The other item that Bob had brought was a replacement ferrite circulator for the repeater. The circulator is installed between transmitter output and duplexer to absorb any unwanted RF which might be traveling down from the antenna. Strong signals that pass through the duplexer into the transmitter's power amplifier can cause unwanted mixing products. The Decibel Products 4314 circulator that is now in use is considerably larger than the previous Alcatel circulator and should be able to handle more power. After the changeover, stations were reporting better signal strength on the repeater output and weak signals were no longer being lost in the noise.

There are still occasional problems with weak signals and noise on the repeater input. Bob has asked members to monitor on and around the repeater input (146.070) to determine whether these signals are local and where they might be coming from.

Full force FiOS

In the *PCARA Update* for October 2013, Henry KB2VJP drew attention to copper phone lines that had suffered storm damage and Verizon's plan to replace them with wireless or fiber-optic service. I did not realize how soon I would be caught up in this developing story.



Trouble tickets

In recent months, I have had problems with my own landline phone service. A couple of years ago, the old copper-clad steel cable drop from the utility pole to the house became intermittent and Verizon had to replace it with a new copper drop, incorporating Kevlar fibers for support. All was well until I started to get noisy connections and hum on the phone line. One of the technicians who looked into my problem told me that Verizon had reduced maintenance on their copper plant, with very few good copper pairs left for my street. If my own pair deteriorated further, then I might have to change over to fiber optic service.

Pushed to the edge

The next time I called in a fault and the technician arrived, he told me he had actually been scheduled to carry out a FiOS conversion. As further encouragement, I had been receiving mailings and phone calls from Verizon to schedule a FiOS installation. I always replied with a polite "No, thank you", for the following reasons:

- Basic phone service over copper wire does not need any local power source, as it runs on electricity from the Central Office. A FiOS terminal *does* require local AC power and only has limited battery backup time in the event of a power outage.
- Copper landline service is heavily regulated by the FCC and NY Public Service Commission, while FiOS is a more lightly-regulated product.
- There is a possibility of radio frequency interference from the FiOS equipment.

I had direct experience of RFI from a FiOS installation. A nearby home had a FiOS terminal mounted outside the house. After installation, emissions on 80 meters and 40 meters were very noticeable. Within 30 feet of the box I could hear pulsating carriers in the two meter band, for example on 146.053 and 146.695 MHz. The fiber optic cable itself cannot radiate RF, but the optical signals that it carries



An external FiOS terminal.

are converted from infra-red to radio frequency for distribution inside the home. (So if you are hearing digital interference on PCARA's repeater output on 146.67 MHz FM, it *might* be from a FiOS installation.) Karl, N2KZ reports interference to over-the-air VHF/UHF TV reception from his own FiOS interface box. In addition, the switch mode power supplies that charge the FiOS backup battery have been notoriously noisy.

Tone - gone

In early November I discovered that my copper phone line had suddenly lost dial tone. The same thing happened to next-door neighbor Joe. We had several visits from Verizon technicians who reported that our phone lines looked good, with Central Office battery volts present, but the techs were unable to restore dial tone. The final repair technician told me the reason why — my telephone account had been *converted to FiOS* by Verizon's Billing Department and the Central Office had therefore disabled service on my copper line. I was told it would be *extremely difficult* to reverse this change.

After almost a week of no landline service, my cell phone minutes and my patience were both running out. So, with much muttering under my breath, I accepted the inevitable and scheduled a FiOS voice installation.

A few days later, the installation technician arrived in his bucket truck. He made a quick survey of the premises for possible entry points, then decided to follow the same line as the original copper drop. Terminal equipment would be mounted inside the basement, where there was easy access to power, ground and the in-house phone wiring.



Preassembled fiber-optic cable drop.

New cable drops for FiOS are manufactured by "Corning Optical Cable" and come in specific lengths with giant connectors already molded on. As a result, entry into the house required a much larger hole than before, around 1 inch diameter. This took a great deal of drilling to penetrate the outer wall. The old cable drop had to be used to pull a new connectorized cable into place — so it was a final

farewell to the old copper wire.

Down in the basement, I was pleasantly surprised by the neat appearance of the optical network terminal, which is an "Alcatel I-211-M inside ONT" unit. The size is only 12" w x 15" h x 4 1/4" deep, including the steel mounting bracket. Inside the plastic enclosure is the fiber optic termination, battery back-up unit and desktop-size ONT. Underneath the case, a small power supply was mounted on the wall.

RFi-OS?

I was concerned about RF interference, so I checked around the installation with my Sangean ATS909/RS DX398

portable FM/MW/LW/SW receiver. Close to the ONT and its switch-mode power supply there was a strong buzzing noise on AM and short wave. But moving a few feet away reduced the interference to a negligible level. There did not seem to be any RFI conducted onto the phone wiring and I have not noticed any additional noises in the radio room. The final seal of approval came when I noted that the shack's "atomic clock" was still synchronizing successfully with WWVB on 60 kHz every night.

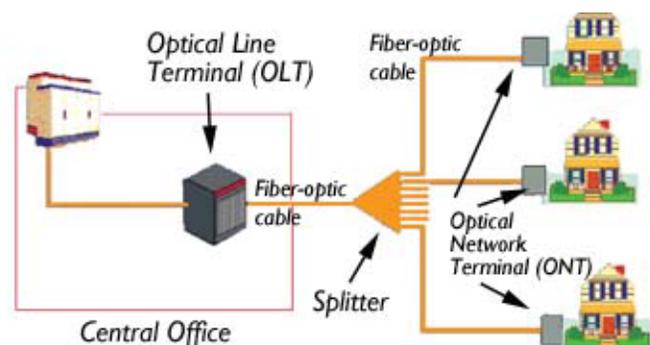


FiOS Optical Network Terminal mounted on the basement wall. (Lefthand door for access to the backup battery is open.)

My own FiOS ONT is only connected to the house phone wire. Local RFI *might* increase if connection was made to coaxial or Ethernet cables for video and Internet.

Finally FiOS

I was not completely happy with the way Verizon effectively forced me off their copper phone lines — but FiOS service works very well and should be more reliable than the old, neglected copper plant. The entire fiber optic connection from the Central Office to the customer's optical network terminal is "passive" — in other words the only components in the light path are optical splitters which divide the infrared beams to multiple customers, and combine their signals in the opposite direction. There are no electronic components to fail or copper cables to get wet and corroded.



FiOS fiber-to-the-premises network is passive, from the Central Office to the customer's Optical Network Terminal.

Follow your fiber

I checked the signal path to my own home. At the end of my street there is a "Fiber Distribution Hub" or FDH mounted on a utility pole. The FDH is connected to the fiber optic feed from the Optical Line Terminal (OLT) located in Verizon's Peekskill central office. The local fiber distribution



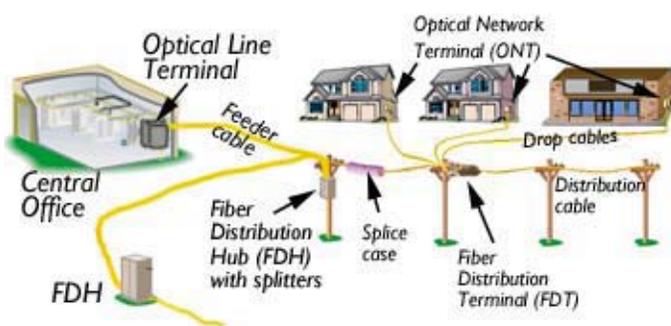
Fiber Distribution Hub (FDH) for my street.

hub contains optical splitters that take the signal from a single central office fiber and divide the downstream wavelengths (1490 nm and 1550 nm) for distribution to 16 or 32 customers via individual fibers to each home. The splitters also combine the upstream wavelength (1310 nm) from those same customer fibers into a single signal that is sent back to the central office on the fiber optic feed cable.

On my street, all utilities are overhead, so the aerial cable drops for FiOS come out of Fiber Distribution Terminals (FDT) which are suspended near the utility poles and spliced into the street's fiber optic distribution cable. The connectorized Corning drop cables for 4-6 households are attached to the nearest fiber distribution terminal, hanging high in the air. Locations with underground utility distribution would have their local FDT located *below* ground, in a Verizon pull box.



FiOS Fiber Distribution Terminal (FDT).



Local components of FiOS fiber-to-the-premises distribution.

Was it worth it?

The Gigabit passive optical network (GPON) technology behind FiOS is very impressive and might last as long as the old copper technology that it replaces. But Verizon's capital costs have been high and analysts differ on whether Verizon's investment in FiOS infrastructure is paying off. In 2010 Verizon said it was winding down further FiOS expansion to concentrate on areas that already had a FiOS franchise. New areas without existing fiber were frozen.

In September 2013, Verizon CEO Lowell McAdam repeated that the company wants to focus on "making FiOS more profitable in the current model before we ever look at expanding further." (There is a FiOS availability map for apartments and offices at the following web page: <http://>

communities.verizon.com/fiosavail/.)

We might consider ourselves fortunate that Verizon's FiOS plant is already installed in our local area around Peekskill/Cortlandt. It will be interesting to see who wins out in the long term for provision of phone/broadband services between the wireline, cable and wireless operators.

- NM9J

Calculating interest

A few weeks ago my old scientific calculator became unreliable and I had to purchase a new model for the radio room. This started me thinking about calculators and calculations that I've encountered over the years.

Half a century ago

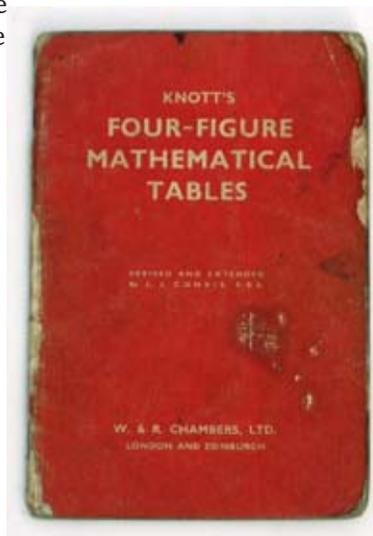
Going back to Grammar School in the 1960s, there were **no** electronic calculators available for students. UK math classes were taught the same way they had been taught for the previous 50 years, preparing future scientists, technicians, accountants and engineers to go out into the world and cope with *hard sums* using just their own resources.

Log jam

A few aids were available. As we started grammar school math, students were given a book of four-figure mathematical tables. This slim volume contained tables of logarithms and antilogarithms, plus the trigonometric functions and square roots. In a few weeks, the math class became proficient at looking up four-figure logarithms, then adding and subtracting those logs to multiply and divide. Later on we learned how to calculate powers and roots by further manipulation of logarithms.

You might think those skills would be a waste of time in today's electronic world, but I still find it helpful to remember a few log values that assist in the calculation of power ratios in decibels.

Even though my class became skilled at using logarithms, the process was **s l o w**. Looking up logarithms in a book of four-figure tables takes a while because the fourth digit has to be estimated by interpolation. At the end of log calculations on paper, the antilogarithm has to be looked up in another table. There was always a chance of error in those additions and subtractions, and in the table look-ups.



Well-worn Mathematical Tables booklet. Stains were caused by splashes in the chemistry lab!

Sliding about

School science calculations did not always require four-figure accuracy, so our teachers encouraged use of the **slide rule**. This is a simple piece of equipment, consisting of three plastic bars engraved with the numbers from 1-10 or 1-100, spaced according to their logarithms. The middle bar could slide past the fixed outer bars, allowing lengths of calibrated ruler to be added or subtracted. Accurate read-out of the answer was assisted by a clear plastic cursor with a vertical line, which slid over the outer bars.



Faber-Castell ten inch slide rule.

After a certain amount of practice, our class became proficient with the slide rule. I can still calculate simple proportions on a “slip stick” four times faster than with log tables.

Scientists and engineers were often associated with slide rules. I remember the story of physicist Enrico Fermi, who famously wielded his slide rule while the first nuclear reactor was going critical at a squash court in the University of Chicago, December 1942.



Enrico Fermi with slide rule.

There is a collection of wonderful vintage photographs at the Slide Rule Museum, http://sliderulemuseum.com/SR_Ephemera.htm. Can you find the Hallicrafters advertisement featuring a slide rule?

Gravity of the situation

The first time I came across an **electronic** calculator was in first year Physics class. The Cavendish Lab wanted freshers to determine “g”, the acceleration due to gravity (9.8 meters/sec²), to several decimal places. In order to carry out accurate calculations, a Sumlock “Anita” electronic calculator was provided for student use.

The time was 1966-67, when there were few integrated circuits available and no large scale integration. Anitas worked in decimal, using a combination of cold cathode tubes, discrete transistors and “Nixie” tubes for the display. They were fast and accurate, but far too expensive for everyday use by an individual student.



Anita Mark 12 calculator from the mid-1960s had a 12-digit display.

Back to basics

When I moved into the workplace to earn a living, electronic calculators were nowhere to be seen. My trusty 10 inch slide rule was still adequate for most chemical calculations, with an accuracy of about 0.2%. After I moved on to a multinational chemical company, my boss had a cylindrical slide rule with a spiral scale, equivalent to 40 feet long. This was capable of much higher accuracy, which was sometimes needed for chemical calculations.



Coming of the calculator

Pocket-size electronic calculators began arriving in 1972, when Hewlett-Packard introduced the HP-35. But with a price of \$395.00 this was out of reach of most people.

Cheaper models were on the way thanks to large scale integration (LSI), in which thousands of transistors are incorporated onto a single integrated circuit (IC). The first calculator that I acquired was a **Sinclair Cambridge**, available from Sinclair Radionics in 1973 for £24.95 as a kit or £29.95 assembled. If the Sinclair name seems familiar, that's because Sir Clive Sinclair went on to found Sinclair Research Ltd., home of the 1980 Sinclair ZX80 and 1981 ZX81 home computers. The ZX81 was resold in the USA as the Timex TS1000.



The Sinclair Cambridge...
no other calculator is so powerful and so compact.
Complete kit - £24.95!

Features of the Sinclair Cambridge

- 8-digit 7-segment display
- 40 operations
- Constant and algebraic keys
- 4 AAA batteries
- Compact size
- 40 operations
- 8 significant digits
- 40 operations
- 4 AAA batteries

Truly pocket-sized

At only 1.5" x 2" x 1.5" the Sinclair Cambridge is the smallest calculator ever produced. It fits in your pocket and is easy to carry. It comes in an ordinary 1.5" x 2" x 1.5" case which gives access to the battery compartment.

Easy to assemble

All parts are tested. All you need to do is a soldering iron and a pair of pliers. Complete with step-by-step instructions, pre-arranged and our service department will back you throughout if you're in any way in trouble.

The cost? Just £27.95!

The Sinclair Cambridge kit is supplied to you direct from the manufacturer. Ready assembled, it costs £32.95. We also do a working £1.50! Or if you'd like to buy the kit, we'll send you the kit with one ready assembled if you prefer. We'll also send you the best calculator value on the market.

Ad for Sinclair Cambridge kit from Practical Wireless, December 1973.

That Sinclair Cambridge calculator was a relatively low-cost pocket device with an eight-LED display, capable of just four basic operations +, -, ×, ÷. The 7-segment red LEDs were tiny, with magnifying lenses in front. The calculator was powered by four AAA batteries — until they ran down. Capabilities might have been limited, but when I acquired my Sinclair in 1974, it was a little miracle, speeding up calculations at home and in the lab.

A few years later, Sinclair Radionics introduced a much better calculator, the “Oxford Scientific”. Results were shown on an 8-digit green vacuum fluorescent display. This was much easier to read than tiny red LEDs. Mathematical functions such as sin, cos, tan, 1/x, x², and square root were available on the keypad by first pressing the “F” key. This



Sinclair Oxford scientific calculator from 1977.

calculator had an internal 9 volt battery, which drained quickly in use, so it was advisable to connect an external power supply. The “Oxford Scientific” cost around £30 in 1977.

Sinclair Radionics continued producing calculators with LED and fluorescent displays — but the writing was on the wall. Small calculators with liquid crystal displays and CMOS circuitry began to arrive from Japan in the late 1970s at the same time as LCD watches. Their main advantage was greatly reduced battery drain — so a calculator could run for years from a couple of small button cells. I still have a

working Commodore LC5K1 from 1979 which only cost \$10.00, and was housed in an attractive metal case. I also have a 1980-vintage Prinztronic MSC 802 scientific calculator made in Taiwan for the Dixons chain of UK stores. The MSC 802 sat in my briefcase for 30+ years and is still working well. It is pleasantly pocket-sized, similar to a modern iPhone.

Years pass by

Over the years, I have picked up a variety of calculators at stores and hamfests. The most useful type for radio use was a scientific LCD calculator such as the Radio Shack EC-4019 — which is a rebadged Casio fx-3800P from 1989. These simple scientific calculators are ideal for quick calculations and quite adequate for Amateur Radio examinations — where Volunteer Examiners must check that memory and formulas have been cleared before the test begins.

The EC-4019 was a workhorse until it started misbehaving earlier this year. Keystrokes would bounce, resulting in multiple digits. I tried cleaning the keypad with some initial success but the problem returned a few months later.

Shift up

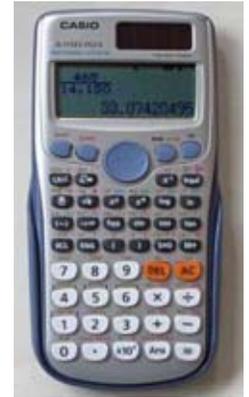
It was time to invest in a new calculator. The first model I tried was a Texas Instruments TI-30XS. This was an interesting scientific calculator, but the function keys were not labeled clearly, the display was difficult to read, and I had a feeling this model was intended for beginners.

I moved up to a Casio fx-115ES PLUS, which cost me all of \$18.00. This seemed better suited to the types of calculation encountered in radio, engineering or chemistry. The dot matrix display was still a little difficult to read, but the keypad labeling was much clearer than on the TI-30XS.

I started entering some typical radio calculations just to get a feel for the way these modern calculators work — and had quite a surprise. I had not been keeping up with calculator technology and the Casio and TI have more tricks

than my previous models. For example, mathematical symbols such as square roots, powers and fractions can be entered and displayed just as they would appear in a textbook or on a classroom whiteboard. Answers are shown as actual fractions. Formulas (expressions) can be entered with variables, then the answer calculated for different values. There are many more improvements that you'll just have to investigate for yourself if you are not familiar with these highly capable scientific calculators. The User's Guide is a good place to start and there are video tutorials available on YouTube.

Perhaps you would prefer a classic calculator without all the fancy frills? Casio still sells their fx-260SOLAR model, with a price under \$10.00. The fx-260 has a clear, 7-segment LCD display and all the usual mathematical functions.



Casio fx-115ES PLUS scientific calculator displays fractions and formulas.

Horses for courses

You may be asking — would it not be easier to use a calculator simulator or an Excel spreadsheet on a PC, or perhaps run an app on a Smartphone? I would say — no! I find it far more convenient to have a small calculator on the desk for immediate use when needed. If only our personal computers were as quick to start as a pocket calculator — not to mention being powered for years from a button cell.

Time machine

I sometimes wonder how things might have developed if these modern aids to calculation from 2013 had been available while I was working my way through math and science classes in the '60s. I am sure we would have got a lot more done in a shorter time! In the reverse direction, my trusty slide rule from the 1960s is still lying safely in a drawer, just in case the modern electronic aids ever stop working. - NM9J

Mail tailpiece

The November issue of the *PCARA Update* newsletter was the last one to be photocopied and distributed by “snail-mail”. Our very last surface-mail subscriber Ed, KB2ZYU, said he is no longer restricted by mailbox size, so with the December 2013 issue, Ed will be transferred to e-mail distribution.

For a reminder of the times when the *PCARA Update* was entirely distributed by U.S. Mail, take a look at the latest batch of 2001-vintage newsletters that have been scanned and uploaded to the Internet web site. Go to <http://www.pcara.org>, then follow the “PCARA Update (newsletter)” link in the left margin. And for those who ordered ‘2001-vintage’ engraved club badges, they will be available at the Holiday Dinner.

Peekskill / Cortlandt Amateur Radio Association

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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.

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 Dec 1: PCARA Holiday Dinner, Cortlandt Colonial Restaurant, 5:00 p.m.

Sun Jan 5, 2014: PCARA January meeting with Annual Bring and Buy Auction, Hudson Valley Hospital Center, 3:00 p.m.

Hamfests

Sat Dec 14: Boy Scout Troop 139 / Venture Crew 7373 Hamfest, Conlon Hall, 19 North William Street, Bergenfield, NJ. 8:00 am.

Sun Jan 5, 2014: NYC/LI Convention - Ham Radio University. Briarcliffe College, 1055 Stewart Ave, Bethpage, NY. 7:30 a.m.

VE Test Sessions

Dec 7: Yonkers PAL Ham Radio Club, 127 N Broadway, Yonkers NY. 2:00 pm. Contact: M Rapp, 914 907 -6482.

Dec 8: Yonkers ARC, Yonkers PD, Grassy Sprain Rd., Yonkers. 8:30 am Contact D Calabrese, 914 667-0587.

Dec 12: WECA, Westchester Co Fire Trg Cen, 4 Dana Rd., Valhalla, NY. 7:00 pm. S. Rothman, 914 831-3258.

Dec 16: Columbia Univ VE Team ARC, 531 Studebaker Bldg, 622 West 132nd Street, New York, NY. 6:30 pm. Alan Crosswell, 212 854-3754.



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