PCARA Update

Foxes and hounds

The **PCARA Foxhunt** is rapidly approaching on May 14, 2016. We will be meeting at the Beach Shopping Center in Peekskill, NY around 2:30 p.m. with the hunt beginning promptly at 3:00 p.m. The hunt will run until 4:30 pm at which time the fox (Mike N2EAB) will announce the location of the post-event meeting for refreshments and awarding of certificates to the winners. Rules are located in this month's newsletter.

PCARA has been requested to assist with traffic control and parking for the **Church of the Holy Spirit 50th Anniversary Festival** on Sunday May 15, 2016. There will be a variety of foods and activities which will include Mass with Cardinal Dolan at 2:00 p.m. All parking will be off-site at Walter Panas High School, 300 Croton Avenue in the Town of Cortlandt, with shuttle buses between the High School and the church proper. We will need quite a few volunteers to assist with traffic control, parking, and coordinating communications between the two locations. We will also need members to man a club table during the festival. Hours for the event are from approximately 11:00 a.m. to 8:00 p.m. Please let us know if you are interested in helping out. Contact us at: mail'at'pcara.org. Details and discussion to follow at the May meeting.

The date of the PCARA **FM Simplex Challenge** has been changed from May 7 to **May 21**, 2016 due to scheduling conflicts. Details can be found in Karl N2KZ's article on page 4 of this month's *PCARA Update*.

Field Day 2016, (June 25-26) planning will continue at the May Meeting. We anticipate holding Field Day activities once again at Walter Panas High School in Cortlandt Manor, NY (pending final approval from the Lakeland Central School District). Upon reflecting on Field Day 2015 and the very inclement weather, it was suggested that PCARA might consider renting a panel/box truck that could serve as a mobile shelter should weather conditions turn nasty again this year. At last month's meeting it was moved, seconded, and approved by the membership present that up to $200.00 could be spent in order to rent a vehicle for the weekend. If you are interested in participating in Field Day 2016 activities, please let us know at: mail'at'pcara.org.

Here are some upcoming area hamfests:

- The Bergen Amateur Radio Association (BARA) is having its Semi-annual Hamfest on Saturday, May 28, 2016 at Westwood High School in the Township of Washington in Bergen County, NJ. For details and directions please visit: http://www.bara.org/hamfest/.
- The Mount Beacon Amateur Radio Club (MBARC) is holding its Spring Ham Radio Hamfest on Sunday, June 5, 2016. Please visit: http://wr2abb.org/home/ for details.

Our next regularly scheduled meeting will be on May 1, 2016 at 3:00 p.m. at New York-Presbyterian / Hudson Valley Hospital in Cortlandt Manor, NY. I look forward to seeing each of you there.

- 73 de Greg, KB2CQE

PCARA Officers

President:
  Greg Appleyard, KB2CQE; kb2cqe at arrl.net
Vice President:
  Joe Calabrese, WA2MCR; wa2mcr at arrl.net

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Adventures in DXing

-N2KZ

Polar Bears Are Key

Can a polar bear help you learn Morse code? Would you believe me if I said 'Yes?' Gil Stacy, NN4CW, can tell you all about it. Back in 2003, Gil was my student assigned to me through the FISTS Code Buddy program. FISTS, The International Morse Preservation Society, is a worldwide group of CW enthusiasts anxious to preach the gospel of Morse to all who will listen. As a code buddy, I would bring Gil into the fold. This is not a hard job. This is lots of fun!

Everyone has to start somewhere and Gil was pretty new to Morse code. We both had early schedules, so we would meet on 40 meters at the crack of dawn and practice for half an hour or so before work. Early on, we went through all the basics: Name, QTH, signal reports, rig names. You have to start somewhere!

When I thought his confidence was really improving, I switched up my messages a little bit. I would change the name I sent, or the QTH. I would send something illogical like a weather report of 90 degrees and snow! When he sent back a 'HI HI' to me, I knew he was getting it. It was a great feeling on both sides of the ether.

Any good showbiz person knows that 'you gotta have a gimmick!' To keep the material fresh, our conversations became more and more offbeat. One morning, feeling like I had really run out of material, I sent Gil a story I thought would throw him completely. I was wrong! Gil is a lawyer with an amazing mind. He picked up on my crazy message right away!

"ALL IS GOOD WITH THE POLAR BEAR. NAME IS BRUTUS BRUTUS. IN SWIMMING POOL AND ENJOYING IT. PLENTY OF FISH AND SPLASH TOYS. BTU." I heard Gil pause and return a completely coherent answer. "OK. GLAD BRUTUS MADE IT UP THERE OK. TAKE CARE OF HIM. MAKE SURE HE DOESNT GET LOOSE." This was very silly and great fun.

The story of Brutus the polar bear expanded every day. We would invent adventures for him. He got a new pair of sunglasses. He loves margaritas. He swam with the neighborhood kids. There were lots of fish jokes. (Polar bears love smelt.) When we decided things were getting out of hand, one of us would comment "ARE YOU SURE YOU DONT WANT HIM BACK?"

Gil and I knew we were onto something when we would end our QSOs with the familiar exchange of: 'DIT DIT' 'DIT DIT' from both ends. Following with tradition, if others are listening in to the conversation, they would send 'DIT DIT' too, just to say they are listening. We heard quite a few listeners!
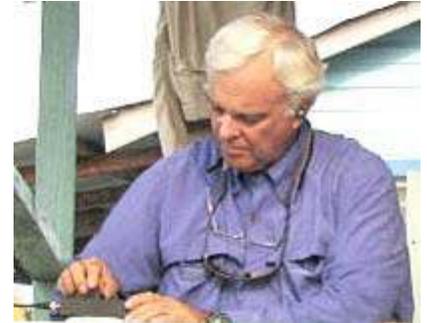
Gil lives down in Savannah, Georgia and we took advantage of great gray-line conditions

Gil NN4CW operating CW.

at dawn to aid our signals up and down the Atlantic Coast. My main rig was my trusty and wonderful Heathkit HW-16 50 watt CW Transceiver built with my Dad back in 1968. Using the matching HG-10B VFO, I would jump in frequency and create some very interesting snurdles from time to time. Gil would usually be using his variety of homebrew QRP rig. We really lived up to Part 97 rules. We never used more power than necessary to handshake during our QSOs!

Karl's Heathkit HW-16 CW transceiver.

Catching Up

Over the years, Gil and I kept in touch. We have lots of common interests and share a good sense of humor. One great moment: Gil changed his callsign from KG4VCG to NN4CW! We have become good fast friends. Lots of smiles and lots of good times, but there was one thing missing.

Although we got to know each other very well, we had never met in person. Fast forward to the year 2016. The time had come! My wife is an avid tennis player and had visited Hilton Head Island, South Carolina several times to attend professional clinics with her tennis buddies. We decided to plan a trip together including our daughter Sarah. Adventure was waiting for us!

All three of us enjoyed visiting the island and admiring the beauty of the island and its surroundings. Hilton Head Island sits in an area known as The Low-

Hilton Head Island is located along the Atlantic Coast of South Carolina. It is 20 miles northeast of Savannah, Georgia, and 95 miles southwest of Charleston, SC.

country named after a vast territory, low to the water level, filled with all sorts of wild-life and wonder. Alligators are seen virtually everywhere: out in the open, skulking underwater and roaming around in swampy waters. Beautiful birds and perfect white sand seashores are everywhere. It really is paradise.

Hilton Head Island is only about an hour from the airport in Savannah so visiting Gil was a natural. By chance, or maybe by divine intervention, the day Gil and I finally had our first eyeball QSO was very appropriate: April Fools' Day! Finding my way off the island and onto the mainland, it would only make sense that I would get lost!

Alligators are seen virtually everywhere in the 'Lowcountry' of South Carolina. [N2KZ pic]

In The Pink

After a good direction-finding conversation with Gil's friend Floyd, I finally gained my orientation and found my way down Route 315 to The Pink Pig, the choice barbecue place for miles around. It is hard to miss! The inside was even more entertaining than the outside, decorated in complete pig attire. There were even little toy pigs hanging from the ceiling. Gil introduced me to his friends Floyd, Jeff and Bill and to

The Pink Pig BBQ is on Rt 315, Hardeeville, SC.

the gals behind the counter. What a great place!

The pulled pork was really tasty and the sauces were just the best. Instead of being laden with goopy sugars or heavy out-of-proportion seasonings, each barbecue sauce I tried was a perfect combination served up in clear squeeze bottles like the ones you would expect to find ketchup and mustard in at a hot dog stand. Great stuff!

Decor in the Pink Pig BBQ is particularly pink. [N2KZ pic.]

A memorable meal may have ended, but the adventure had just begun. Gil and I hopped into his trusty Toyota Highlander and headed down some nearby roads. A friend of Gil's lives on an endless and vast piece of property that had once been an enormous rice plantation. Rice farming was now being restored to the property and the surrounding area was just fascinating.

You could feel the history throughout the old plantation grounds. Everywhere you looked there was so much more to discover and enjoy. We saw berms constructed during Civil War times and long, long vistas of marshland as far as the eye could see. Gil also shared an ornithologist's delight: A swampland thicket filled with great egrets, snowy egrets, anhinga, Louisiana herons and alligators.

Gil handed me his binoculars and I could see large blue eggs in the snowy egret's nests. The alligators actually provided protection to the birds, he explained. Without them, raccoons would raid the nests and render them useless.

Snowy egret. [N2KZ pic]

Alligators are actually quite common in the Lowcountry. Even in the areas that have been developed by man, you will see 'gators out in the open and free roaming around on their terms. Especially if you live close to a pond, lake or stream, it would not be surprising to encounter an alligator in your backyard. You'll see plenty of turtles, in all shapes and sizes, too!

As a finale to this amazing trip, Gil stopped at a barn to show me some of the carvings created by his friend Floyd Robbins. His handiwork and precise skill was a dream. Floyd creates beautiful lifelike keepsakes like no other. What beauty he can create and you can

hold it in your hand! Little did I know that I had already met him back at The Pink Pig.

One of Floyd Robbins' figures.

Antennas For Bogs

During our visit there was some radio talk. Gil told me about his discoveries using **BOGs**. After purchasing some very long spools of wire, Gil created a medium wave DXer favorite known as a **BOG**: **B**everage **O**n **G**round. You lay long pieces of wire literally along the ground and then connect or couple the wire to your radio using clever coupling coils. The results can be stunning!

Gil managed to hear stations in Britain and the well-known Saudi Arabian station on 1521 kHz coupling a BOG to Sony ultralight radios that have been DXer sensations for years. Look for the continuous tuned Sony SRF-59 or the digital Sony SRF-M37W. Both are inexpensive wonders. Gil sent me a SRF-37W that he modified with a crystal bandpass filter. You would not believe what that radio can pick up... and you can hold it in the palm of your hand!

Local broadcast radio on Hilton Head Island is also memorable. There is a delightful radio station you will find on both AM and FM: WHHW 1130 and its FM

translator W228CI 93.5. Known as "The Island," they play "timeless favorites" that are a really nice and novel mix of old songs not over-played and stale. Take a listen at: http://www.am1130theisland.com.

Just at this moment, I have possession of Brutus the polar bear. He is hanging out in the swimming pool in my back yard. I try to keep him under cover... otherwise the neighbors will talk! My sincere thanks to Gil, NN4CW, for a most memorable visit into the Lowcountry... quite an adventure in DXing!

Until next month, 73s and dit dit de N2KZ 'The Old Goat.'

Simplex Challenge - N2KZ

We are anxious and excited to announce the first-ever PCARA Simplex Challenge. The event will commence on our new revised date: Saturday afternoon, May 21st at 2:00 pm. Our hosts will be Malcolm, NM9J and Karl N2KZ, situated high atop Bear Mountain on

Perkins Drive. All licensed amateurs are welcome to participate. This is not a contest or a competition. The Simplex Challenge is designed for newcomers *and* old goats to enjoy and learn. Are you a newbie and just getting started in ham radio? Come join us!

The main goal of this exercise is to see just how far our signals can travel unaided by repeaters, one-to-one, in a simplex fashion. The test will be held on a single 2 meter FM simplex frequency: 146.565 MHz. Participating amateurs or groups of amateurs will be situated in a variety of places of their choice. We encourage everyone to find a location of high elevation and clearance but any place is acceptable.
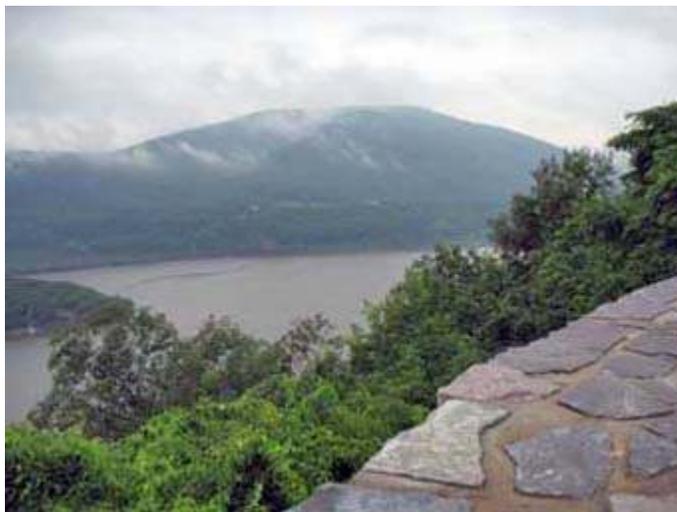
A misty Bear Mountain, as viewed from the Goat Trail Scenic Overlook.

Choice of equipment, operating power and antennas is solely up to the discretion of the participants. Please make sure you allow ample time for travel to your site and for equipment setup. It would be a good idea to include a second rig to monitor the PCARA 2 meter repeater during the simplex tests. If we cannot hear you directly, we will defer to the repeater to instruct participants as necessary.
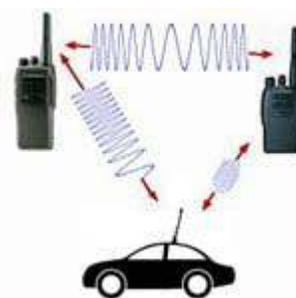
Simplex Challenge.

We will first check-in all stations using the PCARA repeater with an output frequency of 146.67 MHz using a -600 kHz offset and a 156.7 PL. You should be prepared to describe to the hosts your location, equipment and antenna configuration. We encourage everyone participating to take accurate notes regarding all they see and experience. Please follow along and keep track of what order the stations are being called by the hosts. This will aid you during later rounds of the test.

Please remember that our Simplex Challenge is

indeed in simplex! When transmitting on our 146.565 MHz simplex frequency, turn **off** your PL transmit tone and turn **off** your tone squelch (PL decode). It may be best to open up your squelch to hear weak signals among the static received!

The second round will be the beginning of the adventure. The hosts will attempt to reach each remote station via simplex. The operating frequency for all simplex tests will be 146.565 MHz FM. Again, a full roll call of stations will be held in the order of first check-in. While the hosts are touching base with each station, make sure your squelches are turned off. By all means, attempt to hear all the other stations from your QTH as we call the roll.

The third round will be the most challenging and interactive. While the host station atop Bear Mountain acts as coordinator, each remote station will try to contact all the other remote stations one at a time. After you contact other remotes at 'full power', we will also encourage you to attempt contact at lower QRP powers, as you desire.

Keep in mind that it is quite likely that each station will not be able to hear or contact all other stations. We are expecting participation from remote stations in several counties within a wide range from the Bear Mountain host. Try your best to catch them all! An amazing time is guaranteed!

If you have any questions or suggestions about the event, please contact Karl, N2KZ, via e-mail at: pcaraevents'at'gmail.com or by telephone at 914-346-0304. This telephone number will be active during the test as a final method of contact should you not be heard or you have other urgent concerns. Please advise us, via e-mail, of your intended locations and plans. We want to be ready for you!

After the event, all participants and friends are welcome to join us at the Westchester Diner, 300 Albany Post Road in Peekskill (914) 734-4949 to celebrate and compare notes. We expect to be gathering at the diner at approximately 4:00 pm right after the Simplex Challenge has completed. Please feel free to publicize this event to your friends. Everyone is welcome!

- Karl, N2KZ

Church Jubilee Festival

Following a request from George N2LJO and XYL Kathy, PCARA has been providing support for several events during the Church of the Holy Spirit's Jubilee Year, beginning with the 50th Jubilee Concert which took place on June 5th, 2015. This was followed by parking support for Christmas Eve Mass on December 24th and, our most recent effort, the Easter Sunday services on March 27th. These events all had one thing in common — the church parking lot fills up rapidly and drivers try to use any available space, possibly blocking an entrance. This is where PCARA is able to help, encouraging drivers to park in marked spaces and on the grassy area to the north of the church buildings.

David KD2EVI and Greg KB2CQE coordinate the busy parking lot for the Church of the Holy Spirit's Easter services on March 27.

The latest event in the Jubilee Year Calendar will be the Church of the Holy Spirit's **Golden Jubilee Festival Day** on May 15th, Pentecost Sunday. The 50th Anniversary Mass with Cardinal Dolan will start at 2:00 p.m. beneath a large tent erected in the church grounds. This will be followed by a Festival with a variety of food, entertainment and games for the children. Parking at the Church will be extremely limited, so off-site parking has been arranged at Walter Panas High School. Buses will bring participants to and from the church — which is located on Rt. 202 at 1969 Crompond Road in Cortlandt Manor.

PCARA has been asked to assist with vehicle access at the Church entrance on Route 202 and to coordinate off-site parking at Walter Panas High School, where buses will begin running from 11:30 a.m. on Sunday May 15th. If you would like to help, please inform Greg, KB2CQE using mail'at'pcara.org. Bring a handi-talkie capable of operation on 146.565 MHz simplex and on the club's 449.925 repeater. A high-visibility orange vest or jacket is also recommended.

Magnetic decline

At this time of year, PCARA's newsletter encourages participation in the annual **Foxhunt**, with articles on antennas, hints on hardware, and tips on technique.

Point and scoot

When hunting foxes — or navigating unknown terrain — you are probably using a **magnetic compass** to determine direction. (If you are using a GPS device, this topic does not really concern you – until you lose satellite signal and have to fall back on old magnetic methods.)

In the straightforward approach, our foxhunter points his (or her) directional antenna toward the fox's hidden transmitter, adjusts for maximum signal strength, then drives in the direction of the transmitter.

*Al K2DMV (right) demonstrates his directional antenna to Lovji N2CKD at the 2015 PCARA Foxhunt.*

A more refined method involves fastening a compass to the antenna boom, peaking the antenna for maximum signal strength, then reading the bearing to the hidden station from the compass dial. The hunter transfers this bearing to a map, drawing a line from his present position to wherever the fox might be. At the next stop, another bearing is taken, transferred to the map and, with luck, the lines should intersect at the location of the fox.

Bearing lines should intersect at the location of the fox.

Deviation for dummies

Unfortunately, bearings that depend on a magnetic compass can be inaccurate for several reasons. **Magnetic deviation** is the difference between the overall magnetic field and what your magnetic compass actually reads.
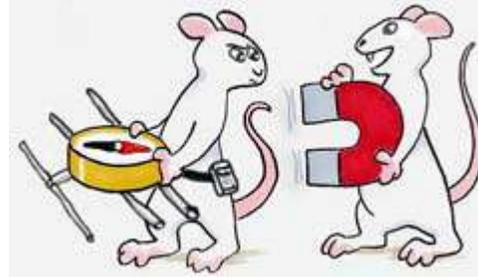
This deviation is caused by the presence of magnetized objects near the compass — examples include:

- iron or steel fasteners
- loudspeaker magnet (for example in your HT)
- magnetic mount antenna
- nearby vehicle with steel body and iron engine
- vessel with a steel hull (onboard ship)
- cast-iron lamp post, steel signs, fence posts
- buried iron pipes (conduit, water, gas)

It's easy to reduce the effect of these items. Just move your compass further away from the source of the problem. The magnetic field decreases as the cube of the distance. Try to pick a clear spot away from obstructions with a good take-off toward the fox.

Keep your compass away from magnetized objects such as an HT loudspeaker.

Decline and fall

Even when we have moved away from magnetic objects, the bearing provided by a magnetic compass will differ from the map bearing because of **magnetic declination**, sometimes called magnetic variation. Magnetic declination is the angle between magnetic north and true north in the horizontal plane. It is reckoned positive when the declination is east of true north and negative when west of true north.
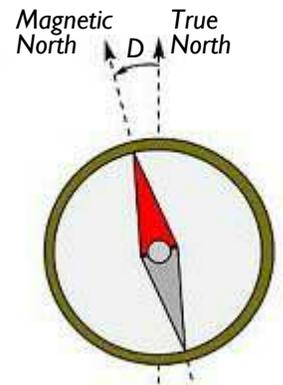
Magnetic declination is the difference between Magnetic North and True North.

Magnetic declination varies with location on the face of the earth. If you imagine the Earth's magnetic field being caused by a bar magnet buried inside the Earth's core, then this magnet is tilted approximately 11° away from the Earth's north-south axis. As of April 2016, the south pole of this magnet (attracting the north pole of your compass) lies somewhere under the Canadian Arctic.
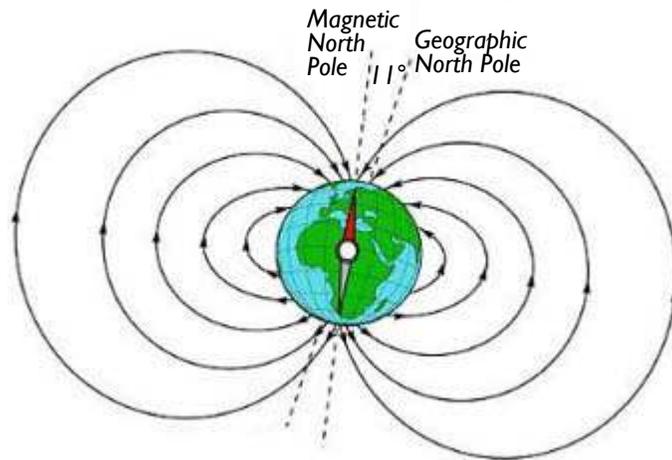
*A magnetic compass points toward the **Magnetic North** Pole.*

Magnetic declination varies with time, due to the fact that our theoretical bar magnet is wavering around
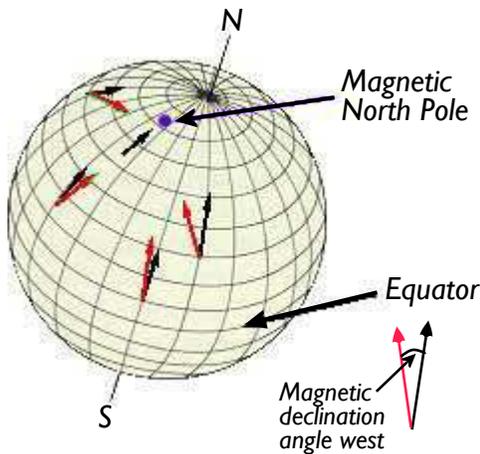
Magnetic Declination depends on your position and the direction to the Magnetic North Pole, currently under the Canadian Arctic.

inside the Earth. The source of the magnetic field is movement of a liquid iron/nickel alloy around the Earth's molten core. This 'geody-namo' is unstable — so the position of the magnetic north pole is constantly shifting. Every few hundred thousand years the Earth's magnetic field can change direction — this is known as a magnetic reversal.

Focus on the fox

For foxhunting purposes, all we need is the current magnetic declination for the area around Peekskill. You can find this value off published maps — for example, Geological Survey quad maps give the declination at

the time the map was pre-pared — but the printed value might be several years out of date. Current infor-mation is avail-able on the NOAA web site, see:
http://www.ngdc.noaa.gov/geomag/declination.shtml

According to NOAA, the declination for Peekskill in April 2016 is: **13° 8' W** ± 0° 22', changing by 0° 2' E per year.
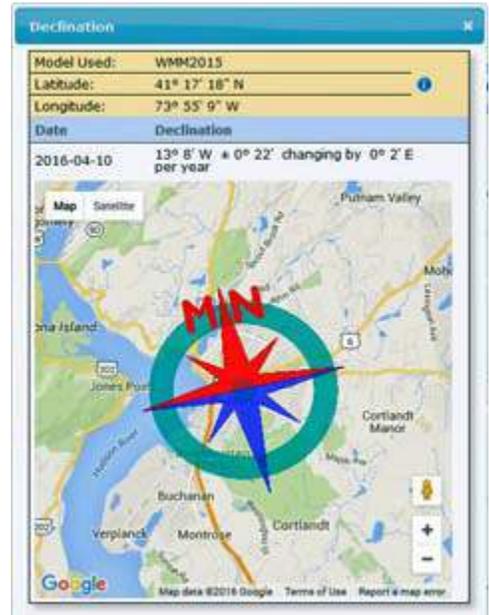
Magnetic declination for Peekskill in April 2016 as shown on NOAA's web site.

So — on May 14th when you point your antenna in the direction of the PCARA Fox and read a bearing off the magnetic compass (measured clockwise, starting from 0° magnetic north), remember to **subtract 13°** off that bearing before trans-ferring the number to your map. That's because the sides of your map are usually aligned with *true* north.

If your local declina-tion is *east* of true north, remember this handy phrase:

If the magnetic bearing to the Fox is 44°, and the declination at Peekskill is 13° W, subtract the declination to obtain the true bearing of 31°.

"**Declina-tion east — compass least. Declination west — compass best.**" This means the magnetic compass bearing is *less* than the true bearing when the declina-tion is east and *greater* than true when the declination is west — as in our example for Peekskill.

Who will be first to find the PCARA fox on Satur-day May 14? Best of luck, and don't **decline** or **deviate** from the challenge.

- NM9J

PCARA Foxhunt Rules

- Saturday May 14, 2016

1. Transmission: FM simplex on 146.565 MHz, horizontally polarized.

2. Transmissions start at 3:00 p.m. for 5 minutes, followed by 5 minutes off. Second transmission commences at 3:10 p.m. 3 minutes on, 7 minutes off. The fox will not move during this time. This cycle repeats at 10 minute intervals until the last transmission ends at 4:30 p.m. when the fox will announce its location.

3. The opening transmission will include a time check for watch synchronization.

4. All contestants who wish to be eligible for a prize must book in at the **Beach Shopping Center car park***, in Peekskill before the start. Contestants will count as one team if more than one person occupies a car. (i.e. if three in a car, they don't get first, second and third prize.)
* on the far west side, near Jo-Ann/CVS.

5. No contestant is allowed to move his/her car until the end of the first transmission, so take your time with the first bearing and make it a good one. The transmission will be audible from the start without a super-sensitive receiver.

6. Radio silence will be maintained by all contestants on all frequencies from the first to the last transmission.

7. No excess mileage penalty will be incurred but all contestants are reminded at all times to stay within the law and observe speed limits, parking restrictions etc.

8. The fox will be hidden not more than 5 miles from the start. The location of the fox will not be on property which is inaccessible by car.

9. Upon a contestant finding the fox, please do not shout or in any way give the location away to other contestants. Report your name/callsign to the fox and retire to the place of refreshment immediately. This will ensure that other contestants do not discover the fox because a group of people is hanging
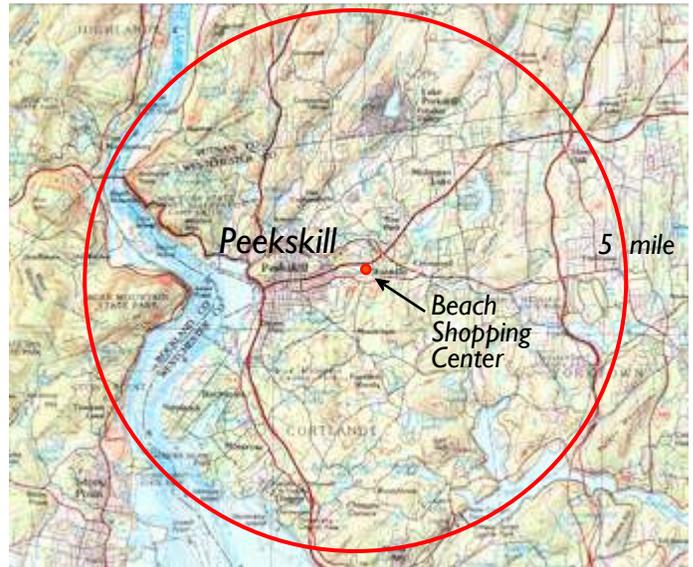
The fox will be hidden no more than 5 miles from the starting point at the Beach Shopping Center in Peekskill.

around nearby. It is requested that you maintain radio silence even though the fox has been found and the fact that you have found the fox should not be revealed to anyone until the place of refreshment has been reached.

10. The first competitor to locate the fox and positively identify him/her will be presented with a certificate. This competitor will be invited to assume the role of fox for the next foxhunt event.

11. Competitors should convene from 4:30 p.m. at the place of refreshment, which will be announced on-air by the fox.

Rules adapted from Bury Radio Society Fox Hunt – Malcolm, NM9J

Maryland Mobileers

In late March, your editor received an e-mail message from Charles, KB3UDJ, editor of *The Mobileer* – newsletter of the Maryland Mobileers Amateur Radio Club, based around Millersville, MD. Charles had been sent a copy of the April *PCARA Update* by one of our members and asked if he could forward it to readers of the *The Mobileer*. We were happy to oblige.

You can take a look at issues of MMARC's *The Mobileer*, at the following web address:
https://sites.google.com/site/marylandmobileers/newsletters

Driving solid state

Is your notebook computer no longer nifty? Is your desktop dawdling at boot time? Perhaps it's time for an upgrade. Nowadays, the biggest performance boost will come from installing a **solid state drive**. Here's why.

Moore's Law moribund?

Since the early 1970s, the capacity of microprocessors has followed **Moore's Law**. In 1965, Gordon Moore of Fairchild (later co-founder of Intel Corporation), observed that solid state devices were increasing in complexity, doubling the number of components on a silicon chip *every year*. He updated this rate in 1975 to
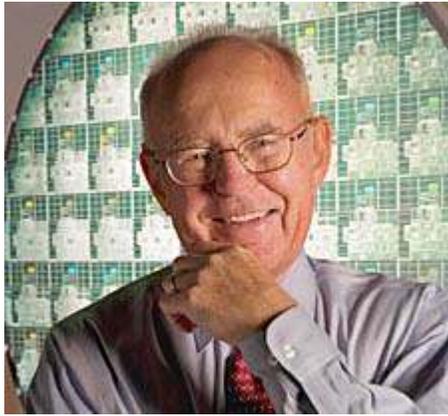
Intel co-founder Gordon Moore. Intel pic.

every *2 years*. By then, microprocessors were in production and clock speeds were increasing — from 1 MHz in the late 1970s to 4.6 GHz today. These amazing improvements have brought us speedy computers with graphic interfaces, plus network routers, smartphones and tablets.
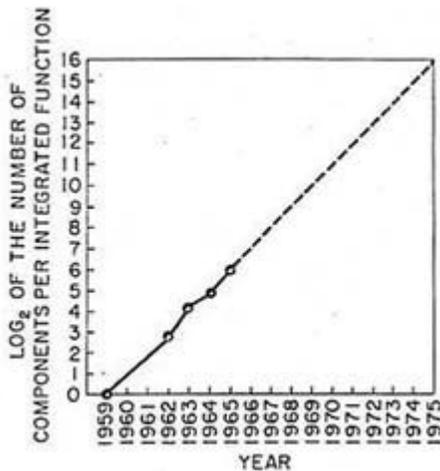
Original graph of Moore's Law [Intel]

But Moore's Law seems to be running out of steam — it is proving increasingly difficult to reduce the size of individual transistors below about 20 nanometers — while further increases in clock speed push the power dissipation too high. The only way to boost throughput is by adding processor cores to the silicon, so we now have microprocessor designs with 2, 4, 8 or more cores.

For everyday personal computing — as deployed in our shacks for web access, data modes and rig control — the one improvement that will bring a *significant* boost in performance is changing the main storage device from a rotating hard disk drive (HDD) to a **solid state drive** (SSD).

More money law

If you have a modern iPod, MacBook Air, Ultrabook, tablet, smartphone — or even a humble Raspberry Pi — then your main storage device is *already* solid state. Yet the majority of desktop and notebook computers sold today still use *rotating* hard disks.

The reason is economics. Current high-street price for a 1000 gigabyte hard drive for desktop or notebook use is around $50-$60. SSD prices are falling, but the cost of a similar capacity solid state drive is roughly **five** times as much, around $250-$300. This could be a substantial portion of the price of a low-end desktop or notebook computer selling for $250-$500.

Faster, smaller, better?

Hard disk drives have made spectacular improvements since the days of the IBM PC-XT with its 5 MB hard drive from the mid-1980s.

Today's disks have shrunk from 5¼" wide (and several inches tall) to a width of 3½" or 2½", while capacity has increased from megabytes to terabytes, a factor of $\sim 10^6$. But the storage mechanism still relies on moving read/write heads, suspended on a tiny cushion of air above the surface of a spinning disk coated with a magnetic medium.

One of my former colleagues had an old desktop hard drive running on his workbench with the cover **off** so visitors could see the spinning disks and moving heads. (Don't try this at home.) Because of all those moving parts, the most likely point of failure in a desktop or notebook computer is still the rotating hard

If the read/write heads of a hard disk drive hit the disk surface, then data is lost.

disk. If the disk fails to spin up or the head hits the disk surface then say goodbye to your precious data.

A modern **hard disk drive** has a data transfer rate of ~100 megabytes per second (MB/s). However, every time the head has to be moved to another track there is a delay of 15-20 msec before data is available. This data access time is significant when multiple files have to be brought from different parts of the disk, or when a single file is stored in multiple fragments. (That is why defragmenting is still important.)

A good **solid state drive** has a data transfer rate of around 500 - 550 MB/s, roughly five times the speed of a hard drive. There is no read/write head to move, so access times are greatly improved. The overall effect is for disk operations to be roughly *ten times faster* than with a rotating hard drive, making your PC boot faster and act far more responsively.

Traditional 3½" SATA hard disk drive on the left with 2½" solid state drive on the right for size comparison.

There are additional advantages for a storage medium with **no moving parts** (other than electrons). Without a disk to keep spinning, power requirements are less than for a hard drive, especially when the SSD is idle. A solid state drive is lightweight, small, silent, impervious to mechanical shock and able to operate over a wider temperature range. So what's not to like?

ReadyBoost crutch

From Windows Vista onwards, Microsoft offered a technique for increasing apparent disk speed known as "ReadyBoost". Just plug in a high-speed flash-memory storage device such as a USB memory stick or an SD memory card, then configure it for ReadyBoost when asked. Windows will then copy frequently-used program files from hard disk to temporary storage in the ReadyBoost cache for faster access. My own experience suggests ReadyBoost *did* provide a performance increase, but at the cost of increased CPU and hard disk activity. All that repeated writing could wear out a USB stick or SD card in short order. Better solutions are to add more memory or substitute a solid state drive.

Shock of the new

By now you should be convinced that a solid state drive is a worthwhile investment. But replacement of the hard disk in an existing PC can be quite an undertaking. As an alternative, you might decide that your *next* computer should come with a solid state drive as standard. That way, the operating system is already installed and optimized for an SSD. You will not find too many SSD-equipped computers in local stores, but you can find a good selection online. Just be prepared for the sticker shock.

Let's upgrade

Perhaps you are not ready for a new computer yet, but you have an existing PC that needs a speed boost. Here's how to prepare for a solid state upgrade.

The first question should be — does your operating system support solid state drives? For Microsoft Windows 7 or later, the answer is – yes. The rest of this article will concentrate on a Microsoft Windows 7 SSD upgrade, though you should be able to adapt the instructions to Windows 8 or Windows 10.

You should make sure that your existing hard drive connection type is **SATA** (Serial AT Attachment) — pop the cover off your desktop PC for a visual check or look up the controller type in Windows' 'Device Manager'. Also check the **capacity** of your existing hard drive and how much space has already been used. You can perform this step by examining properties of local disk **C:** in Windows Explorer.

SATA hard drive with power cable (left) and SATA cable (right).

Final hints – the upgrade will go more smoothly if your computer has an **Intel** processor rather than an AMD CPU and if it has a SATA disk controller that is already set up in the computer's BIOS with a mode of "**AHCI**" (Advanced Host Controller Interface). A SATA controller mode setting of "RAID" may cause problems. See step 2 below for how to check BIOS settings.

Availability of a second computer could be worthwhile for looking up advice or for downloading drivers while the first machine is out of action.

Pick your poison

When it's time to choose a suitable solid state drive, the key factors are capacity, performance, price and reliability. New drives come in the 2½" width format, making them equally suitable for notebook or desktop. Pick a capacity that will easily accommodate all your current data, with room for growth, while still leaving around half the drive 'empty'. In your editor's opinion, 480–512 GB capacity is the current sweet spot, but this figure could vary

A 480 – 512 GB solid state drive is a good choice for price/performance. Price is ~$125 – $150 at present.

with computer use. Don't pick an "economy" drive as it may not produce the boost you expect and lifetime might be short. Instead, choose a drive from one of the top manufacturers such as SanDisk or Samsung, with medium-high performance and a three to five year warranty.

Some additional items may be required… If you are installing the new solid state drive in a notebook computer, you will need a USB-to-SATA adapter ("USB caddy") to carry out the data transfer. For a desktop PC with 3½" drive bays, you may also need a 2½" to 3½" bracket in order to mount the new drive in a wider bay. And if you are *not* using a USB-to-SATA adapter for data transfer, you will need a standard SATA cable to temporarily connect the new solid state drive to an unused SATA port on the desktop's motherboard.

Finally, you will need some software to back-up your existing data (for safety) *and* to transfer data from the old hard disk to the new solid state drive. Suitable software is sometimes provided by the SSD manufacturer, but better products can be purchased or downloaded free — see later.

You may find all the items you need are available in a low-cost **hard drive upgrade kit** from the likes of Apricorn or SanDisk. Check online.

The extra items you will need for an SSD upgrade may be available in a low-cost kit.

Fresh install or data copy?

Assuming you have the installation media for reinstalling your computer's operating system, the cleanest approach can be to reinstall the operating system 'from scratch' onto the new solid state drive.

But this approach has some drawbacks. You will need the media plus license key for your copy of Windows and for any other software that needs to be reinstalled. Windows Update will have many patches to process in order to bring the system up-to-date. You will need to restore all your data files — you have them backed up don't you? And you will have to adjust operating system and application settings back to your liking.

This is a lot of work, so most people prefer to transfer data from the old hard disk to the new solid state drive using disk imaging software. Here are the steps you should follow to accomplish this.

Prudent preliminaries

1. Get hold of the hardware manual for your computer and read through the instructions for disassembly and replacement of a hard disk drive. Hardware manuals are often available in PDF format from the manufacturer's web site. You may find you need a special tool such as a small (0 point) Phillips screwdriver.

Download the hardware manual for your computer.

2. Make sure you know how to access the computer's BIOS system setup. This is usually covered in the hardware manual. You may have to press <F10>, <F2>, <Esc> or some other key at switch-on, just before the operating system loads. Once you are in the BIOS menu, check the settings for boot order and for SATA disk controller mode – you may need to change these settings later.
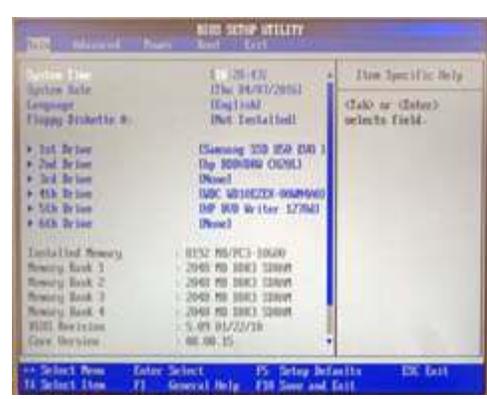
BIOS Setup utility.

Exit from the BIOS menu *without* changing any settings for the time being.

3. With the computer rebooted and operating normally, create a "System Repair Disk". For example, in Windows 7, select CONTROL PANEL →BACKUP AND RESTORE → CREATE A SYSTEM REPAIR DISK. This is usually burned onto a CD/DVD or stored on USB memory stick. Once the disk is created, make sure you can boot from it — you may need to change the boot order in BIOS for a test. Do not repair anything yet.

4. Shut down the computer and **remove** all unneeded peripherals including USB memory sticks, external drives, SD cards, CD ROM discs etc. This will give you a clearer view of the internal storage that you are trying to clone and will simplify the first boot from the new drive.

Remove all unnecessary devices, including USB storage.

5. Open Windows' Disk Management console (CONTROL PANEL → ADMINISTRATIVE TOOLS → COMPUTER MANAGEMENT, then under the left pane select: STORAGE

Windows Disk Management console gives details of all Volumes (or Partitions) for each storage device installed in the computer.

→ DISK MANAGEMENT). This should display a list of volumes on the internal disk drive(s) and a graphic showing their layout. You will probably see that Disk 0 (the first hard disk) has more than one **partition**, for example, a SYSTEM partition of a few 100 MB comes first, followed by a BOOT partition occupying most of the first drive. You might also see a 10-20 GB Recovery partition and maybe a 100 MB Tools partition for diagnostics.

Make a careful note of all these partitions with their positions, names, details and sizes. While you are writing things down, record the **total capacity** of each physical hard drive as well as the **capacity of your new solid state drive** so you can positively identify all devices during the cloning process.

6. The new solid state drive will probably have a *smaller* capacity than your old hard drive — so partitions will need to be **resized** during the data transfer process. Your imaging software must be capable of this resizing. I have had *success* with Macrium Reflect (free version) and Acronis TruImage, but there is other software available — just be sure it can resize partitions to a smaller size.

- Macrium Reflect Free edition:
  http://www.macrium.com/reflectfree.aspx
- Acronis TruImage:
  http://www.acronis.com/en-us/personal/computer-backup/

Familiarize yourself with the migration procedure before starting the actual transfer. Get hold of the User Guide for the software you will employ. You need to look through the chapter on "Cloning a Disk" (Macrium Reflect) or "Disk cloning and migration" (Acronis TruImage).

7. Install the backup/cloning software on your hard drive. Create bootable rescue media as instructed by the software — usually on CD/DVD or USB memory stick. Make sure you can boot from the rescue disk —

you may need to change boot order in the BIOS. Just for safety, create a backup of the existing hard-drive onto removable media. This is also a check that the software is working correctly.

8. Follow instructions in the backup/cloning software for migrating data from a hard disk drive to an SSD. Macrium Reflect allows simple cloning directly from the original hard drive to an SSD which is *either* installed in the computer *or* installed in a USB caddy. Acronis Tru-Image is more complicated — it recommends first backing up the hard disk to a *different* drive,

*Data transfer from a notebook hard disk to a new SSD requires a USB-to-SATA adapter or "disk caddy" — because the notebook only has space for one internal drive. If you have a suitable USB port available, USB **3.0** is faster than USB 2.0.*

replacing the hard disk with the SSD, then booting from the Acronis rescue disk and restoring data from backup to SSD.

In either case, you will need to tell the software which partitions to copy to the new disk, in what order, and whether to modify the partition size in order to fit the smaller capacity of SSD. This is where your previous notes about partition sizes from "Disk Management" will prove useful.

Data Transfer

After the data copying operation begins, sit back and relax. It will probably take longer than you expect. At some point you will have to shut down, disconnect power, remove the original hard drive from the computer then replace it with your new solid state drive. Just follow the instructions provided with the imaging software and in your computer's hardware manual. Be sure to keep the old hard disk drive handy in case of problems.

Will it boot?

The next stage is nail-bitingly critical. Will your computer boot successfully from the new solid state drive? Remove any CD-ROMs or DVDs and keep external devices such as USB memory sticks disconnected for the time being. If the first boot is successful, watch out for messages on-screen. Windows may be making automatic changes to drivers, which will then require a reboot.

If the system does *not* boot, you might see an error message such as "Boot selection failed because a

required device is inaccessible." You may be able to fix this problem by booting from your System Repair Disk (Step 3), or from the PC manufacturer's Recovery Disk, then using the Microsoft Startup Repair Tool.

If the system *still* will not boot, that's too bad! You may have to shut down, remove the new SSD and replace it with the original hard drive. You have learned a lesson, but at least you have not lost any data.

Success?

Assuming that your computer booted successfully from its new solid state drive, note how much speedier it is, then remember you still have a few jobs to do.

First make sure that Windows is properly activated. Check in CONTROL PANEL → SYSTEM. If you have other Microsoft software, make sure it is still operational and activated. Windows should tolerate the upgrade of a *single* hardware component such as a new hard drive — but if you run into difficulties you may have to contact Customer Service.

If you have any automatic backup software such as Norton Ghost or Acronis TruImage, it may start complaining because the disk drive has been changed. Just delete the old backup jobs then create a new backup for the solid state drive.

Solid State subtleties

With a solid state drive, there are a few differences to bear in mind. It is **not** a good idea to be constantly writing and rewriting data to the drive — this will eventually wear out the flash memory cells and cause early failure. The SSD has some reserve capacity, but it can only go so far.

NAND flash memory cells are similar to a MOSFET transistor with the addition of a
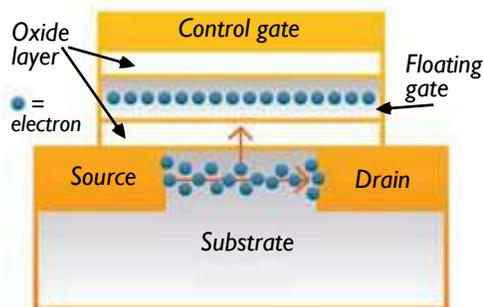
*Structure of a single NAND flash memory cell [after Samsung]. Electrons are attracted from the p-type silicon substrate to the control gate by applying a positive voltage to the control gate — but a few hundred electrons become **trapped** in the **floating gate**, where they can stay for years on end.*

trap for electrons underneath the control gate. When a trap is empty the cell is in one logic state. When a trap is full of electrons it is in another state. Writing data to the cells is relatively fast. Reading is also fast. But *erasing* data from cells has to be done one large block at a time and is relatively slow. As files are deleted, Windows 7 and later can issue a **Trim** command to the solid state drive so data can be erased from the relevant blocks, freeing them up for future fast writes. There is an excellent article by Microsoft on this topic at: https://blogs.msdn.microsoft.com/e7/2009/05/05/support-and-qa-for-solid-state-drives/

You can change Windows' settings to minimize excessive disk writing and prolong life of your solid state drive. For Windows 7 and later, the most important change should take place automatically — scheduled defragmentation should have been turned **off** for any solid state drives. Weekly defragmenting of files is worthwhile on a spinning hard disk but unnecessary on an SSD. These settings are found under: START MENU → ALL PROGRAMS → ACCESSORIES → SYSTEM TOOLS → DISK DEFRAGMENTER → CONFIGURE SCHEDULE.

Additional settings in Windows can be modified for optimum SSD life including hibernation, prefetch/superfetch, system restore and the indexing service. Some of this is automatic once Windows has detected a solid state drive.

If you have an SSD from Samsung, you can install 'Samsung Magician' to monitor your solid state drive and adjust Windows' settings to your liking. Software is also available from SanDisk (SanDisk SSD Dashboard) to monitor health of the SSD and make sure the Trim command is being issued.

Final check

After your new SSD installation is complete, bring up "Event Viewer" in the Windows Computer Management console — available through CONTROL PANEL → ADMINISTRATIVE TOOLS → EVENT VIEWER. In "Overview and Summary", look under "Summary of Administrative Events" for any recent errors since booting-up that might be SSD-related. You can always Google the description to find more information about these problems and how to fix them. Another useful check is available via Windows' '**Reliability Monitor**' (search for 'Reliability').

Best of luck

Upgrading to a solid state drive might seem like a major project, but I hope the steps here will lead you to a successful conclusion. If you run into problems, there is plenty of advice online. And if you **are** successful, you will have a computer that boots up in less than a minute, runs much faster, and has far greater resilience to being dropped or banged about.

- NM9J

National Parks on the Air

Friday April 22 was the first day of a two-day "NPOTA" activation by PCARA member David, KD2IRA. **National Parks on the Air** is being organized by ARRL to celebrate the 100th anniversary of the National Park Service.

David had chosen to activate the **Appalachian National Scenic Trail** (TR01) at the point where it crosses Bear Mountain in Bear Mountain State Park. This activation counts as a 'twofer' since Bear Mountain is also a Summits on the Air (SOTA) peak, "W2/GC-077".
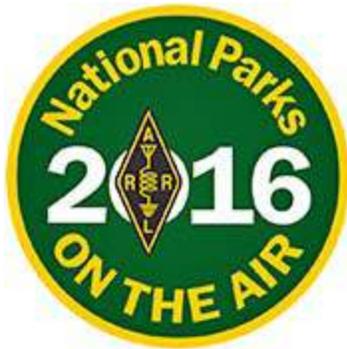
David KD2IRA (right) and Stefani are pictured setting up a portable station on the summit of Bear Mountain for National Parks on the Air and SOTA.

was feeding an Alpha Delta multiband dipole suspended as an inverted-Vee antenna from a convenient tree. Power was supplied by a 12 volt Deltran Battery Tender® LiFePO₄ battery. The band and mode of choice was 40 meter SSB.

Once the station was assembled, around

David and Stefani had set up a portable station in the Picnic Area alongside the scenic trail. This was also close to the area where PCARA has held several memorable Field Days beginning in June 2001.

The equipment used for NPOTA was straightforward — David's Yaesu FT-450D transceiver

4:00 p.m., operations began. The first few contacts came slowly until WJ8Y (Ohio) kindly 'spotted' David's operation on the DX Cluster. Contacts were soon coming in thick and fast, from as far away as Wisconsin, Michigan, Virginia, Maryland and North Carolina. Most of the reports were very

David KD2IRA operating in NPOTA from the Picnic Area on top of Bear Mountain.

good strength, which was in contrast with typical daytime signals heard on the 40 meter band recently.

David is planning a further "NPOTA" operation on the weekend of May 28-29, to activate the **Washington-Rochambeau Revolutionary Route** National Historic Trail (TR23) — at Old St. Peter's Church on Locust Avenue, near Oregon Road in Cortlandt Manor. During 1781-82 the church served as a military hospital for French troops,

who were in the area on their way to (and from) helping the Americans defeat the British at Yorktown, VA. Eight French soldiers who died at St. Peter's are buried in the adjoining cemetery.

If you have some time, pay a visit to this particular "National Parks on the Air' activation by KD2IRA, which is taking place in our own backyard on May 28-29.

You can find full details of 'National Parks on the Air' including rules, a list of qualifying sites and current activations at the ARRL's special web site: https://npota.arrl.org/index.php. For more information about 'Summits on the Air', see http://www.sota.org.uk/ .

- NM9J

Peekskill / Cortlandt Amateur Radio Association

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Newsletter contributions are always very welcome!
Archive: http://home.lanline.com/~pcara/newslett.htm

PCARA Information

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

PCARA Repeaters

W2NYW: 146.67 MHz -0.6, PL 156.7Hz
KB2CQE: 449.925MHz -5.0, PL 179.9Hz
N2CBH: 448.725MHz -5.0, PL 107.2Hz

PCARA Calendar

Sun May 1: PCARA Meeting, Hudson Valley Hospital, 3:00 p.m.
Sat May 14: PCARA Foxhunt, starts from Beach Shopping Center, 2:30-3:00 P.M.
Sun May 15: Church of the Holy Spirit Jubilee Festival.
Sat May 21: PCARA FM Simplex Challenge, 2:00 p.m.
May 28-29: NPOTA activation, Old St Peters, by KD2IRA.

Hamfests

Sat May 21: Southern Berkshire ARC Hamfest, Goshen, CT
Sat May 28: Bergen ARA Spring Hamfest, Westwood Regional HS, 710 Ridgewood Rd., Township of Washington, NJ. 8:00 a.m.
Sun Jun 5: Mt. Beacon ARC Spring Hamfest, Employee Rec Cntr, 83 Red Schoolhouse Rd., Fishkill NY. 8:00 a.m.

VE Test Sessions

May 7, 14, 21, 28: Westchester ARC Radio Barn, 4 Ledgewood Pl, Armonk, NY. 12:00. Pre-reg M. Rapp, (914) 907-6482.
May 12: WECA, Westchester Co Fire Trg Cen, 4 Dana Rd., Valhalla, NY. 7:00 p.m. S. Rothman, (914) 949-1463.
May 15: Yonkers ARC, Will Lib, 1500 Central Pk Ave, Yonkers NY, 1 p.m. Pre-reg John Costa, WB2AUL (914) 969-6548.
May 16: Columbia Univ VE Team ARC, 531 Studebaker Bldg, 622 W 132nd St, New York. 6:30 p.m. Alan Crosswell (212) 854-3754.
May 20: Orange County ARC, Munger Cottage, 183 Main St, Cornwall NY. 6:00 p.m. Joseph DeLorenzo (845) 534-3146.

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