



# PCARA Update



Volume 7, Issue 3

Peekskill / Cortlandt Amateur Radio Association Inc.

March 2006

## Substitute III

"I'm a substitute for another guy..." Greg, KB2CQE was unable to pen his front page column this month, so your editor is once more standing in for our prolific PCARA President.

The first thing Greg asked me to mention is that Joe WA2MCR and Jim W2JJG have been making arrangements for our **special event station**, on Sunday May 28 at Muscoot Farm in Somers. The station will be celebrating the Farm's "Spring Fest" and the 1x1 call W2F has already been requested. Muscoot Farm is a great location for a special event station, with plenty of power, facilities and interested people. Let's hope for some fine, sunny weather to add to the fun. Not only will this be Memorial Day weekend, but the CQ Worldwide CW WPX contest takes place at the same time.

Muscoot Farm is also a possible location for **Field Day**, as an alternative to Bear Mountain. Jim and Joe have been checking out accommodations at the gazebo, situated on one of the Farm's high spots, with picnic tables and vehicle access. More details at the March meeting.

At this time of year, with Punxatawnie Phil still dragging down the temperature, it's good to dream about warmer times ahead. The **local Hamfest** season opens on Saturday March 18 with the Orange County ARC Spring Hamfest in New Windsor, NY. One

month later on Sunday April 23, Mount Beacon ARC will be holding their annual hamfest at Tymor Park in LaGrangeville, NY. PCARA has requested indoor club tables at both events.

You are cordially invited to bring along pre-owned, pre-tested and pre-scratched items of radio and electronic equipment for sale from both club tables. If you are lucky enough to find a buyer for these high quality odds and ends, then think about a donation to PCARA funds, to offset some of the financial requirements of our busy club.

"I was born with a plastic spoon in my mouth..." Mention of financial requirements reminds me of another item that Greg requested. PCARA is still seeking a highly qualified person for the Secretary/Treasurer position. The qualifications include having millions of dollars in the bank and a generous nature. Even if you don't have any dollars, then we'll settle for the generous nature. That's because some of your valuable time will be needed to catch up with the responsibilities of this important post.

Want to know more? Come along to the March meeting at Hudson Valley Hospital Center - as recently patronized by Governor George Pataki, ex-K2ZCZ, for his appendectomy. The meeting date/time is Sunday March 5 at 3:00 p.m.

- NM9J

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## PCARA Officers

President:

Greg Appleyard, KB2CQE kb2cq@arrl.net

Vice President:

Joe Calabrese, WA2MCR; wa2mcr@arrl.net

Secretary/Treasurer: open.



Last year's special event station was located alongside the "old farm house" at Muscoot Farm.

# Part II - FM Combiner

and antenna system in Houston, Texas

—ERI and BDI join forces, by N2CBH.



*By early December, all sections of the new VHF-FM antenna were in place at the top of the 2000 ft tower. (The yellow structure alongside is the gin pole, used to swing sections into position.)*

sign-on Saturday night January 20<sup>th</sup>.

I still had some work to do. ERI president Tom Silliman asked me to make a modification to the antenna switch controller. This addition was a simple



*ERI President Tom Silliman monitors flexing of the gin pole through transit.*



*Assembling new equipment in the combiner room.*

box with three toggle switches and three pushbuttons, the purpose of which was to control each antenna switch individually for test purposes. A trip to Fry Electronics and I was in business. I spent the better part of Thursday morning making the box and testing it. With that complete I spent some time working with Tom to calibrate the directional couplers for the forward and reflected ports. This is not a simple Bird line section that we are all familiar with. This system uses precisely calibrated R.F. samples which are then in turn monitored by a thermal power sensor. Basically these sensors are heated by a small R.F. sample and a power meter is calibrated to the output of the sensor. The beauty of this system is that it is pure physics. Heat up a thermal bridge with R.F. and you know how much power is flowing through the system as long as you know how many decibels down the sample is from the actual power flowing through the transmission line. We used a line section which was terminated at one end through a network analyzer. We adjusted the sample to be precisely 60 dB below carrier power and we were all set.

Friday and Saturday were scheduled for some last minute checks of the interlock system and working with the individual radio station engineers to see that they had continuity on their respective interlock and power control connections. By Saturday afternoon I was browsing around — you guessed it — Fry Electronics with nothing better to do!

Saturday night we arrived at the site at about 10:00 P.M. The excitement was building as each station readied its transmitters for use, after several months in dry dock. One station had no equipment at all in their room when I arrived on Wednesday. I inquired as to whether they would be ready by Saturday — I was assured they would produce R.F. by Saturday night. Well, before I knew it two large trucks pulled up and a bunch of guys poured out. All I saw for the next three days was arms, legs, backs and equipment being moved around by the former! I have to hand it to them, they met the deadline. They did produce R.F. Saturday

night. Quite an impressive feat!

The system had already been proofed out so we knew there wouldn't be any VSWR surprises. The proofing consists of applying a network analyzer to each combiner input on the respective station frequency and then observing a Smith chart pattern of the match. A Smith chart allows an engineer to see precisely how good the resistive component of the match is and in which direction residual reactance falls. This uses the actual antenna as a load so it is a real-world test of the integrity of the system for each station frequency.



*Testing the combiners — it all works!*

Just after midnight we turned the first station on and no smoke — so we proceeded to add stations one at a time, observing the VSWR with the addition of each station. VSWR can change as each station comes onto the system, as they are all on different frequencies and the antenna system can have slightly different reactive characteristics for each frequency. This is due to the fact that the system has been optimized to operate over the entire FM band.

The stations brought up their analog and digital carriers simultaneously and at once Houston had digital terrestrial radio coverage. After each station had been brought up, Tom Silliman got busy doing an important task. The F.C.C. requires that all spurious emissions from such a system be lower than 80 dB below carrier.

Any time a system combines FM carriers together there is always the potential for intermodulation distortion products. With this system the products should easily be below 80 dB due to the port-to-port isolation that the combiner provides. Remember that FM final amplifiers almost always run class C, which makes them susceptible to intermodulation product generation if a stray carrier is fed back into the amplifier. The combiner eliminates any stray R.F. from being fed back, thus minimizing this problem. At about 3:30 A.M. we knew that we were in good shape, once we got a thumbs up from Tom on the intermodulation tests. It

was time to go back to the hotel and get some much needed rest!

Sunday afternoon I visited the site on my way out of town just to take a last look. Except for the failure in the field of a Bird Electronics High Speed VSWR



*Bird 3170A High Speed Wattcher® RF monitoring system.*

Wattcher® all was in order. A spare was sent down later and installed. I ended up with the task of repairing the offending Bird equipment in our shop!

The Senior Road project was a great experience for me both professionally and personally. I got to sample some local Texas cuisine (TexMex) which was better than any “south of the border” food I have ever had! With Houston complete, we have projects in Philadelphia and Cincinnati to work on. I hope to report on those as we get into them so stay tuned!

- 73 de Bob, N2CBH

## Adventures in DXing

- N2KZ

### Silent Voice

Is shortwave listening slowly becoming extinct? The legendary Voice of America has decided to dramatically reduce English broadcasts and end broadcasting in many foreign languages. Their new mission is to target the Middle East where few people speak English. Only Africa will continue to enjoy VOA service in English.

The rest of the shortwave world will have to look elsewhere for English-language news, commentary and features. Broadcasts in Albanian, Bosnian, Croatian, Georgian, Greek, Hindi, Macedonian, Russian, Serbian, Turkish and Thai will be eliminated altogether. In Berlin, Germany, VOA broadcasts will be replaced by programming produced by National Public Radio.

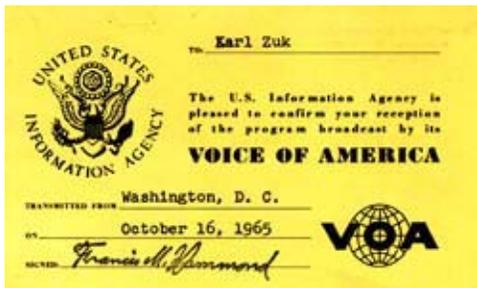
International broadcasters have embraced the Internet as an effective and economical means of distribution. With Internet access, no multi-band radios



*Short wave QSL from Radio Cairo.*

or specialized antennas are needed to receive crystal-clear audio from afar. Some shortwave services have experimented with over-the-air digital broadcasts using the DRM (Digital Radio Mondiale) system, but this method has not been widely adopted. Many shortwave broadcasters have gone completely silent in the past few years. Radio Finland, Radio Norway International, Radio Slovakia International and Swiss Radio International have all ceased broadcasting in English. The BBC has eliminated all shortwave service to North America.

Is the switch to the Internet premature? International broadcasters may be overlooking an important consideration. Their broadcast services reach millions of people in undeveloped and remote areas where Internet access may still be a distant dream. When



*Karl's Voice of America QSL*

shortwave broadcasters silence their powerful transmitters, to conserve power and reduce operating costs, will they orphan their needy audience? It is hard to imagine a world without The Voice of America and its signature tune "Yankee Doodle" blasting through the airwaves. My aunt and uncle used to live very close to a Voice of America transmitter site in Schenectady, New York. The transmitters and antenna farm were originally built by General Electric during the birth of shortwave broadcasting in the 1930s. When the ground was wet from rain, the quartz-filled rocks would sing the VOA's broadcasts as an eerie echo using no radio at all! Boy! Were they powerful!

I first began to listen to shortwave in 1965 using a four tube Hallicrafters S-120 receiver. Imagine my amazement hearing far-off places like Ghana, Egypt and Australia.

Forty-one years later, computers have become the ticket to hearing foreign broadcasts. Instead of endlessly searching for

new musical interval signals, now the hunt is on for exotic URLs. Shortwave broadcasts, loaded with QSB and QRM, have become only memories. Collecting shortwave QSL cards is a lost art. Now your only interruption might be due to heavy Internet traffic!



*Hallicrafters S-120 receiver covered 540 kHz to 31 MHz on AM and CW.*

## Prediction: Snow

The forecast is snow for analog televisions across the USA! President Bush has signed the Deficit Reduction Act of 2005 into law. Part of the Act requires all analog television broadcasting in the United States to cease on or before February 17, 2009. If you still use rabbit ears or an outdoor antenna to receive television, you should begin looking for a digital TV tuner now! The end is near!

Keep in mind that your trusty 4×3 format analog TVs are not obsolete quite yet. Cable and satellite television converter boxes will continue to supply your TV sets with analog signals for many years to come. Only over-the-air viewers will be scrambling for pictures. Not to worry! The Act has allocated \$1.5 billion dollars to subsidize the purchase of DTV converters for viewers left watching snow.

If the big switch is pulled in 2009, it may become a legendary year for TV DXing. As domestic analog stations leave the air, unique final opportunities will be available to log stations never before possible at your QTH. When all of the USA goes dark, the VHF and UHF bands will be wide open to receive TV from Canada, Mexico, Cuba, Venezuela and beyond without competition from strong local broadcasts. Remarkable reception may dominate DXers logbooks like never before. Start polishing up your low-band VHF Yagis now! The best is yet to come!

## New Byte Delight

Chances are that you have now seen high definition television. Why leave radio behind? Welcome to the world of HD Radio! After long preparation and testing by broadcast engineers nationwide, several manufacturers are now offering HD Radio receivers to the public. Using a standard known as IBOC (in-band on-channel,) select radio stations are now sending out both analog and digital signals to their listening audiences.

IBOC digital provides two major advantages over conventional analog broadcasting. HD Radio is delivered to your receiver digitally eliminating fading and interference. Crystal clear signals will be yours! The digital system also adds the ability to multicast. HD Radio stations can send out more than one program stream resulting in two or even three virtual channels of entertainment. You will also receive data your radio will display as song titles, traffic and weather information, or promotional material. IBOC digital is very much like satellite radio featuring multi-channel programming and a descriptive display. It's also free! No subscriptions are required, but you have to buy an HD receiver and listen to commercials now and then.

The most popular HD Radio receiver is the Boston Acoustics Receptor, with a street price of approximately \$299. Early reviews of the radio herald pleasant sound,

but only when strong signals are being received. Its front-end has been criticized as anemic at best. When



*Boston Acoustics "Receptor Radio® HD"*

signals are weak or inadequate, the Receptor seamlessly switches to the trusty analog companion broadcast.

Another quirk is reception of the medium wave AM version of HD. WOR 710 in New York City is the nation's pioneer in AM HD Radio broadcasting. Their engineering staff claims spectacular results with one major provision: AM HD can only be broadcast during the day. Nighttime sky wave propagation of broadband HD signals would result in nationwide reception chaos!

In New York City, several FM stations are now broadcasting HD-2 programs. WCBS-HD2 returns its classic oldies format to the air. WFUV-HD2 has a 24-hour a day version of its City Folk format. Q104-HD2 offers rock "deep classics." WWPR-HD2 is "power Latino." WHTZ-HD2 airs new rock music. WLTW-HD2 features oldies on "classic lite." Probably the biggest novelty for Big Apple listeners is WKTU-HD2's country music format. Will HD soon stand for "heavy demand?" Time will tell!

### Remote Repair

Have you ever owned a remote control that was sensitive, quirky, or annoyingly intermittent? PCARA resident wizard Malcolm, NM9J, has developed a very clever solution to this problem. Inspired by a posting on an Internet users group, Malcolm began his research. His motivation was simple: His remote control, provided by Radio Shack for his recently purchased Accurian HD TV tuner, was almost unusable due to weak performance.

The modulated light beams created by remote controls are invisible to the human eye, but plainly obvious when viewing them through a digital camera. This trick became a marvelous tool for research. One quick look revealed the Accurian remote's problem instantly. The LED in the remote produced a very narrow and directional light beam most useful when aiming the remote angled downwards. Malcolm first tried using a piece of frosted Scotch tape in front of the LED. The beam diffused and became broad and useful. A tiny swatch from a plastic food store bag proved even more effective. The amount of light attenuation produced by the tape or plastic filter was negligible. Further refinement of the idea revealed an optimum material: a small piece of material from a used, fabric softener sheet as employed in clothes dryers. It's very similar to the fiberglass tissue used by professional lighting designers. Tape a little piece of a fabric sheet

over the LED of any fussy remote and you could be quite pleasantly surprised! Many thanks, Malcolm!

Another handy hint for Accurian HD tuner owners: If you would like to program your universal remote for this box, use the code for Pioneer cable boxes: 015. Programming my Sony universal remote this way worked like a charm. It's another simple way to create a useful and robust remote to operate the Accurian tuner.

### SuitSat Success

Amateur radio station RSORS, also known as SuitSat-1, operated for nearly 16 days before going silent. A retired Russian spacesuit, fitted with a Kenwood HT transmitter, a small ground plane antenna, and a hefty battery pack, transmitted its 500 milliwatt signal for hundreds of orbits around the earth. After being jettisoned from the International Space Station, it immediately went into orbit as the world's first spacesuit satellite. Hams from all over the world used a wide variety of equipment to receive SuitSat's signals.

Many hams employed sensitive receivers and high gain antennas with preamps to log the station. Without a means



*SuitSat-1 (right) is released into orbit from the International Space Station.*

of stabilization, Suitsat 1 slowly rolled and spun in orbit, creating long fades in transmission. Its signals could be heard for a few seconds and then disappeared only to return a few seconds later. I was one of the many amateur radio operators pointing their Yagi antennas into the sky in the middle of the night, searching for Suitsat's signals. I wasn't lucky enough to hear its transmissions on 145.990 MHz, but dozens and dozens of hams did. For a lengthy log of reception reports, and more details of the project, visit <http://www.suitsat.org>.

The Suitsat experiment also became an international ambassador for the amateur radio hobby. Many hams and scanner enthusiasts, who had never before tried receiving signals from the International Space Station or other extraterrestrial sources, found their way to searching the skies. Several participants also logged distant earthbound PSK-31 and other digital data signals during their search for Suitsat. Next month, I will detail my quest for out-of-this-world DX. The results were incredible!

Until then, happy trails...

— de Karl N2KZ "The Old Goat"

# Fabulous Field Day

Jon was having trouble staying awake... he had been sitting in the Field Day tent for seven hours, working 20 meter CW. Another club member was helping with the logging for the first few hours but now Jon was on his own and the band was fading fast. Jon's eyelids grew heavy as he continued to turn the tuning knob, searching for yet another station to work.

Suddenly Jon opened his eyes with the realization that he was no longer alone. Someone had quietly entered the tent and was taking in the scene. On the left was the trusty old HRO receiver that had seen some twenty Field Days since it was manufactured during



World War II vintage National HRO receiver, with plug-in coil assembly for each band.

World War II. On the right was the homebrew CW transmitter that Nat had lovingly put together from old TV parts and war surplus components. On the ground was a pair of 6 volt

batteries, connected to the most modern piece of equipment in the tent — a transistorized inverter providing 230 volts B+ high tension for the vacuum tubes in the transmitter and receiver.

Jon's attention went back to the receiver — a new call sign was emerging from the static. Jon adjusted the HRO's crystal filter until the signal was clear, netted the transmitter to the receive frequency, then flipped the transmit switch and started to call the new station on his Vibroplex mechanical bug-key. The contact was soon completed and Jon recorded the details onto a paper log sheet with his favorite fountain pen.

Turning to greet the visitor, Jon was surprised that



Vibroplex mechanical bug key as used by Jon.

he did not recognize the face. The stranger had a tall, bulky frame and his hair had a hint of gray, like the World War II veterans who made up the radio club's senior membership. He was dressed in sweater and chinos, a lot less formal than Jon's sports jacket and tie.

"Evening stranger," said Jon. "Would you like to take over?"

"I'm not sure that would be entirely legal," replied the visitor. "My amateur radio license doesn't cover this time."

Jon's face showed a puzzled look. "What do you mean — 'this time'?" he asked. "Has your license expired?"

"No, not exactly," came the reply. "My license hasn't been issued yet. I'm a time traveler."

After seven straight hours of CW operating, Jon's mind was not working at its usual speed. He shrugged his shoulders and invited the stranger to the logger's position. "Take a seat and help with the logging," said Jon. "I'm nearly as played out as the band. By the way, what's your name, Mr. Traveler?"

The stranger sat down and introduced himself. "My name is Chris, and I'm just passing through," he said. "How is Field Day going? Tell me about your equipment."

Jon began to describe the equipment in the little Field Day station. He explained how the National HRO receiver with its plug-in coil pack belonged to one of the older members of the club who would be safely tucked



"How is Field Day going? Tell me about your equipment."

up in bed by now. He explained how the transmitter had been assembled by Nat, the club secretary, from published designs and from some of his own ideas. And he pointed out the tuner and antenna provided by Billy, who was last seen leaving the Field Day site with his latest YL in tow.

"I know this equipment isn't state of the art," Jon continued, "but it still pulls in the weak signals and works them well enough. It takes a while to net the transmitter VFO and work the transmit/receive switch, but I've been reading about the latest Heathkit twins — maybe next year!"

Chris looked Jon in the eye. "Would you like to know what's to come?" he said. "There's a lot of excitement ahead. First of all, those separate, heavy transmit-

ters and receivers will disappear in a few years' time. And home-built transmitters will fade away, except for the low-power enthusiasts. The future lies almost entirely with commercially-built transceivers."

Jon's mind was still a little hazy, but he went along with Chris's description of the future. "Do you mean we'll all be buying transceivers from Hallicrafters, National and Collins?" asked Jon.

"No, I'm afraid not," replied Chris. "None of those companies is making amateur radio equipment any more. Most of them have disappeared"

"What do you mean 'disappeared'?" demanded Chris. "Those companies were fine last time I looked at their ads in the magazine. What are you talking about?"

"I'm from forty years in your future," replied Chris. "In forty years time, most of your amateur radio equipment will be imported from Japan and the Far East."

Jon was looking puzzled. "That doesn't sound right. All the best equipment is from the U.S.A. There are a few imports like Lafayette, but it's mostly rubbish."

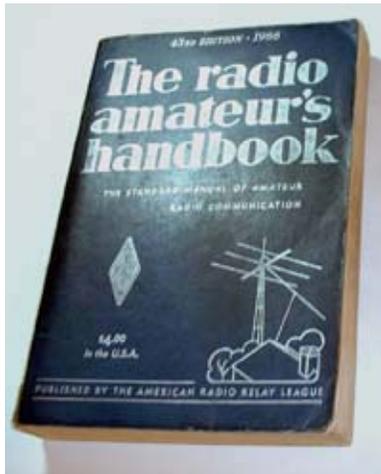
"Wait and see," replied Chris. "Japan's sun will be rising sooner than you think." He waved at the bulky radio equipment on the operating table. "And all of this will be shrunk into a single container the size of a shoe box."

Jon was turning over the idea of a visitor from forty years ahead. His CW-befuddled brain was still coping with the concept. "OK," said Jon. "What else will be different in forty years' time?"

"Well," replied Chris. "You won't be writing entries in a paper log anymore. That's all handled by computerized logging."

"Computerized logging?" queried Jon. "You mean we have to key log entries into a Teletype machine? And how on earth would we connect it to the computer center?"

"Don't worry," said Chris. "Computers will shrink down to the size of your clip board. And they'll all be connected together in a giant network. Submitting the Field Day entry will take just a few keystrokes."



*This 1966 ARRL Handbook carried advertisements from Collins Radio, Hallicrafters, Hammarlund Mfg and Heath.*

Jon was still digesting these revelations about the future. His hand continued to tune the band, looking for new stations to work, but conditions were getting quieter and quieter.

Suddenly, the tent flap opened and a new face was peering into the radio station. It was Billy's XYL who was looking very displeased. "Has anybody seen my husband?" she asked, looking fixedly at Jon and Chris in turn. "He said he would be with you tonight!"

Jon gave Chris a nudge and jumped in with the reply. "He left the site around 9:00 p.m. Maybe he's still having car trouble." Billy's XYL gave a curt nod and disappeared.

"What was all that about?" asked Chris.

"Earlier on, I saw Billy's vehicle parked outside a house a few blocks away," said Jon. "It's hard to miss with that giant mobile whip antenna on the back. Draw your own conclusions."

"Oh to be out of touch," sighed Chris. "Where I'm from, everyone carries cell phones and knows exactly where their partners are."

"Cell phones?" asked Jon.

"Infernal devices," replied Chris. "A digital transceiver the size of a hairbrush, clipped on your belt. It's coupled to the telephone network so you can make a call to anywhere."

"Wouldn't that need an awful lot of telephone operators?" asked Jon.

"Ha ha!" laughed Chris. "You've got a lot to learn over the next forty years. Enjoy yourself old man!"

And with that, Chris walked out of the tent. The stars were shining over the Field Day site as Chris turned and waved back to Jon. "See you in the future," he called. The stars shimmered and all that was left was a line of footsteps in the dew-covered grass.

Jon blinked his eyes and realized that Chris was gone. Had he been dreaming? The only evidence of the visit was on the log sheet, where Chris seemed to have signed the last entry with spidery writing... "*Lux Viator*".

— . . . — — . . . —

*This tale was inspired by a convergence of anniversaries in 2006... it's forty years since my first Field Day and first license, and it's twenty years since arriving in the U.S., gaining my U.S. ticket and enjoying my first Field Day in Illinois.*

*The names may have been changed to protect the innocent, but some of the events in the story above actually happened!*

*The rules for UK Field Day 1966 were quite strict. For example, "Stations must be operated from tents" and "Total d.c. input to the valve, valves or other devices energizing the aerial... shall not exceed 10 watts." The contest was restricted to C.W. only.*

— Malcolm, G3VNQ, NM9J

# Peekskill / Cortlandt Amateur Radio Association

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*Newsletter contributions are always very welcome!*

Archive: <http://home.computer.net/~pcara/newslett.htm>

## PCARA Information

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

## PCARA Repeaters

**W2NYW:** 146.67 MHz -0.6, PL 156.7Hz

**KB2CQE:** 449.925MHz -5.0, PL 179.9Hz

(IRLP node: **4214**)

**N2CBH:** 448.725MHz -5.0, PL 107.2Hz

## PCARA Calendar

**Sun Mar 5:** March meeting, 3:00 P.M. HVHC.

**Sat May 6:** PCARA Foxhunt, 3:00 p.m.

**Sun May 28:** Special Event Station W2F, Muscoot Farm Spring Fest.

## Hamfests

**Sat Mar 4:** Splitrock ARA Hamfest, Parsippany Police Ath Lg Building, 33 Baldwin Road, Parsippany NJ. 8:00 a.m.

**Sat Mar 11:** Orange County ARC Hamfest, Temple Hill School, 525 Union Avenue, New Windsor, NY. 8:00 a.m.

**Sun Apr 23:** Mt Beacon ARC Hamfest, Tymor Park, LaGrangeville NY. 8:00 a.m.

## VE Test Sessions

**Mar 4:** Splitrock ARA Hamfest, Parsippany PAL Building, US Rt 46 at Baldwin Rd, Parsippany NJ. 8:45 a.m.

**Mar 5:** Yonkers ARC, Yonkers PD, 1st Precinct, E Grassy Sprain Rd, 8:30 a.m. Contact D. Calabrese, 914 667-0587.

**Mar 13:** Split Rock ARA, Hopatcong HS, Hopatcong, NJ. 7:00 p.m. Contact Sid Markowitz (973) 724-2378.

**Mar 17:** Bergen ARA, Westwood Regional HS, 701 Ridgewood Rd, Washington Township, NJ. 7:00 p.m. Contact: Donald C Younger, (201)265-6583.

**Mar 18:** Orange County ARC Hamfest, Temple Hill School, New Windsor NY. 9:00 a.m.

**Mar 20:** Columbia Univ ARC, Watson Labs, 612 W 115th St. New York, NY, 6:30 p.m. Contact Alan Crosswell, 212 854-3754.

**Apr 29:** PEARL, Bureau of Emerg Svcs, 112 Old Rt 6, D. Smith Campus, Carmel, NY. 9:00 a.m. Contact NM9J.



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