



PVRC Newsletter

November 2019

SWEEPSTAKES!

Newsletter Editor: John K3TN jpescatore@aol.com

Website: <http://www.pvrc.org>

Meeting Info: <http://www.pvrc.org/chapters.htm>

Facebook: <https://www.facebook.com/groups/PotomacValleyRadioClub/>

President's Letter: This and That – Tom K3AJ

We went to press with the October Newsletter just before the word was out that PVRC had recaptured the NAQP Club Challenge cup. While this is old news now, thanks to everyone who showed up. It all came down to the last event, with an epic PVRC turnout for NAQP SSB toughing it out in some less than ideal conditions. Maybe we can't all be in the top ten individually, but it sure is fun being part of a team effort that results in a hard-fought win!

And speaking of competing, if you haven't yet made use of the real-time on-line scoreboards, give them a try. The two big ones are contestonlinescore.com and the cqcontest.net online contest server. If you are an N1MM user, there are settings that will send your score in automatically every few minutes to all the scoreboards by using a score distribution server. The info on how to configure N1MM to use the score distribution server is found [here](#).

Stay logged in to the scoreboard during the contest and watch your progress. Even if you are not likely to end up at the top of the heap, it's great fun to try to move past the next person ahead. Try it, you'll like it!

Following the President's Letter, you will find two important announcements in this edition of the PVRC Newsletter: "Proposed Bylaws Revision Moving Forward to Vote" and "Notice of Election." Please inform yourself and participate in the upcoming election, which will include a vote on the proposed bylaws revision. The PVRC web site has a link to the details of the proposed bylaws revision.

And now, on to Sweepstakes! Can we defend the club competition title for the eleventh year in a row? You bet! Also, there are bragging rights at stake and travelling trophies to fight for:

The K3LP Memorial Trophy for Most New Logs Submitted:

This trophy goes to the PVRC chapter that submits the most new SS logs across both modes.

The W4MYA Memorial Trophy for Largest % Score Increase:

This trophy recognizes the chapter that achieves the biggest boost over last year's scores. Since some chapters are small (10 members) and others large (100), the trophy goes to the chapter with the highest % increase.

The Battle of the Potomac between North or South:

For bragging rights! We divide PVRC in half, and either one side or the other adds more to the PVRC win effort.

Last year the Blue Ridge Chapter won both the K3LP and W4MYA trophies, while the Battle of the Potomac was won by the South. Is your chapter going to take home the hardware this year?

73 and Go PVRC!
Tom, K3AJ

Proposed Bylaws Revision Moving Forward to Vote

In accordance with the review process announced, the bylaws committee considered the comments received from the town hall, the e-mail address, and suggestions from PVRC members sent to committee members. Three changes were made to the proposed bylaws revision published at the beginning of the comment period as a result. Those changes are:

- 1) Restored text now in the bylaws: "The PVRC Officers in the event of a vacancy on the Board of Trustees may authorize a special election."
- 2) Removed capitalization of "active member" in proposed changes for consistency with Article 1, Section 2.
- 3) Made hyphenation of "At-Large consistent.

The final version of the proposed bylaws and supporting explanatory material may be found in the document titled "2019 PVRC By-Law Revision 10-17-2019 B.docx" on the PVRC web site (see link on home page).

PVRC members will have the opportunity to vote on the proposed bylaws revision during the annual PVRC elections, which will be held during November and December at chapter meetings. An affirmative vote by two thirds of those voting in the election is required for approval.

We are grateful for the thoughtful and diligent efforts of the Bylaws Team under the leadership of Mark Bailey, KD4D. The team will be considering some additional bylaws issues during 2020.

Proposed Bylaws Revision Moving Forward to Vote

In accordance with the process announced at the beginning of September, nominations for the Officers and Trustees for one-year terms term beginning January 1, 2020 are now closed.

Following is the slate of nominees:

President: Tom Valenti, K3AJ
Vice President: Jay Horman, W3MMM
 Mike Barts, N4GU
Treasurer: Dan Zeitlin, K2YWE
Secretary: Tim Shoppa, N3QE

Trustees:

Guy Ollinger, K2AV
 Tyler Stewart, K3MM
 Joe Palsa, K3WRY
 Don Daso, K4ZA
 Brian McGinniss, N3OC
 John Kanode, N4MM
 J. B. Edmonds, N4NQY

Tom Gregory, N4NW
 Pete Smith, N4ZR
 Bud Hippisley, W2RU
 Bud Governale, W3LL
 Frank Donovan, W3LPL
 Bull Kisse, W3MSH

In addition to the annual election of Officers and Trustees, the 2019 election ballot will also include voting on the proposed changes to the PVRC Bylaws.

Elections will be held during chapter meetings during the period November 1, 2019 through December 31, 2019. A ballot form will be provided to chapter chairs and each voter must complete the paper ballot, fold it and give it to the chapter chair. The chapter chair will initial the outside of the ballot and return it to the PVRC Secretary.

PVRC Officers:		Trustees:
President:	K3AJ Tom Valenti	K3MM, N3OC, WX3B, W4ZYT, N4NW, K2AV, K4ZA, W3TB, K3ZO,
Vice President:	N4GU Mike Barts	K2PLF, W3LPL, N4MM, N4ZR, W3MSH, N4NQY, W2RU, K3WRY
Vice President:	W3MMM Jay Horman	
Secretary:	N3QE Tim Shoppa	PVRC Charter Members (all SK):
Treasurer:	K2YWE Dan Zeitlin	W3GRF, W4AAV, W4KFC, N0FFZ, W4LUE, W7YS, VP2VI/W0DX,
		W3IKN, W4KFT

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Sweepstakes Resources

Dates/times: CW: First full weekend in November (**November 2 - 4 2019**). Phone: Third full weekend in November (**November 16 - 18, 2019**). Contest Period: Begins 2100 UTC Saturday and runs through 0259 UTC Monday.

List of ARRL sections - [here](#)

Call History files – check out the PVRC NC site [here](#) or AZ Outlaws file [here](#).

Log Due Dates – 7 days after contest: November 11th for CW, November 25th for SSB.

A pretty good N1MM+ Function Key file for SS CW

F1 RUN CQ,<ss> K3TN K3TN <ss>
 F2 Exch,#~B * 69 MDC
 F3 TU,TU *{CLEARIT}
 F4 K3TN,*
 F5 HIS Call,!
 F6 QSO B4,B4 *
 F7 NR,# B
 F8 ?,?
 F9 NR?,NR?
 F10 CK?,CK?
 F11 Sec?,SEC?
 F12 Wipe,{wipe}

F1 S&P CQ,<SS> * * <ss>{CLEARIT}
 F2 EXCH,#~B * 69 MDC
 F3 SEC,MDC
 F4 K3TN,*
 F5 HIS CALL,!
 F6 CK,69



What Time Is It?? – Chris GM3WOJ

Reprinted with permission from author, online version [here](#). Chris and Keith GM4YXI will be doing the VK9CZ Cocos Keeling DXpedition from 12 – 29 November. Details [here](#).

What do you do when you need to know the exact time? You look at your phone or your watch, or you look at the time on your laptop or iPad etc. All very easy if you have internet connectivity or mobile phone coverage (and if your watch battery has not gone flat)

All right - what do you do if you are on a DXpedition to a remote (Pacific or Scottish) island where there is no mobile phone network and the internet connectivity is patchy – sometimes disappearing completely for hours or days? Not a problem – most laptop internal clocks only lose or gain a few seconds per day – perfectly OK for logging the DXpedition QSOs – yes?

No – DXpeditions at this low point in the sunspot cycle need to operate FT8 and FT4, both of which modes rely on very accurate timings for the transmit and receive periods. FT8 transmissions last for 12.64s in a 15.0s period, FT4 transmissions last for 4.48s in a 6.0s period – you cannot use either mode if your PC clock is inaccurate by any significant amount.

If you have internet connectivity, accurate PC timing is easy – just install one of a number of software packages designed to keep your PC clock synchronised to a very accurate online source – two examples of suitable software are Meinberg NTP and Dimension4. Network Time Protocol (NTP) servers can keep your PC clock accurate to under 0.1s under normal internet traffic conditions.

Back to the problem – no reliable internet, no 4G – what can we do? Let's turn our eyes to the sky – the Global Positioning System is the answer. The GPS system depends on super-accurate clocks (four in each satellite) hurtling around above our heads – let's access that accuracy on our remote island.

My first approach turned out to be a dead end. I found software online called ToyNtp 1.2 written by Alex Shovkoplyas VE3NEA (DXAtlas, Skimmer, etc). The Garmin GPS-18x LVC unit he specified was quite expensive – about £70 – so I decided to build a QRP Labs QLG-1 GPS module kit and see if it would work with the ToyNtp software – it did not!

The photo below shows the QLG-1 module, powered from a +5.0V DC supply. The supplied ceramic patch antenna (not shown) is very effective, but I fitted the optional SMA socket and used an external powered GPS antenna which improves sensitivity.

The green LED flashes at 1 pulse per second once satellites have been acquired – the serial data output is then connected to a COM port on your PC.

(I'll now use this module with a QRP Labs 'Prog Rock' kit to make a GPS disciplined 10MHz oscillator for my shack.)



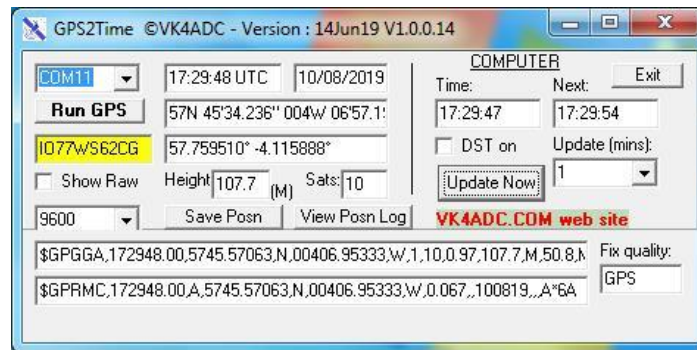
I then looked around the internet more carefully and found exactly what I needed. The software is called GPS2Time and is written by Doug Hunter VK4ADC and made available as freeware – thanks Doug! Download and unzip this software into a separate directory, where you will see the .exe file and two logfiles will be created (once the software runs for the first time).

I purchased a suitable cheap USB car GPS/GNSS receiver on eBay (£10.99) – I ordered a type G-mouse VK-162 as specified by VK4ADC on his webpage, but the unit that arrived was a U-blox 7 (but labelled G-mouse) – I think they are all similar anyway **but they are not - there are some fake VK-162s for sale online! See important note below.**



This is a much simpler approach – the U-blox 7 plugs directly into a USB port on your laptop/PC and is powered by the USB port. This is really convenient for a DXpedition where carrying extra power supplies, etc. can be difficult. You need to download and install the drivers for the U-blox 7 – Windows then recognises the GPS module as a new COM port, which you then point the GPS2Time software to.

Here is a screen shot of the GPS2Time software – the GPS receiver is connected on COM11 and receiving 10 satellites with the baud rate is set to 9600. The update time is set to 1 minute but can be longer of course. As a bonus you get an accurate position and height fix.



I've tested this software with three different Operating Systems – Windows XP SP3, Windows 7 Pro 64-bit and Windows 10 64-bit. It works well in all 3 cases, however there are a few things to watch – with W7 and W10 you have to run the software as an Administrator, but with XP I found it only worked if I did not 'Run as Administrator'. Note - the software won't run unless you first select a Baud rate with the pull-down menu e.g. 9600 as above - you may also need to delete / refresh some COM ports on your PC. Important – make sure you have 'Internet time sync' switched OFF on your laptop or PC.

Doug VK4ADC has recently written new versions of the software, including an improved version for Windows XP – he e-mailed me this information: "That GPS mouse will automatically switch baud rates so while you have used 9600, you can set the software's baud value to 57600 (or even 115kB) and it all still works. In fact, the faster the baud rate then the lower the timing error because the software decodes the GPS's time stream closer to the Seconds 'change-over' point and sets the PC clock closer as a result. The worst-case condition is going to be a 1 second inaccuracy but it can be a lot better than that with a high baud rate".

IMPORTANT - DO NOT BUY A 'G-MOUSE VK-162' IF IT IS MARKED 'BD&GPS' - these are made in China and do not seem to have any suitable driver software available. (BD refers to Beidou No.1 satellite). Look for a VK-162 which has no marking other than 'G-Mouse'. If the photograph on eBay or wherever shows only the back of the VK-162, don't buy it!

GPS2Time software download [here](#). U-blox 7 driver download [here](#). Click 'Download software only' If you are interested in GPS disciplined oscillator control/timing etc. try running this [strangely-named software](#) with your U-blox 7 GPS RX (it can't control your PC clock

ARRL Sets Up Contesting Discussion Group



Contesting ARRL-Contesting@groups.arrl.org

Group Description

To foster discussion of radio contesting, contest operating, and contest rules. All questions are welcome.

The ARRL has re-established a number of online discussion groups, including one on Contesting. As of this writing, there are 159 testers signed up. We already have CQ-CONTEST, so this is kind of a YAPL – Yet Another Place to Look. But if you want to look, look [here](#).

PVRC Olympics Award Winners in the Central VA Chapter – Mark N2QT



L-R N8AID (bronze), N4UA (bronze), W4PK (silver), N3CW (bronze), W4JAM (gold), W4WWQ (bronze), K4XL (gold), N3AC (4M), KC4D (bronze)

In addition, Vic W4VIC passes on his QDOs to other winners: “*Congratulations to Alan, AA4FU; Eric, NR4O; and Jim, W3FA as recipients of the well-deserved 2019 Presidential Leadership Awards. Guys like that make us as good as we are.*”

After discovering a botched QSO data upload to LOTW and making proper corrections I received the long-anticipated confirmation for my 80M CW QSO with XR0ZRC which qualifies me for CW Honor Roll. ? Mixed and CW down, SSB and Digital to go!"

John W4JAM likes to show off his PVRC bling collection like this:



Six meter “death ray” dipole – Hank K3YDX



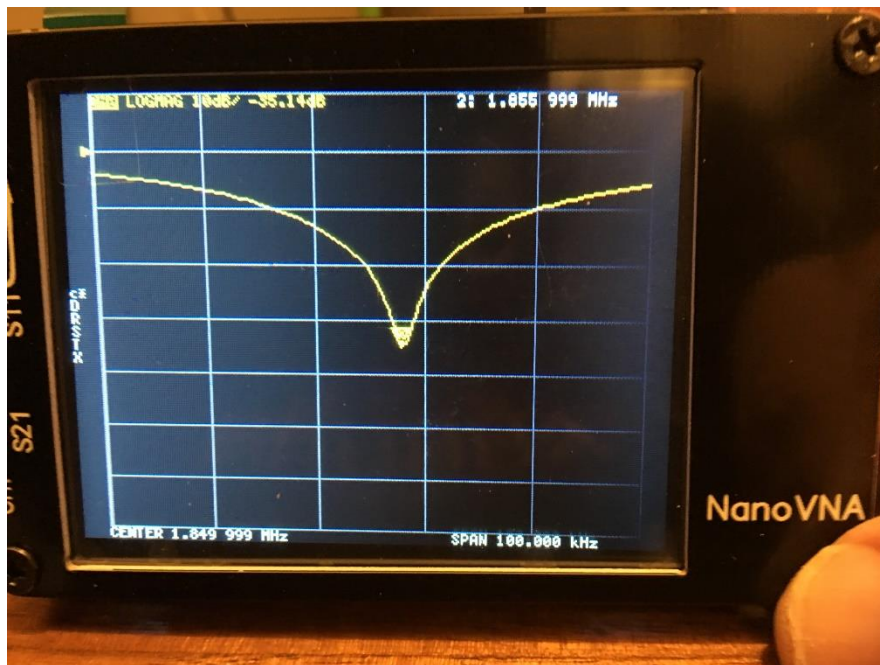
Pelican assisted 6 meter dipole helping capture the coveted PVRC dipole pipe award.

If You Want a Few More Db on 6m – K5QE Vertical Array



From K5QE's talk at the 2019 Pacific Northwest VHF Society Conference [here](#).

Using the NANO VNA – Mike W3IP



The [nanoVNA](#) is a really neat small VNA that can show swept measurements for both S11 and S21 (return loss and power transfer from port 1 to port2). The nanoVNA a a public domain project. It is a self-contained network analyzer that fits in the palm of your hand. It can be battery powered for up to 2 hours or connected to a computer (also recharges the battery). It is a inexpensive way to get a visual representation of antenna VSWR out in the field without having to take along a much larger box or laptop.

Amazon, Banggood, eBay, and TaoBao all sell versions of the unit from \$50 to \$75. There is a very basic manual available (the manual assumes you have some previous knowledge of VNAs and touch screen operations). There is an active group.io site if you are interested in experimenting with the firmware. There is also software available to manipulate the collected data and display it in various forms on a PC (a lot easier to see). The nanoVNA has a SMALL touch screen. It uses the touch screen and a rocker switch to set the parameters.

It covers 50 KHz to 900 MHz, has 2 ports to measure a thru response and reflected power (i.e. S11 and S21). My unit came with the latest firmware that required just a few minutes to figure out how to set parameters and get a useful display. My unit also came with calibration terminations (open, short, load) in case the unit needs to be recalibrated. The only odd thing about the nanoVNA I purchased is that it requires a USB-C connector to connect to a PC.

The photo shows my 160 inverted L after I rebuilt the folded counterpoise (one of my (formerly) standing dead ash trees took it out). All for \$50 to \$75! And yes, it is now resonant too high in the band...

Message from Vic Clark's Son Andy W6KFC – Mike N4GU

I received this email this weekend from Andy Clark, Vic Clark's son regarding the formation of the Clark Memorial Club, W4KFC. We could not have expected a better response from Vic and Kenneth's family. Mike N4GU

Dear Mike, Andy Clark here, son of Vic Clark and brother of Ken Clark, taking the liberty of writing to you at the email address I found at QRZ.com.

I was very pleased to read in the PVRC July newsletter of the creative solution the PVRC found for keeping the W4KFC call sign alive and would like to say "thank you" to the officers of the PVRC for forming the Clark Memorial Amateur Radio Club. It blows me away ... I could not think of any better way of honoring the memory of those two great fellows.

Although I have not been nearly as active or involved with amateur radio as either my father or brother, I am a licensed ham (W6KFC, formerly WA4PRF), and do get on the air from time to time to chat with local hams here in Japan (where, through many twists of fortune, I have spent my entire adult life). Now that I am retired, I am trying to get my code speed back with the goal of operating CW on HF again.



Above is an April 1951 photo of the first four hams in our family. Left to right: My mother (Hester, later WA4PAE) holding me (later WA4PRF, now W6KFC), Ken (who became K4OKZ, later W4KFC), and my father (Vic, W4KFC). (My eldest sister, Beth, was also licensed -- as KA4YTN, I think -- but she didn't arrive until a couple of years later.) My wife, BTW, is JJ1UOW.

Thanks again!

73 de Andy Clark, W6KFC/7J1AA

The Contest (satirical ode to CQ WW SSB) – John K3MD

This is a work of satire (by FRCer John Thompson K3MD), he emphasizes that it should not be taken seriously!

'Twas brillig, and the slithy FRC'ers did QRM each other in the CQWW SSB. The 1.8 kHz filters were useless. Many swore that they would operate RTTY and CW only. However, the lure of SSB often won them back.

Meanwhile, the FT8'ers were unperturbed and sat gently on 14074 kHz, ignoring everything else. The IP3's were pushed to the limit. The superhets were fighting with the DDC'ers for supremacy. The OVF's were lighting up. Many were extremely upset, and consulted their receiver performance charts closely.

Meanwhile, the YCCC'ers were swearing that in no circumstances were the FRC'ers to win CQWW OR ARRL. They may be right, they may be wrong. Recently wrong. Some of the old timers were reminiscing about how the FRC used to take the SS seriously, with many attempting to work all sections with one QSO per section, in the

days when spotting nets did not exist, and nearly all linears, amateur or not, used 3-500Z's or 813's. Tetrodes were rare.

The maxome foes were manifest and multitudinous. The FRC'er volpal swords were used many times, and the blood spilled was voluminous, necessitating many double-unit transfusions prior to surgery, and sometimes 6 or 7 units during surgery for those that survived. (This is a simile, not real, for those incapable of making the distinction.) The PC's were overloading, stating that they had inadequate memory. The carefully crafted filters were inadequate. N1MMplus was taxing the very PC's upon which its existence depended. N1MM cared little, his program was universally used, and the users needed to keep up with technology. Some were calling him "Gates." FRC'ers were stating emphatically that they had to construct their own computers in order to have the correct ones, that commercial computers were inadequate. The Win 7'ers were silent. Microsoft was declaring their operating systems obsolete. This was extremely painful to them.

The K index was low. The flux numbers were incredibly low, many saying it was worse than 1963. The 5 over 5 over 5 arrays were nearly useless other than on 20 meters. The shorty forty's were multiplying, although very many were at inadequate height. Those with 4 bays of verticals were dominant, but the HOA's were making them a thing of the past. Many were using gutter antennas or renting stations to operate remotely for thousands of USD's.

Many said the QRM was so bad and the propagation so ridiculous, and they were swearing off contesting forever. However, like nicotine, the contesting bug strikes many times in many ways, sometimes with very little warning.

The CWops and FOC'ers were stating "it serves you right, SSB is a terrible mode." The SSB'ers were greatly offended. This division in ham radio remains, and is not healing well, despite many attempts at cauterization and healing by secondary intention. The "never HF'ers" were happily calling CQ on 144.205, then giving up and going on FT8. The RTTY'ers and FT8'ers were stating, "these old timers are ridiculous, our modes are obviously far superior."

The PVRC'ers were observing the YCCC/FRC struggle bemusedly. The Bavarian Contest Club was patiently waiting to win the big 4 from the U.S.

The TR-4 sneered at the IC-7610, "you have no tubes." The IC-7610 looked askance at the IC-9700, "you are terribly unstable without GPSDO." There was no FT-1000MP, since most were no longer functional. The Alpha 8410 stated to the KPA-1500, "I am a much better RTTY linear than you!" In general, the radio equipment had as much jealousy as the contesters.

Membership News – Tim N3QE

PVRC did not add any new members in the latest reporting period.

Chapter leaders please remember to complete the [Meeting Attendance Report](#).
Members can check and update their roster details via the [Roster Lookup](#).

Upcoming Contests and Log Due Dates

Contests This Month

- **Nov 2 – CW Sweepstakes!**
- Nov 9 – WAE RTTY
- Nov 9 – OK/OM CW
- Nov 16 – LZ DX
- **Nov 16 – SSB Sweepstakes!**
- **Nov 23 – CQ WW CW**

Logs Due This Month

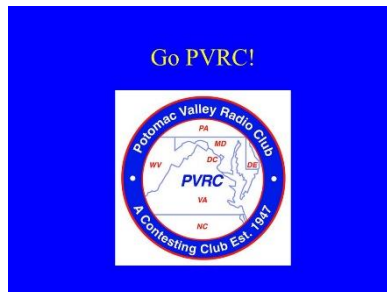
- **Nov 1 – CQ WW SSB**
- Nov 5 – UBA ON
- **Nov 9th – CW SS**
- **Nov 29th – SSB SS**

See WA7BNM’s [Contest Calendar](#) for more detail and the latest information.

Editor’s Last Word – John K3TN

Well, tomorrow is my favorite contest of the year – CW Sweepstakes. Unfortunately, I will be on travel and not getting back until Sunday afternoon – look for me as fresh meat Sunday night!

Thanks to Mike W3IP, Mike N4GU, Mark N2QT, John W4JAM, Hank K3YDX and Vic W4VIC for contributions to the Newsletter. The quality and usefulness of the PVRC newsletter depends on contributions from members. If you have photos from club meetings, screen shots of new contest software, or brief writeups on station improvements or contest war stories, send them in any format to jpscator@aol.com.



From the PVRC Treasurer – Dan K2YWE

PVRC has chosen not to implement an annual dues requirement. We depend on the generosity of all our club members to finance our annual budget. In addition, active PVRC members are expected to participate and submit logs for at least two PVRC Club Competition contests per year.

When contemplating your donation to PVRC, each member should consider the benefit you are receiving from PVRC and its many opportunities for your personal growth in our wonderful hobby, then donate accordingly.

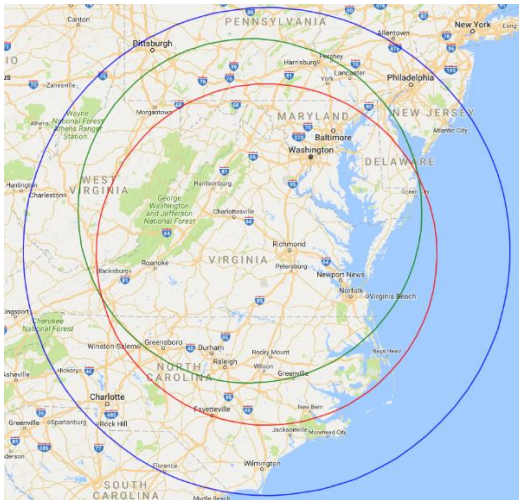
Direct donations to PVRC via Credit Card or PayPal may be made by clicking this "Donate" button and clicking the next Donate button that appears on your screen:



Donations to PVRC are not tax deductible

Eyeball QSO Directions

The latest info on local club meetings and get togethers will always be sent out on the [PVRC reflector](#) and posted on the PVRC [web site](#).



Green: ARRL VHF Circle
175 mile radius
Around 38.075N,
78.171W

Red: ARRL HF Circle
175 mile radius
Around 37.43168N,
77.858482W

Blue: CQ HF Circle
250 mile radius
Around 37.43168N,
77.858482W



Now a Word From Our Sponsors

PVRC doesn't ask for dues, but the Club does have expenses. You can also support the Club by buying from the firms listed who advertise in the newsletter!



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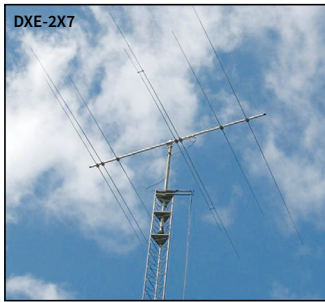

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BHD-DSPKR



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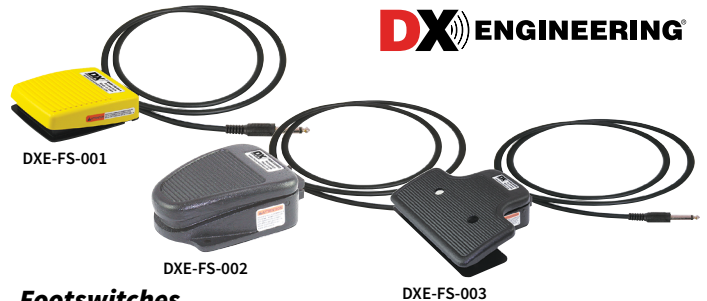


HPY-4STACKII-N

HPY-AS-62

Hamplus

Hamplus makes innovative RF and control switching components tailored to the Amateur Radio community. The Hamplus line includes rotator switches, smart control consoles, and antenna switches that can read data from the radio and memorize antenna selections. DX and contest stations worldwide depend on Hamplus for proven results. In an exclusive arrangement, North American operators can enjoy the same advantage by ordering Hamplus products through DX Engineering. Enter "Hamplus" at DXEngineering.com for the full story.



DXE-FS-001

DXE-FS-002

DXE-FS-003

Footswitches

Go hands-free and speed up your operating. These rugged PTT footswitches from DX Engineering blend performance and value. You have three options: a budget-friendly plastic model, the stalwart cast iron version, and the extra-wide pedal footswitch—perfect for enthusiastic stomps.

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DXE-FS-002...\$79.99

DXE-FS-003...\$109.99



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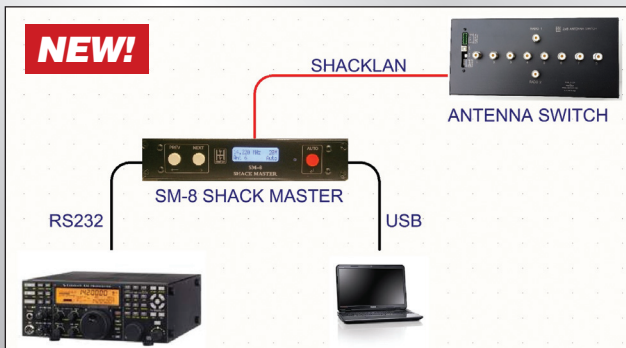
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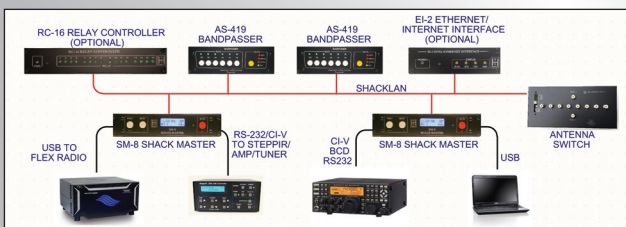
Hamation Station Automation

Hamation remote and Local Station Control products allow you to automatically or manually select antennas, bandpass filters, and control accessories. Accessories can be StackMatches, Antenna switches, antenna phasing systems, SteppIR controller, turning radios on and off, etc. All of this can be done directly from the Ethernet as well!

Wiring are simple phone cables that daisy chains to all the devices. Wireless control is also available to your tower located switches. Call us to learn how to set up simple or complex systems. Below is a simple basic system that can switch antennas as you change bands. We can interface to any radio CAT port, not just RS232.



A more complex system could be a SO2R contest station as shown.



JK Antennas Are Now Sold by Array Solutions

High Quality HF Antennas for the Contester and DXER. We Focus on Quality and it Shows in Everything We Do. Call or email for antenna systems.



RatPack Remote Antenna Switch

Six antenna remote switch with rotary switch controller. Push button controllers available. HF and 50 MHz. Power rating 5 kW CW.

PowerMaster II



RF Power and SWR meter. Couplers for 3 kW, 10 kW or higher available for HF/6 m. VHF and UHF couplers for 1.5 kW. You can connect up to 5 couplers to the display to monitor RF power on different TX lines.

StackMatch

The original, not the imitations. For phasing 2, 3, 4 and even 6 antennas. Also it can be used to combine vertical and horizontal polarized antennas to diminish fading.



OM Power Amplifiers, The New RF Power Benchmark!



OM Power Amplifier Sales Program

Lower prices than the competition's equivalents, most modern design, and strongest warranty in the market!



OM10C amplifier combiner

The automatic amps can drive an antenna switch of up to 10 antennas and select up to ten bandpass filters applies to all automatic models

OM4000HF	Manual 160-10 m 4 kW
OM4000A	Automatic 160-10 m 4 kW
OM4000HF MARS	MARS and Commercial HF
OM2500HF	Manual 160-10 m 2.5 kW
OM2500A	Automatic 160-10 m 2.5 kW
OM2000+	Manual 160-6 m 2 kW
OM2000+ MARS	MARS and Commercial HF
OM2000A+	Automatic 160-6 m 2 kW
OM10C Combiner	Combiner for two OM amplifiers
OM10C 4000HF MARS	Two OM4000HF manual tuned amps and combiner package
OM10C 4000A MARS	Two OM4000A automatic tuned amps and combiner package

OM4000A - OM4000HF OM2500A - OM2500HF

The A-series are automatic band change amplifiers.

The HF-series are manual band change and tuning amplifiers.

OM4000: 4 kW SSB and CW, 3 kW RTTY, AM and FM

OM2500: 2.5 kW SSB and CW, 2 kW RTTY, AM and FM

OM2000A+ - OM2000+

The **OM2000A+** is the lightest and smallest 2000 W fully automatic HF/6 m power amplifier in the market. Its manual tuning version, the **OM2000+**, is our affordable unmatched best-seller.

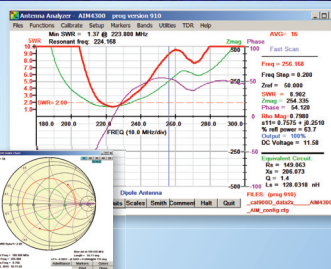
Frequency coverage:

Amateur bands 1.8 - 29.7 MHz including WARC + 50 MHz

Power output: 2000+ W in SSB/CW on HF bands, 1500 W in RTTY
1500 W CW/SSB on 50 MHz



Laboratory Grade Antenna and Vector Network Analyzers



One Port Analyzers and Two Port Vector Network Analyzers ranging from 5 kHz up to 1 GHz

AIM 4300	\$599
VNA UHF	\$1,295

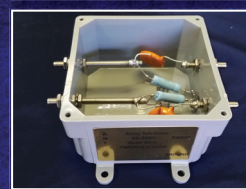
Surge Arrestors

AS-302, AS-303 Coaxial cable arrestors. DC to 500 MHz. N-type or SO-239 connectors. **AS-300SB** Stacking fixture available. **AS-309H**, ladder line arrestor. All have static bleed function. **AS-8SP, AS-12SP** and **AS-16SP** control cable arrestors. Protect your rotator's and other control cables.



Baluns & RF Transformers

Ratios 1:1, 1:2, 2:1, 4:1 and more. RF line isolators. Ratings 3, 5, 10 kW+. Get the most out of your antenna by stopping the coaxial cable from becoming part of it.



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Array Solutions' products are in use at top DX and Contest stations worldwide as well as commercial and governmental installations. We provide RF solutions to the DoD, FEMA, Emcomm, UN, WFO, FAA and the State Dept. for products and installation of antennas systems, antenna selection, filtering, switching and grounding. We also offer RF engineering and PE consulting services.

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All Mode Tri-Band Transceiver



IC-7300
HF Transceiver



IC-7100
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ID-5100A Deluxe
VHF/UHF Dual Band Digital Transceiver



ID-51A Plus2
VHF/UHF D-STAR Portable

KENWOOD



TS-590SG
HF/50MHz Transceiver



TM-D710G
2M/440 Dualband



TM-V71A
2M/440 DualBand



TM-281A
2 Mtr Mobile



TH-D74A
2M/220/440 HT

YAESU
The radio



FT-991A
HF/VHF/UHF Transceiver



FT-891
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FT-450D
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