

PVRC Newsletter

July 2018

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 – Bud W3LL

Hello, PVRC - Thanks to Frank's 33rd W3LPL Open House - we all had a fun time of it. The weather was perfect.

At the PVRC W3LPL meeting I had the pleasure of presenting our Newsletter editor John K3TN with the 2017 President's Distinguished Service Award plaque for outstanding support to the Potomac Valley Radio Club. Well done John!!!

July marks the beginning of a new 5M contest year. So now is a good time to revisit the 2017 5M calendar with emphasis on Club Competition wins - and losses:

- NAQP: We lost to SMC, but a very close 2nd place finish.
- ARRL RTTY RU: We achieved the #1 Club position with enough participants to be in the big league Unlimited category.
- ARRL Jan VHF: A not bad 2nd Place finish in the Medium category.
- CQ 160: This was a big win with a First place USA finish!!!
- CQ WPX RTTY: Another big First place USA win!!!
- ARRL DX: 3rd place behind FRC and YCCC. This is always tough for us.
- Russian DX: ??? Clubs competition: only clubs represented by 5 or more stations will be awarded.
- WPX (CW+SSB): First place!!!
- ARRL June VHF: 2nd place in the big time Unlimited category!!!
- CQ VHF: First place!
- WAE: Not yet published
- ARRL September VHF: 3rd place Medium
- CQWW RTTY: First place! NCCC a very close second!
- CQWW (CW+SSB): Third place (of course!)
- ARRL SS: Won by large margin!
- ARRL 160M: First place (FRC, SMC, YCCC all close behind)
- ARRL 10M: First place

We are truly a world class contest club as attested to by the above results. Nine first place finishes!!!

All of you are winners. None of this could be achieved without your dedication and perseverance in contributing to PVRC. Thanks on behalf of everyone!!!

For those wanting to improve their score contribution with more BIC, join us and our major competitors using the Online Scoreboards. Here's how:

- Go [here](#) for instructions on how to use it with N1MM:
- Change the N1MM broadcast entry to <http://www.b41h.net/scoredistributor.php>
- Go [here](#) for instructions on how to use the scoreboard
- You can view scores [here](#) and [here](#).

Looking forward is the IARU contest on 14 July. It's the vehicle for WRTC 2018. Among the players and referees are PVRC'rs AA4NC, KE3X, KD4D, N4YDU, N3KS, KU1CW (out-of-area) and NN3W. Cheer everyone on with your participation.

The W3AO Field Day is a big PVRC/CARA joint event. This year I returned to the overnight digital position. If you've never been it's a breathtaking experience.

On 15 September we'll have our choice of Fowl or Pig. Choose either the NCDXA/PVRC Fowlfest or the circle wide NR4M Pig Fest at the goat farm. See the PVRC [homepage](#) for more information.

In September we'll have nominations for PVRC elected officials. Officers are constrained to a count of five with winner take all. Trustees are not so constrained. The limit is the size of our membership. We'll grow the number of trustees to where it includes most if not all members holding the PVRC trustee title. At that time we may remove the trustee title as synonymous with membership. Think about it.

Now to the best part of this column:

Sports Pages 6/18

Well, it had been a while since the last 5M contest back in March when WPX CW rolled around. There was a great PVRC turnout for this one, and those who showed up were rewarded with some very good conditions. As WX3B said, 20M was the best it's been "in a long time" and K3ZO said "You'll never hear EU signals stronger than that." 40M was also very productive with even stations with simple antennas doing well during the EU openings.

On the down side, some areas saw a lot of thunderstorm activity and lost some time due to the need to shut down for a while. At NR4M, they lost a good six hours and Steve reported the disconnected coaxes snapping due to static discharge. NG3K (at N3DPB) also lost some time. Congratulations to the team at NR4M for the apparent #1 US M/M score. Multi-two operations in PVRC included NG3K (at N3DPB), reporting a big improvement over last year and the team at K3CCR. M/S HP operations included a less than full time effort at W3LL and a 25-hour father-in-law/son-in-law effort at N4CW. Team VP5M took the top spot in M/S LP with 2799 QSO for 8.4M. In SO (A) AB HP, congrats to N3QE, who made his 5M point goal in the last few minutes of the contest as he scored a top-10 finish (and crushing the US TB/Wires overlay) – with only a single wire antenna! Also, in that category, AA3S put up a good score at 1084/1.7M, and K3WI

and N4ZR did well with only Carolina Windoms, putting up 853/1.4M and 686/1.1M respectively.

N3HEE and AC3U (W3UL op) made good showings in SO (A) AB QRP with N3HEE doing a remote operation from a family vacation in SC. In SOAB HP, KP2M (KT3Y op) in the first post-hurricane operation with one tower from KP2M took the #3 world spot with 3728/13.6M. NY4A (N4AF) and NR3X (N4YDU) had top-10 US finishes in this category, and K3ZO (1751/4.7M) and WJ9B (2052/4M) also had big scores. Congratulations to K4HQK who put in a nice effort in this category using limited wire and vertical antennas from his almost urban location for 500/423K. In SOAB LP, NN3U (N9NB) took the #1 US spot using his newly expanded station capability and the first full time effort in a 48 hour contest in a long time with 1877/3.9M. N8II also had a top 10 US finish in SOAB LP and K4ORD put up a nice score of 667K, not far out of the top ten. In the hard luck category, W4VIC had a good time and scored 410/368K with a broken SteppIR and family commitments. KE3X and KD4D used the contest to do an equipment shakedown for their upcoming appearance in WRTC 2018. W4GDG, K4FTO and WA2VQV get credit for showing up and playing with indoor antennas.

The ARRL June VHF Contest featured some pretty darn good propagation on 6M in PVRC land. On Saturday, the openings were more limited, but there was a good opening to FL and some Caribbean and Central American stations were worked. Sunday? Oh, my – there were openings at one time or another all over the US map, including some nice double hops. This was also the first June VHF contest with FT8 widely available and used. There were a lot of growing pains with that.

Team W3SO, with many PVRC operators, was in shakedown mode after replacing all the station computers and making the switch to N1MM. They also had some trouble with the 222 station. Given all that, it went pretty well, and they appear to have finished third overall in Limited Multiop HP. The six-meter openings from FM00 may not have been quite as good as in further east and south PVRC land, but they still logged 159 grids. WA3EKL (LP) and W3RFC (HP) were two Multiop entrants, posting 123/57 for 7K and 330/136 for 51K, respectively. In SOHP, K3MEC (ND3F) was in the top 10 with 600/212 for 149K. W3IP (who worked 14 new grids on 6M), K3ZO and N3HBX were lined up in places 11, 12 and 13 with close scores of 128K, 119K and 118K. K3AJ was also in that tier with 465/172 for 80K. W3LL with 58K, N3XF with 33K and N3OC with 16K also had good scores.

In SOLP, W3EKT is in the top 10 with 258/120 for 40K, operating on 9 bands with “small antennas surrounded by wet trees.” Ed was followed by N4YDU with 225/102 for 23K, N9NB (W4FS) with 185/108 for 20K, N8II with 175/74 for 13K and WB2ZAB with 151/78 for 11K. N4MM is in second in SO 3B HP with 152/72 for 11K and K5VIP scored nicely in SO 3B LP with 180/97 for 17K. If you have seen the detailed report posted to the reflector, then you also know that 21 PVRC members competed for the “PVRC Pipe” awards by operating on 6M with various classes of makeshift antennas. It is amazing what can be done with an HF antenna or a dipole! There were 21 PVRC stations operating that way and they made just under 1,000 QSO – including some for whom this was their first ever VHF contest.

Finally, several PVRC'ers enjoyed some remarkably good openings (considering the sunspot cycle) to Asia on 20 and 40 during the recent All Asian DX Contest – CW. K3ZO had the top PVRC score with 288 QSO for 43K in SOHP. K7SV went LP and made 77

QSO for 4K. Out of circle PVRC member WJ9B made an outstanding showing in SOSB 40 HP with 486 QSO for 58K. N3AM made 76 QSO for 4K and N4UEZ (@K5EK) made 38 QSO for 1K.

That's it for another month. 73, Bud W3LL

<u>PVRC Officers:</u>		<u>Trustees:</u>
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		W3IKN, W4KFT

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Photos from W3LPL Open House – John K3TN



Jim N3JT and George N3GB (soon /4)

Mike W3IP, Jim N3KTV, Brian N3OC, Pat K000

Bouncing Your Signal Off the Moon - Jim AB3CV

Here's some information on how to get your feet wet with 6m EME (aka Moonbounce, as in Earth-Moon_earth). Why do I play with EME on 6m? First, it is something new to do with little additional cost. The second is it gives me a way to get additional entities on 6m that I might not ever otherwise achieve. Note that after you're successful with EME everywhere on the earth becomes the same distance away i.e. a 480,000-mile roundtrip. The only limits become geometry (you both need to see the moon with your antennas at the same time) and propagation.

I don't claim to be an expert on 6m EME, but I have a little experience to share. So far, I've made 3 DX contacts on EME all with JA at my moonset. Most of what I know came from W7GJ's excellent [website](#).

The first thing to figure out is whether you can hear well enough. Note that by "hear" I mean that the software can decode the signal. I doubt the signals will ever be audible with a simple setup. Signals bouncing off the moon are very faint, and you can't afford to waste any of that precious signal you receive. I doubt you'll have success with less than a 5 element Yagi.

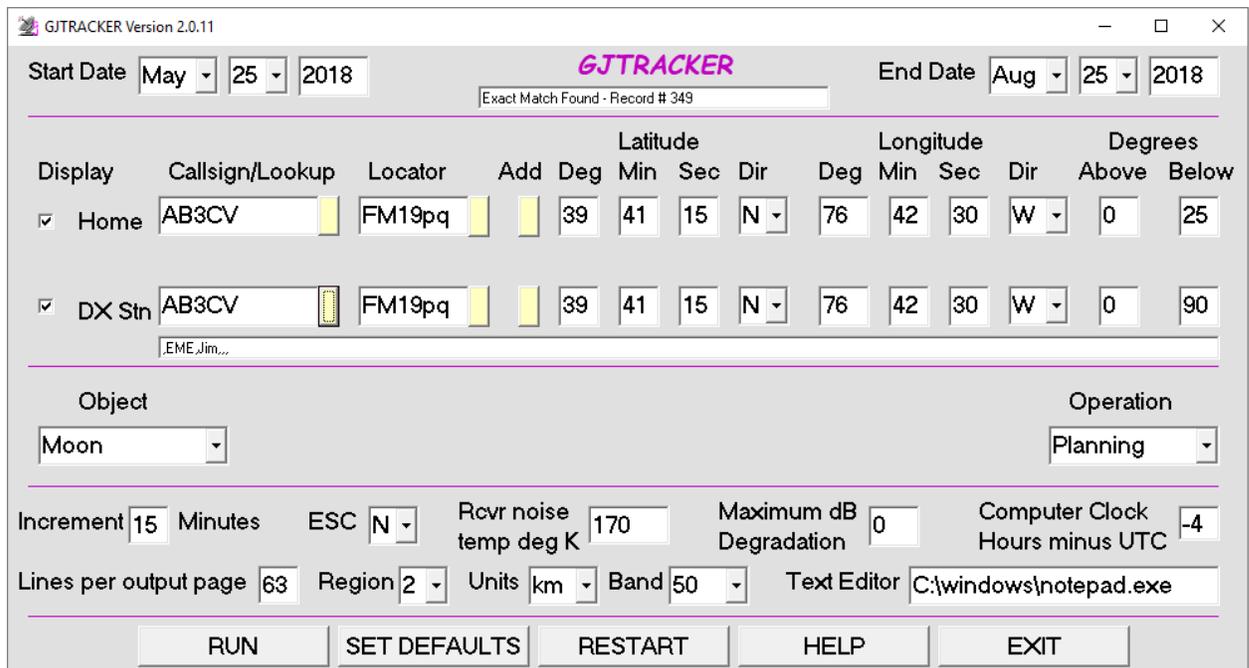
Here's a picture of my antenna setup. It's a 6M7 a few feet above my DB18e turned by a Alfaspid RAK1 and up 65 feet on an AB621. Note that it is rather buried in the woods, but I've found little impact of vegetation on signals. You can make out the two 7/8" hardlines along the tower. The DB18e is retracted when using the 6M7 on 6m.



Once you have a sufficient antenna there are two primary ways to get a good 6m signal to noise ratio. The first is to have total feedline losses below 1db. There are several online coax calculators which can tell you what to expect with your feedline on 6m. A good one is [here](#). Most of the 250ft of feedline between my shack and my antenna is 7/8" hardline which works for me. Even with this however it requires a very quiet receiver. In my case the Elecraft K3s with its built-in preamp does the job.

The second way is to put a mast-mounted low noise preamp at your antenna feed point to boost the signal to overcome the feedline loss. Keep in mind that the preamp will need to be isolated very well during your transmission to avoid blowing it out since you'll be using at least 500w to be heard. I don't have any experience with this approach but I'm sure other PVRC members who contest at VHF/UHF can help.

Once your receive ability is set you need to figure out when propagation will be good. EME conditions are somewhat predictable. If there is E-skip then you won't be able to get your signal past the E layer, so those times are not good. The other factor is the location of moon with respect to the background radiation from the sky as well as the distance from moon to earth. The easiest way to find the best times is to use a program written by W7GJ called GJTracker which you can find [here](#).



You'll need to enter your station location and other easy information. For ease of getting some quick info just put in yourself as the DX station as well. One of the parameters you'll need to put into the program is how high you think you can see the moon over your moonrise or moonset horizon. It turns out that the lobes from your 6M antenna may well give you usable signals up to 25 degrees even though your antenna is pointed at the horizon. So, set the Above value to zero and the Below value to 25. You'll want to set the DX station value to 0 and 90 since they'll likely have full elevation ability.

Put in a range of days, perhaps 3 months' worth, by setting the Start and End dates and see when the degradation (DGRD) is lowest by selecting the Planning option. The

degradation is a function of how far the moon is from the earth in its orbit and where it is relative to potential background noise sources in our galaxy. Days when DGRD is around 2db or less is a great place to start.

JUN 16,2018		39 ° 41' 15" N		MOON POSITION				RANGE: 361,423 KM		
SATURDAY		76 ° 42' 30" W		(PREPARED BY GJTRACKER)				P +2 DAYS 16.53'SD		
JD: 2458285.5		AB3CV NOTES: ,EME,Jim,,,								
DX: . KM		(AB3CV in FM19pq)		(AB3CV in FM19pq)		APPROX 50 MHZ DB				
UTC	NOTES	W	AZIMUTH	ELEV	DEC	AZIMUTH	ELEV	POL	SKY °K	DEGRADATION
=====	=====	=	=====	=====	=====	=====	=====	=====	=====	=====
0015		A	276.2	23.9	18.5	276.2	23.9	0	4400	1.7
0030		A	278.3	21.1	18.5	278.3	21.1	0	4365	1.7
0045			280.4	18.4	18.5	280.4	18.4	0	4348	1.7
0100			282.5	15.6	18.4	282.5	15.6	0	4313	1.6
0115			284.6	12.9	18.4	284.6	12.9	0	4279	1.6
0130			286.8	10.2	18.4	286.8	10.2	0	4261	1.6
0145			288.9	7.6	18.4	288.9	7.6	0	4226	1.6
0200			291.1	5.0	18.3	291.1	5.0	0	4192	1.5
0215			293.3	2.4	18.3	293.3	2.4	0	4157	1.5
1300			67.4	1.8	18.4	67.4	1.8	0	3583	0.9
1315			69.6	4.4	18.4	69.6	4.4	0	3565	0.9
1330			71.8	7.0	18.4	71.8	7.0	0	3565	0.9
1345			74.0	9.6	18.4	74.0	9.6	0	3548	0.9

The above is a snip of the full planning output which shows Saturday Jun 16 to be excellent. You can also see that the moon is only above the horizon and below the set 25 degree limit for about 2 hours.

Next, you'll need some computer software to decode the EME signals which use JT65A encoding. Many of you are probably already playing with FT8, and JT65A is another mode in the same WSJT-x package. It is quite different in operation however, so you really need to read the manual section for JT65 and do the practice examples.

It's beyond the scope of this article to do a WSJT primer so read the manual and practice. If you have questions you can always call me. We can use TeamViewer to make it easier to work on the software together.

A word of caution: WSJT-x doesn't yet have all the features for EME that its predecessor, WSJT-10, had. I personally find WSJT-10 to be much more moon friendly. If you find that WSJT-x doesn't produce results for you go ahead and load WSJT-10 to use. The two programs don't share anything so nothing in your WSJT-x setup will be affected. Of course, don't try to run them both at the same time. Both WSJT-x and WSJT-10 can be found [here](#). WSJT-10 has its own user guide and examples so do those if you're planning to use it.

Also note that as the moon rises or sets it changes location in azimuth. So, you'll need to rotate your antenna periodically to track that movement. Accuracy isn't terribly important since your beam width is pretty wide compared to what's needed. If you're lazy like me [PSTRotator](#) will control your rotator to track the moon for you.

Once you've played with the software to gain some confidence, you'll need to find others to work. The best way to find that out is to go to the [ON4KST site](#) on days when good conditions are expected and sign into the EME chat page. When conditions are good for 6M EME you'll find hams working each other off the moon which will give you a chance to listen in. I've found everyone there eager to help new EME stations.

Make yourself known at ON4KST and see if someone is willing to send some signals to the moon when it is above your horizon between 5 and 25 degrees. The frequencies that folks are working are announced there and most contacts are made by schedule rather than CQ since the signals are so faint. The frequencies in use are usually 50.200 plus or minus a few Khz.

The big guns can elevate their antennas to follow the moon above their horizon and often have an array of four 7 element Yagis fed by a KW or more. This will allow them to illuminate the moon to compensate for your own lack of ability to elevate. Their huge antenna gain advantage will help to overcome your station limitations.

Note that local noise can play a big part in your ability to hear. I've worked 3 big guns from JA yet I can't hear any EU big guns at my moonrise due to much higher local noise to my east. However, all the big guns found my signals to be easy copy. So, if you can't hear EU at your moonrise give some JA signals at moonset a try. Note that there are many more big guns to our east than in AS. My first JA contact was with 500w and a M2inc 6M5 so I know it can be done at least when your partner station is a big gun.

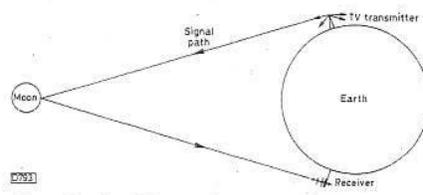
If you find that you can decode signals you've done the hard part! The transmit part is easy by comparison. You just need to be able to transmit at 500w or greater continuously for 48 seconds then listen for 72 seconds for your partner before sending again. Just as in FT8 the software does all the timing. Also just like FT8 it is important to have your clock set properly on the PC. Unlike FT8 however you need to be actively involved in discerning the decoded signals validity by checking the quality and the delay time (DT) of the signal. A signal delayed by about 2.5 seconds indicates an EME round trip!

By the way, if you decode a signal with a very short delay like 0.2 seconds you're likely just getting a terrestrial path. This is not uncommon when working non-DX big guns.

6M EME using JT65 can take quite a while to complete a QSO if you're not both big guns. I find that 2 QSOs a night is about all I've been able to do before the moon moves beyond my elevation limits or the horizon.

I highly recommend visiting W7GJ and see all the information available there.

If any would like some help with 6m EME drop me an [email](#) and I'll be happy to do so.



WPX CW 2018 @W3LL



Jack W3KX and Bob ND3D during a shift change.



Jack W3KX running 'em at W3LL.

Cushcraft 40M Yagi Antenna Repair at N3JT – Jim N3JT

Antenna problems so often begin as intermittent anomalies that can be explained by other possibilities. You hope they'll just go away, especially when you're operating remotely from 1,000 miles away! Maybe it's only ice, or maybe moisture somewhere. Sometimes it is, after all.



In late winter I experienced high SWR when using my 40m beam, a Cushcraft 40-2CD that has been up for some 17 years at the current location in McLean, Virginia – and was up for a few years in Arlington, Virginia before that. I had installed the W6QHS modifications to stiffen the elements and used rivets at all element-to-element junctions, in addition to the stainless hose clamps supplied by Cushcraft.

The intermittent SWR would seem to go away if I went to another band for a while, suggesting the possibility of a Top Ten band switching relay problem at the tower. But the intermittency became more common so by the time we returned to Virginia from Florida it was occurring nearly every time I operated. On several occasions during CWT sessions the high SWR prevented me from responding with my report. Then the intermittency transmogrified into a permanent failure.

In the meantime, we had new carpeting installed in the shack to repair damage from a frozen heating pipe in January. (Hint: It's no fun to be called by a neighbor at 7 a.m. advising of an inch of ice on his driveway and water flowing from our house wall, all 1,000 miles away from where we were in Florida for the winter!) I had to completely disassemble the station, which itself took 2 days. (Yes, I finally found my favorite pliers.) And then I had to reassemble it, though at least I had labeled every single cable, which in the end paid off given there were many times when I was not sure what cable went where. Remember, the station is set up for remote operation using Remote Rig boxes so the interconnections are complex. In the end, all who have seen the station agree it is neater now than it has been in many years, with cables now mostly hidden rather than running across the front of the operating desk. All this is relevant to the SWR problem, as you'll soon see.

My 70-foot SSV (self-supporting) tower has a Skyhawk tribander at the bottom of the mast, a Cushcraft WARC beam above that and at the very top the 2-element 40 m beam. The 40m beam now resonated (using MFJ-259B) at 7.9 MHz, suggesting an open connection – perhaps at one of the coils. I also noticed that the driven element of the WARC beam was swinging laterally in high winds, so there was lots of work to be done. There was a time when I climbed towers, and I still might to put up a wire or the like, but I would never attempt this kind of job, one that required removing beams, rotator, etc. A good friend of mine, AA4JJ, had just used AA1K (Jon) to assist with installation of an antenna. Based on his availability I asked Jon to see what he could do.



It took the better part of a day to get the 40m beam to the ground for inspection. I served as ground crew, which at times was serious work hauling antennas up and down with ropes. The other two antennas had to be lowered to the top of the tower and lashed sideways to make room for the 40m beam to be lowered. And then there are the nearby trees, the house roof, etc. But Jon (with some rope help from me) managed it skillfully.



On the ground, we saw immediately what was wrong with the 40 m beam. It was what we had expected! At the end of one of the driven-element coils a stainless sheet metal screw that held the coil wire in place had loosened enough to cause a high-resistance joint. It was in plastic shrink wrap but apparently over time came loose. With high power there was arcing and scorching, quite evident once the antenna was on the ground. See the photo.

Based on an article by W1WEF, I had prepared for this possible connection failure by ordering a box of 8-32 1-1/4" stainless bolts and Nylock washers. To be safe, I also ordered two replacement 40 m coils from Cushcraft (which I later returned). We drilled holes for the bolts at each of the 8 coil connection points and installed the bolts. We covered the connection points with rubber tape and then with regular electrical tape. We also ran a new coaxial cable feedline, including a new RF choke and feed pigtails. Interestingly, one of the old pigtails was nearly broken in two pieces. Both pigtails had been soldered end to end, and the effects of weather and motion had flexed the solid twisted braid conductor too many times. For this repair we used coaxial cable braid for the lengths of pigtail needed for both center and outer conductors, but we did not solder them, to allow for flexing. We wrapped them with rubber and electrical tape.

The WARC beam was repaired by tightening loose hardware, all the antennas were restored to their positions on the tower and the new feedline was attached to the relay box near the base of the tower. But I still had high SWR on 40 m in the shack!

The analyzer showed a great SWR curve for the antenna but it was apparent the 40 m relay at the tower was not being activated. What could be wrong? Recall the carpet repair and disassembly of the station? Be sure that any loose, poorly soldered or otherwise sloppy wiring will express its presence by failing when reinstalled. With troubleshooting advice from N3RD (Dave), I found a bad wire connection on the J2 plug of the Top Ten decoder in the shack. Once that was fixed the 40 m antenna was like new in performance.

I have talked to a number of other Cushcraft 40 m beam owners (new model and old because the coils are the same in both) who have experienced similar failures. Were I to consider installing such an antenna anew I'd definitely install the stainless bolts at the coils to prevent ultimate failure of the sheet metal screws. It's a fantastic antenna but it's neither fun nor inexpensive to repair a bad coil connection on the top antenna on a tower!

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](#).

Editor's Last Word – John K3TN

The Newsletter will take its usual summer QRX and there will be no August issue. I will miss the IARU/WRTC contest this year – my XYL and I will be bicycling in the OH0 Aland Islands, and stopping by to visit with Jukka OH6LI.

Thanks to Jim AB3CV, Bob ND3D and Jim N3JT for submitting great content. As usual, send whatever you have to [jpescatore at aol dot com](mailto:jpescatore@aol.com) – pictures, IARU war stories, plans for improvement, whatever you got.

Upcoming Contests and Log Due Dates

Contests This Month

- July 1 – RAC Canada Day
- July 1 – DL DX RTTY
- July 8 – IARU HF
- **July 15 – NAQP RTTY**
- July 15 – CQ WW VHF

Logs Due This Month

- July 3 – SEANET
- July 18 – All Asian CW
- July 24 – Field Day

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

From the PVRC Treasurer – Tom K3AJ

PVRC has chosen not to implement an annual Dues requirement. We depend on the generosity of all of 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.

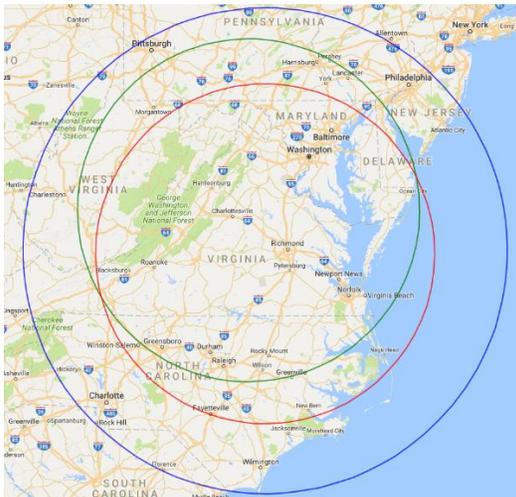
Direct donations to PVRC via Credit Card or PayPal may be made by clicking this "Donate" button and clicking the next Donate button that appears on your screen:



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



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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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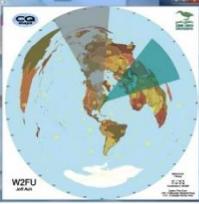
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- Great circle maps



GH Everyware Base and Remote

- USB and wireless relay controls
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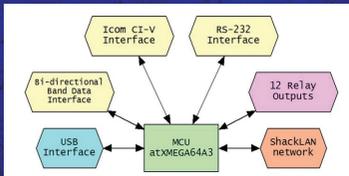
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The next generation of the popular BM-3 with direct USB support for FLEX Radios

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The BM-5 BandMaster V is a full featured unit that contains a universal band decoder and antenna switch controller. It features five communication channels. All channels are active simultaneously and provide data translation for your station accessories. In other words, if you are using an Icom radio on the CI/V interface the BandMaster V will output 4-bit band data as well as RS-232 data in Yaesu or Kenwood format. In reverse, when using a radio on the RS-232 interface the BandMaster V will output 4-bit band data as well as an Icom CI/V data stream. The USB interface may be connected to your PC for radio control. **The USB interface may be connected directly to a Flex SDR with no additional cables or interfaces required.**



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



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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.



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Two antenna switch, 12V DC via wires or optional via coax cable. DC to 150 MHz. HF 5 kW rating. Metal box.



Off-Center Fed Dipole Antenna

AS-OCF-2K, AS-OCF-5K Seven bands antenna (80 to 6 m). Heavy duty materials. 4:1 balun included. Ratings: 2 or 5 kW or higher available.



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OM2000+	Manual 160-6 m 2 kW
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OM Power was founded in 2004 as an initiative of two enthusiastic Slovak ham operators. Since that time OM Power has become a successful and well established company in the production of amplifiers. OM Power amplifiers can be found on all continents and in almost every country of the world. All of the amplifiers have state of the art design, and are solidly built.

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

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+

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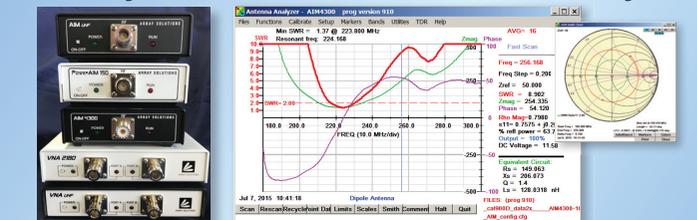
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IC-7200 | HF Transceiver

- 160-10M • 100W • Simple & tough with IF DSP • AGC Loop Management • Digital IF Filter • Digital Twin PBT • Digital Noise Reduction • Digital Noise Blanker • USB Port for PC Control



IC-PW1 | HF/50 MHz Amplifier

- Wide freq. coverage - 1 kW from 1.8 MHz to 50 MHz (amateur bands only) • Wide ALC adjustable range • Full duty cycle • Auto antenna tuner built-in • Auto AC input voltage selector is employed



IC-7851 | HF/50MHz Transceiver

- 1.2kHz "Optimum" roofing filter • New local oscillator design • Improved phase noise • Improved spectrum scope • Dual scope function • Enhanced mouse operation for spectrum scope



IC-7100 | All Mode Transceiver

- HF/50/144/430/440 MHz Multi-band, Multi-mode, IF DSP • D-STAR DV Mode (Digital Voice + Data) • Intuitive Touch Screen Interface • Built-in RTTY Functions



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

- Analog FM/D-Star DV Mode • SD Card Slot for Voice & Data Storage • 50W Output on VHF/UHF Bands • Integrated GPS Receiver • AM Airband Dualwatch



IC-7700 | HF/50MHz Transceiver

- The Contester's Rig • HF + 6m operation • +40dBm ultra high intercept point • IF DSP, user defined filters • 200W output power full duty cycle • Digital voice recorder



IC-718 | HF Transceiver

- 160-10M** • 100W • 12V operation • Simple to use • CW Keyer Built-in • One touch band switching • Direct frequency input • VOX Built-in • Band stacking register • IF shift • 101 memories



ID-4100A | VHF/UHF Dual Band Digital Xcvr

- Compact, Detachable Controller for Flexible Installation • DV/FM Near Repeater Search Function • Apps for iOS™ and Android™ devices • Wireless Operation with VS-3 & UT-137 Bluetooth® Headset & Module • MicroSD Card Slot



IC-7610 | HF/50 MHz All Mode Transceiver

- Large 7-inch color display with high resolution real-time spectrum scope and waterfall • Independent direct sampling receivers capable of receiving two bands/two modes simultaneously



IC-2300H | VHF FM Transceiver

- 65W RF Output Power • 4.5W Audio Output • MIL-STD 810 G Specifications • 207 alphanumeric Memory Channels • Built-in CTCSS/DTCS Encode/Decode • DMS



IC-V80 | HD 2 Meter FM Transceiver

- Tough construction • 750mW loud audio • Powerful 5.5W of output power • IP54 and MIL-STD-810 rugged construction • Built-in CTCSS/DTCS • WX channel & weather alert function



IC-7300 | HF/50MHz Transceiver

- RF Direct Sampling System • New "IP+" Function • Class Leading RMDR and Phase Noise Characteristics • 15 Discrete Band-Pass Filters • Built-In Automatic Antenna Tuner



IC-2730A | VHF/UHF Dual Band Transceiver

- VHF/VHF, UHF/UHF simultaneous receive • 50 watts of output on VHF and UHF • Optional VS-3 Bluetooth® headset • Easy-to-See large white backlight LCD • Controller attachment to the main Unit

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- RS-MS1A, free download Android™ application • New modes for extended D-STAR coverage • Terminal Mode & Access Point Mode allow D-STAR operation through Internet • DV & FM repeater search function • Dplus reflector link commands



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FTDX3000 | 100W HF + 6M Transceiver

- 100 Watt HF/6 Meters • Large and wide color LCD display • High Speed Spectrum Scope built-in • 32 bit high speed DSP /Down Conversion 1st IF



FT-991A | HF/VHF/UHF All Mode Transceiver

- Real-time Spectrum Scope with Automatic Scope Control • Multi-color waterfall display • State of the art 32-bit Digital Signal Processing System • 3kHz Roofing Filter for enhanced performance • 3.5 Inch Full Color TFT USB Capable • Internal Automatic Antenna Tuner • High Accuracy TCXO



FTDX1200 | 100W HF + 6M Transceiver

- Triple Conversion Receiver With 32-bit Floating Point DSP • 40 MHz 1st IF with selectable 3 kHz, 6kHz & 15 kHz Roofing Filters • Optional FFT-1 Supports AF-FFT Scope, RTTY/PSK31 Encode/Decode, CW Decode/Auto Zero-In • Full Color 4.3" TFT Display



FT-891 | HF+50 MHz All Mode Mobile Transceiver

- Rugged Construction in an Ultra Compact Body • Stable 100 Watt Output with Efficient Dual Internal Fans • 32-Bit IF DSP Provides Effective and Optimized QRM Rejection • Large Dot Matrix LCD Display with Quick Spectrum Scope • USB Port Allows Connection to a PC with a Single Cable • CAT Control, PTT/RTTY Control



FT-857D | Ultra Compact HF/VHF/UHF

- 100w HF/6M, 50W 2M, 20W UHF • DSP included • 32 color display • 200 mems • Detachable front panel (YSK-857 required)



FT-2980R | Heavy-Duty 80W 2M FM Transceiver

- Massive heatsink guarantees 80 watts of solid RF power • Loud 3 watts of audio output for noisy environments • Large 6 digit backlit LCD display for excellent visibility • 200 memory channels for serious users



FTM-100DR | C4FM FDMA/FM 144/430 MHz Xcvr

- Power Packed System Fusion Transceiver • High Audio Output Power • Rugged Powerful Transmitter • Integrated 66ch High Sensitivity GPS • 1200/9600 APRS Data Communications



FTM-400XD | 2M/440 Mobile

- Color display-green, blue, orange, purple, gray • GPS/APRS • Packet 1200/9600 bd ready • Spectrum scope • Bluetooth • MicroSD slot • 500 memory per band



FT-70DR C4FM/FM 144/430MHz Xcvr

- System Fusion Compatible • Large Front Speaker delivers 700 mW of Loud Audio Output • Automatic Mode Select detects C4FM or Fm Analog and Switches Accordingly • Huge 1,105 Channel Memory Capacity • External DC Jack for DC Supply and Battery Charging

FT-2DR C4FM/FM 144/430 MHz Xcvr

- Analog/C4FM Dual Monitor (V+V/U+U/V+U) • System Fusion compatible • 1200/9600 APRS Data Communications • Integrated 66ch High Sensitivity GPS • Wide Band Receiver • Snapshot Picture Taking Capability With Optional MH-85A11U



NEW

FT-65R | 144 MHz Transceiver

- Compact Commercial Grade Rugged Design • Large Front Speaker Delivers 1W of Powerful Clear Audio • 5 Watts of Reliable RF Power Within a compact Body • 3.5-Hour Rapid Charger Included • Large White LED Flash-light, Alarm and Quick Home Channel Access



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- V+V/V+U/U+U operation • Built-in GPS • Built-in TNC for APRS & DX-Cluster operation • 50W 2M & UHF • 1,000 memories • Dual receive • Green or amber backlight colors • Latest APRS firmware w/new features • Sky Command II remote functions

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TS-480SAT/HX | HF + 6M Transceiver

- 480HX 200W HF & 100W 6M (no tuner) • 480SAT 100W HF & 6M w/AT • Remotable w/front panel/speaker • DSP built-in

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TS-590SG | HF/50MHz Transceiver

- Equipped with 500 Hz/2.7 kHz roofing filter as standard • ALC derived from TS-990S eliminating spike issues • Antenna output function (shared with DRV connector) • CW - morse code decoder function • Improved 1st mixer • New PFB key with multi-function knob • New split function enabling quick setting • LED backlight with selectable color tone



TM-V71A | 2M/440 DualBand

- High RF output (50W) • Multiple Scan • Dual receive on same band (VxV, UxU) • Echolink® memory (auto dialer) • Echolink® Sysop mode for node terminal ops • Invertible front panel • Choice of green/amber for LCD panel • 104 code digital code squelch • "Five in One" programmable memory • 1000 multifunction memory

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TH-D72A 2M/440 HT w/extended RX

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- APRS w/built-in 1200/9600 TNC • Built-in GPS, Built-in USB, digipeater • Echolink® compatible, • Mil-Spec STD810

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TH-D74A M/220/440 HT w/D-STAR!

- D-STAR compatible • APRS ready w/built in GPS • Color weather station information • Built-in KISS mode TNC • High-performance DSP voice processing • Standard compatibility for Bluetooth

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TS-2000/2000X | HF/VHF/UHF Transceiver

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TM-281A | 2 Mtr Mobile

- 65 Watt • 200 Memories • CTCSS/DCS • Mil-Std specs • Hi-quality audio

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- 55' freestanding crank-up • Handles 18 sq. ft. @ 50 mph • No guying required • Extra-strength construction • Can add raising and motor drive accessory • Towers rated to EIA specifications • Other models available at great prices!



218XATC-PL-(length) RG8x (240UF) w/PL259 Connectors Each End.

Weather-Proof Heat Shrink Tubing.

- Stranded Center Conductor.
- 95% TC Braid + bonded 100% Foil Shield.
- Very Flexible, Light Weight, and Smaller than RG8 sizes.
- Non-Contaminating-UV Resistant-Direct Burial-Black Jacket.



233/2-G4-(length).

- Unique design (Nickel Grommets 4" Spacing) allows for easy attachment to a vehicle's body or truck bed to create a "ground-plane".
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This set of interfaces allows remote control of your Amateur Radio Station via Internet in a user-friendly and cost effective way! RemoteRig gives you control of the radio coupled with crystal clear TX & RX audio and sending CW with your own Paddle!

New! Now Stereo Version for Dual Receiver radios.

Works with all Computer-controllable radios from: **Alinco - Elecraft - ICOM - Kenwood - Yaesu**

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