



PVRC Newsletter

March 2019

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 – Tom K3AJ

Reflecting on the Reflector

One of the premier benefits of PVRC membership is access to the PVRC reflector. We use it to rally the PVRC troops before a contest to encourage our members to get on and to submit logs. Without doubt that results in more players, more logs and more PVRC club competition victories. The reflector is your go-to source for nearly instantaneous help and tech support. Post a question and - **BOOM** - the answer appears (heck – the answer is even right most of the time!). Looking for a good deal on some equipment or ready to part with something you no longer need? Most “FS” or “WTB” posts are very quickly followed by another post reporting “sold” or “got it.” Want to learn something new about propagation, antennas, software or anything related to the technical side of ham radio? Stand by for many an interesting post or link shared by your fellow PVRC'ers.

The after-contest results posts are often pure gems. We not only hear about how everybody did but also the back stories: the visits from Murphy, the personal life obstacles encountered, the things that were learned, new personal milestones achieved. The thrill of victory and the agony of defeat, so to speak. These stories provide a window into the person behind the score. By reading these posts over the years, you can learn a lot about your fellow PVRC'ers. The personalities behind the scores begin to take shape even if you have never met them.

The key to making all this happen is that our reflector is lightly moderated. Posts appear without prior review, so the discussion is fresh and timely. With that comes individual responsibility about what to post. While PVRC's focus is contesting, we also see useful posts about related ham radio topics such as DXing, local radio club happenings, ARRL news and FCC/regulatory issues that are of general interest. Our members use good judgement and seldom wander too far off topic.

We all also bear the individual responsibility of ensuring that our posts are courteous, professional and respectful of others. This applies not only to the obvious things like respecting differing personal values and beliefs, but also recognizing that ham radio is a diverse activity. Those who enjoy aspects of the hobby different from what we enjoy should not feel belittled by comments denigrating those activities. On the rare occasions when the discussion begins to get a little too far from these standards, our moderator

Eric, W3DQ will step in. It recently became necessary to remove the reflector privileges of a member who egregiously violated our standards. We regret that we had to do that but rest assured that we will take action when necessary.

If you are not already on the reflector, by all means subscribe and make use of it for all its worth! Take a few minutes to review the reflector [FAQ](#) on the web site – even those of us who are regulars on the reflector might learn a few things that are good to know .

73 and Go PVRC!
Tom, K3AJ

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Gene W3ZZ Nominated for CQ Contest Hall of Fame – Jay W3MMM



This year PVRC nominated Gene W3ZZ to the CQ Contest Hall of Fame. The chosen inductees will be announced at the May 18 Contest Dinner at the Dayton Hamvention. Our submission highlighted Gene’s accomplishments and impact; an amazing man of many talents who went above and beyond in our community. Be sure to cross your fingers, put on your rally cap, and hope really hard that Gene is chosen this year and takes his place in the Hall of Fame!

PVRC Novice Rig Roundup

In honor of the weeklong Novice Rig Roundup event that will be held from 2 March to 10 March (info [here](#)) PVRCers have sent in these nostalgic shots of what they and their shacks looked like way back when. Thanks to John N3AM for his expertise in cleaning up these photographic gems...



Here I am in front of my HT-40 and SX-99 circa 1966. Was I really making a contact? -
Mike W3IP, then WN4ACJ



This is my first amateur radio station. - **Ed KN4KL**



This is the Radio Club at White Plains High School (NY). It's from the 1958 yearbook, so I was a new General. I'm in the front row, second from the viewer's right (Teacher's side). **Dan K2YWE**



The shack pic was taken a year or so later. The local radio club photographer insisted on "at the mic" pictures for everyone. My bug can be seen on the right side. My novice rig was a DX-35 with an S-85 receiver. The Globe Scout was a replacement for the DX-35 which was stolen and the HQ-110 was bought a few months after I got my General ticket. - **Dan K2YWE**



My H&H station- Hallicrafters and Homebrew. The cardboard front panel and cigar box chassis was an RF monitor for my monitor signal. The Bud chassis on top of the S-85 was an adjustable audio filter. The coil on turret standoffs way off to the left was my alligator clip adjusted antenna tuner. My favorite band was 15M and my first DX was F2RL. March 6th will mark my the 57th year of being QRV! - **Sid K3SX**



My shack back in 1958, when I was KN1HTV in New Haven, CT. It included a DX20, an ARC5 receiver, and a Knight Kit Ocean Hopper regenerative receiver (\$15.95 plus \$2.40 for 4 plugin coils). I used it as an SWL to receiver over 100 countries. I rewound the 15-35 MHz coil and was surprised that I could copy the audio of European TV stations on frequencies just below 6M. That was back during the peak of solar cycle 19. The highest solar flux ever recorded, 285, occurred a few months before I received my Novice ticket. Little did we know that we were operating in what was the best solar cycle ever, never to be repeated in our lifetime. - **Rich K1HTV**



My KN1NIJ novice station, early 1960 photo. Eico 720 and Hallicrafters SX-100. On the left is my mentor K1LWS who is now Dr Victor Kaylarian, M.D., K0ARM. As a novice, those were my best times in ham radio. - **Dave W4JVN**



Here's a picture of me at my station in 2012. I'm the one in the white T shirt. My grandpa NE6AA is in the plaid. **Nick KK4ODQ**



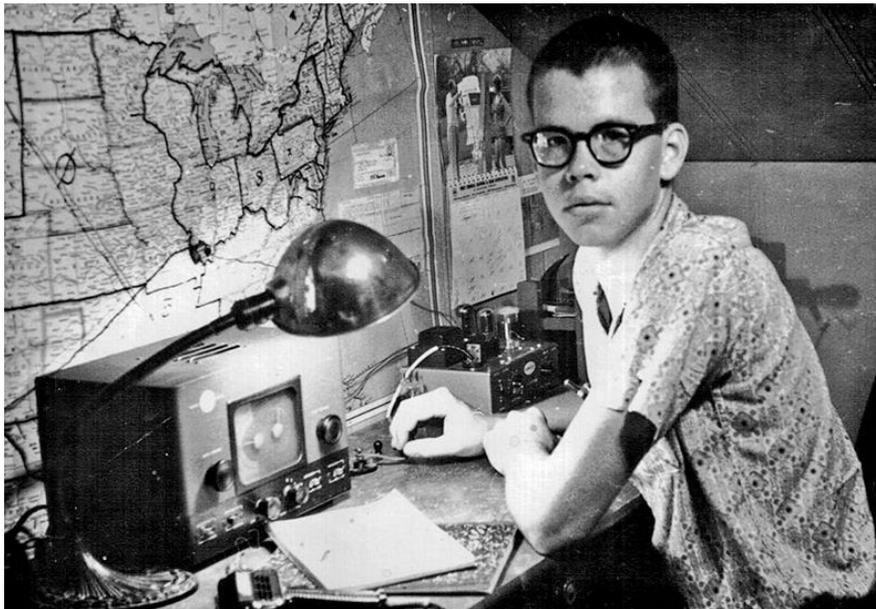
My first station after upgrading from KN3DML to General in 1959 as K3DML
Dick WN3R



KN5VRX circa 1959 in Tulsa at the pupster age of 13.- **Roger K5VRX**



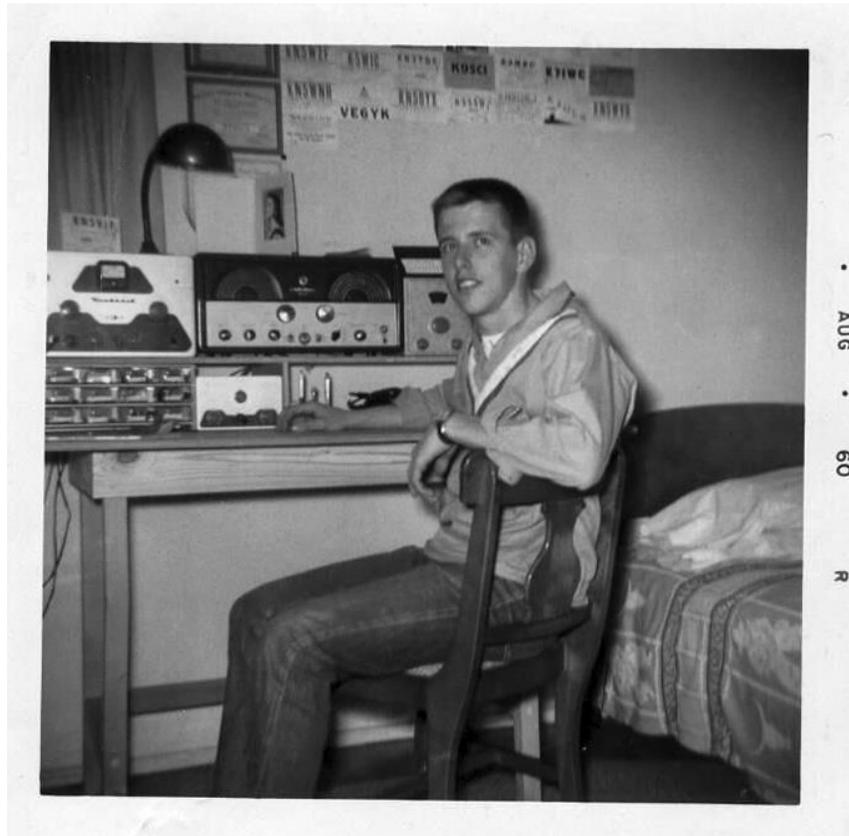
K3AJ as WN3HKF circa 1967. The Lafayette HA-230 RX was truly awful. The EICO 720 was a workhorse. The attic dipole that this was all connected to was marginal. **Tom K3AJ**



This is the first station I put together on a small desk in my teenage bedroom when I received my WN4HQW Novice class license in 1962. It had an Ameco AC-1 15W transmitter and my maternal grandfather's Hallicrafters S-41G "Skyrider Jr." receiver with a dial where the 80M band was only ½" wide! – **Mike N4CF**



HW-16!? Hah! That rig actually had a CW filter! DX-40 and HQ-129-X for me.
Mark K4SO



This photo was taken after I got my conditional license in 1960. It was my novice station except I added the VF-1 VFO. **Barry K5VIP**



Me, on the right, at Byrd station in Antarctica in 1963, providing many phone patches!
Arno W4AKO



Sadly, I never took any pictures of my WN2ADH novice station in my bedroom as a kid in Freeport NY, but my equipment was bought used at Harrison Radio in NYC and out of the ads in the back of QST. The transmitter was a Viking Challenger, xtal-bound CW/AM that chirped like crazy until I added an outboard dog food can electrolytic capacitor that thankfully never electrocuted any of our pets. The Hallicrafters SX-140 was probably the worst receiver ever sold, as a recent review in the QST antique radio section admitted! The TX antenna was a HyGain vertical and the RX antenna was a wire thrown on the roof of our house. I had no TR switch – that may have had something to do with why the SX-140 was so bad... **John K3TN**

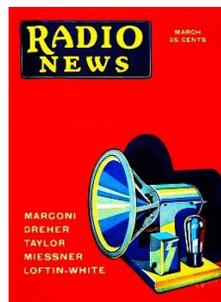


Brand new General, 1957, 19 years old in Texas, K5KBH and now K4XL. The gear is Hallicrafters Ht-18, Heath DX-100, Hallicrafters SX-96 and an RME DB-20 preselector. **Ken K4XL**

W3LL ARRL MultiSingle Operators in the ARRL DX CW – Bud W3LL



Bob ND3D on the left is relieved at 8 AM Saturday morning by Ted WA3AER at W3LL. Phil (Pip) WB4FDT takes over the Saturday night shift.



Microphone Equalizer Adjustments - Alan WA3EKL

Most modern-day radios have some type of band pass filtering for our microphones also known as equalization. This article is intended to allow you to get the most out of those equalizers for the particular microphone you have attached to your radio.

First, I want to give you some information, ask you some logical questions and attempt to get you to understand how I am approaching this subject and why. Just a quick background. I have been an Amateur Radio Operator for 55 years and listening to SSB for 55 years because SSB has been around just a little longer than that! I have grown up with, compressors, expanders, equalizers, and ALC circuits just to mention a few. For 32 years I worked in the engineering department for one of the major TV stations in Baltimore MD. Half of that time I did audio on commercials, newscasts, public service recordings etc. The head engineer held us to the highest quality of sound at all times, plus the 12 years I sat at Master Control I was monitoring the sound constantly for excellence. My blind uncle who taught in the School for the Blind and Deaf in Romney West Virginia and tuned pianos taught me how to hear very minute changes in pitch and how to listen for distortion. This is what I am going to attempt to teach you here in this article - how to hear and how to listen for distortion maybe in a way you have never heard of or tried before.

Since most of you reading this article are contesters I would like to make some statements, ask you some logical questions and ask you to leave emotions out of it. My wife of 40 years, N3DPB, and ham for 40 years said to me one day "if you alienate your audience they will never listen to you." Therefore, what I am about to say or propose is not meant to upset you but only to get you thinking. So here we go:

When you are running stations in an SSB contest what is the first station you respond to? Normally it is the loudest station. In time the louder stations go away and the crowd that is calling you seems to be all the same level. Now what station do you respond to? This is the question that may or may not upset you. Do you respond to the most rattiest signal to get him out of the way so you can hear the remaining stations or do you respond to the clearest signal that is understandable in the crowd? Personally, I respond to what I can understand.

With our modern day radios, we pinch down the audio to where the highs are accentuated, the lows are suppressed, the sound is compressed and expanded and then we run the ALC way up so we do not over drive the amps and cause distortion. Does this make sense? Really? There is a better way.

Now let us reverse the above situation. When you are trying to work that rare DX station or trying to hold a frequency who do you think that rare DX station is going to respond first? The ratty, high pitched, compressed, voice or the voice that is perfectly clear and one he or she can totally understand on the first call? If your answer is the clear sounding signal, then please read on.

I am going to attempt to teach you one method of how to adjust your equalizers and compression so that you will have the most punch in your voice with the least amount of distortion and as crystal-clear audio as you can get with your mic and your radio. Notice I said, "your mic and your radio" not "your mic and your voice." I have three different Heil

mics and one Shure mic on four different radios. Each radio's equalizer is adjusted for the mic that is on that radio. No matter who sits at what radio their voice is faithfully reproduced and transmitted. We have gotten many compliments on our voice quality with different people sitting at the same radio. Again, we want to adjust the mic to the radio, not the mic to the voice. This is an entirely different concept than what most of us are used to.

Every one of us has different voice characteristics - we each sound different. This is how we recognize each other in a crowd. If we adjust our equalizers correctly then when someone tunes across our signal they should be able to recognize us by our voice, provided they have not messed up their receive audio equalizers too much. Some of you will say my voice sounds crummy on the radio and I must equalize it. **Why?** How do you sound in real life? Is your voice high, low, bassy, squeaky? Is it different from the rest of us? If it is then you have an advantage over the rest of us in a pile up. Your voice is unique. If that unique voice is crystal clear with punch you will get through before the rest of us. Do you all see what I am talking about? Different is better but "crystal clear different" is what we are after.

To make these adjustments, first you need to learn how to hear. You need to listen to your own voice in another receiver or on your radio's monitor. You need to train your ear and brain to hear certain sounds for clarity then after you have learned that task you will then learn how to listen for distortion. As you begin to understand what distortion sounds like you will be able to adjust it out or reduce it to a minimal amount, not just a tolerable amount. For the musicians out there, this will be easy because most of us can easily detect 2% or less distortion. Most people don't notice distortion until it goes above 7% or more. For some of you this will take time. The CW ops will take less time learning how to hear because they are already conditioned to listening to narrow frequency segments of sound. That is part of the key to this process; starting to listen for narrow bandwidths of sound. So, let us start learning how to listen. Remember I said this is only one method.

The power in our voices is in the 300 to 800 Hz range. The clarity in our voices is in the 1500 to 3500 Hz range and the sibilance is in the 4000 to 5500 Hz range which adds some clarity and uniqueness to our voices. Our SSB band pass filters are about 2.7 to 2.8 KHz wide but the lower frequency range starts at about 300 Hz so the upper frequency range would be 3.100 KHZ. From this we can see that we can only adjust power and clarity but not sibilance because it is out of the range of our equalizers. The highest equalizer on my k3's is at 3.2 KHz which makes sense for what I have just shown you.

If we take certain letters in the alphabet and speak them out loud using Military phonetics we can learn much about clarity and distortion. Let us start with the letter "W." Say Whisky out loud in a strong voice a few times. Now go to the corner of a room, cup your ears with your hands and say it again out loud. Sound crazy? Yes, it does but it will sound different and clearer. Even if you are using hearing assistance this method will work. Listen for the first part of the word Whisky, the "wis" sound. Learn to hear it clearly. Do it over and over until it's burned in your brain. Next listen for the "key" part only concentrating on the "e." Now work on the letter "A" Alpha - the "pha" sound. The Pha sound is where the power in the voice will come in. The "wis" and "e" is where the clarity will come in. Try B, Bravo many times. Concentrate on "BRAV." There is a lot of air pressure here and too much gain in the mid-range will distort this sound yet you need enough gain here to have power or punch in your signal. Remember the lower tones

raise the overall average power level of your signal even though they don't carry a great amount of intelligence. Letters like K, Kilo can get you hearing the high clarity and the low punch at the same time. Letter O, Oscar, again the clarity in the "osc." It is a lower sound but still has the "wis" of whisky. Listen to your own voice with no radio first and critically hear and learn all these sounds.

Now turn on your radio. Put it into a dummy load. Flatten all your equalizers - turn them all to zero. Turn down and take out all compression. You want to hear only your pure voice. Turn the power output down to zero. Transmit and start listening to your own voice. Start with the lower letter tones first. Unless you are a basso any frequencies below about 200 Hz don't even adjust. Start on the next one up. Adjust it up or down and see if it makes a change in the sound of the letter you are saying phonetically. Remember some letters cover both high and lows. If it does then adjust that equalizer until you can detect even the smallest change in your voice. Now adjust that eq for the clearest sound of your voice on that letter. Do the same thing with the rest of the letters all the way up through the high end of the equalizers. Then go back and adjust them again rechecking to see if you can make your voice clearer. I have spent as much as 3 hours just doing this part, but I am an old audio man!

Now is the time to bring up the power a little. Look at an output meter. Start saying five five five into the mic and turn up the compression slowly. As you turn up the compression you will notice the overall power output average will begin to increase. Eventually turning up the compression will not yield more average power output. Take note of that compression setting. Now back down that setting two notches and write down that setting number.

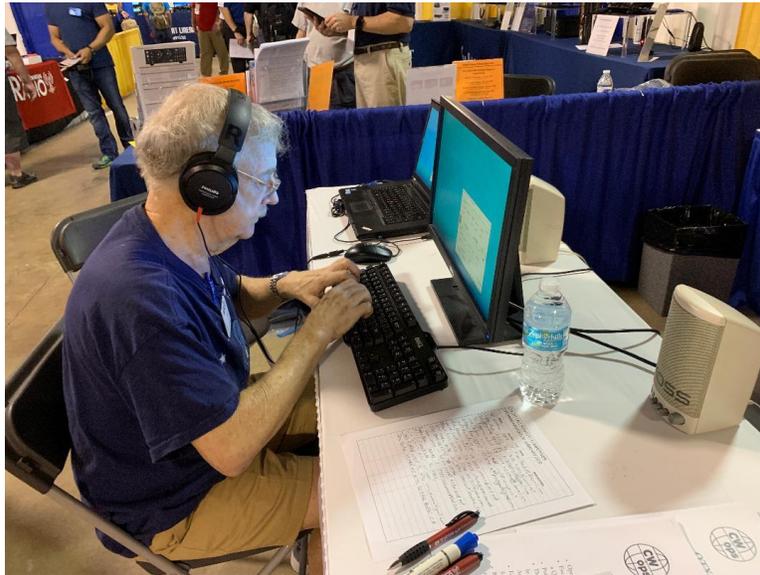
Turn your compression all the way back down again. If you don't follow what I tell you next you will not get the best clarity with the best punch. Please do it this way.

Start critically listening to your voice again using the same letters you did before. Leave the power setting up a little so you are putting some power into the dummy load. Turn up the compression just a little. **It will distort your voice.** Turn it up until you can hear the distortion. Learn what it sounds like. You don't sound like you anymore. When you clearly recognize what distortion sounds like then start backing down the compression until you can just hear it or just recognize it. Now go back and very carefully listen to your letters again. Very slowly adjust the eq for each letter and you will be able to adjust the distortion out but now you have a clear signal with a more punch. Do it again. Bring up the compression just a tad more and readjust the eq's. Keep doing this until you reach the compression setting you wrote down earlier. Now critically listen. How do you sound. Take the compression out and put it back in. Do you sound the same or almost exactly the same? If so run the power output up to full and try listening again with compression in and out. Slightly adjust if necessary.

Now write down your final eq settings for that mic. You don't want to have to go through this again!

(Editor's note: for you K3 users, there are a lot of software packages that make it easier to twiddle with the EQ settings than going thru the menu. If you are comfortable with Python software, AB3AP has a very cool (and free) implementation [here](#).)

Orlando HamCation Pictures – John N3AM



N3JT playing with RUFZ at the CW Ops booth



He's not a PVRcer but I thought K4RSV had an impressive Rover setup

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

- Mar 2 - **ARRL DX SSB**
- Mar 10 - NA Sprint RTTY
- Mar 16 – BARTG RTTY
- Mar 16 – Russian DX
- Mar 30 – WPX SSB

- Mar 8 – NAQP RTTY

Logs Due This Month

- Mar 10 - ARRL DX SSB
- Mar 17 – NA Sprint RTTY

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

Editor's Last Word – John K3TN

Thanks to the many PVRCers who sent in pictures of their first stations, and thanks to John N3AM for cleaning up many of the images. More thanks to Alan WA3EKL, John N3AM and Bud W3LL for other contributions to this issue.

My wife was away this past weekend, and the weather wasn't good for outdoor activities, so I spent the weekend either acting as a Renaissance Man contester or an attention deficit disorder contester: I made QSOs in the CW 160 SSB, NAQP RTTY, and CW QSOs in both the SC and NC QSO parties. High rate CW is about the only thing that really keeps my butt in the chair for these part-time kind of things, so I never spent more than 30 minutes or so at a time in any of them – but good to give out QSOs in all of these as they have many casual or part time contesters getting on the air. I've noticed that some of those calls will hang around and try multiple times to get through when I'm running in the contests I am serious about. Kind of a pay it forward deal...

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 [jpescatore at aol dot com](mailto:jpescatore@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.

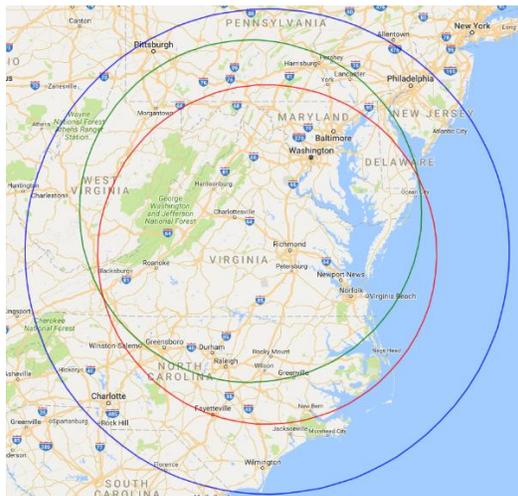
Direct donations to PVRC via Credit Card or PayPal may be made by clicking this "Donate" button and clicking the next Donate button that appears on your screen:



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

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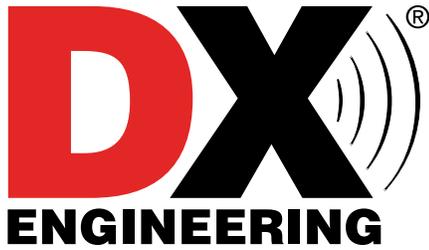


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Loop Antennas

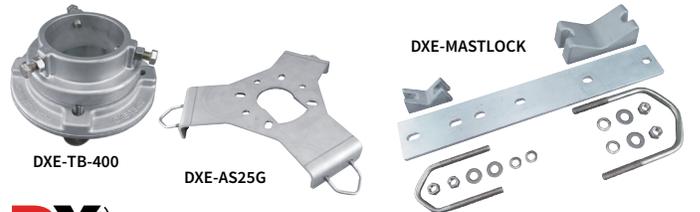
DX Engineering carries well-known Loop Antennas by I3VHF, manufactured by Italy's Ciro Mazzoni. The 78" diameter MIDI Loop covers 80 through 20 meters. The popular 39.8" diameter BABY Loop and the new Stealth Loop are perfect for working the 40 to 10 meter bands when you have limited space and don't want to bother your neighbors or HOA. The low-profile Stealth Loop features a typical SWR of 1.3:1 and requires no pole or installation. It measures 54" x 19.6" x 10.2", making it easy to hide on the ground or place on a balcony. Enter "MZZ" at DXEngineering.com for more information.



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Upgrade your towers with DX Engineering designed and manufactured accessories. These include Advanced Design Thrust Bearings (for 2" and 3" O.D. masts) that ensure smooth rotation and a reduced load on the rotator motor; Tower Accessory Shelves that take the hassle out of mounting rotators and thrust bearings; the Mastlock Tower Accessory, which locks your tower mast in position for simple rotator removal and worry-free antenna maintenance; and stainless steel Genius Clamps for mounting round tubing and pipe members perpendicular or parallel to each other. Enter "Tower Accessories" at DXEngineering.com for complete details.



DXE-SSGC-2P



Towers and Antennas

DX Engineering carries more than 60 elite directional Yagi and log cell Yagi antennas from OptiBeam, including the latest model—the OB10-5M-P. This 20/17/15/12/10 meter, 10-element Yagi has been extensively tested to deliver the highest possible gain and cleanest radiation patterns. System package includes balun, shipped separately.

DBO-OB10-5M-P...\$1,615.98

Hummelmasten's 29 foot Mini XL tower and antenna mast system features an ingenious crank-up two-tier carriage that mounts both a rotator and a mast bearing, or a stationary mast. Made from high-strength square tubular aluminum, the Mini XL is built to handle tough weather conditions and is a good choice for small- to medium-sized beams and VHF antenna use.

Mini XL Tower Packages...from \$2,385.00



Gator Rack Cases

Gator Cases makes virtually indestructible rack cases that are ideal for housing radios, power supplies, antenna tuners and more—whatever you need in your emergency go-kit. Made from sturdy roto-molded or lightweight molded polyethylene, these cases come in rack heights of four or six units and are built tough to secure every element in your portable setup. Racks come in depths of 14.25 or 19 inches, with or without wheels. Enter "Gator" at DXEngineering.com to view all your options.

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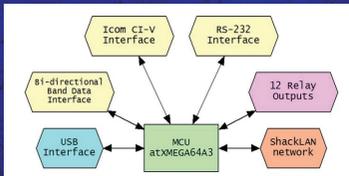
Announcing the new BM-5 BandMaster V

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

NEW!



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.**



RatPack Remote Antenna Switch

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



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.



TwoPak

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.



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.



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!

OM4000HF	Manual 160-10 m 4 kW
OM4000A	Automatic 160-10 m 4 kW
OM2500HF	Manual 160-10 m 2.5 kW
OM2500A	Automatic 160-10 m 2.5 kW
OM2000+	Manual 160-6 m 2 kW
OM2000A+	Automatic 160-6 m 2 kW

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+

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.

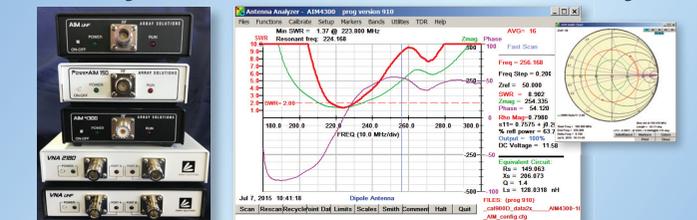
Frequency coverage:

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	\$495
AIM UHF	\$695
VNA 2180	\$995
VNA UHF	\$1,295
PowerAim 150 Broadcasting Engineers Choice. 150 V peak RF capable	\$2,495

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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IC-9100 | The All-Round Transceiver

- HF/50MHz 144/43vvv0 (440) MHz and 1200MHz*1 coverage
- 100W on HF/50/144MHz, 75W on 430 (440) MHz, 10W on 1200MHz*1 • Double superheterodyne with image rejection mixer



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-R8600 | Wideband Software Defined Receiver

- 10 kHz to 3 GHz Super Wideband Coverage • P25, NXDN™, dPMR™, D-STAR Mode • Large Dot Matrix LCD Display w/ Quick Spectrum Scope • SD Card Slot • Remote Control Function



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-R30 | Digital/Analog Wideband Xcvr

- 100 kHz to 3.3 GHz Super Wideband Coverage • P25 (Phase 1), NXDN™, dPMR™, D-STAR Mode • 2.3" Large LCD Display & Intuitive User Interface • MicroSD Card Slot for Voice & Data Storage • USB Charging & PC Connection



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

ID-51A PLUS2

VHF/UHF D-STAR Portable

- 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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- Internal Power Supply • Two Totally Independent Receivers
- Super Sharp "Roofing" Filters • High Performance Yaesu Custom- designed 32-bit Floating Point DSP • True Analog Meter Precision



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+U/U+U+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



FT-65R | 144/430 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



FT-60R | 2M/440 5W HT

- Wide receiver coverage • AM air band receive • 1000 memory channels w/alpha labels • Huge LCD display • Rugged die-cast, water resistant case • NOAA severe weather alert with alert scan



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Call For Special Price!



TM-D710G | 2M/440 Dualband

- 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

Call For Special Price!



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

Call Now For Low Price!



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

Call Now For Your Low Price!



TH-D72A

2M/440 HT w/extended RX

- 5W TX, RX 118-524 MHz, VxU, VxV, UxU
- APRS w/built-in 1200/9600 TNC • Built-in GPS, Built-in USB, digipeater • Echolink® compatible, • Mil-Spec STD810

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

- 100W HF, 6M, 2M • 50W 70CM • TS-2000X 10W 1.2GHz
- Built-in TNC, DX packet cluster • IF Stage DSP • Backlit front key panel

Call For Special Price!



TM-281A | 2 Mtr Mobile

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

Call For Special Low Price!



TH-D74A

2M/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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TH-K20A | 2M Handheld

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- Now includes the new RSPduo 14-bit Dual-Tuner SDR
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- All RSPs can receive, monitor and record up to 10MHz spectrum at a time
- Visualise all the signals in multiple bands simultaneously
- S/W pre-sets for all the bands from the new LF2200m to 23cm
- Excellent dynamic range for challenging reception conditions
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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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- 1/2" wide tinned copper 38x48x8/384 10ga 53 Amps.
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RRC-1258 MkII-S-Set

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New! Now Stereo Version for Dual Receiver radios.

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

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Just simply insert your control box in place of your front panel interconnect cable, place the body of the radio on the remote end and you are on the air as if you are there! Extra Controller and Remote interface units sold individually for multiple sites/users.

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