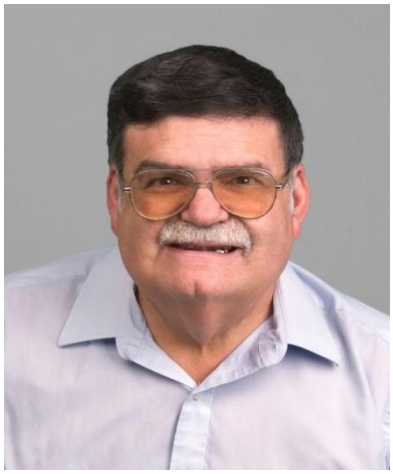
PVRC Newsletter
June 2020

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

Gene Zimmerman W3ZZ Is Inducted in to CQ Contest Hall of Fame



For those who may have missed this news, on Thursday, May 14 PVRC legend Gene Zimmerman, W3ZZ (SK) was inducted into the CQ Contest Hall of Fame. I had the honor of speaking in his memory and in appreciation for Gene's contributions to amateur radio and contesting during the on-line induction following Contest University 2020. For those of you who missed this event and might want to hear more about Gene, his induction is recorded here. Skip to 9:29:30 as this is a recording of the entirety of Contest University 2020.

I would like to acknowledge the driving force behind shepherding Gene's nomination through the process over a two-year period – PVRC Vice President Jay Horman W3MMM. Without Jay's hard work and tenaciousness this would not have happened. I am also grateful for the advice and input provided by Bernie W3UR and CQ Contest Hall of Fame members Frank W3LPL and Fred K3ZO, who were especially helpful in creating the presentation.

For those who may have never had a chance to meet Gene, his personality and impact on others was summed up admirably by quotes from two members of the CQ Contest Hall of Fame:

“Amateur Radio has had its share of characters but none were more colorful or more widely respected than Dr. Gene Zimmerman, W3ZZ -- a man who in one breath could identify the source of the world’s greatest hot dogs, explain once-in-a-lifetime propagation and recount the history of contesting and contesters.” – Ward, N0AX

“Gene developed a reputation as a great talker, but he was also a careful and sympathetic listener. He had a special quality of treating everyone he met as somebody who was worth knowing and deserving of respect, no matter their station in life. And he made it a point to discuss something that his interlocutors were really interested in. In that way he endeared himself to everybody with whom he came in contact.” – Fred, K3ZO

In addition to his contributions to amateur radio, Dr. Gene Zimmerman PhD was also a giant in his professional field of virology and immunology though a long career at the National Institutes of Health. Can you imagine how great it would be to hear Gene’s take on the current Covid-19 pandemic?

Oh, and before I sign for this month – we are looking forward to a big turnout in the upcoming PVRC Reunion. Tim, N3QE provides all the details later in this month’s Newsletter. I would especially encourage everyone to make some noise on SSB during the periods where it is emphasized. Don’t just tune around – smash down on that foot switch and call CQ!

73 and Go PVRC! - Tom K3AJ

PVRC Officers:

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

Trustees:

K3MM, N3OC, K2AV, K4ZA, W3LPL, N4MM, N4ZR, W2RU, W3LL

PVRC Charter Members (all SK):

W3GRF, W4AAV, W4KFC, N0FFZ, W4LUE, W7YS, VP2VI/W0DX, W3IKN, W4KFT

Newsletter Editor: John K3TN jpescatore@aol.com

PVRC Website: http://www.pvrc.org

PVRC Meeting Info: http://www.pvrc.org/chapters.htm

PVRC on Facebook: https://www.facebook.com/groups/PotomacValleyRadioClub/

2019 PVRC Reunion Results – Tim N3QE

Whether we are in-circle or out-of-circle, every year in June, we celebrate PVRC's heritage through the PVRC On-The-Air Reunion!

As Zory KB3VQC observes "Lots of fun, and lots of noise on all bands!". Many other members noted the QRM that decided to join the reunion too! Rob K4OV made a special effort. He notes "I really enjoyed this. I pulled out the two Kenwood TS-850S radios that I was using when I joined PVRC in 2004. I forgot what nice radios they are. It was fun to remember all the controls and feel a little muscle memory come back." Buddy W4YE calls out "Great to work my Brother W4AGI (K4CAX) PVRC 1958 and W3KC (W3VOS) PVRC 1954. We all early teenagers when we joined."

We even had several non-members get on the air and make a substantial number of QSO's - notably John K4BAI, who made a whopping 68 QSO's with PVRCers over the two nights of the reunion. Congratulations to John - only 4 PVRCers made more member QSO's than K4BAI did!

Being contesters, we kept a score! Each member we worked on each band and mode was worth one point. See below for score summary. Calls with asterisks note non-members who worked a bunch of PVRCers and who submitted logs.

Congrats to Jim N3JT, for working the most members on the most bands in the 2019 Reunion! (N3QE as organizer counts only as a checklog). Everyone who submitted a log will be receiving a PDF certificate by email, and the top 5 scores will be getting "PVRC Reunion 2019" buttons. Thanks to everyone who got on the air for the reunion fun!

Call	Score	Call	Score	Call	Score
N3QE	96	W4EE	40	K2YWE	13
N3JT	80	KG3V	39	K0XP	12
KT3Y(KP2M)	70	K3WA	32	K1HTV	12
K4BAI*	68	W4VIC	27	KB3VQC	12
W4YE	68	N4CF	25	KT3RR	12
W4YE	65	KE4S	23	W4JVN	12
K4XL	63	N6DW	23	W3GVX	11
K3AJ	57	AA3S	22	W3IDT	11
K0OO	47	AC3BU	21	K4OV	10
W3LL	47	W3FA	21	N0TK	10
K7SV	45	NR4O	20	KE3X	8
K4ORD	44	N4YDU	17	N3XL	7
K3ZO	42	K4MI	14	WR3R	6
W3YY	42	W3WHK*	14	ND3D	5
		W4AGI	14	AB3CV	4

Don't forget: the 20201 PVRC Reunion is June 6th and 7th!

Contest Operation with a Gaming Mouse - Geoff NE3K

A few months ago, I purchased a ‘gaming mouse’ for use with my laptop computer. My initial thought was for use with online game platforms to control multi-key sequences with a macro programmed to a button on the mouse

.

Then, I thought about using it to integrate with contest logging software to control sending of messages, similar to using the function keys on the keyboard. With a little bit of time, and some arrangement in the control software for the mouse, I was able to program the function keys of the mouse to map to the standard function keys on the keyboard.

In this article, I will outline the process I followed for making this all work and share the results I found in the latest CQ WW WPX SSB Contest in March 2020.

Hardware Setup

A few years ago, after being a loyal Apple MacBookPro user, I took the plunge back into the word of the PC. My MacBookPro was starting to show its age and was no longer running well. MicroCenter sells many laptops, and I settled on a Dell Inspiron 7577 with a 15” screen. This laptop is marketed to ‘gamers’, and I have found it to be more than adequate for daily use. It is equipped off the shelf with an intel Core i7-7700HQ CPU @ 2.80Ghz, 4 Cores, with 8 logical processors, a 250GB nVMe SSD as the ‘System’ drive, as well as a 1TB Seagate Hard Drive that is set up as a ‘data’ drive. I have since swapped the 1TB HD out for a 2TB SSD. I upgraded the memory from 16GB to 32GB.

For the mouse, I use a Corsair Scimitar RGB Elite Optical MOBA/MMO Gaming Mouse. It has your standard right/left click buttons, a clickable center wheel, two more buttons on the top, and 12 buttons on the left side, all of which can be programmed to activate functions on the computer, using the iCue software that is included.

My rig is a Flex Radio 6300, with internal antenna tuner, running SmartSDR 3.1.8 control software. I use a Heathkit SB-1000 manual tune amplifier with an Ameritron ARB-704 to control the keying of the amp. All of this feeds into a 125’ long wire antenna from the peak of my roof to the tree across the parking area.

For headsets, I currently use a Heil ProSet Elite which is directly connected to the FlexRadio. I also have the option of using a Corsair HS70 Pro Wireless headset connected to the laptop, which I use to record voicing files for N1MM+, and can use as a radio headset with the Flex.

Corsair Scimitar RGB Elite Optical MOBA/MMO Gaming Mouse

Flex Radio 6300 w/ATU, and Heathkit SB-1000 Amplifier

Software Setup

For contesting software, I have used both Win-Test and N1MM+ software. I do like both, but it seems that N1MM+ doesn't have the learning curve initially that Win-Test does. So for now I am using all N1MM+.

For the SSB contests, 'Voicing' files are needed to transmit the exchange information. I used Audacity which is a free download on the internet. It records, equalizes, and removes dead space in the files automatically. While it is not required for contesting, it makes it quite useful when people are sleeping and you don't want to disturb them, as you only need to press the button on the mouse or keyboard. It would not be required for CW contesting.

First step is to create a profile for N1MM+ in the software. You can even link N1MM+ to the profile, so that when you run N1MM+, it automatically will select the correct profile for the mouse.

Next, you enter the 'Actions' pane of the software. Here you see the mouse, the function keys (F1-F24) in the bottom right panel, and then next to the mouse is a layout of the 12 side buttons of the mouse. Clicking on the number in the top panel selects the button on the mouse, and then you select the function key in the bottom panel that you want activated. Simply create a new 'Action' for each F# key you wish to use. You can even rename them in the panel under where it says 'Actions' on the left side to correspond with what it does in N1MM+

CQ WW WPX SSB 2020

My first foray into this type of control of N1MM+ was during CQ WW WPX SSB 2020. I wanted to be able to stay up past when the kids and wife went to bed, without disturbing them by having to talk on the radio. I set up 'Advanced Voicing' in N1MM+ which strings together audio files to make up the exchange for each contact. Putting this part of the experience together is beyond the scope of this article, but it was not difficult to do, only somewhat time consuming.

I tend to do better with S&P during contests due to the limitation of only one antenna, and not a very good one at that. But I did attempt, at least, to also get runs going for this contest. Which led to some interesting discoveries, at least for me, using this setup. Overall, I found that using the mouse with my right hand and typing with only my left to be much easier during S&P than running. It seemed to me that it was somewhat predictable when things would be said during a S&P exchange, ie, I could catch the tail end of the previous Q and fill in some information, allowing me to use the buttons in order to control the radio. For my attempts at running, which were somewhat successful (worked HL0W on 20m Saturday morning) it didn't seem as easy or practical to do things this way. I felt like I wanted to have my hands ready on the keyboard at a moment's notice. It was still usable for some slower times when running, but when there are callers piling up, it was easier to just use the function keys on the keyboard.

Conclusions

For my type of operation in a contest, mostly S&P, this seems like a worthwhile endeavor. It is especially helpful, as I said, for the late night/early morning hours with the voicing files you provide to N1MM+. The mouse itself was about $80 retail, and they are available at any Best Buy store, or online retailer. As always, YMMV.

"Sunspot Aurora Paralyzes Wires" in 1921 – John K3TN

On May 15th, 1921 people woke up to headlines like this one from the Los Angeles Times: "***Telegraph Service Prostrated, Comet Not to Blame***."

May 1921 Geomagnetic Storm

SUNSPOT CREDITED WITH RAIL TIE-UP

New York Central Signal System Put Out of Service by Play of Northern Lights.

The sunspot which caused the brilliant aurora borealis on Saturday night and the worst electrical disturbance in memory on the telegraph systems was credited with an unprecedented thing at 7:04 o'clock yesterday morning, when the entire signal and switching system of the New York Central Railroad below 125th Street was put out of operation, followed by a fire in the control tower at Fifty-seventh Street and Park Avenue.

This is the first time that a sunspot has been blamed for such a piece of mischief. From other accounts it appeared

The New York Times
Published: May 16, 1921
Copyright © The New York Times

SUNSPOT AURORA PARALYZES WIRES

Unprecedented Disturbance Is Attributed to Solar Manifestations.

BROADWAY LIGHTS DIMMED

Theatre Crowds Returning Home Amazed at the Brilliancy of the Skies.

WARHINGTON, May 14.—The un-

ELECTRIC DISTURBANCES AFFECT FRENCH WIRES

Aurora Not Visible, Its Absence Being Attributed to Atmospheric Conditions.

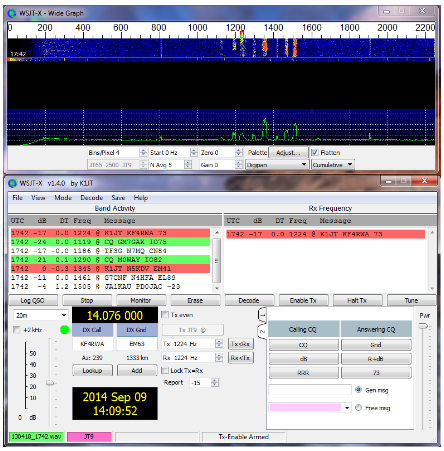
Copyright, 192[illegible] by The New York Times Company

By Wireless to THE NEW YORK TIMES.

PARIS, May 17.—The disturbance which interrupted telegraphic transmission in the United States last week has been making itself felt also in

Three days of coronal mass injections caused by giant sunspot AR184, crossing the sun during the declining phase of Solar Cycle 15 wreaked havoc on the world back when there was considerably less electric (let alone electronic) infrastructure upon which to wreak. Interesting article with details here.

New Version of WSJT-X Software Released – John K3TN

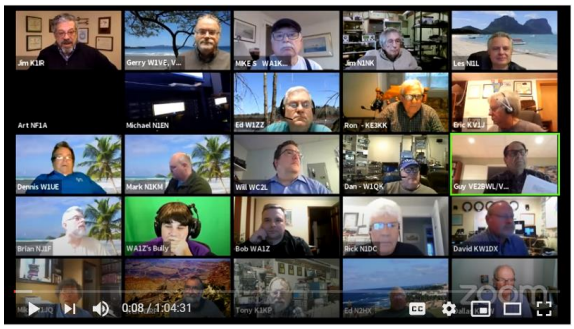


A new beta version of the WSJT-X software for FT8/FT4 and other modes is now available. It has several bug fixes and some decoding improvements. There will likely be a final update prior to the ARRL June VHF contest, so you can wait until the first week of June to update. Download from the development group website here

Remote Station Operating Hints and Kinks – John K3TN

Interest in remote station operation continues to grow. In PVRC, Mike W4RN has experience with just about every way of remotely controlling a station and is always willing to share his knowledge.

Gerry W1VE is the YCCC equivalent of W4RN. Gerry recently gave a Zoom talk on remote operating for YCCC and they have made it available here.



One Really Strange Beverage – Alan WA3EKL

I want to share with you an experience I had building a short beverage recently but here is the background first. Due to the graciousness of my neighbors I have 4 beverages ranging from 285 to 478 feet long. The South beverage is 285 feet and hears very well into the Caribbean, Central America and South America and is amazingly directive. It is used on 160, 80 and 40 meters through a filter switching system that Frank, W3LPL, encouraged me to design and build.

The shortest beverage on my property is about 190 feet, looks East, and runs 6 foot off the ground along my 8-foot wooden fence across the back of my property. It was sensitive but poor on directivity. You are probably thinking: I guess so, Alan - it's too short. I agree so how do I make it longer **without** making it longer? Better said, how do I make it look longer to the approaching wave front without physically making it longer. That was my quest.

From the feed point the wire went vertical up the first fence post to a common screw in electric fence insulator, then over to the next fence post all the way to the end post where it dropped vertically the termination resistor. The termination resistor and the feed point matching transformer were in waterproof boxes. So, this is a standard beverage, 6 feet off the ground (which is sand a depth of 55 per the Anna Arundel County person who registers all the county wells,) and about 190 feet long, way too short!

As I searched the internet, I came across the site of Slinky and Loaded Beverage Antennas by W8JI. He was saying you could equally place certain amounts of inductance along the line to slow down the signal and make the line look longer. I then contacted Frank asking his advice about loaded beverages and he said I was on my own. He had not experimented with them.

My first attempt was to place a 2 ½ inch piece of PVC plastic pipe in the middle of the beverage with about 100 feet of # 12 wrapped around it. **Failure**. The second attempt was to place three coils of 2 ½ inch PVC wrapped with 50 feet of #12 each at the middle, and ½ way between the middle and the beginning and ½ way between the middle and the end. **Failure** again. In each case I had less sensitivity and no better directivity.

Then I had a brilliant idea, and this is what may help some of you all. How about if I put an additional screw in insulator at the same level as the top insulator on each post and another screw insulator about 4 ½ below the top two insulators. Now looking from left to right I could string the wire through the first top insulator, drop down the post, go through the bottom insulator, come back up the post, go through the second top insulator and over to the next post repeating the process all across all 23 posts. The total added length of added wire would be 23 x 9 or 207 feet. Therefore, total antenna length would be 207 + 190 = 397 feet.

I felt really good. **It worked** and it worked super good. It had great sensitivity, but it did pick up more man-made noise. It had great directivity with one issue. It heard to the south 6dB better than my 285 foot South beverage and heard nothing to the East what so ever, total null. You remember this was supposed to be an Eastern beverage. Apparently, all those vertical elements spaced 8 feet apart added up in phase and made a great bidirectional antenna perpendicular to the plane of the antenna. So, think about

this. If one of you has a wooden fence pointing 90 degrees from where you want to here this could be a solution for you. Obviously, it wasn't for me!

My next configuration was to cut out the 9-foot sections of vertical drop and wind each section up on its own 2 ½ inch piece of PVC pipe. I then placed each coil between the two top insulators at the top of each post. To shorten the story here is the final configuration that yields the best performance.

From the matching transformer the wire goes vertical up the first fence post, then over **two** fence posts to the first coil, then through 19 more coils/fence posts, across **two** more fence posts and vertically down to the termination resistor. Total length of wire is now 370 feet. I found that whatever the distance is between your fence posts you need two of those distances horizontally on each end to get the best directivity. I would recommend that you Only wind up on each coil the length of wire that is the distance between two fence posts and keep the turns about 1/16 of an inch apart.

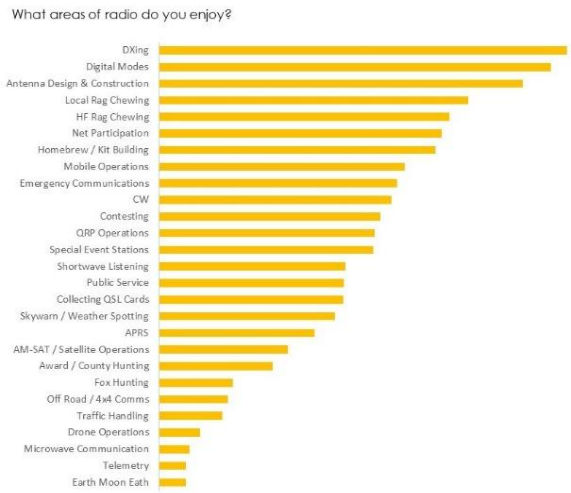
Next this antenna has a higher termination resistance than a normal beverage. It is more like 900 to 1.2K ohms. Therefore, you need to wind your own matching transformer. I used 2 turns on the primary that goes to the RG6 75-ohm coax and 7 turns on the secondary that goes to the antenna and ground on one of those binocular cores. I ended up with a 1.2K termination resistor. The matching transformer and termination resistor are important in this shortened loaded beverage in order to get the best sensitivity and directivity. This short beverage now hears well to the East, has good directivity and the man-made noise has disappeared.

I hope this article will help some of you with limited yard space.

2020 State of the Hobby Survey – Dustin N8RMA

N8RMA has open up his 4th annual state of the hobby survey here.

You can participate through June 12th. Last year there were close to 4000 respondents and some interesting results. Digital modes are the second most popular activity after DXing – another sign of FT8's rapid growth. Contesting beat out QRP operation but lagged behind Net Participation! We need more contesters to participate in the survey and beat the Pig Farmers in 2020!



PVRC DXCC Challenge Standings – Frank W3LPL

Below are the DXCC Challenge totals for PVRC members, transcribed from the ARRL DXCC standings data as of the 20th of each month or so. Thanks to Frank for the data each month to make this a regular feature. Please report any omissions or errors to Frank.

CALL	DXCC	CALL	DXCC	CALL	DXCC	CALL	DXCC
W4DR	3185	K5RT	2425	W0YVA	1936	KF7NN	1377
W3UR	3144	K5VIP	2360	N3KS	1906	W9GE	1364
W3LPL	3129	N4TL	2358	W3KB	1815	ND3F	1319
K4CIA	3114	W3OA	2344	N3ND	1801	N1SZ	1317
N2QT	3070	W2YE	2334	K4EU	1795	K4ZA	1313
W4PK	3038	N4GG	2327	W3DM	1791	N3MK	1272
N4MM	2979	WA2BCK	2316	W2CDO	1724	NR4M	1224
W3DF	2939	K1ZZI	2308	K3SX	1720	N3RR	1199
WX4G	2928	K1GG	2305	N4XYZ	1720	W3NRJ	1188
K1HTV	2921	W4VIC	2304	W4GP	1710	N3OC	1183
K5EK	2900	W3YY	2297	N4GU	1701	K3AJ	1172
K2PLF	2892	N3RC	2265	NE3H	1668	W3US	1077
KG7H	2869	W2GPS	2255	K4QE	1666	N3COB	1049
N4DB	2848	NW4V	2219	KE4S	1666	W3OU	1046
N3NT	2835	K3TN	2189	K3WI	1652	W4ZV	1046
W0VTT	2824	K4FJ	2188	W3UL	1614	K4ZW	1038
W3LL	2805	N4ZH	2188	K3KY	1606	NE3K	1021
K3WA	2789	K1EFI	2176	K3STX	1579		
KG4W	2782	K2BA	2129	KE3X	1571		
K1AR	2754	W3TN	2125	NA1DX	1557		
W3KX	2750	K3PU	2107	W3FOX	1535		
AB3CV	2656	W3GG	2071	N3AO	1527		
WB3AVN	2655	W3MR	2070	WB2ZAB	1522		
W4FQT	2622	N4NW	2068	AA4FU	1519		
N3KK	2575	AA4NC	2061	WB4DNL	1506		
W3BW	2544	K4WNW	2004	N4ZR	1491		
K4SO	2499	N3QE	2000	K3WC	1430		
K3JT	2495	N4JQQ	1981	N3HBX	1428		
N4QQ	2494	N3KN	1968	N3AIU	1415		
W2GG	2434	K5RJ	1961	N8II	1390		

Membership News – Tim N3QE

PVRC added two new members in the latest reporting period. Please welcome:

- **Matt KM4VWD** in the Central Virginia Chapter
- **Mason KM4SII** in the North Carolina East Chapter

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

Upcoming Contests – from WA7BNM

June 2020	
+ PVRC Reunion	0000Z-0200Z, Jun 6 and 0000Z-0200Z, Jun 7
+ SEANET Contest	1200Z, Jun 6 to 1200Z, Jun 7
+ ARRL June VHF Contest	1800Z, Jun 13 to 0259Z, Jun 15
+ All Asian DX Contest, CW	0000Z, Jun 20 to 2400Z, Jun 21
+ Stew Perry Topband Challenge	1500Z, Jun 20 to 1500Z, Jun 21
+ His Maj. King of Spain Contest, SSB	1200Z, Jun 27 to 1200Z, Jun 28
+ ARRL Field Day	1800Z, Jun 27 to 2100Z, Jun 28

Editor's Last Word – John K3TN

Thanks to Geoff NE3K, Tim N3QE, Frank W3LPL and Alan WA3EKL for contributions to this issue of the PVRC newsletter.

All signs point to many people getting interested in ham radio during the pandemic shutdowns and many hams getting interested in contesting - something like 3,000 signed up to view the Hamvention Content University sessions online (full session here or individual presentation here). Maybe in November we will see a lot more CK 20's in Sweepstakes – and it won't only be a few University club stations…

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.

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.

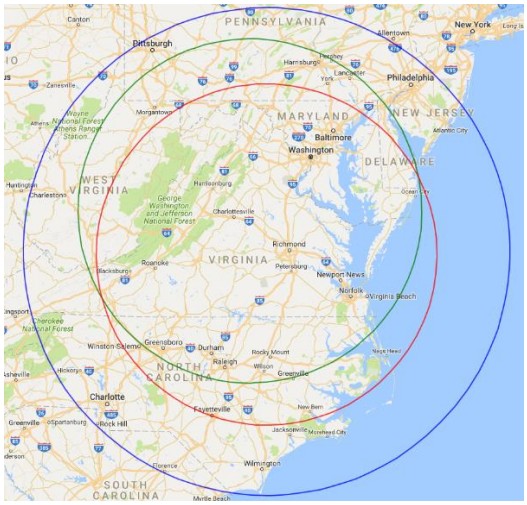
Direct donations to PVRC via Credit Card or PayPal may be made by clicking this "Donate" button and clicking the next Donate button that appears on your screen:

Donate

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!

Your source for DX News!

Get a free two week trial of The Daily DX and The Weekly DX by sending a request to **bernie@dailydx.com**.

The Daily DX
3025 Hobbs Road
Glenwood, Maryland 21738
Phone: 410-489-651

PVRC QSL Cards
by
LZ1JZ QSL Print

Get Ready for Field Day—June 27-28!

Field Day Triplexer Combo

We've made it easy to work the 20, 15 and 10 meter bands with three different radios, using just a single tri-band antenna! Our Field Day Triplexer Combo includes Low Band Systems' (LBS) innovative 200W Triplexer (LBS-PB-TP200), LBS 20/15/10M band-pass filters, and coaxial cable jumpers. Eliminate the need (and cost) for extra antennas while enjoying fast setup and worry-free operation without RF interference.

DXE-200FD-8X-P	With RG8X cables	**$662.93**
DXE-200FD-P	With RG400 cables	**$749.93**

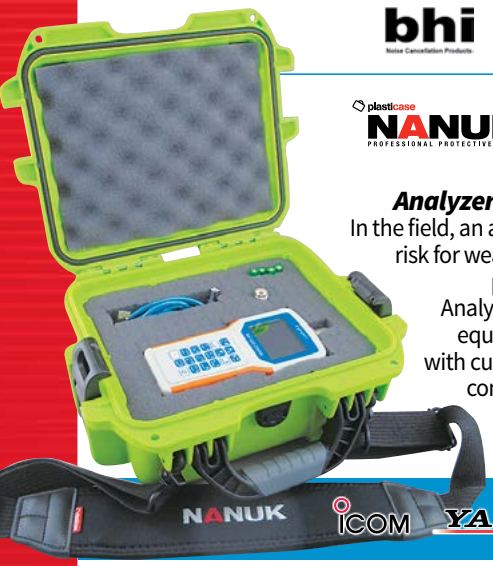
ON ALL BANDS — An amateur radio blog powered by DX Engineering

DX Engineering's Amateur Radio Blog for New and Experienced Hams.
Visit OnAllBands.com for information you can use to improve your on-air experience.

Headsets and Headphones

DX Engineering carries a great selection of hands-free headsets and state-of-the-art headphones from bhi, Heil, INRAD and other top brands. Don't accept anything less than clear, intelligible speech fidelity whether you're doing the speaking or listening.
Click on "Audio" at DXEngineering.com for our full lineup.

bhi Noise Cancelling Products · Heil Sound · INRAD International Radio



plasticase NANUK Professional Protective Cases · RigExpert®

Analyzer and NANUK Case Combos

In the field, an antenna analyzer is especially at risk for weather and shock damage. We've paired select RigExpert Antenna Analyzers with perfectly sized NANUK equipment cases. Each case is filled with cubed, sectioned foam for custom configuration. Available separately or in combos. *Enter "Analyzer Combo" at DXEngineering.com.*

DX Engineering Coaxial Cable Tool Kits

Get everything you need to prep and install soldered or crimp-on connectors on your coax. Complete kits from DX Engineering include cable strippers, grippers, replacement blades, braid trimmers, cable shears and carrying case. Individual tools also sold separately.

Coaxial Cable Assemblies

These low-loss cable assemblies are available in standard lengths with DX Engineering's revolutionary patented PL-259 connector. Use the online Custom Cable Builder at DXEngineering.com to build assemblies made to your exact specs. DX Engineering's coaxial cable is also available by the foot or in bulk spools.

Request Your New Catalog Today at DXEngineering.com!

Multi-Band Dipole Antenna Kits

Ideal for easy setup on Field Day, these rugged yet lightweight full legal limit rated antennas are usable to 30 MHz with a tuner balun (available separately). They feature strong and flexible 14 AWG stranded-copper, relaxed PVC-jacketed elements; 18 AWG 300-ohm ladder feedline; center-T support; and end mount brackets.

DXE-WA-070	Antenna, 70' Long for 40M and Up	**$64.99**
DXE-WA-135	Antenna, 135' Long for 80M and Up	**$73.99**
DXE-WA-260	Antenna, 260' Long for 160M and Up	**$89.99**

Free Standard Shipping for Orders Over $99*.
If your order, before tax, is over 99 bucks, then you won't spend a dime on shipping. (Additional special handling fees may be incurred for Hazardous Materials, Truck Freight, International Orders, Next Day Air, Oversize Shipments, etc.).

FAST FREE SHIPPING over $99*

NANUK · ICOM · YAESU · KENWOOD · ALINCO · AlexLoop · MASTR ANT Antenna Guying · GATOR Cases · iPortable

Showroom Staffing Hours:
9 am to 5 pm ET, Monday-Saturday

Ordering (via phone):
8:30 am to midnight ET, Monday-Friday
9 am to 5 pm ET, Weekends

Phone or e-mail Tech Support: 330-572-3200
8:30 am to 7 pm ET, Monday-Friday
9 am to 5 pm ET, Saturday
All Times Eastern I Country Code: +1
DXEngineering@DXEngineering.com

800-777-0703 | DXEngineering.com

DX 20 YEARS ENGINEERING

CELEBRATING 20 YEARS 2000-20

Email Support 24/7/365 at DXEngineering@DXEngineering.com
We're All Elmers Here! Ask us at: Elmer@DXEngineering.com

YouTube

Array Solutions Your Source for Outstanding Radio Products

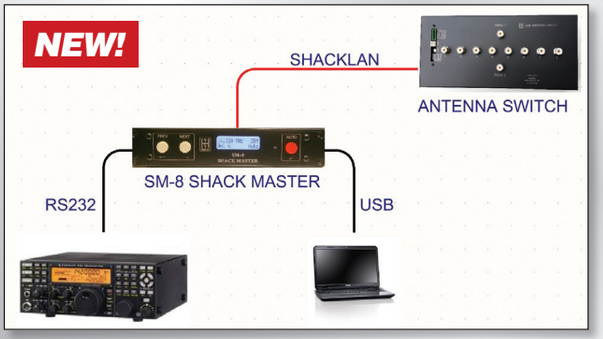
Professional Grade Equipment from Array Solutions

VK0EK HEARD ISLAND EXPEDITION

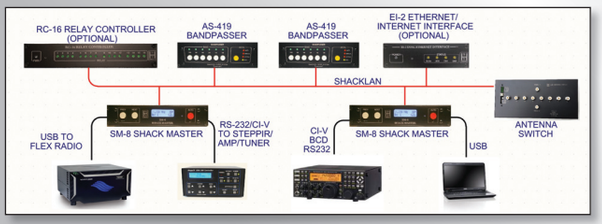
Hamation Station Automation

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 shone.



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.

JK ANTENNAS

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.

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.

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.

ARRAY SOLUTIONS

OM Power Amplifiers, The New RF Power Benchmark!

OM Power

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 andselect 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 amplfiiers
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

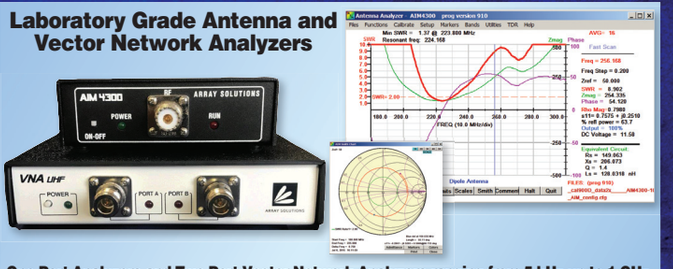
OM2000A+ – OM2000+

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

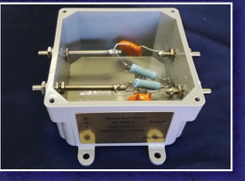
AIM 4300	$599
VNA UHF	$1,295

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.



Check our Website for more new products!

ARRAY SOLUTIONS

www.arraysolutions.com

2611 North Beltline Rd., Suite 109
Sunnyvale, Texas 75182 USA
sales@arraysolutions.com
Phone 214-954-7140 Fax 214-954-7142

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.

HAM RADIO OUTLET

WWW.HAMRADIO.COM

NOBODY BEATS AN HRO DEAL!

IC-9700 | *All Mode Tri-Band Transceiver*

• VHF/UHF/1.2GHz • Direct Sampling Now Enters the VHF/UHF Arena • 4.3" Touch Screen Color TFT LCD • Real-Time, High-Speed Spectrum Scope & Waterfall Display • Smooth Satellite Operation

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-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-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-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-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

IC-705 | HF/50/144/430 MHz *All Mode Transceiver*

• RF Direct Sampling • Real-Time Spectrum Scope and Waterfall Display • Large Color Touch Screen • Supports QRP/QRPp • Bluetooth® and Wireless LAN Built-in

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

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

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

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

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-V86 | *VHF 7W HT*

• 7W OutputPower Plus New Antenna Provides 1.5 Times More Coverage • More Audio, 1500 mW Audio Output • IP54 & MIL-STD 810G–Rugged Design Against Dust & Water • 19 Hours of Long Lasting Battery Life • 200 Memory Channels, 1 Call Channel & 6 Scan Edges

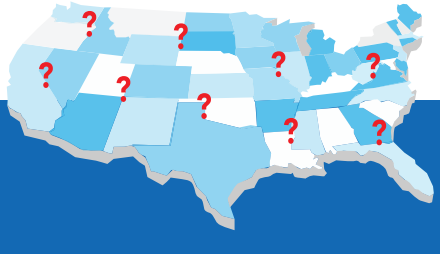
IC-R30 | *Digital/Analog Wideband Xcvr*

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

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



New Ham Radio Outlet Coming Soon!

ICOM®

Tell Us Where To Build The Next Ham Radio Outlet Superstore!

For everyone who wanted an HRO store close to them... now is your ultimate chance. Let us know now at: **www.hamradio.com/newstore**

**Except 60M Band. ***Frequency coverage may vary. Refer to owner's manual for exact specs. QST May 2020. The Icom logo is a registered trademark of Icom Inc. Toll-free including Hawaii, Alaska and Canada. All HRO 800-lines can assist you. If the first line you call is busy, you may call another. Prices, specifications and descriptions subject to change without notice.

HAM RADIO OUTLET

WWW.HAMRADIO.COM

*FREE 1 OR 2 DAY DELIVERY TO MOST OF USA!

FTDX101MP | *200W HF/50MHz Transceiver*

• Hybrid SDR Configuration • Unparalleled 70 dB Max. Attenuation VC-Tune • New Generation Scope Display 3DSS • ABI (Active Band Indicator) & MPVD (Multi-Purpose VFO Outer Dial) • PC Remote Control Software to Expand the Operating Range • Includes External Power With Matching Front Speaker

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 ModeTransceiver*

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

FTDX101D | *HF + 6M Transceiver*

• Narrow Band SDR & Direct Sampling SDR • Crystal Roofing Filters Phenomenal Multi-Signal Receiving Characteristics • Unparalleled - 70dB Maximum Attenuation VC-Tune • 15 Separate (HAM 10 + GEN 5) Powerful Band Pass Filters • New Generation Scope Displays 3-Dimensional Spectrum Stream

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

FTM-300DR | *C4FM/FM 144/430MHz Dual Band*

• 50W Reliable Output Power • Real Dual Band Operation (V+V, U+U, V+U, U+V) • 2-inch High-Res Full Color TFT Display • Band Scope • Built-in Bluetooth • WiRES-X Portable Digital Node/Fixed Node with HRI-200

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-3DR *C4FM/FM 144/430 MHz Xcvr*

• High Res Full-Color Touch Screen TFT LCD Display • Easy Hands-Free Operation w/Built-In Bluetooth Unit • Built-In High Precision GPS Antenna • 1200/9600bps APRS Data Communications • Simultaneous C4FM/C4FM Standby • Micro SD Card Slot

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 Flashlight, 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

5 Ways to Shop!

- RETAIL LOCATIONS – Store hours 10:00AM - 5:30PM - Closed Sunday
- PHONE – Toll-free phone hours 9:30AM - 5:30PM
- FAX – All store locations
- ONLINE – WWW.HAMRADIO.COM
- MAIL – All store locations

YAESU The radio

ANAHEIM, CA (800) 854-6046	OAKLAND, CA (877) 892-1745	PORTLAND, OR (800) 765-4267	PHOENIX, AZ (800) 559-7388	MILWAUKEE, WI (800) 558-0411	WOODBRIDGE, VA (800) 444-4799
PLANO, TX (877) 455-8750	SAN DIEGO, CA (877) 520-9623	DENVER, CO (800) 444-9476	ATLANTA, GA (800) 444-7927	NEW CASTLE, DE (800) 644-4476	SALEM, NH (800) 444-0047

Shop Anytime From Anywhere with Our Online Superstore
WWW.HAMRADIO.COM

*On most orders over $100 in the continental US. (Rural locations excluded.) Contact HRO for promotion details. Toll-free including Hawaii, Alaska and Canada. All HRO 800-lines can assist you. If the first line you call is busy, you may call another. Prices, specifications and descriptions subject to change without notice.

HAM RADIO OUTLET

WWW.HAMRADIO.COM

NOBODY BEATS AN HRO DEAL!

TS-990S | *200W HF + 6M Transceiver*

• World's first dual TFT display • 200W output on all bands • ±0.1ppm TCXO ensures both high stability and reduced power consumption • Triple 32-bit DSP's dedicated to main/sub receivers and band scope • Main receiver employs full down conversion, new mixer & narrow band roofing filters • Third order intercept point (IP3) +40dBm for highest level of RX performance (main receiver)

Call For Special Price!

TS-890S | *HF/50MHz Transceiver*

• Receive performance on a whole other level from narrow bandwidth roofing filters that only full down conversion can provide • CW Morse code decode/encode possible with stand-alone unit • 150dB Blocking dynamic range (BDR) • Expanded touch operation scope • Kenwood Sky Command® II Support • Remote operation achieved without host PC Direct remote-control function (KNS)

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-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!

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!

TM-281A | *2M Mobile*

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

Call For Special 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

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

Call For Low Price!

TH-K20A | *2M Handheld*

• 2M 5.5W • VOX • CTCSS/DCS/1750 Burst built-in • Weather alert

Call For Special Low Price!

HRO is family owned and operated by active hams!

5 Ways to Shop!

- **RETAIL LOCATIONS – Store hours 10:00AM - 5:30PM - Closed Sunday**
- **PHONE – Toll-free phone hours 9:30AM - 5:30PM**
- **ONLINE – WWW.HAMRADIO.COM**
- **FAX – All store locations**
- **MAIL – All store locations**

KENWOOD

ANAHEIM, CA (800) 854-6046	OAKLAND, CA (877) 892-1745	PORTLAND, OR (800) 765-4267	PHOENIX, AZ (800) 559-7388	MILWAUKEE, WI (800) 558-0411	WOODBRIDGE, VA (800) 444-4799
PLANO, TX (877) 455-8750	SAN DIEGO, CA (877) 520-9623	DENVER, CO (800) 444-9476	ATLANTA, GA (800) 444-7927	NEW CASTLE, DE (800) 644-4476	SALEM, NH (800) 444-0047

Shop Anytime From Anywhere with Our Online Superstore
WWW.HAMRADIO.COM

Contact HRO for promotion details. Toll-free including Hawaii, Alaska and Canada. All HRO 800-lines can assist you. If the first line you call is busy, you may call another. Prices, specifications and descriptions subject to change without notice.