PVRC Newsletter
June

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 – Doug AA3S

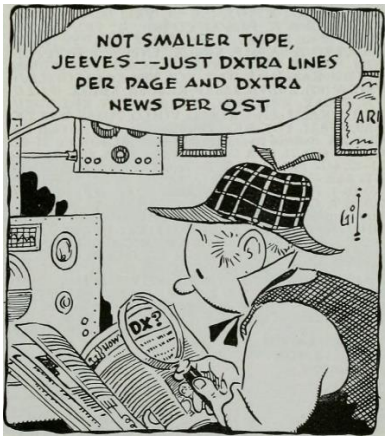
At the Dayton Hamvention in May, a very deserving PVRC member, Bernie McClenny, Jr. W3UR was elected into the CQ DX Hall of Fame. In the photo below (taken by Tom K3AJ) Bernie is shown very happily holding his award plaque!

Bernie's long involvement with DX reporting includes being editor of: *The Daily DX* (1997-2024), *The Weekly DX* (2001-2024) and the monthly QST column *How's DX?* (1999-2024)

Please join your PVRC Officers in congratulating Bernie and thanking him for the thorough and timely DX insights he has given us through his ARRL column and his newsletters.

Read the remainder of this Newsletter for photos and observations from the attendees at the Hamvention.

Doug Hart AA3S, PVRC President



Club Competition News – Doug AA3S

Only two more 5M contests and the ***PVRC Reunion On-The-Air*** remain in this 2023 – 2024 contest season!

1) ARRL Digital 1800Z, Jun 1 to 2400Z, Jun 2
2) ARRL June VHF 1800Z, Jun 8 to 0259Z, Jun 10

Read the PVRC Reflector for news of changes to the PVRC Reunion.

I know of no state QSO Parties with club competition awards until September.

The new contest season begins in July so think about new, higher personal goals and how to make them come true! The first 5M contest of the new season is the NAQP RTTY, are you ready for RTTY?

Annual W3LPL Open House, Saturday June 17 – Frank W3LPL

The Annual W3LPL Open House will take place as usual on Saturday June 15th at noon, rain or shine. NCDXA and PVRC members and their guests are welcome.

Please email me at donovanf@erols.com if you plan to attend. **IMPORTANT**: In your email please indicate if you plan to purchase food from CJ's BBQ who will be on site from noon to 2 p.m. as usual.

PVRCers Hamvention Happenings

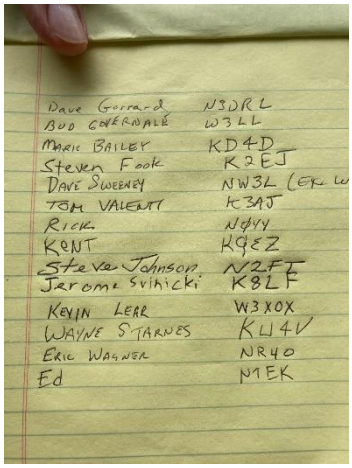
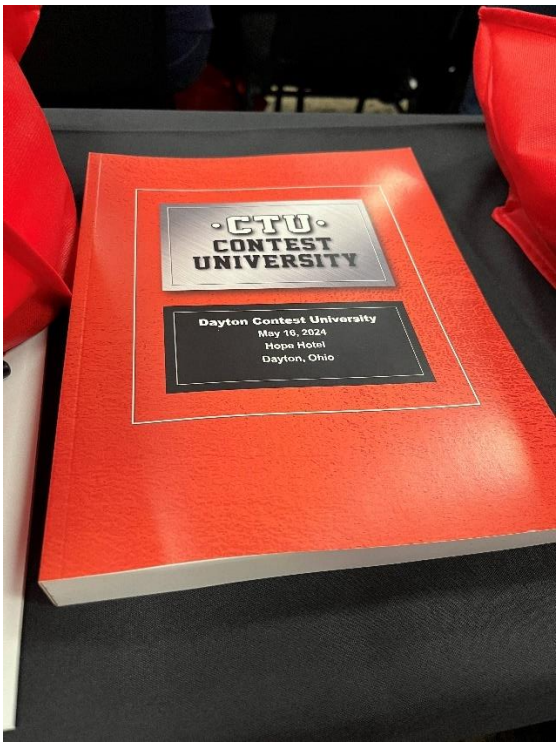


Photo by Ed N1EK's XYL

Rusty W3US won the Dayton Hamvention DX Dinner Grand Prize from Icom. BernieW3UR was inducted into the CQ DX Hall of Fame. Photo courtesy of Alex UT5UY (OH2UY)

Guy K2AV, presenting at the Antenna Forum on the Folded Counterpoise (FCP) (de N4GU)



Contest University Textbook (NW3L photo)

Rick N1RM, Bud W3LL, Tom K3AJ at the Contesting Dinner (de NW3L)

Dave NW3L (formerly W3MAM) and Masa JR1AQN at the DX Dinner

Dual Monitors in a Limited Footprint – Dan K2YWE

My station doesn't have the room to place two monitors side by side without a major redesign, and even then maybe not. I found a monitor stand on Amazon that allows vertical stacking and thought it was worth $36 to give it a try. The stand is rated for up to 44 lbs for each monitor and proved more than sturdy enough for my 21 and 18 inch units (the 18" is an old TV with built-in DVD player). I am pleased with the result.

The base is a 14" x 9.5" piece of heavy 1/4" thick black glass. A vertical rail assembly is bolted through the glass. Stick-on rubber feet are provided. The stand comes with two 4" hole-spaced VESA mounting plates that lock into slots in the vertical rail. A series of slots give good flexibility in mounting heights. The plates may be rotated left-right and tilted up-down. Tilt range is limited by monitor dimensions but can be extended by using optional spacers which move the monitors out slightly from their plates.

K5VIP and AE3T Shack Photos (inadvertently omitted in February)

Barry K5VIP in his shack

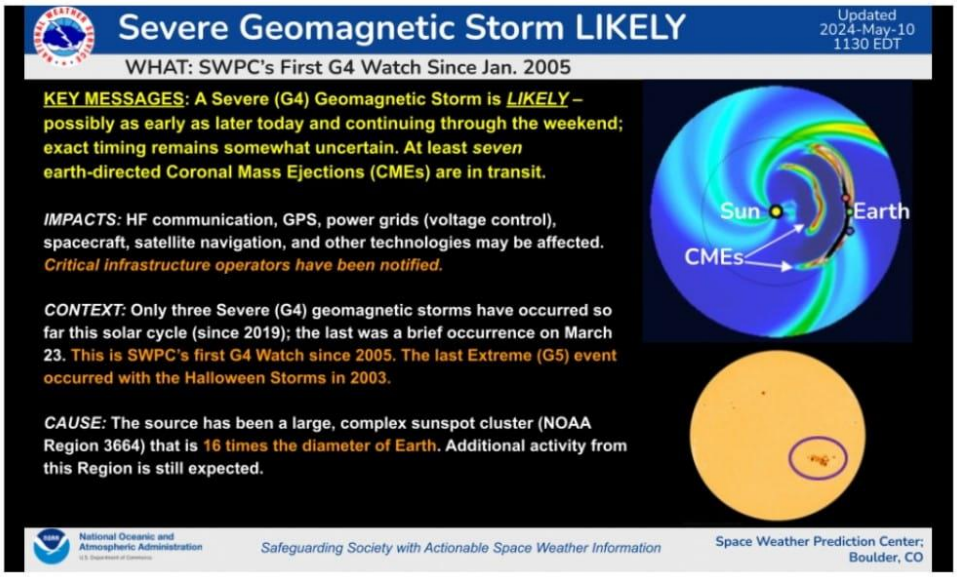
Howard AE3T in his HOA home in Frederick MD. The local gear is a K3s to an attic 40M dipole, and a 9:1 transformer feeding my 200' rain gutter and downspout. I operate at 50W CW and FT8 and do very well. I also have an attic mounted 5el 2M ,3el 6M yagi, along with a DX Engineering RX loop.

Analysis of G4 Solar Storm – via Tom K2GO/HP1XT (retired commercial pilot)

Analysis of Last Week's Solar Storm (from Pilot's Newsletter

The Pilot Occupational Health Subcommittee focuses on risk mitigation, including the effects of space weather and radiation. Last week, the sun produced a series of large solar flares that led to multiple coronal mass ejections (CMEs) that sent magnetic energy toward Earth. When these CMEs connected with the Earth's geomagnetic field, they produced an enhanced version of the Northern Lights, which could be viewed across much of the United States last weekend.

CMEs also produce geomagnetic storms, which are measured on a scale of G1 to G5. A strong (G3), severe (G4), or extreme (G5) storm can impact technology in various ways, to include anomalies within global navigation satellite systems. Last week's event led the National Oceanic and Atmospheric Administration's Space Weather Prediction Center to issue a G4 watch for the first time since 2005.



Since December of 2021, the WSI Pilotbrief Optima has been supplying Space Weather Prediction Center alerts to APA members via our iPads. We are working with AA, IBM, and WSI to integrate the FAA's Maps of Ionizing Radiation in the Atmosphere (MIRA) to enable advanced decision making for our members.

The FAA has not released a solar radiation alert since 2017. Solar radiation storms, which can affect human biology, are measured on a scale of S1 to S5, and last week's storm registered as an S2 – below the threshold for an alert. APA members can expect to see an alert message on AlliedPilots.org if a storm reaches the S3 level. You will be alerted via email if a storm reaches the S4 level.

Our FOM offers additional guidance on space weather, and we anticipate the Space Weather Prediction Center will release a new solar radiation product for the aviation industry soon. This product comes at a critical time as we are currently in the sun's solar maximum cycle (January 2024-October 2024). While space weather storms can happen at any time, solar maximum is recognized as the peak of storm activity. This new aviation-based product will enable APA members to view areas of solar radiation to be avoided. Solar radiation increases with both altitude and latitude, and the FAA's MIRA system reflects guidance to fly below certain altitudes and latitudes.

On the polar routes, there are times when dispatch limit cruising altitudes to no more than 29,000 -33,000 ft.

The Inverted Delta Loop – Alan WA3EKL

I have experimented with vertically oriented, triangular loop antennas, for nearly 48 years. In the past we just called them full wave triangle loops. Then the point up triangle was renamed the "Delta loop" but the first Delta loops I remember were only ½ wavelength long. I never experimented with them.

In 1974 Lawrence V. Mayhead G3AQC, sk, published an article in Radio Communications Magazine on vertically oriented, full wavelength loop antennas. It was titled "Loop aerials close to ground." See my article in the May 2021 PVRC Newsletter for details.

I would like to share with you some of the information contained in Mayhead's article. I spent many hours with a modern-day antenna program unable to reproduce Mayhead's triangle patterns until I discovered the secret of how these patterns were reproduced. Ground reflections will modify any antenna's pattern, especially antennas that are close to ground.

Mayhead's article showed that feeding a point up delta loop at the top point, or at the bottom center yielded the exact same horizontally polarized pattern which is very close to the pattern of a dipole or inverted V at the same height with a take off angle of 50 degrees or more. The feed point impedance is close to 50 ohms. The only advantage of the loops is that they are quieter than dipoles. Installing a delta loop and feeding it on the top point or bottom center will perform well for close-in work but is very poor for DX. If you are a net control operator on 80 or 40 meters for domestic nets then a point up delta loop, fed bottom center with a 1 to 1 balun would be an excellent configuration for you.

A point up, corner fed, Delta Loop produces a vertical polarized lobe at about 23 degrees elevation. This angle is very good for working Europe from the East coast. The corner fed loop has about 110 Ohms of impedance when 7 to 9 feet off the ground.

It can easily be fed with a piece of 75 Ohm ¼ wavelength of coax. The other end of the coax then becomes 50 Ohms. The formula to find the needed impedance of the ¼ wavelength matching sections is: Z = the square root of the source impedance x the load impedance. 110 x 50 = 5500 and the square root of 5500 is 74.16 Ohms. Close enough! Therefore, you need a ¼ wavelength per the velocity factor of the coax of 75 ohm line to match the corner fed point up triangle to a 50 ohm piece of coax.

Now I would like to tell you about a much better Delta Loop configuration; the "Inverted Delta Loop" fed on the bottom point. I have participated in Field Day for 57 years and at least 45 of those years was QRP out in the woods. I have had the opportunity to do direct A/B comparison between the Inverted Delta Loop and inverted V's and dipoles on 40 meters which were between 45 to 90 feet in the air on those Field Days. 95% of the time the inverted delta loop beat out the V's or dipoles especially working the farther out contacts like W6, W7, KL, HI, KP from here on the East coast in MD.

When I moved to my present QTH 21 years ago I had a 40 meter drooping dipole at 55 feet below a two element 40 beam at 93 feet. The dipole worked well. A few years later I moved the 40 dipole to 70 feet and it didn't work as well. This was not due to interaction with the beam. Soon I lost a tree that was holding up one end of the dipole and I then installed a 40 meter inverted delta loop between two other trees. The top horizontal wire is at about 50 feet

and the point is about 9 feet off the ground. After the first contest season went by I said ”Why did I not do this sooner?”

The full wavelength, inverted delta loop fed at the bottom point according to Mayhead produces two angles of radiation. A very broad “horizontal” lobe centered about 50 degrees and an equal intensity “vertically” polarized lobe at 23 degrees and has an input impedance of 180 to 200 ohms. My two-element horizontal beam at 93 feet also produces a “horizontal” lobe at 23 degrees. Many times we are working Europeans on the beam then switch to the loop to work a South/Central American and forget to switch back to the beam and continue working EU’s on the loop! The 200 ohm feed point on the inverted delta loop is easily matched with a 4 to 1 balun. The Inverted Delta Loop makes an excellent antenna for both domestic and DX contacts. My 40 meter loop performs amazingly well in both domestic and DX contests.

Over the past 3 years I have installed inverted delta loops on 30, 17 and 12 meters and within a year or just over of installing each I had worked DXCC and WAS with just a K3 and about 80 watts of power.

My good friend Ken Reid, KG4USN who lives about 20 miles from me has a backyard full of tall trees. Some time ago I convinced him to take down his OCF Dipole at 70 feet and install all inverted delta loops on 10 through 40 meters. It was at Ken’s house we discovered Mayhead’s secret for producing the excellent antenna patterns he proposed. I always believed the patterns were correct by the results myself and others have enjoyed over the years but never could prove it on paper. Each of Ken’s loops had a 4 to1 coax balun matching transformer and was tuned to resonance (no XL or XC) with my RigExpert antenna analyzer using a short piece of coax maybe 18 to 24 inches long. We then found that raising or lowering the loop affected the loop’s input impedance! We adjusted the height of each loop so we had the SWR as close to 1 to 1 as possible.

We also found that each band 10 through 40 meters had it’s own perfect height range and none were the same. With Ken’s soil conditions the 10 meter loop’s feed point wanted to be 6 feet off the ground. The 40 meter loop’s feed point wanted to be 9 feet off the ground.

Ken has been obtaining excellent results on all bands with these loop point down loops. With my soil my 12 meter loop’s feed point is 6 ½ feet off the ground, 17 meters feed point 7 1/2 feet, 30 meters feed point 8 feet and 40 meters feed point is 9 feet off the ground.

After seeing how the height of the loop above ground affected the impedance I went back to my antenna program and set the impedance parameter to a fixed 200 ohms then adjusted the height of the loop above ground. At a specific height the program drew the exact patterns proposed by Mayhead. He was totally correct that these loops want to be close to ground. I tried raising the loops to various other heights on the program and was not able to create the same pattern or any useful low angles.

Constructing an Inverted Delta Loop

A 40 meter inverted delta loop needs two support points about 50 feet high and 50 feet apart. The formula for the perimeter of any full wave delta loop is 1005 / Freq in MHZ = Length in Feet. This formula works for both the delta loop and the inverted delta loop depending on the corner insulators. However, don’t start cutting wire until you read the remainder of this article!

The inverted delta loop and 4 to 1 balun is easily built. The feed point for the inverted delta loop is constructed from a 1 ½ inch wide by 1/8 inch thick by 6 inch long aluminum strip cut from a longer piece available at most home supply stores like Lowe's or Home Depot. Three SO239 chassis mount connectors are mounted evenly across the strip with stainless steel machine screws, lock washers and nuts; two screws per connector. See Pix 1. #10, round hole lug, crimp connectors with the yellow insulation pulled off are inserted down over the two outer SO239 connectors center pins. A piece of #12 solid copper insulated wire is then inserted between the center SO239's center pin and one of the outer SO239's center pin. Then all three center pins are soldered. The two outer SO239 connectors with the lugs attach to the lower ends of your loop with the stainless steel machine bolts, lock washers and nuts. The center SO239 is your feed point. The two outer SO239 connectors are where you connect a ½ wavelength piece of coax which creates the 4 to 1 balun. The formula for the ½ wavelength piece of coax is 492 x VF / Freq in MHz = Length in feet of the coax. VF is the velocity factor of the coax. Just coil up the coax into a circle, tape it in at least three places and let it hang as weight to hold down the point of the inverted delta loop. Caution, don't try to make the coil real small especially on 15 and 10 meters. It will have an effect on the antenna resonance and add extra reactance. If you have used the formulas to calculate the perimeter and the resonant frequency seems way off to begin with, make the coil diameter wider. Tightly wrap at least 3 layers of Scotch 33 electrical tape around the all PL259 to SO239 connectors for water proofing. On the antenna side of the aluminum plate use "duct seal" over the SO239 connectors, lugs and machine screws to keep water out of the SO239 connectors or any other sealant you choose. Never use silicon seal that has an acidic smell. It will corrode and short out the RF connections.

The insulators are important and can have an effect on the resonant frequency of the delta loop or the inverted delta loop. The larger the diameter of the bend of the wire going through the insulator the less chance of breakage. All my wire antennas are #12 solid insulated house wiring. I use large black or white plastic egg "electric fence" insulators found at most farm stores also found on the internet. An example of what I use is made by AMERICAN FARM.WORKS Corner Post Insulator (High Strain) model ICJB-AFW. There are many companies that sell insulators like these. Pick an insulator that has a "round hole" so that the wire goes in a curve around and through the insulator. Many insulators have "square holes" which will put two 90 degree bends on the wire and reduce its strength and longevity. The yellow-colored electric fence insulators are more brittle and break easier.

If you use this type of large insulator the wire freely moves through the insulator which can cause the triangle to lose its shape. To remedy this situation, where the wire exits the insulator on both sides just past the end of the insulator, I remove about ¾ inch of the insulation and soldered a short piece of #12 wire between the two wires. This prevents the wire from slipping through the insulator. These large insulators with the short across them will also "change" the resonant frequency of the loop to a higher frequency. After constructing many of these loops with the above insulators the following formula is more accurate for determining the loop's perimeter length. 1030 / Freq in MHz = perimeter length in Feet.

Field Day is almost here so I have some suggestions.

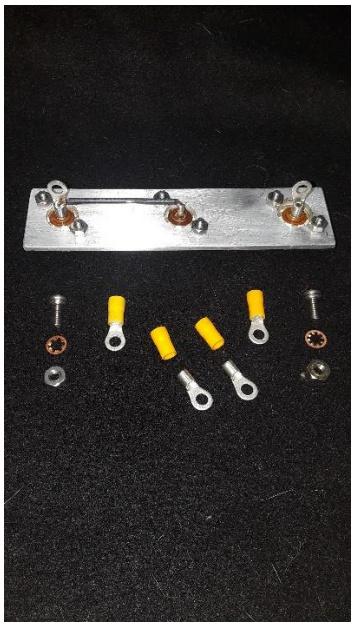
Put up a point down Delta loop especially on 40 meters if possible. If you don't have two support points about 50 feet high and 50 feet apart for the loop then here is another suggestion I always wanted to try.

This can apply to any Delta Loop on any band. With one support point put up a Point up Delta Loop. Create two feed points. One in the center bottom wire of the loop and the other feed point at one of the side corners. Put small DPDT 12 volt DC relays, in a little box at each feed point. Bring the two feed lines and relay power lines back to the transceiver site.

Set up the relays so that one set of contacts goes to the coax shield and the other set of contacts go to the coax center conductor. (this could be done in a little plastic box with an SO339 connector and two wires coming out to connect to the antenna feed points, maybe with banana plugs so it could be used again next field day) On one relay put a short across the Normally closed contacts. On the second relay put a short across the Normally open contacts. The relay wipers go to the coax feed lines, the other thermals go to the antenna feed points. Now you can switch between the two feed points and short out the feed line not being used at the antenna feed point.

You can get real smart and build a little box with a triple pole double throw switch, five SO239 connectors and a 4 pole terminal strip that will switch the transceiver coax feed between the two coax feed lines and correctly activate the correct relay in and out.

This will give you a choice of a High angle lobe or a Low angle lobe from your location depending on what the propagation is like at the moment and give you a better chance of more contacts over your competition.



PVRC DXCC Challenge Standings – Frank W3LPL

Below are the DXCC Challenge totals for PVRC members, transcribed from the ARRL DXCC 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	3204	W4FQT	2622	KN4KL	2079	K3KY	1606
W3UR	3183	N4TL	2605	W3GG	2071	KE3X	1588
W3LPL	3172	N3KK	2575	N4NW	2068	NA1DX	1579
K4CIA	3138	K5VIP	2572	N3KN	2066	W3OU	1568
N2QT	3106	N4QQ	2565	AA4NC	2061	N3AO	1527
W4PK	3038	K3JT	2560	W3XY	2055	WB2ZAB	1522
N4BAA	3037	W3BW	2554	W3FOX	2002	AA4FU	1519
W3DF	2995	W3OA	2550	W0YVA	2001	K4HQK	1518
K4SO	2989	WA2BCK	2524	K5RJ	1961	KU1T	1501
N4MM	2987	W4VIC	2509	N3KS	1906	N3AIU	1487
WX4G	2973	W2GG	2486	K4EU	1871	W8AKS	1487
K1HTV	2972	N3RC	2432	N3ND	1867	WA3EKL	1462
N3NT	2966	N4GG	2426	K3STX	1826	N3HBX	1428
W3LL	2953	W2YE	2334	W2CDO	1825	N8II	1390
K5EK	2949	K0GD	2314	K3AJ	1818	N1EK	1388
W3KX	2930	K1ZZI	2314	W3KB	1815	W4PRO	1377
W0VTT	2928	K3TN	2300	W3DM	1791	NR4M	1367
K1AR	2919	W3YY	2297	KE4S	1758	W9GE	1364
K2PLF	2903	K4WNW	2278	K4QE	1753	AK3E	1348
KG7H	2896	KA4RRU	2256	W3US	1750	KG4USN	1337
AB3CV	2889	W3IP	2226	N3OC	1749	W3NRJ	1325
K3WC	2889	NW4V	2219	K1RH	1748	N1SZ	1317
N4DB	2858	W3MR	2217	N3MK	1738	K4ZA	1313
KG4W	2853	K4FJ	2214	N4GU	1738	K5VG	1234
K3WA	2839	N4JQQ	2208	N4XYZ	1720	K4NTO	1222
K3RA	2708	KM3V	2206	ND3F	1718	N3RR	1199
K5RT	2689	K1EFI	2190	W4GP	1710	W4NF	1181
K1GG	2673	N4ZH	2188	KF7NN	1698	K3IXD	1090
WB3AVN	2669	K2BA	2153	W3UL	1679	NE3K	1073
N3MN	2657	N3QE	2147	NE3H	1668	N3COB	1049
W4FQT	2622	W3TN	2132	K3WI	1652	W4ZV	1048
N4TL	2605	K3PU	2107	N4ZR	1651	K4ZW	1044
N3KK	2575	K3SX	2092	WB4DNL	1620	K4VX	1021

DX Marathon Update – Frank W3LPL

PVRC is competing in the DX Marathon. Please contribute your normal and contest QSOs to our effort - see dxmarathon.com

K5EK 274	**K3TN 232**	**W3ZQI 196**	**N3QE 184**	**N3ZQI 156**
W4VIC 262	**W3LL 230**	**N4ZR 194**	**N5HC 176**	**W3IDT 133**
W3LPL 260	**K3AJ 213**	**N1RM 193**	**N3RT 163**	**N4CF 128**
N2QT 255	**N3AM 206**	**N1EK 191**	**KK4ODQ 162**	**N4IW 141**

Membership News – Tim N3QE

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 2024	
+ PVRC Reunion	0000Z-0159Z, Jun 1 and 0000Z-0159Z, Jun 2
+ ARRL Inter. Digital Contest	1800Z, Jun 1 to 2400Z, Jun 2
+ Batavia DX Contest	0000Z, Jun 8 to 1700Z, Jun 9
+ ARRL June VHF Contest	1800Z, Jun 8 to 0259Z, Jun 10
+ All Asian DX Contest, CW	0000Z, Jun 15 to 2400Z, Jun 16
+ Stew Perry Topband Challenge	1500Z, Jun 15 to 1500Z, Jun 16
+ His Maj. King of Spain Contest, SSB	1200Z, Jun 22 to 1200Z, Jun 23
+ ARRL Field Day	1800Z, Jun 22 to 2100Z, Jun 23

RED – scores count towards PVRC 5M Awards or Challenge Program

Editor's Last Word – John K3TN

Thanks to K2YWE, W3IP, WA3EKL K2GO, K5VIP, AE3T, W3UR, K3AJ, N1EK's XYL, NW3L, N4GU and W3LPL for contributions to this issue of the PVRC newsletter.

The quality and usefulness of the PVRC newsletter depends on contributions from members. If you have photos from club meetings, screenshots of new contest software, or writeups on station improvements or contest war stories, send them in any format to jpescatore at aol dot com

From the PVRC Treasurer – Ted WA3AER

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.

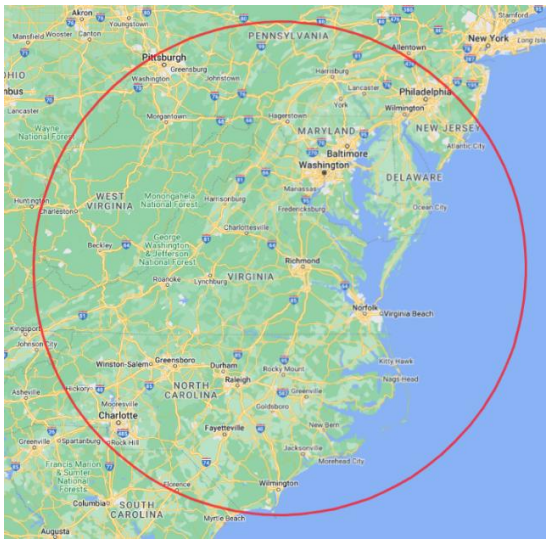
Direct donations to PVRC via Credit Card or PayPal may be made by clicking this "Donate" button and clicking the next Donate button that appears on your screen:

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.



Now a Word From Our Sponsors

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

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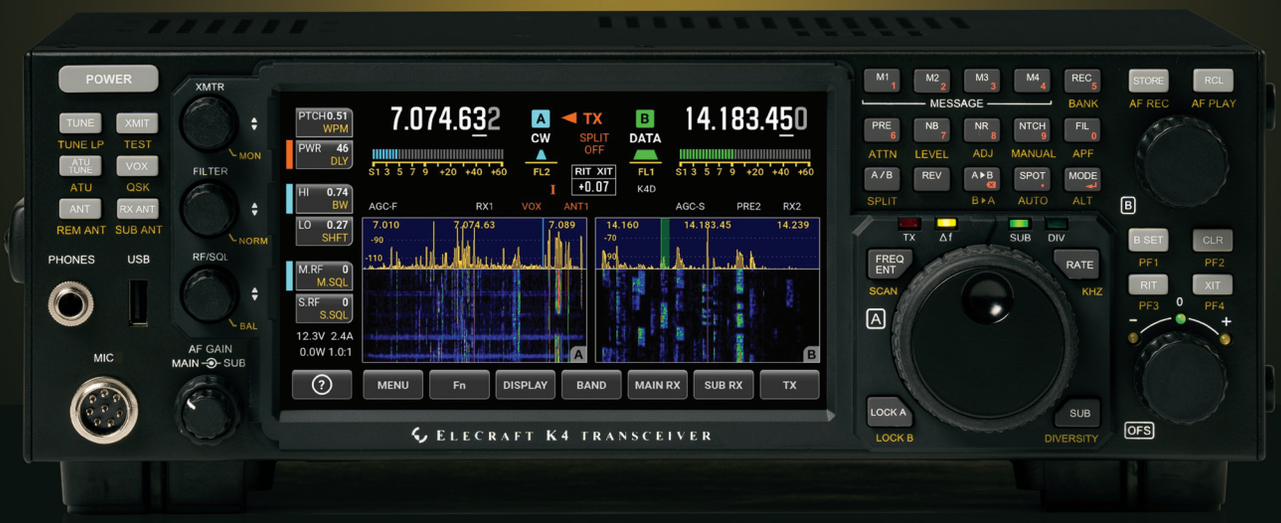
ELECRAFT K4

High-Performance Direct-Sampling SDR



A direct-sampling SDR you'll love to use

Our new K4 transceiver harnesses advanced signal processing while retaining the best aspects of the K3S and P3. It features a 7" touch display, plus a rich set of dedicated controls. Per-VFO transmit metering makes split mode foolproof. Band-stacking registers and per-receiver settings are versatile and intuitive. Control usage information is just one tap away thanks to a built-in help system.

Modular, hybrid architecture adapts to your needs

The basic K4 covers 160-6 m, with dual receive on the same or different bands. The K4D adds diversity receive, with a full set of band-pass filters for the second receiver. (Thanks to direct RF sampling, there's no need for crystal filters in either the K4 or K4D.) The K4HD adds a dual superhet module for extreme-signal environments. Any K4 model can be upgraded to the next level, and future enhancements–such as a planned internal VHF/UHF module–can be added as needed.

Single or dual panadapter, plus a high-resolution tuning aid

The main panadapter can be set up as single or dual. Separate from the main panadapter is our per-receiver *mini-pan* tuning aid, with a resampled bandwidth as narrow as +/- 1 kHz. You can turn it on by tapping either receiver's S-meter or by tapping on a signal of interest, then easily auto-spot or fine tune to the signal.

Comprehensive I/O, plus full remote control

The K4's rear panel includes all the analog and digital I/O you'll ever need. All K-line accessories are supported, including amps, ATUs, and our K-Pod controller. The USB display output supports its own user-specified format. Via Ethernet, the K4 can be 100% remote controlled from a PC, notebook, tablet, or even another K4, with panadapter data included in all remote displays. Work the world from anywhere–in style!

K4 KEY FEATURES

- Optimized for ease of use
- Modular, upgradeable design
- 7" color screen with touch and mouse control
- ATU with 10:1+ range, 3 antenna jacks
- Up to 5 receive antenna sources
- Full remote control via Ethernet

The K4 interfaces seamlessly with the KPA500 and KPA1500 amplifiers

'The performance of their products is only eclipsed by their service and support. Truly amazing!' **Joe - W1GO**

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HAM RADIO OUTLET®

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Family owned and operated since 1971

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-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-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-R8600 | *Wideband SDR Receiver*

10 kHz to 3 GHz Super Wideband Coverage • Real-time Spectrum Scope w/Waterfall Function • Remote Control Function through IP Network or USB Cable • Decodes Digital Incl P25, NXDN™, D-STAR • SD Card Slot for Receiver Recorder

IC-905 | *VHF/UHF/SHF All Mode Portable*

• GPS-Controlled Oscillator for Ultimate Frequency Stability • Separate Controller & RF Unit Configuration • Industry First 144 MHz to Microwave Transceiver • Wideband 50 MHz Span Real-time Spectrum Scope • Full D-STAR Functions

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

ID-5100 AD

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-V3500 | *144MHz FM Mobile*

• 65W of Power for Long Range Communications • 4.5 Watts Loud & Clear Audio • Modern White Display & Simple Operation • Weather Channel Receive & Alert Function

ID-50A | *VHF/UHF D-STAR Portable*

• High Visible LCD with Backlight Function • Find Nearby Repeaters with the Built-In GPS • Easy D-STAR Settings for Beginners • Voice Recorder Function • Share Pictures in DV Mode

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-T10 | *Rugged 144/430 MHz Dual Band*

• Disaster Ready - Excellent Fit for Your Emergency Bag • Loud Audio - New Speaker Design • Long Bettery Life - Up to 11 Hours • FM Broadcast & Weather Channels

ID-52A | *VHF/UHF D-STAR Portable*

• Bluetooth® Communication • Simultaneous Reception in V/V, U/U, V/U and DV/DV • Enriched D-STAR® Features Including the Terminal Mode/Access Point Mode • UHF (225~374.995MHz) Air Band Reception

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