



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 – Mike N4GU

This newsletter is for June, but many of us have just returned from Hamvention after a two-year break and it was good to be back! It was great to see so many PVRC'ers in person, some for the first time. If you've couldn't make it this year, start making plans for next year.

Friday, we had our 'traditional' (OK, second sorta-annual) group picture at the Hamvention (see below). Not everybody was able to make it to the photoshoot, but it does show that PVRC had a great turnout. Also on Friday, we had a presentation to the ARRL of funds for the PVRC scholarships which is detailed in a separate piece in this newsletter. A real highlight for me was the performance of the Spurious Emissions Band on Friday night. These guys sounded better than ever. The show was dedicated to Will, AA4NC (SK), one of our own and a past member of the band. There should be some good videos of their performance on YouTube shortly. Look for them.

WRTC 2022 (2023) is a little over a year away. PVRC is well represented with eight(!) members going as either team leaders or teammates. What an incredible showing. At Hamvention we got information on station sponsorship (no tents!) from the organizers. Shortly, we will be announcing a fund-raising campaign to sponsor (hopefully) several stations at WRTC. With so many competitors from our club, we should be generous in our support.

Despite being summer, June is a busy month on the air. Up first is the PVRC Reunion on June 3 and 4. Check out the details on our website [here](#). Say hi to some old friends and meet some new ones.

The same weekend is the inaugural running of the ARRL International Digital Contest. This event does have a club competition like all the other ARRL contests, so we should try to capture that gavel as well. We can be the first first! Check the ARRL website for details.

Next up is the ARRL June VHF contest. This is a 5M contest and we are awarding Double 5M points for it this year. Not only can it be fun, there is always the (now

traditional) PVRC Pipe Antenna Award by K3AJ. Get out your wire and some PVC pipe and get creative. I'll leave it to K3AJ to announce the official "rules". That should be enough to keep you busy this month. This is the end of our contest season for 5M and Olympic awards, so it will be time to start counting up the scores. There may be some changes in our award programs for next season. We will announce those, if any, next month.



Hamvention 2022, Photo curtesy of Chip, N2YO

PVRC Officers:

President: N4GU Mike Barts
Vice President: K3WA Bill Axelrod
Vice President: AA3S Doug Hart
Secretary: N3QE Tim Shoppa
Treasurer: WA3AER Ted Bauer

Trustees:

K3MM, N3OC, K2AV, K7SV, W3LPL, N3KN, W2RU, W3LL, N4RA

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/>

PVRC Donates to the ARRL Scholarship at Hamvention 2022.

At Hamvention 2022, PVRC presented the ARRL Scholarship Fund a check for \$1072.78. Mike Barts, President N4GU, and Ted Bauer WA3AER Treasurer, made the presentation on Friday, May 20 to Melissa Stemmer KA7CLO, who is the ARRL Manager for Development and the Scholarship Fund. The donation was the result of donated equipment sales by Ike Lawton W3IKE.

Melissa was very appreciative of PVRC's donation and reports that she still intends to have the fund's Web page support electronic donations. Until that becomes available, if you prefer, you may call Melissa at 860-594-0348 to donate using your credit card. Please note that you are donating to the PVRC Scholarship. – *Ted WA3AER*

Annual W3LPL Open House, Saturday June 18 – Frank W3LPL

The Annual W3LPL Open House will take place as usual on Saturday June 18th at noon, rain or shine. NCDXA and PVRC members and their guests are welcome. However, Phyllis and I respectfully request that anyone who is not fully vaccinated not attend this year's event, for our protection and the protection of all of our guests.

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.

Please Join Us On the Air For the 2022 PVRC Reunion – Tim N3QE

The PVRC 2022 Reunion will be in two two-hour sessions with activity centered "on the 47's" to celebrate the founding of PVRC in 1947. PVRC's motto of "Once a member, always a member" shines through and this is an excellent opportunity to meet and greet on the air with members who are now living out of circle.

As part of our celebration of PVRC's 75th anniversary, the club calls of Vic, W4KFC and Lenny, W3GRF will be active in the reunion! Tell all your friends about the [PVRC reunion website](#).

Times and Dates

This year there are **two** two-hour sessions throughout the weekend:

Friday June 3, 8PM-10PM EDT (that's June 4 0000Z-0159Z)

Saturday June 4, 8PM-10PM EDT (that's June 5 0000Z-0159Z)

Modes and Center-of-Activity Frequencies

Suggested CW frequencies: 1817, 3547, 7047, 14047, 21047 and 28047 kHz.

Try to emphasize CW Activity on the **even** UTC hours Suggested SSB frequencies: 1847, 3847, 7247, 14247, 21247 and 28447 kHz. Try to emphasize SSB Activity on the **odd** UTC hours Moves between bands and modes are highly encouraged.

Scoring

1 point for each QSO with PVRC member, work each member once per band-mode combination. Moves between bands, especially at slow times, are highly suggested!

Spotting

Spotting of PVRC members is highly encouraged. In fact, self-spotting in this event is encouraged as well! It's amazing the level of non-member activity you can stir up, especially on phone, with a few self-spots. The on-the-air activity with nonmembers is an excellent opportunity to explain a little about PVRC as a contesting club to non-members, and point them to the PVRC website if they want more information about contesting or our club.

When spotting PVRC'ers for this reunion, please give a comment to the effect of PVRC Reunion.

Participation Eligibility

Both PVRC Members and Non-Members are welcome to participate. Non-members can work PVRC members for points and earn award certificates in their own non-member category.

CQ

Call "CQ PVRC" on CW, and "CQ PVRC Reunion" on SSB.

Exchange

A PVRC member's exchange is the year you joined PVRC, your name, your state/country, and your callsign when you joined PVRC. Example QSO between two PVRC members:

WX3B: CQ PVRC DE WX3B WX3B

K4ZW: K4ZW

WX3B: K4ZW 1998 Jim MD WA2GPQ

K4ZW: WX3B 86 Ken VA KE9A

WX3B: TU WX3B

Note: A non-member only gives his name and state/country for the exchange

Logger Support

You can use any general-purpose logger for this contest. You will have to count up member and non-member QSO's when filling out the score summary form.

A UDC file is available to teach N1MM+ how to handle the PVRC Reunion. It will handle scoring for you automatically. Please right-click and download PVRC2017.UDC and save it in your Documents\N1MM Logger+UserDefinedContests directory. Then quit and restart N1MM+ and you will find PVRC2017 available as a contest log type you can create.

A Youtube video is available to help you download, install, and use the PVRC2017 UDC module. Access it [here](#).

Results Submission

You can submit your results online, using either a score summary sheet, or a Cabrillo log. Submit your results [here](#):

PVRC Takes Home Another Club Plaque – Dan K2YWE



Eric W3EAB, president of the AARC, (r) presented a club plaque to Dan K2YWE for PVRC for as top scoring club in the 2021 Maryland QSO Party.

Congrats to PVRicers Who Have Qualified for WRTC 2023

QDOs to the following PVRicers who qualified for the World Radiosport Team Championships 2022 to be held in Italy in 2023 (team leads in bold):

- **KU1CW**
- W2SC
- KE3X
- N3QE
- **NN3W**
- **KD4D**
- N4YDU
- N9NB

WRTC Goals

- The Ham Radio Contesting Olympics
- To Find the World's Best Contester
- To Foster International Friendship
- To Develop Contesting Technology



Elecraft K4 Compressions with Controlled Envelope SSB – Rick N1RM

[Note: This article describes a feature that was introduced in K4 Firmware Beta Revision 29. Shortly after I wrote it, Elecraft recalled Beta R29 due to a couple of instances of lockup during the update. They have recently introduced Beta R30 which also includes the CESSB feature. It is likely that R30 Tx audio behaves the same as R29, but I have not tested it yet. – N1RM]

Single sideband¹ is a very efficient way of modulating RF with audio. All the RF power coming out of the transmitter directly contributes to the reproduction of the audio signal in the receiver with no watts wasted in a carrier or redundant sideband.

The average power of the human voice, compared to its peak, is low – often several dB below peak power. That means that the average power of your voice, and therefore the average power out of your transmitter, is nowhere near the peak. Your 100-watt peak transmitter may only put out a few watts of average power when operating SSB voice.

Speech compression is a valuable tool for SSB communications. The general idea is to increase the level of quieter parts of speech so that the average power is greater and more easily heard. In addition, most speech processors redistribute the power to different frequencies, emphasizing those that are most important to speech intelligibility. These are simple concepts, but they are difficult to implement without the output signal becoming distorted or growing in bandwidth (“splattering”).

Elecraft recently released beta version 29 of their firmware for the K4 transceiver. One of the significant changes made in that release is the addition of Controlled Envelope Single Sideband (CESSB) processing in their speech compression. Elecraft claimed that there was a significant increase in average power when using compression in this release without increasing the bandwidth of the signal.

The compression algorithm in R28 was not very effective. It appeared to decrease average power when first engaged and provided very little increase in average power even when turned up to maximum. As a result, I was very interested in comparing the two versions of the compression processing.

I happened to get access to a K4D with R29 firmware and a K4 with R28 firmware, so I took this opportunity to do some A/B comparisons of the two versions. What I found was that the new firmware is a huge improvement over the previous version of speech processing.

Test Setup

I set up the two K4's so that they could be modulated simultaneously by the same signal. Both output waveforms as well as the original audio were displayed on an oscilloscope. I also fed the output of one radio at a time to a spectrum analyzer for use in computing the peak and average output power and also for observing the frequency spectrum of the RF signal. The setup is shown in Figure 1.

¹ Hams often refer to Single Sideband but nearly always mean “Single Sideband Suppressed Carrier” modulation. I’m assuming Suppressed Carrier in this writeup.

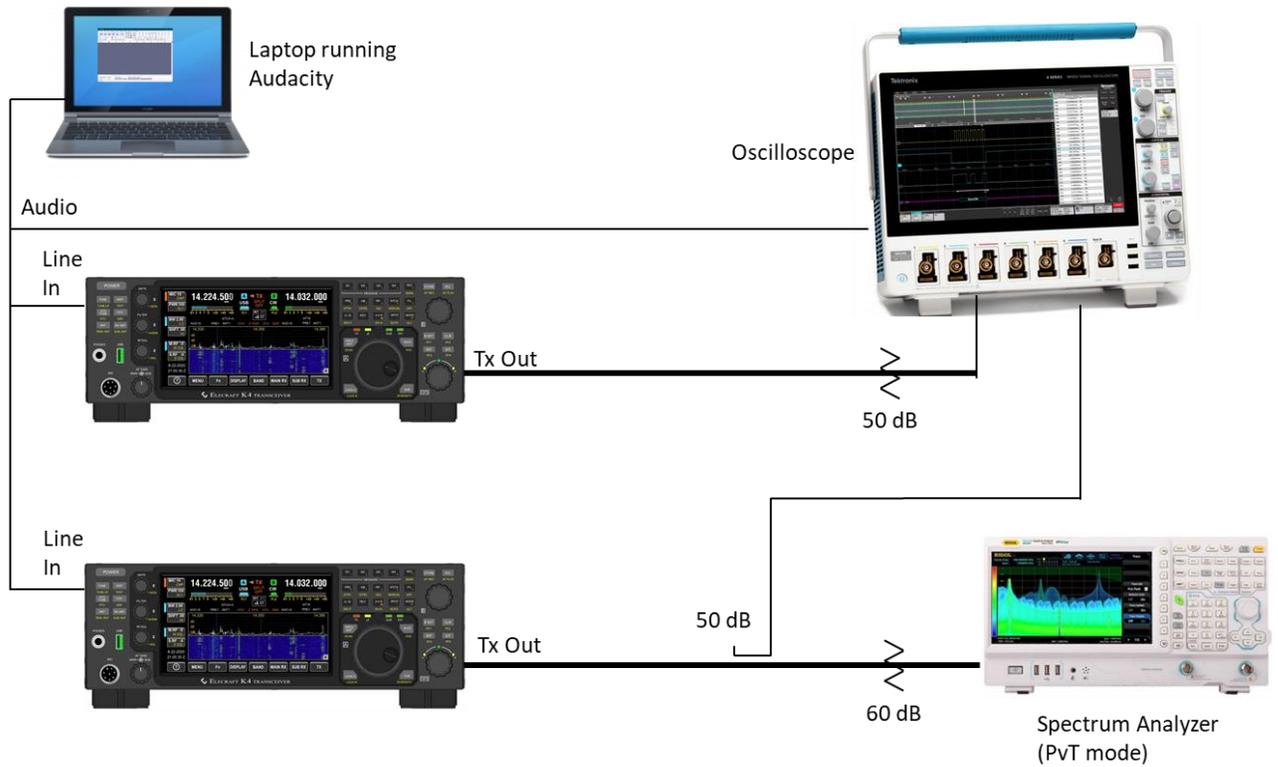


Figure 1 - Test setup for compression measurements

I recorded a 4 second audio clip calling CQ on a computer using Audacity software. I fed the audio output from the computer to the analog line input on the two radios, and to one channel of the oscilloscope. Since audio processing in the radio changed between the releases, I used a 1 kHz test tone to set the line input levels on the two radios for full output power with minimal ALC action. Since ALC is also a form of compression, I wanted to minimize its effects. With the R28 firmware, the line input setting was 48 and in R29 it was 70. The pertinent settings for the two radios are in Table 1. I used VOX to key the radios.

Table 1 - Radio Settings

	R28	R29
Radio Model	K4	K4D
Radio Serial Number	00364	00122
Line in level	48	70
Output Power Setting	100	100
Noise Gate	N/A	Off
ESSB	Off	Off
Mode	USB	USB
Tx Bandwidth	2.8 kHz	2.8 kHz
Tx Equalizer	Flat	Flat
Compression	0,1,10,20,30	0,1,10,20,30

Audio Test Signal

I recorded “CQ contest, CQ Contest. This is November one Romeo Mike.” The clip was about 6 seconds long, but I only used the first 4 seconds of it. Figure 2 is a scope capture of the audio.

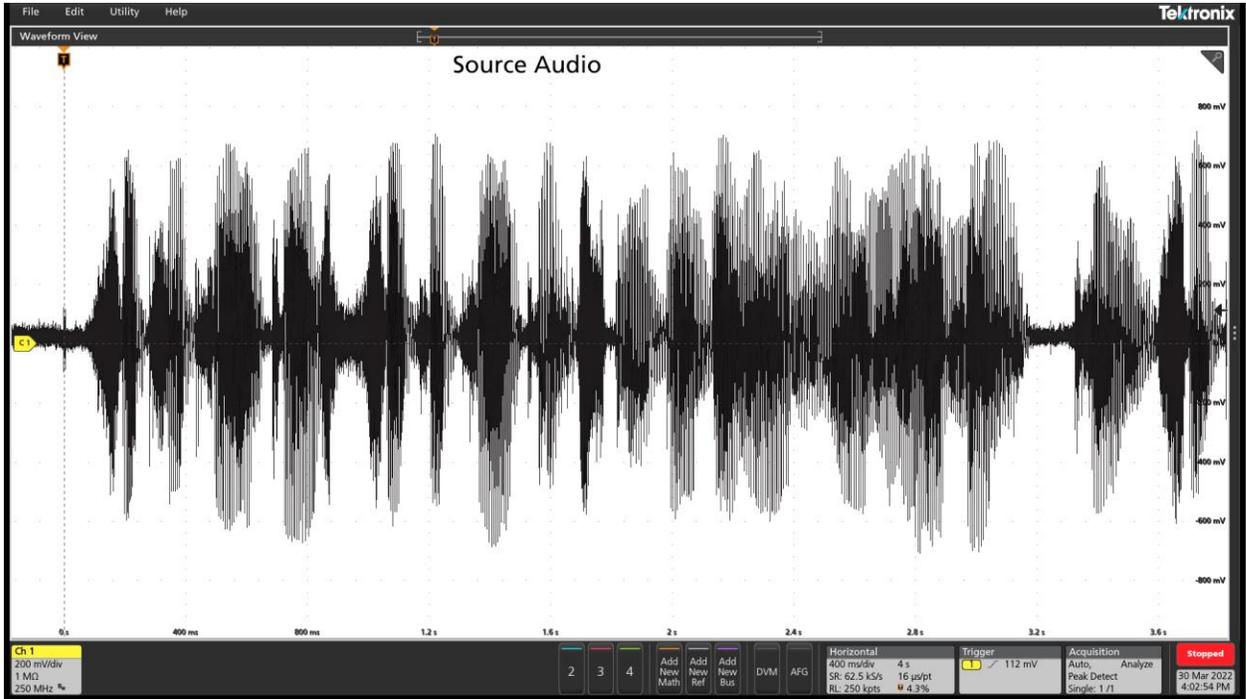


Figure 2 - Audio test signal

Results

RF Waveform Comparison

I ran the test signal through both radios at the same time and displayed both RF output waveforms on the scope. I captured the signals with compression off, and at settings of 1, 10, 20, and 30. The results are shown in the figures below.

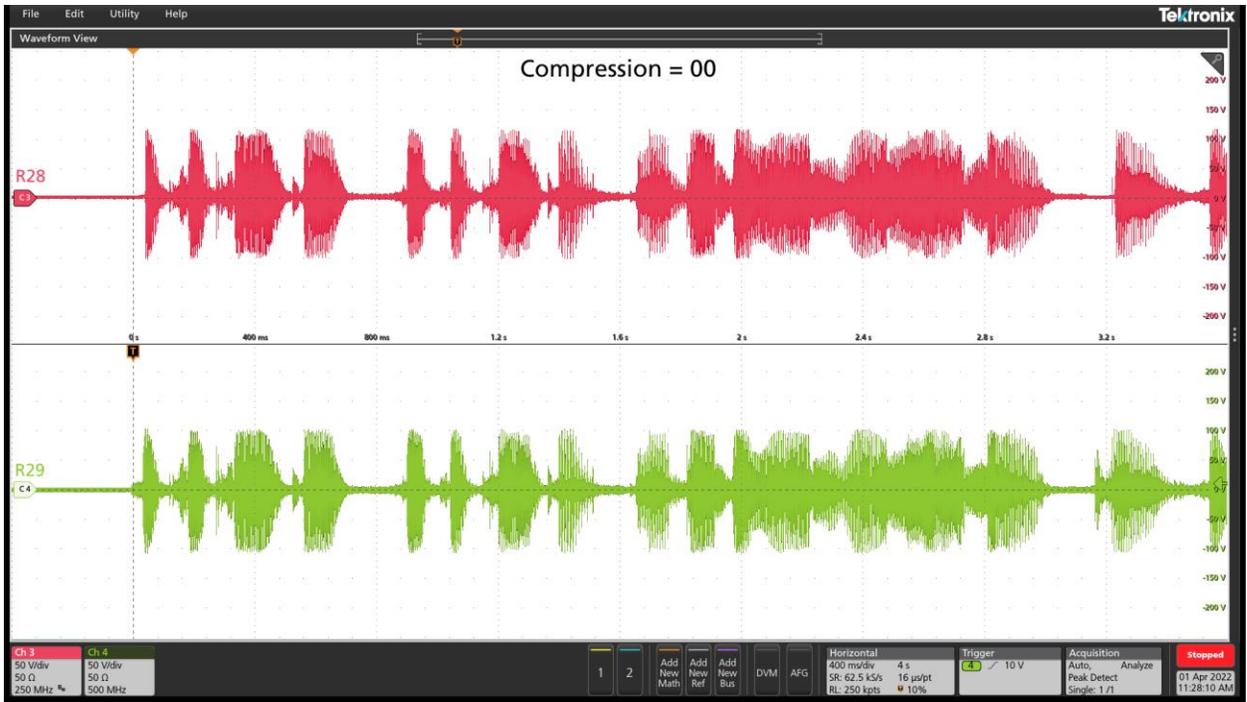


Figure 3 - RF with no compression

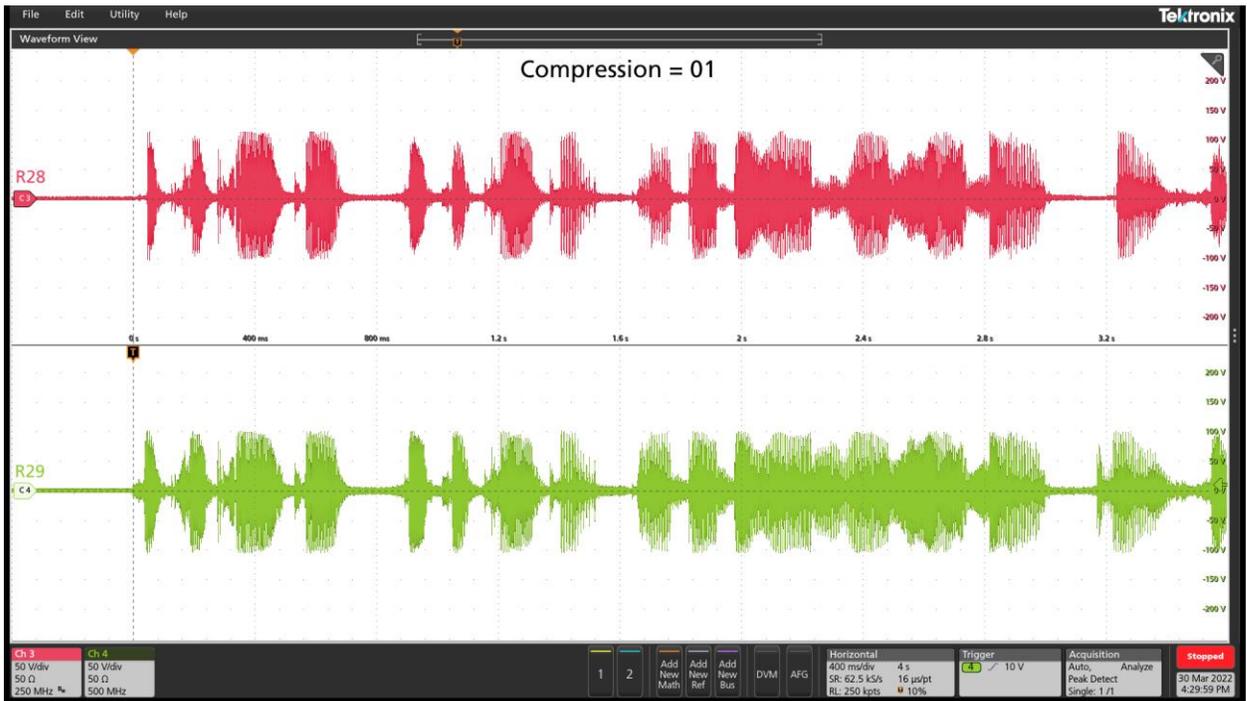


Figure 4 - RF with compression set at 1

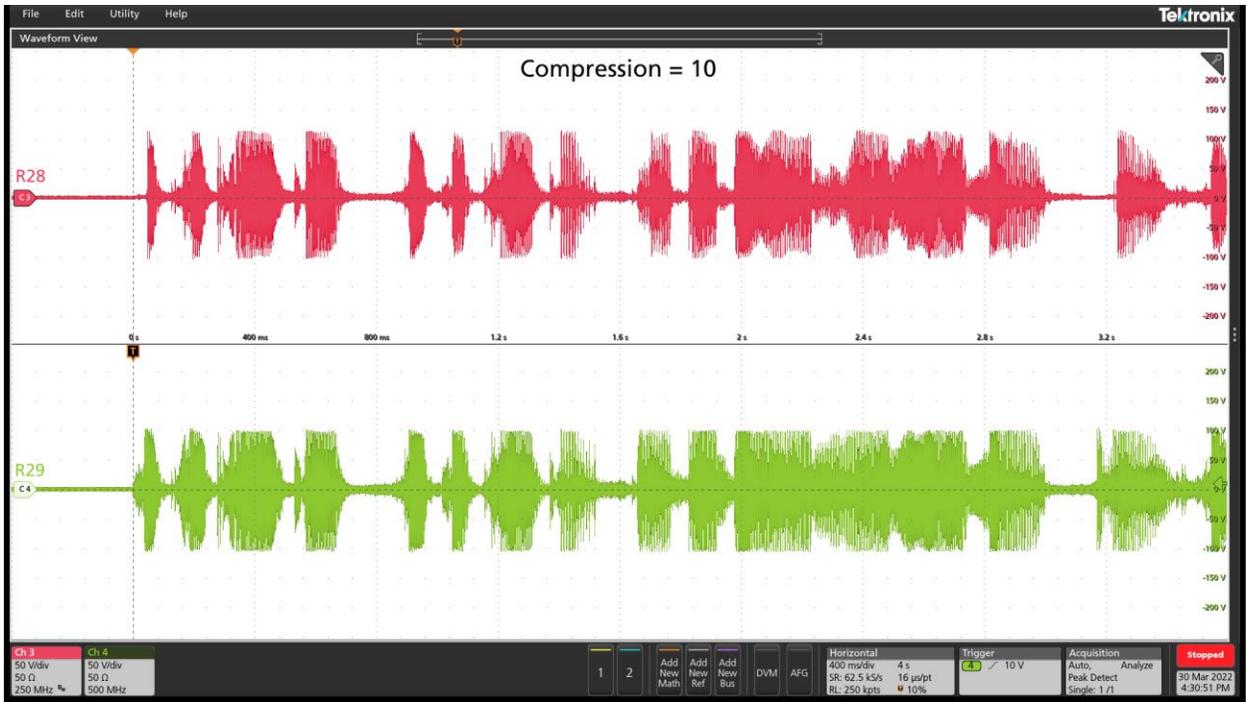


Figure 5 - RF with compression set at 10

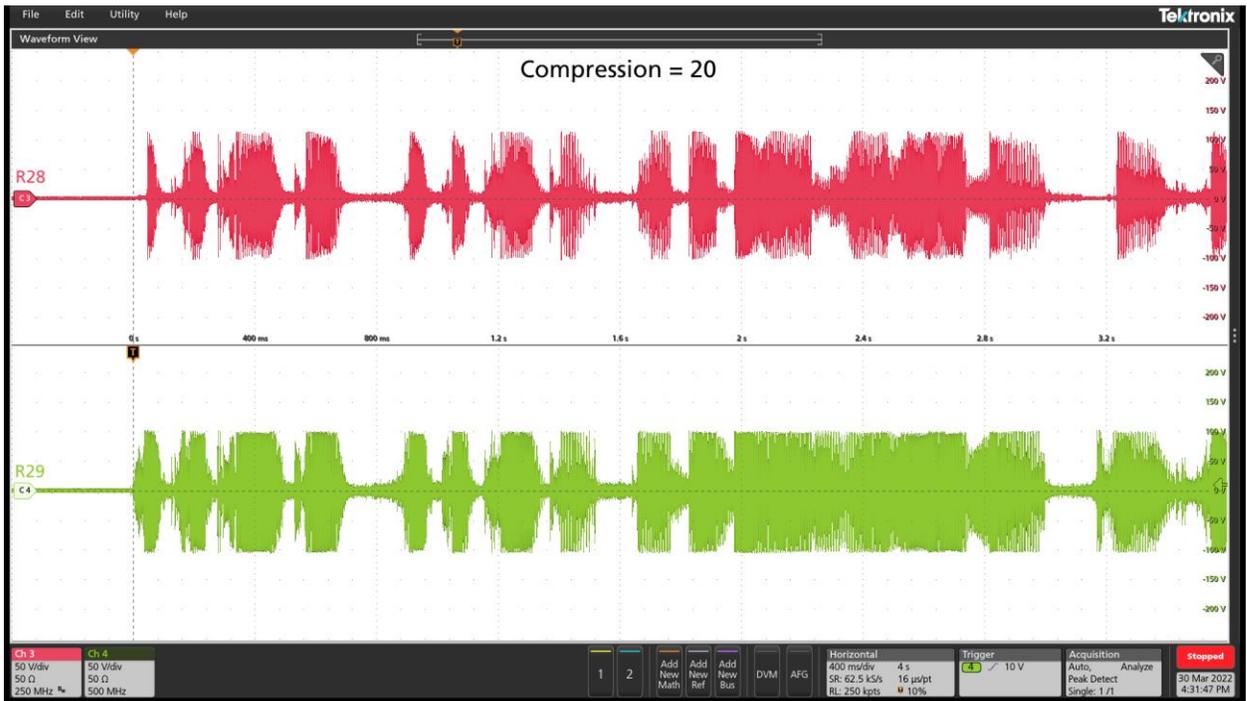


Figure 6 = RF with compression set at 20

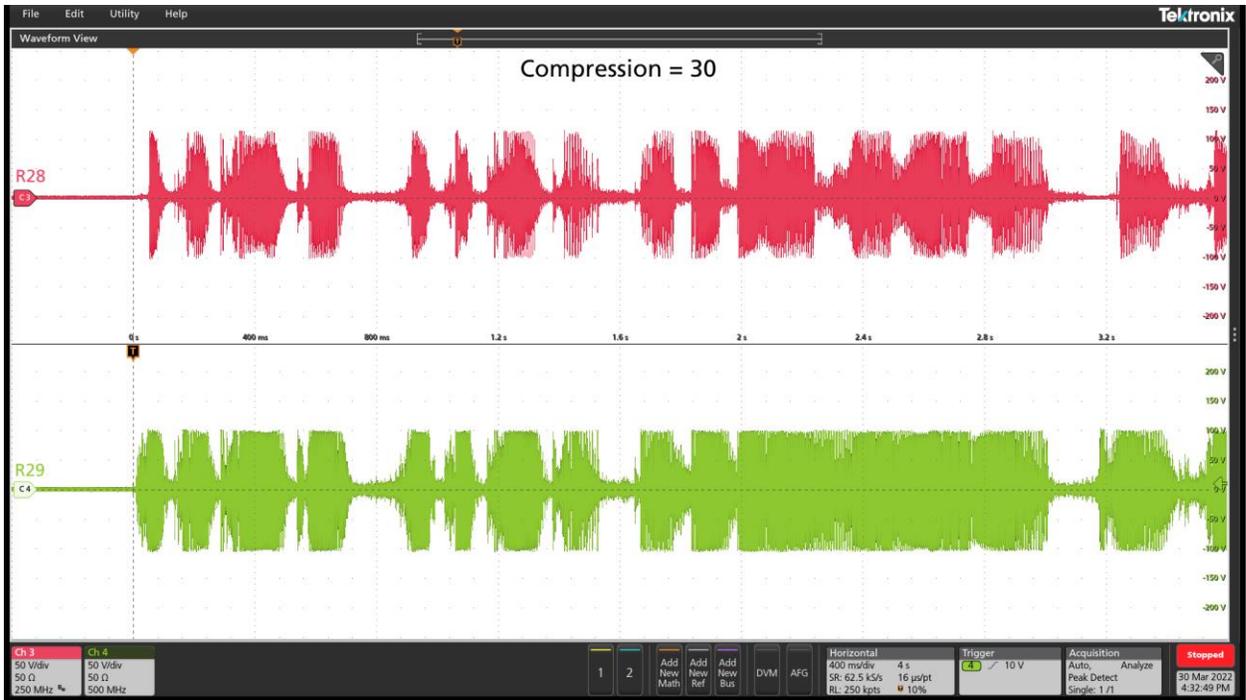


Figure 7 - RF with maximum compression

Peak and Average Power Measurements

I fed the output of each radio to a spectrum analyzer that was set up in Power vs. Time mode. I used it to perform a power measurement, taking 800 samples over approximately 4 seconds. I captured that data and transferred it to my computer for analysis. That analysis shows the huge improvement in average power in the R29 compression. The peak power was 100 watts, or 50 dBm.

Table 2 - Average power measurements

Compression	R29		R28	
	Average Power (dBm)	Delta	Average Power (dBm)	Delta
0	43.5	0.0	45.4	0.0
1	44.9	1.4	44.8	-0.6
10	46.3	2.8	45.4	0.0
20	47.1	3.6	45.8	0.4
30	47.5	4.0	45.9	0.6

There are a couple of very interesting things to note about this data. First, this data confirms what many folks were hearing in the R28 compression. It actually *decreased* average power output in compression settings below around 15, and even at the full setting of 30, it improved average power by less than 1 dB.

It also shows that the R29 compression is *much* more effective. At the highest setting of 30, average power increases by 4 dB and is less than 3 dB below the peak power. Even at a setting of 20, it boosts average power by over 3 dB. At these settings, the average power for this transmission is over half of peak.

I've included plots of power vs. time for both versions at compression settings of 0, 10, 20, and 30.

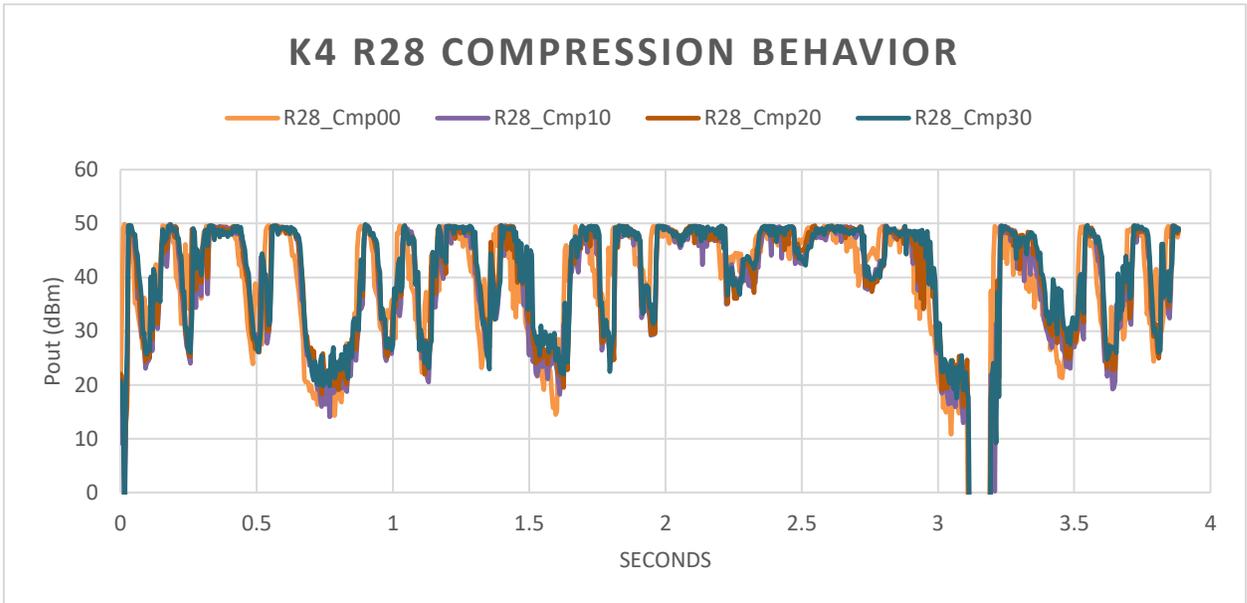


Figure 8 - R28 compression has little effect on average power

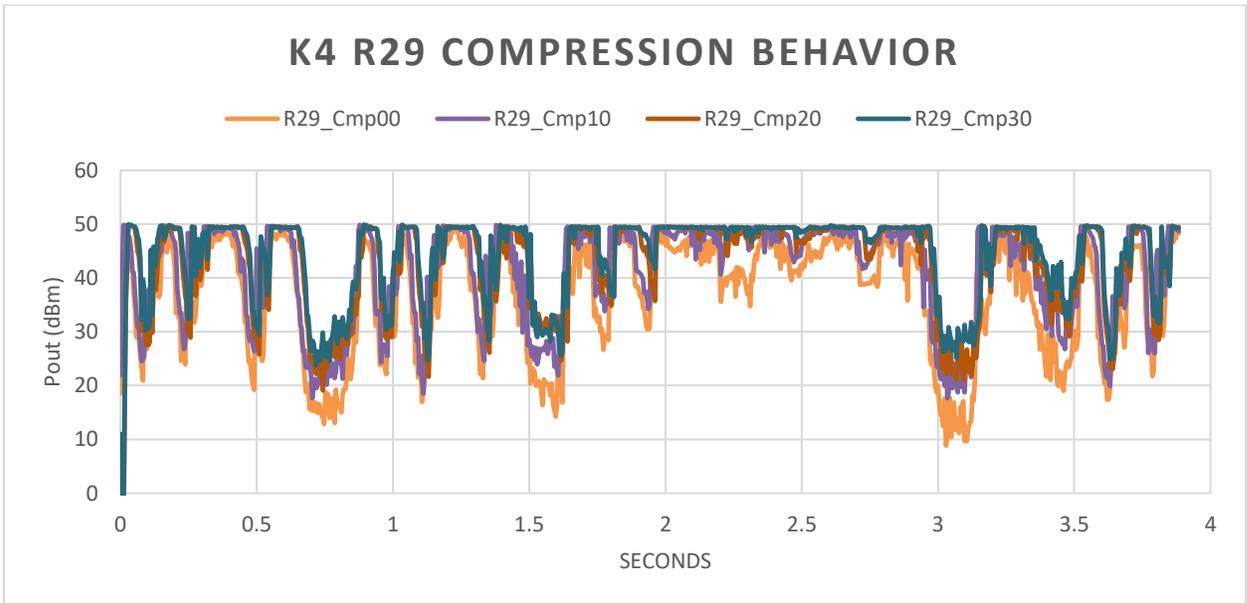


Figure 9 - The effect of the R29 compression is dramatic

Spectral Behavior

Very high compression levels aren't much good if they cause the signal to distort and "splatter" outside its normal bandwidth. Since the R29 compression is so effective, I was interested in knowing how well it constrained the signal's bandwidth. I did tests using my voice track as well as swept tone and white noise audio signals, using the spectrum analyzer in peak hold mode. The results all show that even at the maximum compression level of 30, there is very little increase in occupied bandwidth.

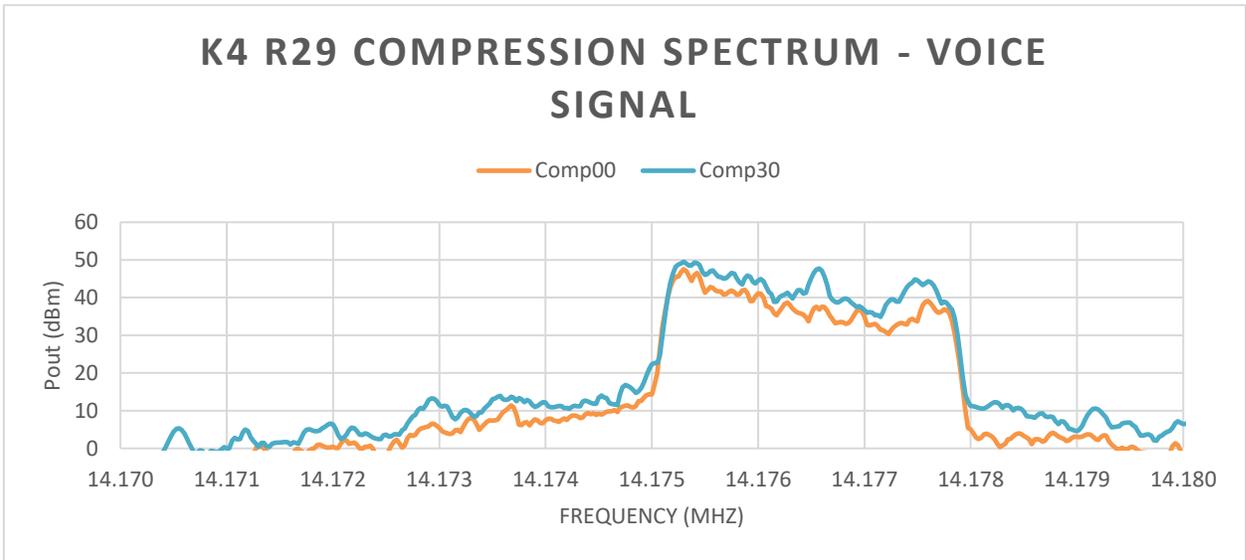


Figure 10 - R29 compression has very little bandwidth growth

I was interested in the audio frequency response of the transmitter with compression, so I used a swept tone for the input with the spectrum analyzer on max hold. The audio response looks quite flat and has nice steep skirts on the filtering. This surprised me a little bit since I expected some emphasis of certain frequencies of the audio signal.

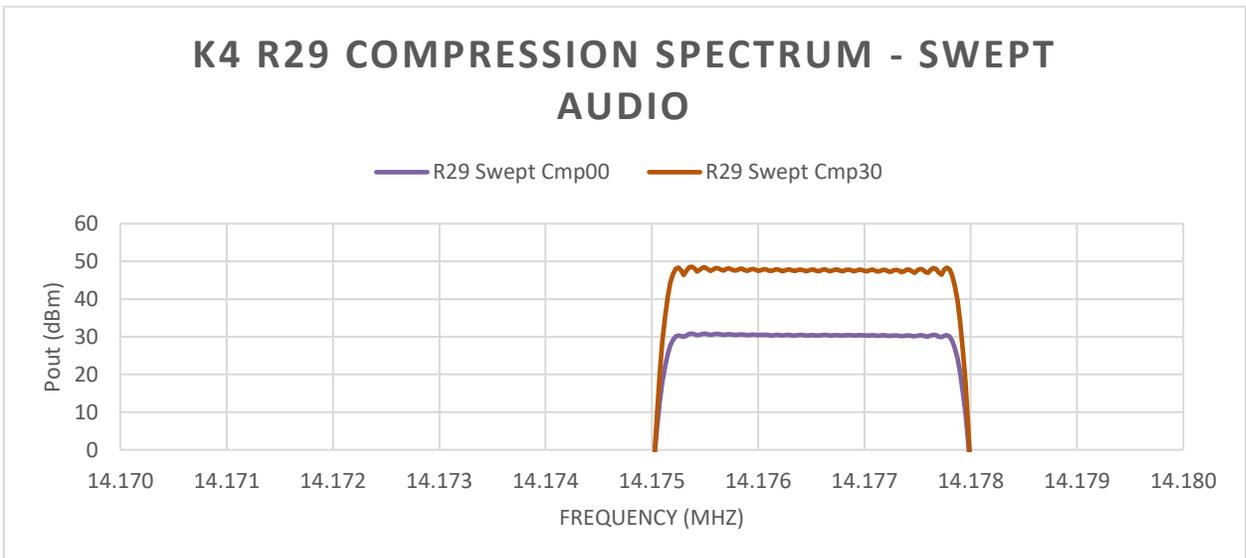


Figure 11 - The R29 audio response is very flat

I decided to try a white noise audio source to see if the response would be different. It also would expose non-linearities by generating random intermodulation products. There was a little more out-of-band signal, though it was still almost 30 dB down from the peak power output. The audio frequency response still looked very flat.

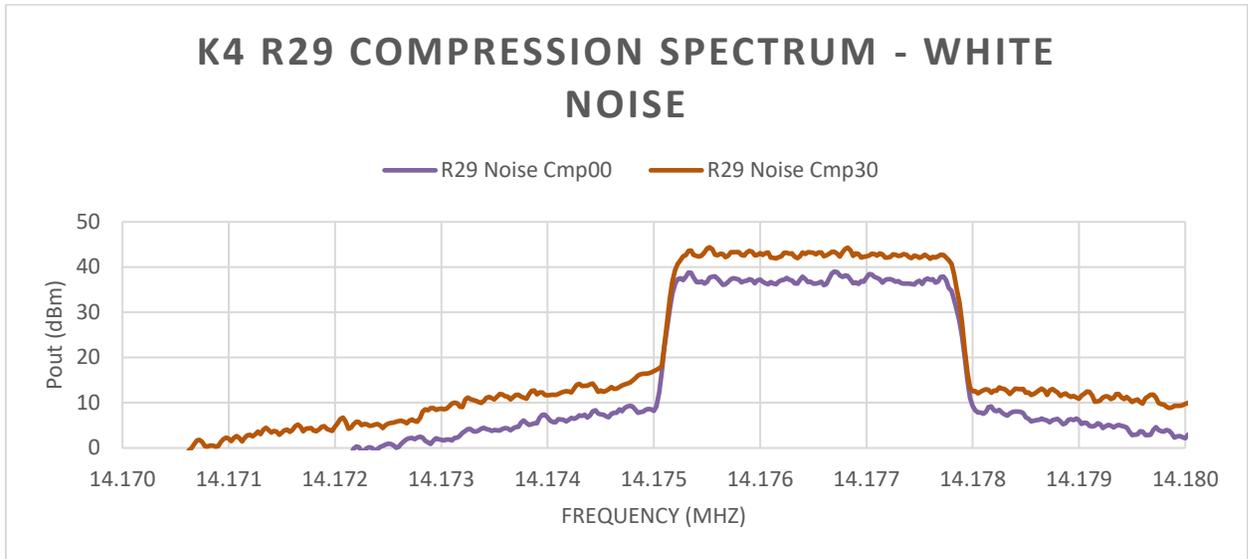


Figure 12 - R29 response to white noise audio signal

So, how does it sound?

I think it's amazing how much time the compressed waveform spends at or near 50 dBm (100 watts) in Figure 9, and the R29 RF envelopes in Figure 6 and Figure 7 are a little scary. They make it look like the RF is clipped, which would create lots of splatter. The spectrum plot of the signals, though, shows no significant widening of the signal bandwidth even at the highest compression levels. It looks like Elecraft's implementation of CESSB in R29 is very good.

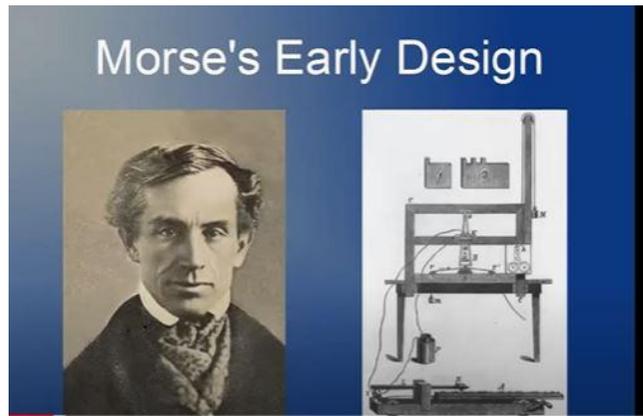
I used R29 in the WPX SSB contest right after installing it. I set the level to 20. I received more than the usual number of unsolicited "loud" comments, and also more than the usual number "great audio" comments.

I listened to the signal on the radio's monitor, which includes the compression processing. I found that up to a setting of around 20, the signal got much more punch with no significant effects on audio quality (to my ear). Full compression at a setting of 30 seems to be right at the onset of perceptible distortion. All these observations are purely subjective.

Bottom Line

In my opinion, the speech compression processing in Beta release R29 is a remarkable improvement over R28. It made my station louder without degrading audio quality and without any splatter.

Antique Wireless Association - History of the Telegraph



Antique Wireless Museum Telegraph Historian Chris Hausler explores the early history of telegraph, both the technology it used and the cultural changes it brought about. Watch [here](#).

Super Check Partial Is Getting Even More Super-er

From the ARRL Contest Update: Recent changes to Super Check Partial

Stu Phillips, K6TU, writes: "Users of Super Check Partial will see a significant increase in the number of call signs in MASTER and its derived files. This month's release (just posted live) has 40,940 calls in MASTER - up from 35,416 last month.

This step function in active calls is a result of a new API which allows logging programs to directly submit a log to Super Check Partial. This removes the need for the contester to take the extra step of emailing the log to logs@supercheckpartial.com. Logs are submitted securely to Super Check Partial over HTTPS and are "signed" by the logging program before submission to authenticate the origin of the log.

SCP API support has already been added to N1MM+, DXLog.net, SkookumLogger, N3FJP's loggers and Writelog. This support is in published releases for N1MM+ and DXLog.net, selected contests for N3FJP loggers and in beta versions for SkookumLogger, Win-Test, TR4W, and Writelog. N3FJP's release process will add this support to all their loggers through the course of this year.

I will be watching closely over the next few months to see whether the threshold needs to be changed. As in the past, please report busted calls or requests for add/deletions/changes to logs@supercheckpartial.com."

Stu also added that any logging software authors who wish to add the API support to their programs to contact him [directly](#).

Contesting Humor – Robert KI3O via the PVRC reflector

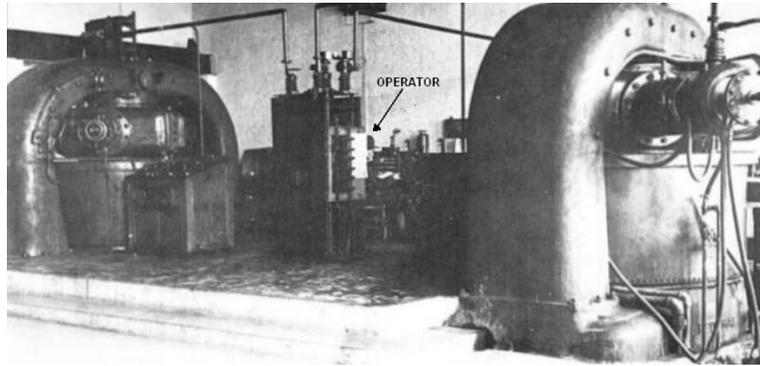


(Skipper obviously had not been to the Contest University – K3TN)

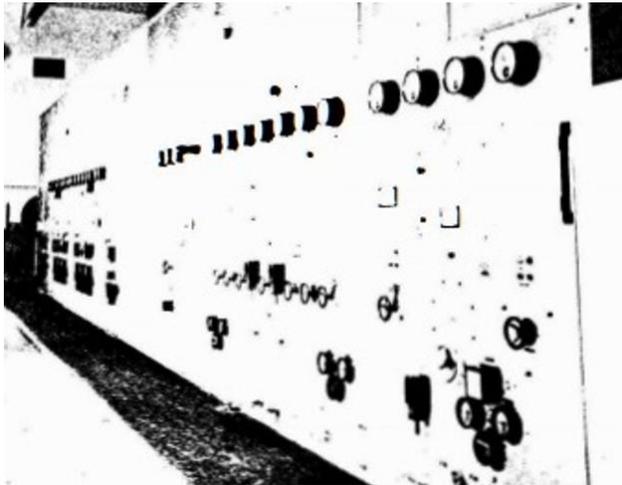
Armed Forces Day NSS Operation – Frank W3LPL



NSS operation last weekend was from a waterfront location about 1000 feet north of the now demolished 1918 transmitter building. K2YWE, K3LU, K3RA, W3UR and W3LPL made hundreds of CW QSOs, including QSOs with many PVRC members.



NSS operations began in 1918 using a pair of 500 KW Poulsen arc transmitters operating in the VLF band, a CW transmitter that produced severe phase noise interference to other VLF users.



NSS continued to use 500 KW Poulsen arc VLF transmitters until at least 1932 when they were replaced by another physically huge transmitter using fifty 10KW vacuum tubes.

NSS operations in the HF bands began circa 1926 and continued for 50 years, ultimately using many dozens of transmitters running up to 50 KW.



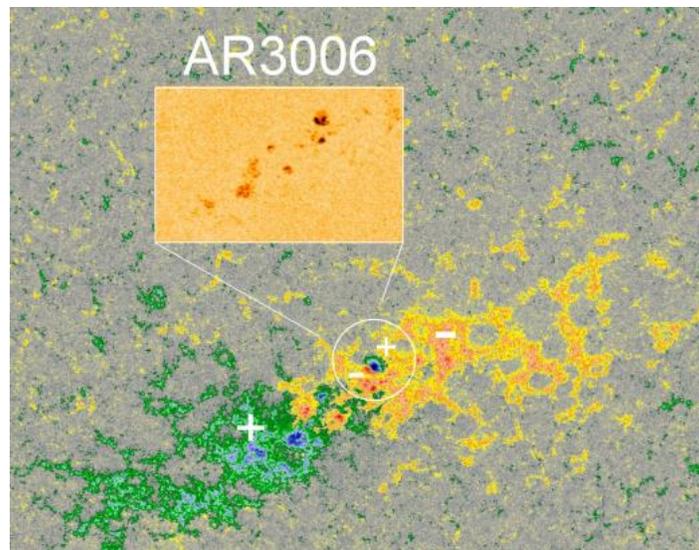
NSS was demolished in 1999, but three of the nine 600 foot towers were not demolished and remain at the southern tip of the one square mile (8000 ft x 2500 ft) antenna field, now a nature preserve.

If you worked NSS in 2022, QSL with SASE via [K3LU](https://www.k3lu.com)



A Mixed-Up Sunspot – From Spaceweather.com

Sunspot AR3006 had an identity crisis. It was supposed to have a +/- magnetic field. Mostly it does. But deep inside the sunspot's primary core, the polarity was opposite: -/+. Note the circled region in this magnetic map of the sunspot from NASA's Solar Dynamics Observatory:



The mixture of magnetic polarities makes this sunspot interesting and dangerous. When opposite polarities bump together, it can light the fuse of [magnetic](#)

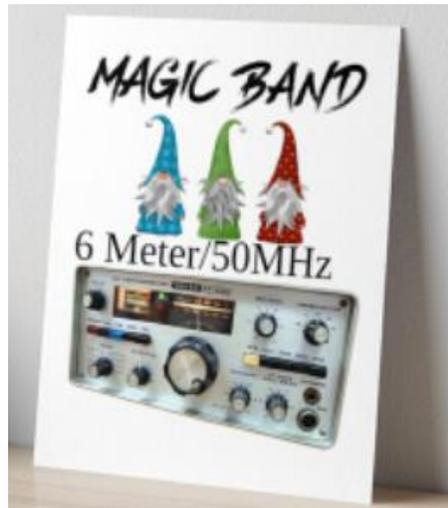
[reconnection](#)--the explosive power source of solar flares. The sunspot was directly facing Earth.

It caused an X1.5 class explosion on May 10th (1355 UT) caused a radio blackout over the Atlantic Ocean and may have hurled a complicated CME toward Earth

PVRC 6 Meter DXCC Standings – Frank W3LPL

Below are the 6M DXCC 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
W3BTX	167	AB3CV	129	W3DF	107
K1HTV	165	W3KX	124	N4VA	106
W4DR	164	WX4G	124	W2YE	106
N4MM	152	NW5E	123	W3IP	105
W3LPL	150	K3SX	122	K3ZO	103
W3UR	145	N4TL	121	N3DB	103
N4BAA	142	AK3E	120	W3OR	103
N2QT	135	K3XA	119	K3AJ	102
K4CIA	134	K5VIP	111	N4PY	102
K2PLF	133	N4JQQ	111	W4FQT	102
K4SO	132	W3EKT	111	K3WC	101
K5EK	132	N4DB	111	W3XO	100
W3LL	132	W3XY	109	W4TJ	100
K4SN	131	W4PK	109		
KG7H	130	K3KO	108		



Membership News – Tim N3QE

Please welcome these new members who were recently voted in to PVRC:

- At the February Colonial Capitol chapter meeting, Steve, KO4ENU.
- At the March Eastern Shore chapter meeting, Tim, KB3UT.
- At the June Downtown DC Metro chapter meeting, Kurt, KO4JXB and Dave, K1ZZ.

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 2022	
+ ARRL Inter. Digital Contest	1800Z, Jun 4 to 2400Z, Jun 5
+ ARRL June VHF Contest	1800Z, Jun 11 to 0259Z, Jun 13
+ All Asian DX Contest, CW	0000Z, Jun 18 to 2400Z, Jun 19
+ Stew Perry Topband Challenge	1500Z, Jun 18 to 1500Z, Jun 19
+ His Maj. King of Spain Contest, SSB	1200Z, Jun 25 to 1200Z, Jun 26
+ ARRL Field Day	1800Z, Jun 25 to 2100Z, Jun 26

Editor’s Last Word – John K3TN

This month we have an amazing piece by Rick N1RM as he tests out the new and impressive compression in the new Elecraft K4 transceiver. The era of software defined radios started a while back, primarily with Flex, but the wide use of Elecraft in the contest world means we are going to start to see contest features being added to radios via software updates – of course, not until Elecraft gets the production release software stable... Imagine touching one button and your radio configures itself the way you like it for WPX or for the 6M contest or for a RTTY test.

Hopefully, when the ICOM/Kenwood/Yaesu triumvirate joins in we will **not** start to see updates that are like Windows 11 – just moving the cheese around to confuse us...

Thanks to N1RM, W3LPL, WA3AER, N3QE, AND K2YWE 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, screen shots of new contest software, or brief writeups on station improvements or contest war stories, send them in any format to jpescatore@aol.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.

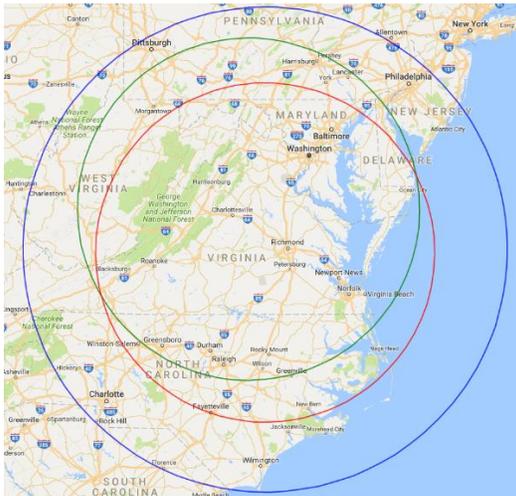
Direct donations to PVRC via Credit Card or PayPal may be made by clicking this "Donate" button and clicking the next Donate button that appears on your screen:



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



GREEN HERON ENGINEERING LLC

(585) 217-9093
www.greenheronengineering.com

RT-21 DIGITAL ROTATOR CONTROLLERS
Unmatched Performance for any Rotator

RT-21



RT-21D



RT-21 AZ/EL



Rotator Packages



FREE Shipping for PVRC Members
At Checkout Enter Coupon Code "PVRC"

Heavy Duty Custom Mast Clamps
-for G-2800 and Orion



Wi-Fi Option
-control your rotator from any web browser device

GH EVERYWARE WIRELESS CONTROLS

- Internet access for switches and rotators
- Eliminate cables and tethered control boxes
- Create customized on-screen controls
- Great circle maps

GH Everywhere Base and Remote

- USB and wireless relay controls
- Utilizes your existing antenna switches



Select-8 Wireless Remote Coax Switch

- Built-in GHE Wireless
- Powered through the coax
- Tower leg Mount
- Amphenol RF connectors

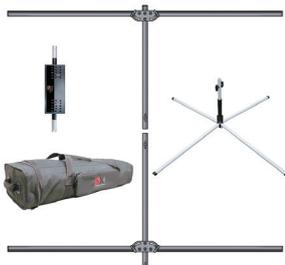





Get Ready for Field Day—June 25-26!

TransWorld Packages

TransWorld antennas are small and portable, yet provide superb performance and durability. DX Engineering has created several packages including the 5-Band Explorer combo, which delivers 20-10M coverage with manual bandswitching. It comes with a portable quadrastand, basic antenna structure, and travel bag. Band-Specific Solo Explorer packages are available for the 80, 60, 40, and 30 meter bands. Accessories include DX Engineering's center box protective cover. Enter "TW" at DXEngineering.com.



Coaxial Cable Tool Kits

Get everything you need to prep and install soldered, crimp-on or Universal Compression F-connectors on your coax. Complete kits include cable strippers, grippers, replacement blades, braid trimmer, cable shears and carrying case. The Ultra-Grip 2 Crimp Connector Hand Tool Kit comes with a ratcheting steel crimper and five die sets for making professional-quality crimps on coaxial and Powerpole® connectors. Individual tools also sold separately. Enter "Tool Kit" at DXEngineering.com.



Power Supplies

Make DX Engineering your source for reliable switching and linear power supplies from major brands, including Alinco, Ameritron, Astron, Kenwood, Yaesu, and more. Choose from units with input voltages from 85 to 260 Vac and peak outputs from 10 to 50 amps. Enter "Power Supplies" at DXEngineering.com.



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. Enter "DXE Assemblies" at DXEngineering.com.



Headset and Footswitch Packages

Add greater flexibility to your station! Choose from eight packages that feature a rugged DX Engineering footswitch paired with either a Heil Pro 7 or Elite stereo headset, each loaded with ham-friendly benefits: high rejection of outside noise, articulate audio, exceptional comfort, less listener fatigue, and more. Headset adapter cable sold separately. Enter "DXE Headset Foot" at DXEngineering.com.



Multi-Band Dipole Antenna Kits

Ideal for easy setup on Field Day, these rugged yet lightweight 2,500W power 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



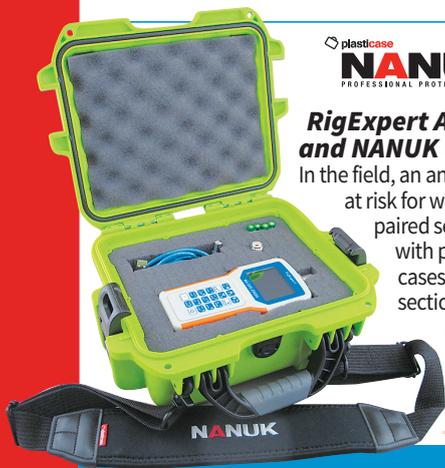
SWR/Wattmeters

Measure forward and reflected transmitter power with SWR/wattmeters from top brands, including Ameritron, Coaxial Dynamics, Daiwa, Diamond, Elecraft, and Palstar. Choose from models with true peak and average readings, 20/200/2,000-watt ranges, amplifier bypass for high SWR, high SWR audio alarms, remote sensors, and more. Enter "Wattmeter" at DXEngineering.com.



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.



Get All Your Field Day Gear Right Here!



Ordering (via phone) Country Code: +1
 9 am to midnight ET, Monday-Friday
 9 am to 5 pm ET, Weekends
Phone or e-mail Tech Support: 330-572-3200
 9 am to 7 pm ET, Monday-Friday
 9 am to 5 pm ET, Saturday
Email: DXEngineering@DXEngineering.com

Ohio Showroom Hours:
 9 am to 5 pm ET, Monday-Saturday
Ohio Curbside Pickup:
 9 am to 8 pm ET, Monday-Saturday
 9 am to 7 pm ET, Sunday
Nevada Curbside Pickup:
 9 am to 7 pm PT, Monday-Sunday

800-777-0703 | DXEngineering.com



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

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

ELECRAFT®

For complete features and specifications visit elecraft.com • 831-763-4211

HAM RADIO OUTLET®

WWW.HAMRADIO.COM

***Free Shipping and Fast Delivery!**



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



FTDX10 | HF/50MHz 100 W SDR Transceiver

- Narrow Band and Direct Sampling SDR • Down Conversion, 9MHz IF Roofing Filters Produce Excellent Shape Factor • 5" Full-Color Touch Panel w/3D Spectrum Stream • High Speed Auto Antenna Tuner • Microphone Amplifier w/3-Stage Parametric Equalizer • Remote Operation w/optional LAN Unit (SCU-LAN10)



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



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 • WIRELESS-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



FT-818ND | HF/6M/2M/440 All Mode Portable Xcvr

- Ultra-Compact/Portable • Multi-Color Easy to See LCD • 208 Memory Channels/10 Memory Groups • Built-in Electronic Keyer • Internal Battery Operation Capability • Two Antenna Connectors • Built-in High Stability Oscillator ±0.5 ppm



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-5DR C4FM/FM 144/430 MHz Dual Band

- 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 • Supports Simultaneous C4FM Digital • 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



FTM-6000R | 50W VHF/UHF Mobile Transceiver

- All New User Operating Interface-E20-III (Easy to Operate-III) • Robust Speaker Delivers 3W of Clear, Crisp Receive Audio • Detachable Front Panel Can Be Mounted in Multiple Positions • Supports Optional Bluetooth® Wireless Operation Using the SSM-BT10 or a Commercially Available Bluetooth® Headset



- 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

YAESU
The radio

FOLLOW HRO ON SOCIAL MEDIA



twitter.com/HamRadioOutlet
facebook.com/HROHamRadioOutlet
instagram.com/HamRadioOutlet
youtube.com/HamRadioOutlet