



# The Old Professor

The Providence Radio Association, Inc. June 2023 Volume CIV, Issue II



## MESSAGE FROM THE PRESIDENT:

**N**orth America's pinnacle Amateur Radio event is days away. Field Day is the ultimate EMCOMM exercise. Per its sponsor, the ARRL, "Every June, more than 40,000 hams throughout North America set up temporary transmitting stations in public places to demonstrate ham radio's science, skill and service to our communities and our nation. It combines public service, emergency preparedness, community outreach, and technical skills all in a single event. Field Day has been an annual event since 1933, and remains the most popular event in ham radio."

Anyone who's participated will attest to it being an extraordinary two days. In hours, an empty field is transformed by volunteers of varying skillsets, backgrounds, and capabilities into a nationwide emergency communication facility. These volunteers then proceeded to transmit, receive, and log with utmost accuracy brief messages from thousands of stations. 24 hours later the station is broken down, carted away with little evidence anything ever happened, other than a meticulous log of message details.

Not much different than any other Amateur contest, of which some will say there are too many, yet very different in purpose. The ARRL stresses that Field Day is not a contest, it is an emergency exercise. The laundry list of bonus points attests to this, being a greater component of the total score for some groups than their number of QSOs made!

Field Day is not only an exercise in preparedness, it's our hobby's #1 Media Event. I have never seen an article in the local newspaper

## BASIS AND PURPOSE

DAVE TESSITORE, K1DT

### § 97.1 Basis and purpose.

The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:

- (a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

about the CQ World Wide contest or weekly 2M net, but every year the newspapers and TV crews cover groups of Amateurs out in the field for their "annual emergency communications exercise." It is safe to say the most, if not only public exposure our hobby receives is via Field Day, showcasing our EMCOMM capabilities.

Let's also use Field Day as a catalyst to improve the capabilities of our own stations and sharpen our individual skills. With today's radios and lithium iron phosphate batteries there is no excuse for any station to not have emergency capabilities. With the Parks On The Air program, any day can be your own mini Field Day; not only fun and healthy, but you become a grass-roots spokesperson for the value of our hobby to the onlookers.

Field Day validates the main purpose of Amateur Radio: a volunteer service to the public providing emergency communication. Without that sentence in the Code of Federal Regulations, our hobby would surely cease to exist.

Like Field Day, EMCOMM is not a contest, it is a service to our community. Making 1000 Field Day QSOs is great. Relaying one emergency message of, "Mom is safe and will call soon", is what Amateur Radio is all about.

73, Dave, K1DT



# WELCOME

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### The Providence Radio Association, Inc.

**The Old Professor** is The Newsletter of The Providence Radio Association, Inc. and is published quarterly.

#### Honorary President for Life:

**Princess Elettra Marconi**

**President: Dave Tessitore, K1DT**

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**Secretary: David Steussie, W3DRE**

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**Gilbert Brown, N1BBM**

**Neville Bedford, W1ESQ**

**Bob Simoneau, N1ET**

**Editor: Tom Greenwood, W1ER**

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### How to Contact Us

1 Ludlow Street  
Johnston, RI 02919-6618

E-mail: [motormandave@gmail.com](mailto:motormandave@gmail.com)

<http://www.w1op.com>



<https://www.facebook.com/groups/144768709262409/>

#### Johnston, RI Repeaters

222 MHz Analog: 223.980 / 222.380

440 MHz DMR: 447.725 / 442.725 CC2



**I**t's been a while since last production you may have noticed. The shack reconstruction project here consumed significant time and the well being of family members required attention. Then of course there is this all time consuming daily activity we call work. At the end of the day, little brain power remained to sit and create. But this did get me thinking.

Yes, there was more I wanted to accomplish with shack reconstruction. Painting was completed and the new radio bench installed which meant that some of radio equipment could be installed to get a rudimentary station back on the air. Yes, there was lots of rare DX to chase during the beginning of the year. I did manage to work some of it, not Crozet and not Bouvet but still good stuff. This emphasizes two important considerations of the Radio Amateur's Code as written by Paul M. Segal, W9EEA (SK) back in 1928.

***CONSIDERATE...He/[She] never knowingly operates in such a way as to lessen the pleasure of others.***

***BALANCED...Radio is a hobby, never interfering with duties owed to family, job, school or community.***

As exciting and as much fun this hobby can be, be sure to be "Considerate" and "Balanced" in your pursuit of the hobby. Your family will appreciate it, your friends will appreciate it, and ... you will appreciate it.

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***Want to learn more about the Radio Amateur's Code?***  
<https://www.arrl.org/amateur-code>

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We have some great articles this quarter. Andy, AJ1S provides some great information about his project to convert a Heathkit SB-200 to 160 meter operation based upon an article from 1978 by Doug Demaw, W1FB (SK). Ready to advance the test equipment on your test bench, our metrology expert, Domenic Malozzi, N1DM continues his great article. Finally, club friend and Newport County Radio Club President Nancy Austin, KC1NEK in collaboration with our club President Dave Tessitore, K1DT report on our recent Armed Forces Day operation and some history behind the callsign we used for the event, NAF.

... and last but not least, in my editorial absence, I extend an apology to Andy, AJ1S, and Dom, N1DM who prepared great material earlier this year that I have kept in a safe place for your reading pleasure this issue. This can't be pulled off without the help of fellow members like them. Many thanks.

73

Tom, W1ER

Editor, The Old Professor



**W**ith much of the exterior upgrades completed in the summer and fall of 2022, it was time to pay attention to the interior. Some of the critical systems required for the over-

and provided some nice interior decorating touches. Fantastic job! Even the ladies will like it.



**The Newly Renovated and Remodeled Bathroom**



**Mini Splits** – One item that had been lacking from the very beginning was air conditioning. New England’s humid summers made the clubhouse very uncomfortable. As for the furnace, there are very few HVAC technicians remaining who understand the

all comfort of the clubhouse were nearly as old as the clubhouse itself and it was time to freshen up.

**Bathroom Renovation** – The bathroom, while still functional, was showing signs of structural decay, particularly in the floors. And while its usability was just fine for those accustomed to weekend Boy Scout camping trips, it really had no appeal. With the aid of a contractor, Dave Tess and Gilly Brown overhauled it



**Mini-Split in the Meeting room**



## CLUB NEWS:

old electromechanical ladder logic controllers of the 60's. It was time for an upgrade.

**Boy Scouts** – In February, we hosted Boy Scout Troop 2, Central Falls, RI for an introduction to Amateur Radio and a tour of the W1OP station. Dom N1DM impressed the audience with a QSO via the International Space Station transponder as it was passing



overhead. We made QSOs on 12M FT8 and ragchewed with European stations on 17M SSB. The Scouts then got to listen to and send Morse Code. Even the Troop Leaders had a great time. We welcomed them back for a BSA Radio Merit Badge session and

Tech licensing class if there is interest.

Well, interest there was. In March and April, N1DM and K1DT taught a BSA Radio Merit Badge course to four Scouts from Troop 2 of Central Falls, RI. They completed all requirements for their badge, and were each gifted a new Baofeng UV-5R transceiver programmed on FRS and NOAA WX courtesy of the PRA Foundation.

**Club Elections** - Elections were held at the PRA's annual meeting on January 10, 2023. For 2023 our officers are as follows:

- Dave Tessitore K1DT—President
- John Good W1GS—Vice President
- David Steussie W3DRE—Secretary
- John Winman KZ1K—Treasurer
- Gilbert Brown N1BBM—Board of Directors
- Neville Bedford W1ESQ—Board of Directors
- Robert Simoneau N1ET—Board of Directors

**Please support our club officers**





## CLUB NEWS:

**Exemplary Leadership Award** - At the April business meeting, the club officers called a timeout of the meeting to take a few minutes to recognize club President, David Tessitore, K1DT, with an award for his exemplary leadership. During Dave's tenure as President, he has accomplished a large list of significant projects including:

- Increased the membership
- Led us through two Centennial Anniversary Celebrations – for the Establishment of the P.R.A. in 1919 and our Affiliation with the ARRL in 1921
- Obtained 501(C) (3) Status for the Association
- Established the P.R.A. Foundation to benefit the P.R.A.
- Obtained an ARDC grant which provided in part for refurbishment of the Log Periodic and replacement of the 222 MHz repeater antenna, and Installation of a new 440 MHz DMR repeater and link to NEDECN



### K1DT Exemplary Leadership Award

- Overseen renovation of the clubhouse to include new siding, installation of a new heating and cooling system, and upgrade of the bathroom.

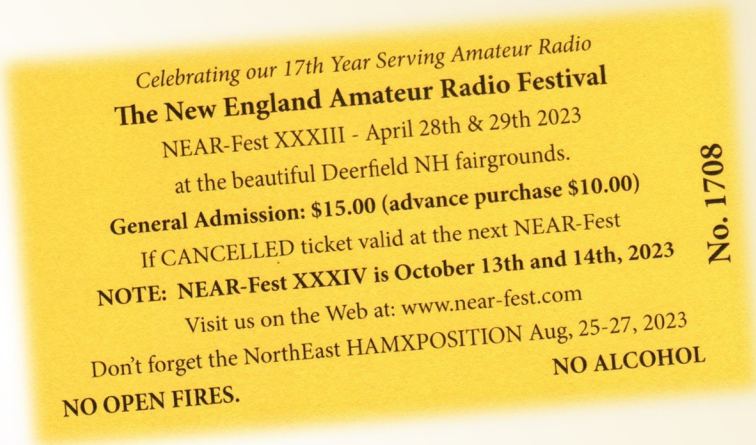
**Please join us in congratulating Dave for a job well done.**



**PRA Vice-President W1GS Presents the Award to K1DT**



**Dave and XYL, Carolyn**



**N**earfest XXXIII came early this year. Did you attend? Reports are that at opening on Friday morning, vehicles were backed up to the main gate waiting to get in. How's that for dedication?

Friday was an absolute gorgeous sun filled and warm day. Saturday was not quite as accommodating as the clouds started to set in mid morning bringing cooler temperatures than the day before and some winds. But the rain was kept at bay.

W1GS finally unloaded his 4-400 HF amplifier that had been accompanying him for many years. k1DT spent much of his time in prowl mode returning home with some good finds.

Nearfest is an institution. Attendance is what keeps these events going. Keep your eyes on our calendar and consider joining us for the next big event in Fall 2023.

**NEAR-FEST XXXIII HONOR ROLL**

<p>W1AV, Bob Ruzzo  N1DM, Domenic Mallozzi  KV4DN, Don Stamford  K1DS, Rick Rosen  K1DT, Dave Tessitore  W3DRE, Dave Steussie  W1ER, Tom Greenwood</p>	<p>W1EYH, Frank DePetrillo  W1GS, John Good  W1NZR, Brown Beezer  W1PRA, Paul DePetrillo  AJ1S, Andy Stenberg  NE1U, Ed 'Ted' Casassa</p>
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**CAUTION: LETHAL VOLTAGES COULD BE PRESENT! TAKE CARE TO DISCONNECT FROM AC POWER, DETERMINE THAT HIGH VOLTAGE CAPACITORS ARE DISCHARGED AND LETHAL VOLTAGES ARE NOT PRESENT**



**The Gentlemen's Band Half Kilowatt—Look familiar?**

**A little history**—Going back a few years, I would often head up to the Providence Radio Association's club house to see what Zaven W1IUX (SK) would be working on. Generally, coming up to contest season, he would be working on some project so that W1OP would be one of the Big Guns on the air. For "160", a.k.a Top Band or The Gentleman's Band, he always had something new to build and try out be it antennas or amplifiers. One amplifier project to get on 160 meters had an Eimac 4-1000A tube or valve, which was very impressive to see that glass jug light up in the cabinet and start glowing on key down.

With 160 meter amplifiers being the focus about that time, I came across ARRL QST Senior Technical Editor Doug Demaw's W1FB (SK) article, "The Low-Bander's Special". This article outlined a conversion project for a Heathkit SB-200 to operate on 40, 80 and 160 meters. Back then, I had just bought a used SB-200 which worked perfectly fine and could not bring myself

to tearing it apart for a conversion project. Maybe "someday" another SB-200 would be a better candidate.

Fast forward to "someday" about 35 years later. An email came through about some parts for making tuners, amplifiers and other projects, "if anybody still homebrews anything anymore". I replied to all that maybe an amplifier for 160 meters would be a good project. John W1GS replies, "If you're serious, I've got a SB-200 you can have". Which I replied, I'll try to dig up the W1FB SB-200 conversion article to see what is involved. Then he replied, "I've got that somewhere here as well". I vaguely recall the project written up in a ARRL handbook, but John did have the September 1978 QST issue pages 17 – 19. Although the project design allows for operation on three bands, single band operation for 160m was decided for this project. It simplified the conversion and the other amplifier, spared from so many years ago, was still available to cover 80 – 10 meters.





The article starts off by suggesting that one should...

Acquire a candidate SB-200 by any means possible – check that one off the list.

Get over the disemboweling of said candidate SB-200 – check.

**Here we go**—Much of what Demaw used for his three band design was used as a guide-

line. As stated above, this project converted the SB-200 to a 160m mono-band amplifier.

Everything except the Loading Capacitor (C28), the Fan and Tube Sockets were removed from the RF Deck. The Input Circuit Switch, Input Circuit components and Filament Choke were removed from the rear compartment behind the RF Deck.

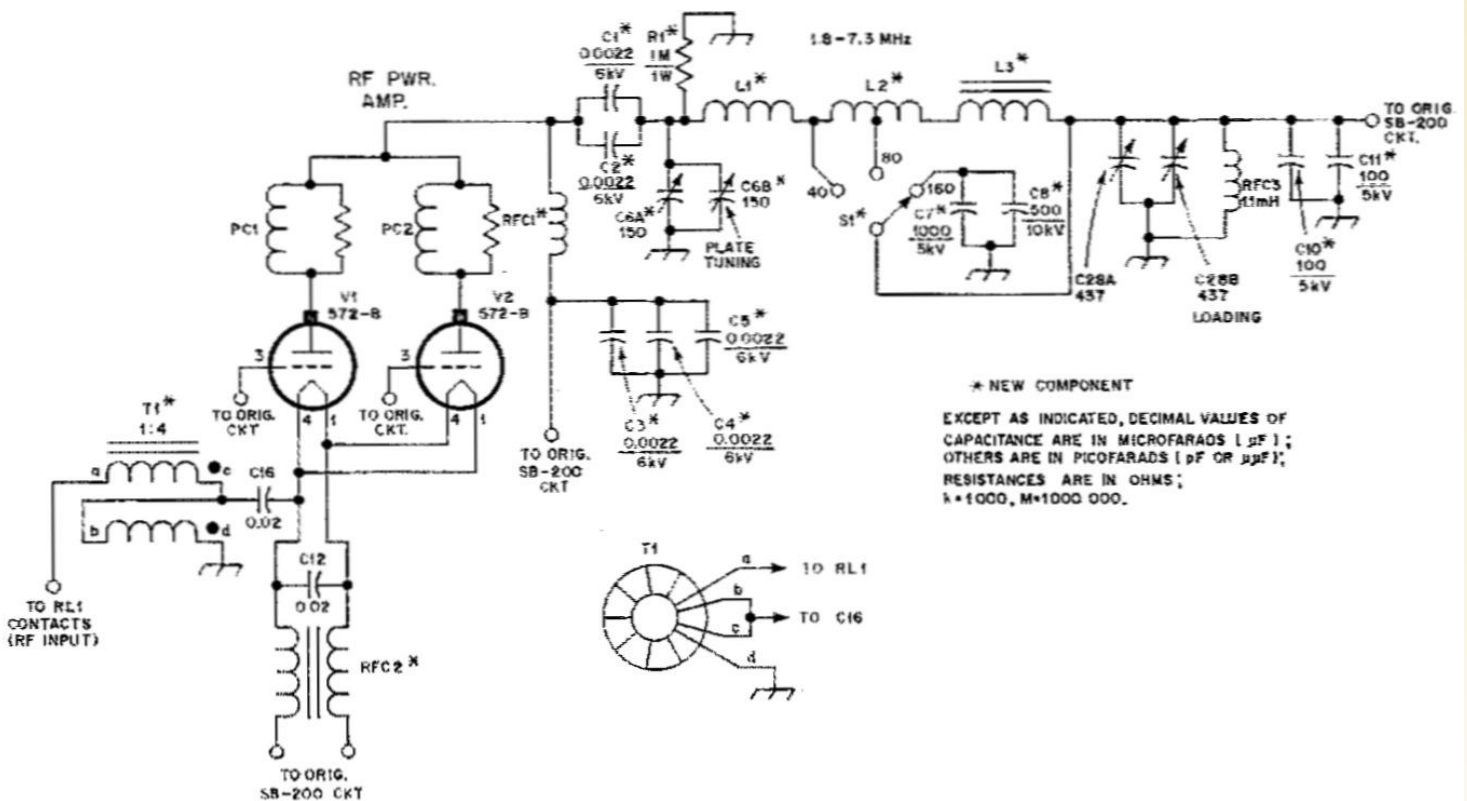


Fig. 1 — Schematic diagram of the revised SB-200 amplifier circuit. Original parts retain their Heath identification numbers. All others have ARRL assigned numbers.

- C1-C5, incl. — Disc-ceramic HV type such as Sprague 60GA-D22.
- C6 — Transmitting variable, 300 pF or greater max. capacitance. Split-stator, 150 pF per section, surplus unit used (see text).
- C7, C10, C11 — Ceramic transmitting capacitor, Erie type 850 or equiv. Surplus transmitting mica capacitors also suitable.
- C8 — TV-type 500-pF HV doorknob capacitor or Erie type 850 unit.
- L1 — 6- $\mu$ H inductor. Use 12 turns of a B&W 3026 Miniductor coil, or form air-wound coil of 12 turns no. 14 wire, 2 in (51 mm) dia by 1-1/2 in (38 mm) long.
- L2 — 17- $\mu$ H inductor, tapped at 6  $\mu$ H. Use

- 15 close-wound turns of no. 14 enamel wire on L3 end of coil, and 12 space-wound turns on L1 end of coil. Tap at junction of two halves of L2. Use original Heath coil form (see text).
- L3 — See text; 18 turns no. 14 enam. wire on Amidon T200-2 toroid. Wrap toroid core with 3-M glass tape or equiv. before adding winding (5  $\mu$ H).
- RFC1 — Transmitting-type rf plate choke, solenoidal wound. Must be capable of handling 500 mA or greater. An ohmite equivalent was used in this example (part no. unknown, but rated from 160 through 10

- ometers at 1 A), although a B&W type 800 is suitable.
- RFC2 — Bifilar-wound filament choke, Amidon filament choke kit or Amidon 30-61-4 ferrite rod ( $\mu_r = 125$ ), 4 inches (100 mm) long and 0.5 inch (13 mm) dia wound full of no. 12 enamel wire.
- S1 — Single-pole, four-position (90° indexing) ceramic-wafer rotary switch. One position unused. (See text.)
- T1 — Broadband 4:1 toroidal transformer. Use three stacked Amidon FT-82-43 (950  $\mu_j$ ) toroid cores. Winding consists of 15 bifilar turns of no. 22 enam. wire. A hand drill can be used to twist the wires 8 times per inch.



The switched input circuit was replaced with a broadband 4:1 Un-Un toroidal transformer (T1). The input impedance of the tubes works out to be about 200 ohms and the transformer presents about a 1.5:1 SWR to the exciter across the band. It simplified construction and solved the tuned input SWR problem when using a sol-

(Using the 4:1 Un-Un solution might benefit a standard SB200 for 80 – 10m)

The filament choke (RFC2) value needed to be increased, which was achieved by removing the original choke and replaced with a 6" long x 1/2" dia. 125 mix ferrite rod fully wrapped with a bifilar winding of #12 AWG enameled wire. The design only required 4" x 1/2" 125 mix ferrite rod so the 6" could be cut but appears to work fine.



**The Modified Input Circuit**

id-state radio with the amplifier. Instead of winding T1 with discrete parts, an LDG RU-4:1 UN-UN was purchased, disassembled, and the transformer was used. The SO-239 connector from the assembly was then used to replace the original RCA Jack that the amplifier had for an input connector. Note: Not included in the original article was the need for C16 to be replaced with two 220 pF 6kV ceramic disc caps tied together in parallel (440 pF) and connected series from the output of T1 to the input of the tubes, to replace the original input coupling capacitor.

**The Tank Circuit** — The plate tank coil from the original coil form was removed and rewound with close spaced 30 turns of #14 AWG enameled wire for a value of approximately 20 uH. A maximum value for C6 of 440 pf, the plate tuning capacitor, was selected. The 440 pF was achieved by using a wide spaced, split stator tuning capacitor with a value range of approximately 68 pf to 268 pf when both stators were configured in parallel. With an additional 200 pf in parallel with a ceramic doorknob capacitor, the tuning range values of 268 to 448 pf were achieved.

The calculated resonant frequency range of the circuit worked out to 1.682 - 2.175 MHz which would appear to provide enough tolerance for component and external effects to the circuit. Capacitor and inductor values were measured with an antenna analyzer.

**Mounting and Routing** — On the output of the Tank Circuit, C7 (1000 pF 5kV) and C8 (500 pF 10 kV) are mounted on the inside of the front wall of the RF Deck compartment. Note: To allow the flush mounting of the amplifier's front panel, use a countersink and flat head screws. The same will go for the cover plate that



is used to cover holes and labeling on the face of the front panel.

A new hole was drilled through the front panel and the RF Deck compartment to accommodate the shaft of the Plate Tuning capacitor, C6.

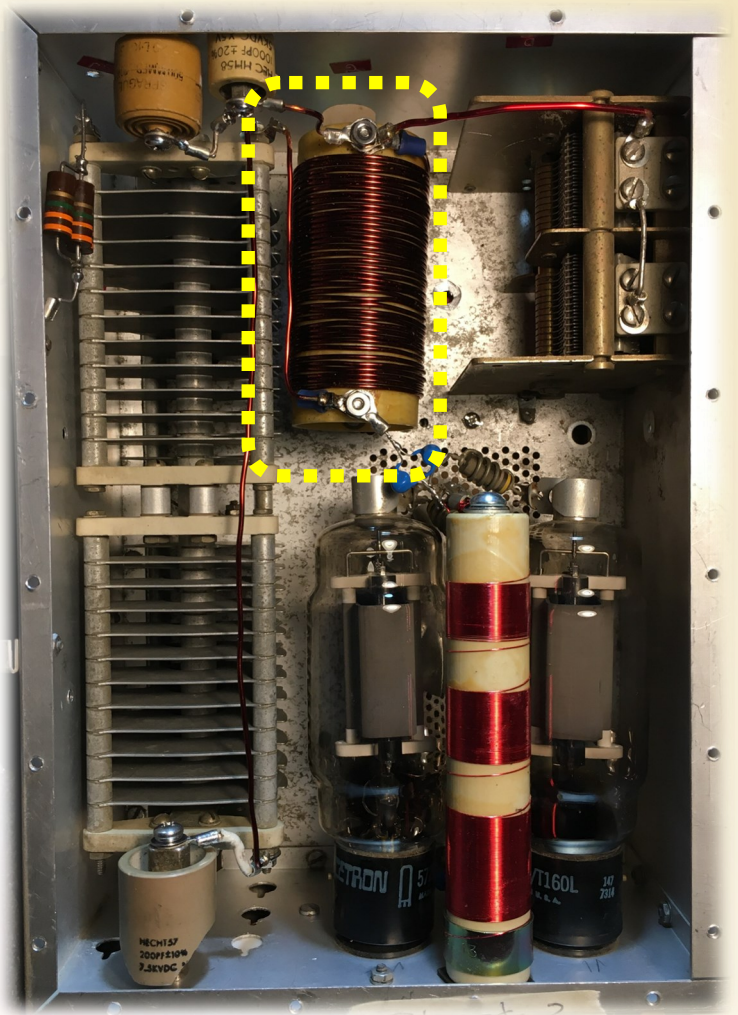
The screw connection points of the stator plates on C26, Loading Capacitor, were used for the connection of the Tank Circuit, C7 and C8 output. Doing so, avoids the need to drill another hole through the floor of the RF deck for connection to the output.

Two 220 pf 6kV ceramic disc capacitors were tied together in parallel to connect plates of V1 and V2 to the Plate Tank Circuit

The B+ HV Line was removed and replaced with a section of RG-8 with the outer jacket and shield removed. Just the center conductor and insulation were used. A hole was drilled in the floor of the RF Deck directly below where the connection point of the plate choke will be.

The By-Pass capacitors (C3, C4, C5 220pf 6kV) for the Plate Choke were tied together in parallel, one side connected at the plate choke base and the other side connected to the rear wall of the RF Deck

The Plate Choke (RFC1) was purchased, listed as Ameritron Plate Choke 225 uH 1.5A 4.5 kV 1.8 – 30 MHz. The mount point is located between and above Tubes V1 and V2 exactly where a terminal strip, on the outside rear of the RF deck is mounted. A work-around was to ream the terminal strip mounting tab, as best possible, to the diameter of the 1/4" mount screw of the Plate Choke. Make sure that the B+ HV connection clears the cabinet cover.



### The Modified RF Deck—Pre-Optimization

**Remove turns from the plate tank coil as needed to achieve approximately 30μH**

R1, a 1MΩ 1W resistor, was added in the design to avoid flashover on C6 if the plate spacing was not sufficient. The spacing of C6 in this build was suitable for the application but R1 was added as a precaution.

Two capacitors designated C10 and C11 (100pF 5kV) are mounted on the underside of the RF Deck

Additional items that were installed while under construction...



## ON THE AIR:

Soft Key Conversion offered from Harbach Electronics (P/N SK-220) allows a solid state radio or sequencing device to key the amplifier without damage. It takes a little time to build and install but worth it. The instructions are very specific on placement of the board's mounting screw, but it will need to be moved slightly to accommodate the capacitor plates of C6 inside the RF deck.

If the amplifier has a RCA Jack for the RF input connection, an SO-239 connector is much more convenient and it would be a good time to make the change.

**The Finishing Touches**—From the article, the front panel was painted white and a false panel was painted green. The false panel was used to accommodate the shafts and cover up the old shaft holes. Dymo Tape labels were used to label the various controls. For this project, the original front panel was left alone as the lettering and Heathkit dark green paint was still in good condition. A cover panel was cut big enough to cover the old holes and the lettering of “Load” and “Tune” and their position marks. The entire cabinet and the new cover panel were painted caramel brown. It can be left alone or pick your own color. The new lettering on the cover panel was made by using black on clear label. White on clear was preferred but not available for the label material used. Many coats of satin clear coat were applied to prevent wear on the panel. The original project used epoxy to adhere the panels together, but #8 flat head screws and acorn nuts were used on this build. Remember to countersink the holes on the back side of the Front Panel.

**Testing**—After making a visual inspection for any short or open circuits, from all of the

## THE GENTLEMEN'S BAND HALF KILOWATT CONT'D

work and modification, the amplifier was powered up.... No Smoke! Good News. Other checks included, T/R functionality, Meter Function (the Meter Function Switch needed a cleaning with some alcohol) High Voltage and Idle Current.

The Amplifier was connected to a radio and Dummy Load – Initial testing uncovered that the Input Coupling Capacitor (C16 mentioned earlier) needed to be changed to 440 pF as the input SWR was extremely high. This condition caused the radio to decrease power/drive and the amplifier would only develop less than 100 watts. Changing C16 decreased the SWR to less than 1.5:1, as expected, allowing for normal drive and full output power. The amplifier provides upwards of 600 watts of power.

**Summary**—With all of that said, the amplifier conversion was not particularly hard to complete. If you have some knowledge of electronics, can read a schematic, have some mechanical ability, attention to detail and patience, it should move along fairly well. Have some fun homebrewing. When complete, you will have a nice 500 – 600 watt desktop 8dB amplifier on 160m for the shack.

**The Cost**—Most items used were either repurposed or found around in various junk boxes from over the years. Enameled wire and other parts were, for the most part, purchased on-line. Rough Estimate about \$150 Try to make sure you have everything on-hand before you start. Otherwise, the project may never be finished.

**On the air**—The report on the first QSO using the Amplifier was, “599 and nice copy”, which was very satisfying.

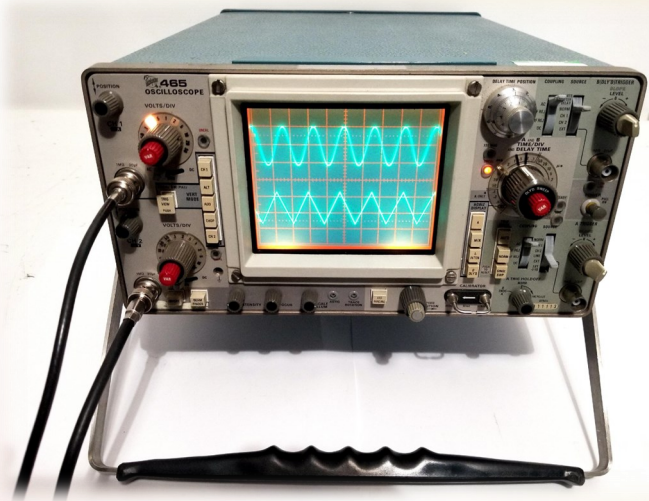
**I**n our previous installment of this series we discussed some common instruments. Let's now delve into more specialized items and find out how the newer instruments becoming available are helping us as hams.

**Antenna Analyzer** — Antenna analyzers have become the hams indispensable tool in the last 15 years. They allow you to measure the antennas impedance without any other equipment as they all include their own very low power generator to use as a signal source. They not only tell SWR but the resistive and reactive components of the impedance which is telling when tuning antennas. The more advanced units have capability to sweep a whole band and display the 2:1 antenna bandwidth. They are also nice for tuning up manual matchboxes (like we use at the CW station on Field Day). MFJ, Comet, Rig Expert and others make these and they are a great tool to put on your next to buy list after buying a DMM and SWR meter. The very popular MFJ-259D is shown below, I have an older version of it and use it all the time.



training course). Most have the capability to display two independent channels simultaneously. If you connect one channel on the input to an amplifier and the other on the output you can quickly see how much gain the amplifier has and if there is a phase shift in the signal as it passes through the amplifier. You can also see if the amplifier is distorting the signal in addition to amplifying it.

Modern dual channel digital oscilloscopes are quite reasonable in price (under \$500) and have the capability to download signals to a computer to analyze further. In addition, there are quite a few optional extras. If you feel the need to buy one talk to one of us in the club who can help point you in the right direction on the things you really need in an oscilloscope.



**Oscilloscopes**—Electrical engineers and technicians will tell you that oscilloscopes are incredibly versatile and useful tools. Oscilloscopes are often referred to as “scopes”. When I was designing test equipment for Raytheon there was always a scope on my workbench to test out circuits I built.

Oscilloscopes display time vs amplitude of signals (like the sine wave voltage diagram you see in the textbook for almost every electronics

While not a first purchase for the new ham, to those interested in experimenting and repairing equipment will find the ‘scope’ indispensable.

**Frequency Counters**—Until the appearance of digitally synthesized transceivers in ham radio a counter was an essential tool. It does just what the name says, it digitally displays the frequency of a signal it is receiving. They typically



run from \$50.00 to about \$500.00. The more expensive ones have a wider frequency range and also have a more stable timebase that makes them more accurate. The counter is a good tool and especially if you want to work on or use old radios with a VFO it is incredibly useful.

There are some options that apply to the timebases available in frequency counters. Let's delve into that a bit. Every counter has a timebase that determines its counting period and therefore its accuracy. The simplest timebase is using a crystal oscillator with no temperature compensation. This is inexpensive and has adequate accuracy for most simple applications at HF. If you look at a data sheet for a counter under timebase you will see a specification that says something like +/- 10 PPM. What does that mean? Well, PPM means parts per million which refers to the error in frequency you can expect to see in normal use of the counter. So, if you have a signal at 14 MHz you are measuring with a counter with a +/-10 ppm timebase that means the frequency displayed will be 14.000 MHz plus or minus 140 Hz. In most cases this is fine. But a counter with the same timebase at 432 MHz is not as good, it can be off as much as 4.32 KHz in displayed frequency. To cure this there are three options may be used: TCXO, oven stabilized timebase or GPS locked.

TCXO – TCXO's are temperature compensated crystal oscillators. They take a basic crystal and

add circuitry to compensate for the fact that a quartz crystal's frequency varies slightly when its local temperature varies. A typical TCXO improves a crystals stability by a factor of between 10 and 100.

Oven stabilized timebase – Before TCXO's became popular the simple solution was to mount the crystal in a small temperature controlled oven that was set so it stayed above the highest possible local room temperature the counter might encounter in use. This temperature control was pretty precise but took a significant amount of power to keep the heater running. TCXO's have none of this additional power drain so that's why oven stabilized oscillators are not as common today.

GPS locked – Many higher quality bench top counters made in the past 40 years have an input for a 10 MHz reference signal on the back panel. Its purpose is to allow the counter to be 'locked' to a more accurate signal to use as a timebase to make its accuracy in reading frequencies the best it can be. Until recently most hams did not use this. Nowadays the availability of cheap GPS timing receivers means you can lock your counter to a reference source as accurate as most commercial laboratories have (in fact today most calibration laboratories use a GPS receiving system as their frequency standard, it's a lot cheaper than a Cesium Atomic Clock).

I have a 40 year old Heath IM-2420 counter bought at Nearfest for \$30.00 tied to a \$135 Brodeur GPS reference receiver I bought at Dayton. This means my 40 year old counter now has a fabulous accuracy. OK, I know your saying how much better is it really? As delivered by Heathkit the counter can read a signal to within +/- 100 Hz at 440 MHz, while when connected to the GPS receiver in improves to within +/- 0.006 Hz. That's an improvement of over



16,000. That's what we call real improvement.

**Vector Network Analyzer** —In the last couple of year's an on-line hobbyist project called the NanoVNA to design a handheld vector network analyzers has brought what used to be a very expensive professional instrument (greater than \$20,000.00 each) down to dirt cheap varying from \$45 to \$250 (depending on frequency range). The 'vector' word in the title means it can measure not only differences is



amplitude of signals, like is done in an antenna bridge but also can measure phase between two signals over a range of frequencies up to at least 400 MHz. This makes it a very powerful tool especially in designing high frequency filters and networks. As vector network analyzers have two measurement ports (inputs) they can be used not only for measuring antennas but also to measure filters and delay lines. They are fabulous in that you can sweep a frequency range and get not only SWR but a number of very complex measurements like filter response and real loss, along with some rather esoteric measurements like delay time in transmission lines (great for cutting phasing lines for antenna arrays). There are numerous on-line descriptions of these analyzers and their use. They appear to be slowly replacing the antenna analyzers we discussed above, the big issue is using a VNA is a bit complex to set-up requiring you to go thru

multiple menus to get it to do what you want, while your typical antenna analyzer is very easy to operate.

**Bird® Power Meters** —Having discussed above SWR/power meters it is not unusual to hear one of the older members say get the 'Bird' to look at power or SWR. This refers to a manufacturer (Bird) that came out with the classic RF power meter that was used in the two-way radio business. Bird 43 series power meters are simple but interesting devices that are designed to read power over limited frequency bands determined by plug-in elements (some newer ones avoid the plug-in elements and are wideband). The unusual feature of Bird meters is they di-



rectly read forward (transmitted) and reflected power. To get SWR you have to either plug both those values into a formula or use a chart to determine the SWR. As the big thing in matching



is to get the reflected power down to a minimum that is what most hams with a Bird strive for.

The Bird meter is known for accuracy which is very good at a typical accuracy of 5%. They also are very well constructed and rugged for use at industrial sites and banging around in service vans. This all comes at a financial price that is a bit steep. They are great meters but probably not a great first purchase as you join the hobby. In some parts of the hobby as you progress to more complicated projects they are really nice to have. I own 3 different Bird meters and use them quite often when repairing gear.

***In the final installment of this series we will pick up our discussion with both new and old instruments you might run into as your ham career progresses.***

**LEAGUE SURVEY**

Attention all league members. Just a few days remaining but the League is requesting your participation in a survey concerning dues increases.

Go to: [www.arrl.org/take-dues-survey](http://www.arrl.org/take-dues-survey)

Log in and take 5 minutes to answer some questions.

Survey closes on May 31st.

Thank you



**PARKS ON THE AIR ACTIVATIONS**

Dave Steussie, W3DRE and Andy Stenberg, AJ1S with the assistance of many others continue to put Parks On The Air.

Recent activations include:

May 16, 2023	Kearsarge Mountain State Forest	AJ1S
May 16, 2023	Winslow State Park	AJ1S
April 30, 2023	Rocky Point State Park	W3DRE K1DT KB1EFR
April 15, 2023	Pillsbury State Park	AJ1S
April 7, 2023	Gardner Memorial Wayside State Park	AJ1S
April 3, 2023	Fort Dummer State Park	AJ1S
March 27, 2023	Odiorne Point State Park	AJ1S
March 17, 2023	Minuteman National Historic Park	AJ1S
March 10, 2023	Kearsarge Mountain State Forest	AJ1S
March 10, 2023	Rollins State Park	AJ1S
March 8, 2023	Wadleigh State Park	AJ1S





## ON THE AIR:

## PARKS ON THE AIR ACTIVATIONS CONT'D

February 22, 2023	Sunken Meadow State Park	AJ1S
February 10, 2023	Rollins State Park	AJ1S
February 10, 2023	Kearsarge Mountain State Forest	AJ1S
January 30, 2023	Hannah Duston State Historic Site	AJ1S
January 27, 2023	Sunset Rock State Park	AJ1S
January 21, 2023	Mount Sunapee State Park	AJ1S
January 3, 2023	Mount Sunapee State Park	AJ1S
January 21, 2023	Pulaski Park	W3DRE N1ET

### Apologies for any I have missed

The Parks On The Air program is a great way to get out and enjoy the outdoors while playing radio at the same time. It also is a great way to educate the community all about amateur radio, a great public relations opportunity. Finally, we have learned that W1OP has received “Hunter” status for it’s contact with Bouvet Island during the recent 3YOJ expedition.

*Want to learn more?*  
<https://parksontheair.com/>

#### YTD PRA NET ACTIVITY

21 sessions

201 check ins

9.57 checkins/session

Don't forget, we meet every Sunday night  
at 2000 EST/EDT rain or shine on DMR  
Talk Group NETAC1

Hope to See you There



**Kearsarge Mountain State Forest  
K-4918 US-NH**



## ON THE AIR:

## RI'S RADIO LEGACY CONTINUES

NANCY AUSTIN KC1NEK, NCRC & DAVE TESSITORE, K1DT

Rhode Island is a small state with a rich history. The Providence Radio Association invests in RI's radio legacy by maintaining a historic Collins 237B-1 rotatable 13 element log periodic antenna originally installed as part of [NAVCOMMSTA Newport's impressive transmit antenna farm on Beavertail Point, Jamestown RI from c.1964-1975](#). On Saturday 13 May 2023, the Providence Radio Club again participated in the [MARS Armed Forces Day \(AFD\) Crossband Test](#) using their historic antenna and the equally historic call sign, NAF.

NAF began operation from Naval Torpedo Station, Newport, RI c. 1900, and was among [the first US Naval Radio shore stations](#). Eventually, several naval radio stations were consolidated as NAVCOMMSTA Newport. NAF transmitted from c.1900 until 1975 at various coastal Narragansett Bay locations, including [NAVRADSTA \(T\) Beavertail Point \(Jamestown RI\)](#).

The Providence Radio Association shares the next chapter in this rich Rhode Island radio history: "The drastic curtailment of naval operations on Narragansett Bay in 1975 closed all naval activities at Sachuest Point and Beavertail Point. In 1975 the Navy allowed the Providence Radio Association to hold its annual Field Day exercises at the Beavertail Station. Following the decommissioning of the facility and turn over to land of the State, in 1983 the PRA acquired one of the Collins 237B-1 rotatable log periodic antennas used by NAF and erected it at our club facility in Johnston, RI. It has been utilized since then under the Amateur callsign W1OP. Once a year, we either operate from the original NAVRADSTA (T) location at Beavertail Pt, or we use this antenna from our clubhouse in Johnston to participate



**Providence Radio Association's historic Collins antenna used during the recent MARS Armed Forces Day Crossband Test, with Club President Dave Tessitore, K1DT and Vice President John Good, W1GS**

in the Armed Forces Day Crossband Test, using its original naval call sign NAF."

For this year's [AFD Crossband Test](#), [the Providence Radio Association again](#) got permission to operate as NAF and transmit on their restored original Collins antenna. The W1OP clubhouse on [Neutaconkanut Hill](#) (on the Providence/Johnston border) opened its impressive radio station to members and Amateur Radio



## ON THE AIR:

## RI'S RADIO LEGACY CONTINUES

NANCY AUSTIN KC1NEK, NCRC & DAVE TESSITORE, K1DT  
CONT'D

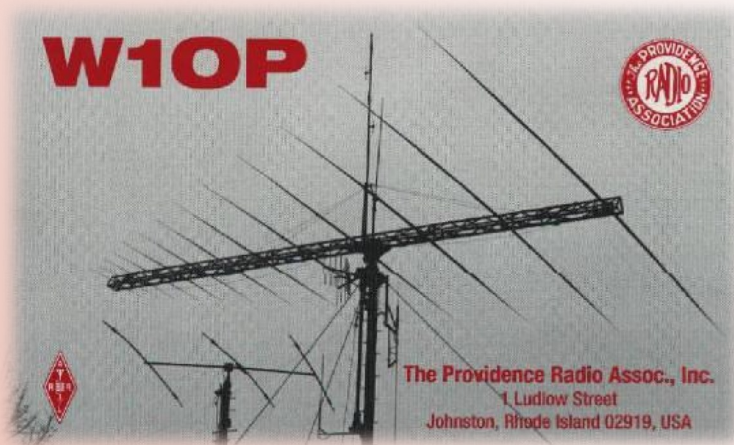
guests, including: Dom N1DM, David W3DRE, Doug K3DRE, Andy AJ1S, John W1GS, Dave K1DT, Teri W1PUP, Jeremy K1JST, Adam KC1KCC, and Nancy KC1NEK. Hundreds of phone QSOs were logged on mostly 20m and 40m.

As the ARRL notes: "The AFD Crossband Test is a unique opportunity to test two-way communications between military communicators and radio stations in the Amateur Radio Service (ARS), as authorized in 47 CFR 97.111. These tests provide opportunities and challenges for radio operators to demonstrate individual technical skills in a tightly controlled exercise scenario. Military stations will transmit on selected frequencies and will announce the specific ARS frequencies monitored. All of the times are Zulu (Z), and all frequencies are Upper Side Band (USB) unless otherwise noted."



**Providence Radio Association club President Tess, K1DT**

For more on the history of call sign NAF and their restored Collins antenna, reach out to Providence Radio Association club president Dave Tessitore "Tess", K1DT at [k1dt@verizon.net](mailto:k1dt@verizon.net)





## ON THE AIR:

## RI'S RADIO LEGACY CONTINUES

NANCY AUSTIN KC1NEK, NCRC & DAVE TESSITORE, K1DT  
CONT'D



Radio communication has a long history in RI. By 1900, Newport's naval officers were given instruction in wireless technology. Newport's Torpedo Station was one of the first of a network of U.S. Navy shore radio stations, along with an adjacent site at the Naval Training Center used to train radio operators for the Navy. From c.1964 until 1975, Sachuest Point on Aquidneck Island and Beavertail on Jamestown served as key Receive and Transmit stations.

Today, Amateur Radio offers an experiential learning gateway to 21st century workforce development opportunities in electronics and wireless radio communication, both analog and digital. This highly relevant mission is at the heart of many [ARRL-affiliated RI radio clubs](#).

**Many thanks to the PRA's special friend, Nancy Austin, KC1NEK, President of the Newport County Radio Club for her fine contributions to this article.**



**W**elcome to a new column that I am calling “Beyond Spark”. The aim of this column is discussion about radio and telecommunications that goes beyond normal amateur radio activity but could still be of interest to those of us that love playing radio. I hope you enjoy it.

While my shack was in the midst of reconstruction, there were many times when I could not do anything. Pounding nails and running the table saw at 11:00 PM would not have been acceptable to my family. Remember, the amateur is “balanced” and “considerate”. So when you have nothing you can do, you do what many of us do, you sit behind the idiot box.

Well, one night while playing with my smart TV, I found that there were many channels on there that I had never seen before, about a thousand of them. It turned out that I could watch a lot of streaming channels. While scrolling through all these new channels, I found one that was dedicated to British television shows. This is where I discovered the British crime drama, “Line of Duty”.

“Line of Duty” is about an anti-corruption unit in a fictional British police force investigating internal criminal activity allegedly with ties to organized crime. Two things about the show captivated my interest. It kept me on the edge of my seat the entire time. The show had more twists and turns that always kept me trying to figure out what was going on with an ever evolving storyline. Second was how much they portrayed the use of cell phone technology to provide clues that would aid in solving the case.

The final episode of one of the seasons reveals that one of the detectives in the anti-corruption unit is bad and has been passing information about cases to the criminal leadership, only referred to as “H”. Through the entire series they try to learn who is “H”, but each time they think they have a lead, they only find that they still don’t really have the answer. The typical end of season cliff hanger results in a shootout between the bad police officer and the SWAT team. He is shot and is lying on the side of the road. The anti-corruption detective encourages him to provide a dying declaration in his final breaths.

While later reviewing the video of his dying declaration they observe that he is tapping the tip of his finger against his thumb four times repeatedly. It is at that time that they come to the revelation that “H” is actually four people. Why?

So, besides portrayals of cell phone technology, what does any of this have to do with radio? I’m going to allow you to figure that out. If you think you know the answer, drop us a line.

If you have an idea for this column, something different that you have done in the hobby, something you did in your professional career involving RF, telecommunications, or in a supporting role, send me your ideas.

Thanks for reading.



© IMDb



## HAPPENINGS:

**C**ongratulations to the following new PRA members:



**K3DRE**  
Doug Evans  
May 9



**NE1U**  
Edward Casassa  
April 11



**N1MZA**  
Domenic Valenti  
April 11



**N1TUD**  
David Killian  
April 11



**W1AV**  
Bob Ruzzo  
March 14



**KC1QYD**  
Thomas Boulay  
February 7



**K1LFS**  
Leo Smith  
April 11

**KC1MPO**  
Donald Pillsbury  
February 7

**Jose Sandoval**  
March 14

**Welcome to the club and remember “once a member, always a member”.**

**M**any thanks to Frank, W3LPL on helping us to procure an AB577 mast. This will assist the club greatly during our field day deployment.

**I**n the December issue of the newsletter I indicated that there was a hidden message. Did you find it? Take another look at page 23.



Our **Happenings** section is the place to list member accomplishments and other short notices pertaining to club members and other items of member interest.

If you think there is an item of interest or event that should be listed in our **Happenings**, please let our Club President know and we will do our best to get it included.



## CALENDAR:

## SUMMER 2023

<b>POTA Activation</b> Colt State Park	<b>27-May</b>	Site #19, same as last year <a href="https://parksontheair.com/">https://parksontheair.com/</a>
<b>ARRL VHF Contest</b> 1 Ludlow St	<b>June 10-11</b>	Operate 6, 2, 220, 432 from Club Station <a href="http://www.arrl.org/june-vhf">http://www.arrl.org/june-vhf</a>
<b>PRA Cookout</b> 18 Lake View Dr., Chepachet, RI	<b>20-Jun</b>	Bob VanHerpe invites all PRA members to his home in Chepachet for a cookout
<b>FIELD DAY! W1OP, W1B, W1C, and W1D</b> Masonic Youth Center, 116 Long St, Warwick, Ft. Burnside, Beavertail Pt, and PRA HQ	<b>June 24-25</b>	Big Effort Field Day. W1OP and W1C GOTA at Masonic Youth Center. W1B on FT4 from Ft. Burnside. W1D on FT8/4 from Clubhouse. <a href="http://www.arrl.org/field-day">http://www.arrl.org/field-day</a>
<b>Tune-Up Flea Market</b> NE Wireless & Steam Museum, E. Greenwich	<b>22-Jul</b>	Flea Market and Museum Tours <a href="https://newsm.org/">https://newsm.org/</a>
<b>Volunteers On the Air - W1AW/1</b> 1 Ludlow St.	<b>Jul 25-Aug 1</b>	Operate as W1AW/1 on various bands and modes per RI schedule. Week 1 of 2 <a href="https://vota.arrl.org/">https://vota.arrl.org/</a>
<b>Visit to the Retro Computing Society of RI</b> Atlantic Mills, 118 Manton Ave, Providence	<b>19-Aug</b>	Mike Umbricht W9GYR, Curator of Retro Computing Society will give us a tour <a href="https://www.rcsri.org/">https://www.rcsri.org/</a>
<b>Northeast HamXposition</b> Best Western Royal Plaza, Marlborough, MA	<b>Aug 25-27</b>	Host PRA Happy Hour <a href="https://hamxposition.org/">https://hamxposition.org/</a>
<b>POTA Activation</b> Brenton Point Park	<b>TBD</b>	<a href="https://parksontheair.com/">https://parksontheair.com/</a>
<b>"Annual" Club Awards Dinner</b> Atwood Grille, 5:30-8:30pm	<b>26-Sep</b>	Awards presented to outstanding members <a href="https://www.atwoodgrille.com/">https://www.atwoodgrille.com/</a>
<b>NEAR-Fest XXXIV</b> Deerfield State Fairgrounds, NH	<b>Oct 13 &amp; 14</b>	New England Amateur Radio Festival and Flea-Market <a href="https://near-fest.com/">https://near-fest.com/</a>
<b>Olneyville NY System Dinner</b> Olneyville	<b>24-Oct</b>	The PRA meet at the infamous Olneyville New York system for dinner <a href="https://www.olneyvillenewyorksystem.com/">https://www.olneyvillenewyorksystem.com/</a>

### PRA NET ON DMR

Don't forget that the PRA conducts a weekly net on DMR every Sunday night at 2000 EST/EDT, hosted by the New England Digital Emergency Communications Network (NEDECN) on talk group NETAC1.  
**All are welcomed to attend.**

Our **Calendar** section is the place to list events either sponsored by the PRA or of general interest to the PRA membership and including its participation.

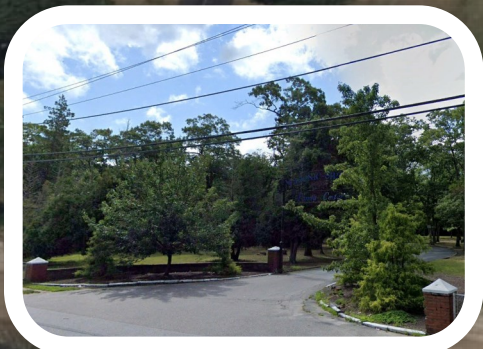
Events take place year round, be it contests, conventions, flea markets, or just casual get togethers.

If you think there is an event that should be listed in our **Calendar**, please let our Club President know as soon as possible and we will do our best to get it included.

Also, don't forget we meet weekly every Tuesday evening on the web. Members should watch your email for meeting announcements.



# FIELD DAY 2023 W1OP W1B, W1C, W1D



**24 June 1800Z – 25 June 1800Z**  
**At Buttwood Masonic Youth Center**  
**Come Join the Fun and Be Ready To Operate !!**







## IN CLOSING:

Since our founding in 1919, the Providence Radio Association always has considered that Amateur Radio is obligated to serve its community, and through the years its members have strongly supported the ARES, RACES, NTS, and other EMCOMM programs.

In 1933, a young Stanley Atkinson W1AFO was charged with equipping the Providence Police with their first radio system, consisting of a transmitter at Police HQ and receivers in 6 new scout cars.

Our members were active during the Great Hurricane of 1938, with reports that Westerly's only communication with the outside world was by Amateur relay to Providence by PRA members.

During WW2, while Amateur Radio operations were curtailed, most PRA member who were not serving in the armed forces were enrolled in the Providence Police Radio Patrol. Using the new "Ultra High" bands of 2 1/2 and 5 Meters, regular nets and patrols were carried out, looking for and reporting of suspicious activities, especially at critical port, utility, and wartime manufacturing locations throughout the Providence area. The Patrol was led by Father Charles J. Mahoney W1BBA of the Diocese of Providence. PRA members included Walter B. Marshall W1JEZ Director, John M. Bristow W1JP Captain, Robert C. Bellisle W1KKE Captain, Alphonse Tonaszewski W1HJB Captain, Nicholas Abbenante Ex W1BTV Leut., Theodore Davis W1NLF Leut., and John A. St. Martin W1MQZ Sgt.

Prior to our present clubhouse, the PRA met at the Providence Armory of the Mounted Commands, headquarters of the RI Army National Guard, from 1951-1954. Using predominately 6 Meters AM, PRA members operated from the Armory throughout the destructive Hurricane Carol of 1954 providing much needed communication.

## THE PRA AND EMERGENCY COMMUNICATIONS

DAVE TESSITORE, K1DT

Then from 1955 through 1957 the PRA was invited to utilize the RI Civil Defense Agency radio site at Darby Road in North Scituate as our meeting place. We continued close ties to RI Civil Defense through their transition to the RI Emergency Management Agency. In 1988, State radio officer Dick Buchard, W1HQV was instrumental in assisting the PRA to acquire surplus equipment which we used to provide communication to earthquake ravaged Armenia, with the PRA handling health and welfare traffic for over two months for some of the 180,000 casualties.

In the late 70's and early 80's, while member Jack Titterington W1EOF was our ARRL RI Section Manager, the PRA ran the weekly RI ARES net. We moved the net from the unreliable 2M AM mode to the popular new FM mode on 146.52 Simplex and held weekly drills encouraging all stations to check in use emergency power. During this time, several PRA members were also active on the National Traffic System CW and SSB HF nets, including W1EOF, WA1PJD, WA1POJ (N1RI), WA1PWA, N1DM, and K1DT.

The PRA continued to provide emergency HF comms for hurricanes in Jamaica and Puerto Rico, as well as during Hurricane Katrina and Superstorm Sandy.

Just two weeks ago, your PRA President K1DT and VP W1GS met with the new RI ARES leadership team and the President of the Newport County RC. We discussed how we can continue to best work together as Radio Amateurs to serve our State and Nation in times of need.

Help us to continue our legacy of community service, a PRA cornerstone going back 100 years.

Dave Tessitore, President



## IN CLOSING:

## THE PRA AND EMERGENCY COMMUNICATIONS

CONT'D



Harold T. Hargraves at the mike of mobile radio patrol's headquarters at Providence police department. The hams were active in this network during the war.

DATE	TIME	CALLEDDOWN	REPORT SENT	REPORT NO	FREQ	POWER	TIME OF RADIO QRG	OTHER DATA
19 SEPT	1900	W1BLS	R1A2B	F3	10			FRANK
		F100	W1A0SL				1930	NORM
19 SEPT	1900	W1WAC/M	R1A2B	F3	10			CELL
		W1AXO						CEO
		AEL5/M						JOE
		W1LGT						ROGER
		N1DD7						BOB RVDL
		W1LMT						JOE
		W1LDV						JED
		W1LDV						DICK
		W1SFF					1915	FRED
19 SEPT	1900	N1DD7	R1A2B	F3	10			GRU
		W1EET						REPEATER 3
		W1SFF						SNT 1
		W1LO						SNT 2
		K1DT						SNT 1
1930		N1DD7		162X	10		1930	SNT 1
		W1EET					1945	GRU
7 OCT 1100		W1WAB	EMR1	3440	25	1148		SNT 2
7 OCT 1900		W1EET	R1A2B	F3	10			SNT 1
		W1LO						SNT 2
		W1FAD/M	APL STNS					GRU
		N1DD7	ON EMERGENCY					RVDL
		W1AXO	POWER					GRU
		K1BIDV						SNT 1
		K1DT						SNT 4
		N1R1					1925	GRU
17 OCT		W1WAB	EMR1	3440	20	1710		RVDL/EMR1

RI ARES Net Log from 1979



State Civil Defense Radio Officer Dick Bouchard W1HQV in the RI State House EOC using an HT on the 16/76 amateur repeater to re-ley critical information during the Blizzard of 1978, with RI Governor Garrahy (in his renowned plaid shirt) and Radioman Steve Anthony K1POX (arms crossed) listening in.

Many thanks to all who contributed for this issue.  
It could not be done without you.

This is Your Newsletter !!

Forward your items of interest, short articles, and photos to [W1ER@ARRL.NET](mailto:W1ER@ARRL.NET)  
We will make every effort to include your submission.

**73 AND SEE YOU IN SEPTEMBER**