

OUR 27TH YEAR!

# EPARA BEACON



VOL. 7, NUMBER 2 THE OFFICIAL NEWSLETTER OF THE EASTERN PENNSYLVANIA AMATEUR RADIO ASSOCIATION FEBRUARY 2023

## **NEXT CLUB MEETING: FEBRUARY 9TH**

Monroe County Public Safety Center, 100 Gypsum Rd Stroudsburg, PA 18360

Welcome to the EPARA Beacon! This newsletter is published monthly and is the official newsletter of the Eastern Pennsylvania Amateur Radio Association. EPARA has served the amateur radio community in the Pocono Mountains for over 25 years. We have been an ARRL affiliated club since 1995. We offer opportunities for learning and the advancement of skills in the radio art for hams and non-hams alike. EPARA supports Monroe County ARES/RACES in their mission of providing emergency communications for served agencies in Monroe County. Feel free to join us at one of our meetings or operating events during the year. The club meets on the second Thursday of every month, at the Monroe County 911 Emergency Control Center. The business meeting starts at 7:30 P.M. Anyone interested is invited to participate in our meetings and activities.

**ZOOM Meeting Info: Meetings begin at 7:30PM!**

<https://us02web.zoom.us/j/85463346031?pwd=bU1KcVZoaVZiVEUvdjRsUXlNNHZkZz09>

**Meeting ID: 854 6334 6031 Password: 244632**

## Comet 2022 E3 (ZTF)

Photo taken 1/29/2023

Nikon D800 F11 105mm 6400ASA 40 images stacked 5sec exposure

# From The President



Not much has happened since I spoke to you last month, this is the slow time of the year for our group. I've been busy with work and family obligations again so I haven't had much time for amateur radio. I did find time to inspect the antenna at the 911 center and I did find some issues. The feed-line was damaged during one of the high wind events recently so we will need to replace the coax from the rear of the building to the antenna. We will discuss this at the meeting to form a team and set a date for the coax replacement.

The HF bands have been open quite a bit lately so take advantage of the enhanced propagation and get on the air! We are entering the peak of the solar cycle so now is the time to go for your DXCC and worked all states. Band openings on 20, 15, 10 and 6 meters are great for this so go ahead and get on the air.

Our next meeting will be on February 9th ,hope to see you then. 73

Chris, AJ3C

P.S. Remember that the 2023 dues are now due

## CONTACT INFORMATION

President Chris Saunders AJ3C: <a href="mailto:aj3c@gmx.com">aj3c@gmx.com</a>	Vice President Bob Matychak W3BMM: <a href="mailto:w3bmmqth@gmail.com">w3bmmqth@gmail.com</a>
Secretary Kevin Forest W3KCF: <a href="mailto:w3kcf@outlook.com">w3kcf@outlook.com</a>	Treasurer Scott Phelan KC3IAO: <a href="mailto:kc3iao@hobbyguild.com">kc3iao@hobbyguild.com</a>
Member at Large Eric Weis N3SWR: <a href="mailto:n3swr@ptd.net">n3swr@ptd.net</a>	ARES EC Charles Borger KB3JUF <a href="mailto:KB3JUF@gmail.com">KB3JUF@gmail.com</a>

Postal Address: EPARA PO Box 521 Sciota, PA 18354	Web Site: <a href="https://www.qsl.net/n3is/">https://www.qsl.net/n3is/</a> Email: N3IS@qsl.net	Send dues to: EPARA PO Box 521 Sciota, PA 18354	Newsletter submissions to: Eric Weis, N3SWR Editor <a href="mailto:EPARAnewsletter@ptd.net">EPARAnewsletter@ptd.net</a>
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***EPARA Net list***

Monroe county ARES-RACES – Sunday’s 8:30 PM, 146.865 MHz, PL -100 Hz

The Monday Night Pimple Hill repeater 8:30 PM ( Repeater freq = 447.275 with a - 5MHz offset) DMR TECH Net on TG314273\* Time Slot 2

SPARK Information/Swap Net – Tuesday’s 8:30 PM, 147.045 MHz, PL 131.8 Hz

The Wednesday Night EPARA Hot Spot DMR Rag Chew net at 8:30 PM, TG 3149822\* Time Slot 2 (N3IS Talk Group)

EPARA Tech Net – Friday’s 8:30 PM, 147.045 MHz, PL +131.8 Hz

\*TG = Talk Group

- President**  
Chris Saunders AJ3C
- Vice President**  
Bob Matychak W3BMM
- Secretary**  
Kevin Forest W3KCF
- Treasurer**  
Scott Phelan KC3IAO
- Member at Large**  
Eric Weis N3SWR
- \*\*\*\*\*
- ARES EC**  
Charles Borger KB3JUF
- Assistant EC**  
Chris Saunders AJ3C  
Len Lavenda KC3OND
- Field Day Coordinator**  
Chris Saunders AJ3
- Quartermaster**  
TBD
- Membership Coordinator**  
Al Brizzi KB3OVB
- Newsletter Editor**  
Eric Weis N3SWR
- Photographer**  
Eric Weis N3SWR
- Public Information**  
Ruth Ann W9FBO
- Social Media**  
Chris Saunders AJ3C  
Eric Weis N3SWR
- Hamfest Coordinator**  
Bill Connely W3MJ  
Walter Koras W3FNZ
- Technical Program Coordinator**  
Bill Carpenter AB3ME
- Lead VE**  
Chris Saunders AJ3C
- Webmaster**  
Chris Saunders AJ3C

# Announcements

## AND UPCOMING EVENTS



### **EPARA Club Dues!**

Club dues are coming due next month. Contact Scott KC3IAO via his email: [KC3IAO@hobbyguild.com](mailto:KC3IAO@hobbyguild.com) and you can send him a check or pay via PayPal.

### **Rep. Bill Johnson Introduces Bill to Eliminate Private Land Use Restrictions on Amateur Radio**

Congressman Bill Johnson (OH-6) introduced a bill in the U.S. House of Representatives (H.R.9670) on Thursday, December 22, 2022, to eliminate private land use restrictions that prohibit, restrict, or impair the ability of an Amateur Radio Operator from operating and installing amateur station antennas on property subject to the control of the Amateur Radio Operator.

### **More Amateur Radio Astronauts Head for the International Space Station**

Three of the four new astronauts on February's planned launch of the SpaceX Crew-6 mission to the International Space Station (ISS) are amateur radio operators.

The four crew members that comprise the SpaceX Crew-6 mission pose for a photo during a training session on the crew access arm at the Kennedy Space Center's Launch Pad 39A in Florida. From left are, Mission Specialist Andrey Fedyaev, Pilot Warren "Woody" Hoburg, Mission Specialist Sultan Al Nedayi, and Commander Stephen Bowen. Photo Courtesy of SpaceX.

Pilot Warren "Woody" Hoburg, KB3HTZ; Commander Stephen Bowen, KI5BKB, and Mission Specialist Sultan Al Neyadi, KI5VTV, will join Mission Specialist Andrey Fedyaev on board the SpaceX Dragon spacecraft, Endeavour.

The spacecraft will be atop a Falcon 9 rocket and, while a launch date has not been selected, the earliest date would be mid-February 2023.

All crew members have learned about Amateur Radio on the International Space Station (ARISS), received guidance on studying and testing, and learned how to operate the ARISS radios and the basics of on-the-air protocol from ARISS team members at NASA's Johnson Space Center.

The crew will be able to participate in ARISS, using the ham radio station on the ISS to contact schools and other educational institutions.

ARISS is a cooperative venture of international amateur radio societies and the space agencies that support the ISS. In the US, participating organizations include NASA, the ISS National Lab, ARRL The National Association for Amateur Radio®, and AMSAT.

Rule #1 of Amateur Radio, it is a hobby, unless you figured out a way to fashion a living out of it.

Rule #2 of Amateur Radio, life is not a hobby and typically carries heavy responsibilities of everything that is not a hobby.

Rule #3 of Amateur Radio, never give up a LIFE event for a Ham event. You may make some great memories at the Ham event, but the guilt you may carry missing a LIFE event can be a terribly heavy millstone.

Rule #4 of Amateur Radio, as technology moves forward, so does Ham Radio - do what makes you happiest, experiment with other elements of Ham Radio as LIFE allows.

Rule #5 of Amateur Radio, it is only Ham Radio, when confused always refer to Rule #1 through #4.





## EPARA GENERAL MEMBERSHIP MEETING AGENDA

### EPARA Membership Meeting Minutes January 12th 2023 General Membership Meeting 7:30Pm

**Open meeting:**

Meeting called to order at 7:30 pm on January 12<sup>th</sup>, 2023 by Chris AJ3C

**Declaration of Quorum.**

Total attending 25. Present at 911Center 21. Present on Zoom 4. Visitors present 5

**Pledge of Allegiance / Moment of silence:**

**Membership Meeting – Minutes Nov 12<sup>th</sup> 2022**

Secretary - W3KCF:

Meeting minutes for Nov 12<sup>th</sup> 2022 were posted on the EPARA website. Chris – AJ3C asked members if they had seen and read the minutes from our previous meeting. He then asked if there were any questions or objections to the minutes as they were presented. With no objections, Chris asked for a motion to accept the minutes as presented:

**Motion to accept minutes as read:** By Ruth Ann – W9FBO 2<sup>nd</sup> by Bob-W3BMM Motion Passed

**Treasurers report:**

**Treasurers report: For November 2022 EPARA Club Meeting.  
Read by Scott – KC3IAO**

**Bank Account Statement Opening Balance 11/30/22 statement.): \$4635.46**

**Income:**

- Deposit 11/15/22: Dues \$35 (KB3VSQ & KC3UTB)
- Deposit 12/13/22 50/50 \$35
- Transfer from PayPal Account \$447.58
- Interest \$0.40

**Expenses: None**

**Closing Balance: 12/30/22 \$5153.44**

**Our PayPal Account: 11/30/22 statement – Opening balance \$447.58**

**Transfer to checking account \$447.58**

**Income: Dues \$35 (KC3PPB & W0ROY)  
Donation \$1.00**

**Fees: \$1.68**

**Balance: \$34.32**

**Motion to accept by Brad – KF6FOB Seconded by AL-KB3OVB Motion Passed**



## EPARA GENERAL MEMBERSHIP MEETING AGENDA

**Correspondence:**  
None

**Reports of officers and committee's:**

**Bill AB3ME – Program Committee**

Bill stated there would be no presentations tonight after the meeting by Alex -KD2FTA on SDR Radios. At this time there are no other presentations scheduled.

Chris -AJ3C stated that those interested in giving a presentation, please contact him or Bill – AB3ME.

**Charlie KB3JUF – ARES/RACES:**

Charlie reiterated that all involved in ARES need to be motivated. Make sure you attend our meetings on the 4<sup>th</sup> Friday of the month and keep your Task Books up to date. Complete any and all training required and stay enthused. Charlie also stated, please check in on the Sunday Night ARES Net.

Charlie also mentioned we are in the recruitment stage. We are looking for volunteers to increase membership in our ARES group.

**Charlies new email address and phone number**

[Charlesborger155@gmail.com](mailto:Charlesborger155@gmail.com)

570-534-1818

**Ruth Ann, W9FBO – PIO:**

Ruth Ann stated that our grant application is its final review process and we are still in the running. She also said the St. Patrick's Day Parade was coming in March 2023 and would like to get the club involved. She thought it would be a great opportunity if we could come up with some sort of live float design, showing what Amateur Radio is all about.

**Chris AJ3C – Instruction and Training:**

VE sessions have started again on the 4<sup>th</sup> Friday each month at 6:00pm. General License class will begin in March. Dates will be announced as soon as I confirm with the 911 center.

Then, starting in the Spring, Chris mentioned we will hold a class for Technicians.

**Chris AJ3C – Website:**

Chris said the club's website update is complete. It has been stream lined to reduce the resources needed on the free website server provided by QSL.NET

**Bob W3BMM – Social Media:**

Bob said, "please like the site". Chris said, as always, share material with Bob for the club's various social media accounts.

He mentioned that the ARRL has very good material on their Facebook account, which is beneficial to all.

Bob said Groups IO (input/output) is up and running. Contact him for additional information to join.



## EPARA GENERAL MEMBERSHIP MEETING AGENDA

### AL, KB3OVB: Membership:

AL said we are currently at 72 members.

### Eric N3SWR – Newsletter:

Eric was absent at tonight's meeting, but wanted us to know that everything is well with the newsletter. Keep sharing content with him. He plans to have audio links and additional pages in the next addition.

### Sat-Com / EME Group:

Bob – W3BMM, said both antenna's are being modified for storage and will soon be put away.

### Old business:

### EPARA Christmas Dinner:

Our annual Christmas dinner was well attended and all had a great time

### Annual Santa Net:

We had to cancel the Santa Net due to repeater issues

### Radio Room Rig Upgrade:

We have received a donation offer for a Yaesu FTdx10 and an Icom IC9700. Chris said he would follow up and see if the offer is still available. This will be a great addition to the radio room and save the club a lot of money.

### Any other old business:

### New business:

### Use of Big Pocono:

We have confirmed use of Big Pocono State Park for Field Day (June 23, 24, 25) and Elmer/Antenna weekend (July 29 and 30)

### Any Other New Business

### 4H Club:

Pete gave an update on the 4H club and told us it is run the University of Pennsylvania and there is a field office in Stroudsburg. The woman in charge will meet with him after the new year. He plans to contact the university and see if they offer any classes pertaining to Amateur Radio. Once he has more information, he will get back to us and keep the clubs informed.

### Votes/New Members:

Pete-K3PNC (Extra) He would like to join our club and has already paid his dues.

Vote was unanimous - approved.

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## EPARA GENERAL MEMBERSHIP MEETING AGENDA

### Announcements:

Club dues for 2023 are now due. If you would like to pay your 2023 EPARA dues using PayPal, please email Scott and Include your Call Sign, Name, and Age. Scott will send you a PayPal Invoice you can use to pay your dues.

[KC3IAO@hobbyguild.com](mailto:KC3IAO@hobbyguild.com)

Alex -KD2FTA announced our latest 80m SSTV Net on the 1<sup>st</sup> and 3<sup>rd</sup> Thursday of the month. It starts at 1930. Check in on 147.045 repeater, then head to 3.847 to transmit and receive. Don't forget to download the MMSSTV software.

### Any Additional Announcements

*Tonight's 50/50 Raffle: \$80.00. Won by Chris-AJ3C*

### Adjournment...

*Meeting was adjourned at 2030:*

*Motion to close by Ruth Ann - W9FBO 2<sup>nd</sup> by Ed - KC3OLB Motion Passed.*

### **Secretary**

*Kevin Forrest*

W3KCF





## TEST YOUR KNOWLEDGE!

What happens if a signal is applied to the secondary winding of a 4:1 voltage step-down transformer instead of the primary winding?

- A. The output voltage is multiplied by 4
- B. The output voltage is divided by 4
- C. Additional resistance must be added in series with the primary to prevent overload
- D. Additional resistance must be added in parallel with the secondary to prevent overload

Last months answer was A. When you install a system of radial wires at the base of a ground-mounted vertical antenna, current flows into the radials instead of into the soil. You can improve an antenna's efficiency by reducing losses from resistance and soil resistance can be significant.

### What is Digital Mobile Radio (DMR)?

- A European Telecommunications Standards Institute (ETSI) standard first ratified in 2005 and is the standard for "professional mobile radio" (PMR) users. Motorola designed their MotoTrbo line of radios based upon the DMR standards
- Meets 12.5kHz channel spacing and 6.25kHz regulatory equivalency standards
- Two slot Time Division Multiple Access (TDMA)
- 4 level FSK modulation
- Cutting edge Forward Error Correction (FEC)
- Commercial ETSI/TIA specs mean rugged performance and excellent service in RF congested urban environments (no intermod and other RF "hash")
- Equipment interoperability is certified by the DMR Association



**The EPARA HOT SPOT Wednesday night DMR rag chew is here!**

**Wednesday evenings at 8:30 PM local, 0:30 UTC!**

***Tune your DMR radios to Talk Group 3149822 TS2 to join the  
N3IS EPARA Hot Spot rag chew DMR net.***

**Listen to the Tech Net Friday nights on the 147.045 repeater to learn more about joining this net and for upcoming ZOOM meetings announcements to learn more about programing your radios and hot spots!**

Anyone looking to take an exam is encouraged to contact Chris AJ3C to preregister at least one (1) week in advance of the test date. If you have any questions or to register, Chris can be reached via email [AJ3C@GMX.COM](mailto:AJ3C@GMX.COM). VE sessions are being held the 4th Friday of each month at 6pm at the Monroe County 911 training center. Seating is limited for the time being so we can follow the health guidelines set forth by the county and state.

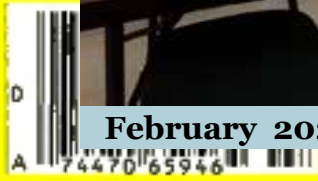


**VE sessions are back - contact Chris AJ3C for further information!**



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ARES/RACES meetings are now being held on the fourth Friday of each month at 7PM. The meetings are once again being held at the 911 call center. These meetings will serve as training sessions covering several aspects of amateur radio emergency communications. We will start with traffic handling and the use of Radiograms and the ICS 213 general message form. Future sessions will cover the use of several ICS forms and the setup and use of digital communication modes including Winlink, Packet Radio, APRS, and the FLDIGI software program. Meeting are open to all, you do not need to be an ARES/RACES team member to attend.



## Want to Put Your Ham Radio Skills to Good Use? Get Involved in EmComm!

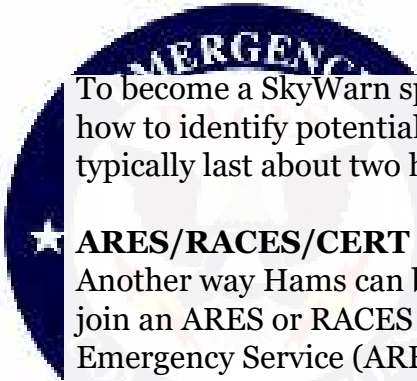
One of the missions of the Amateur Radio Service is for amateur radio operators to provide public service and emergency communications (EmComm) when needed. We act as a voluntary noncommercial communication service and pitch in to help our communities and first responders.

So, what organizations are out there for community-minded amateur radio operators and what can we do to help?

### Join In

One good entry point into public service and emergency communications is to join SkyWarn, a volunteer program run by the National Weather Service (NWS) with more than 290,000 trained severe weather spotters. These volunteers help keep their local communities safe by providing timely and accurate reports of severe weather to the NWS.

Not all of these weather spotters are amateur radio operators, but many are. Amateur radio communications can report severe weather in real time. When severe weather is imminent, SkyWarn spotters are deployed to the areas where severe weather is expected. A net is activated on a local repeater and SkyWarn spotters who are Hams check into that net. The net control advises the spotters when they might expect to see severe weather, and the spotters report conditions such as horizontal winds, large hail, rotating clouds, and even tornadoes.



To become a SkyWarn spotter, you must attend a class that teaches you the basics of severe weather, how to identify potentially severe weather features, and how to report them. The classes are free and typically last about two hours. Check your local NWS website for class schedules.

### ★ ARES/RACES/CERT ★

Another way Hams can become involved in public service and emergency communication is to join an ARES or RACES group. Technically, these are two separate services—the Amateur Radio Emergency Service (ARES) is run by the ARRL, while the Radio Amateur Civil Emergency Service (RACES) is a function of the Federal Emergency Management Agency (FEMA). Amateur radio operators who typically take part in one also take part in the other.

To participate in RACES, you'll need to take some self-study FEMA courses in emergency preparedness and emergency-response protocols. Classes may or may not be required to participate in ARES. These requirements are set by each individual ARES group. To get involved with either ARES or RACES, ask your local club members when they meet. You can also contact the Section Manager or Emergency Coordinator for your ARRL section. To contact them, [click here](#) and find the section that you live in.

Amateur radio operators belonging to ARES (and its predecessor, the Amateur Radio Emergency Corps) have responded to local and regional disasters since the 1930s, including the 9/11 attacks, and Hurricane Katrina and Hurricane Michael, among others.

The Community Emergency Response Team (CERT) program trains volunteers—both Hams and non-hams—how to be prepared for disasters that may impact their area. They provide basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT offers a nationwide approach to volunteer training and organization that first responders can rely on during disaster situations, allowing them to focus on more complex tasks.

### What Gear Do You Need?

For most local needs, a 5-watt VHF/UHF handheld transceiver is sufficient for utilizing local repeaters to relay messages and report on conditions as they exist. Replacing the radio's stock antenna with a higher gain antenna or connecting it to a magnetic mount on a vehicle will increase range significantly.

Even better is a VHF/UHF mobile radio installed in your vehicle with 25 or more watts output and a good mobile antenna. In the event the repeater loses power, you can talk over a considerably larger area in simplex mode with the extra power and a good mobile antenna.

If you work with an ARES or RACES group, you may be asked to act as a county control station. In this capacity, you'd need both HF and VHF transceivers in a fixed location, such as your house, with a good antenna system and emergency power capabilities like a generator or batteries. This allows you to make contacts within your state and throughout the U.S.

### Helping Hams

Ham radio can play a key role in emergency situations. Here are a few examples:

- Ham radio connected firefighters and police departments, Red Cross workers, and other emergency personnel during the 2003 blackout that affected the northeast United States.
- In 2017, fifty amateur radio operators were dispatched to Puerto Rico to provide communications services in the wake of Hurricane Maria.
- Amateur radio operators provided communications in the aftermath of the Boston Marathon bombing when cellphone systems became overloaded.

- During Hurricane Katrina, more than one thousand ARES volunteers assisted in the aftermath and provided communications for the American Red Cross.
- During the devastating Oklahoma tornado outbreak that began in May 1999, amateur radio operators—giving timely ground-truth reports of severe weather—played a critical role in the warning and decision-making processes at the NWS Weather Forecast Office in Norman, Oklahoma.

Credit: <https://www.onallbands.com/want-to-put-your-ham-radio-skills-to-good-use-get-involved-in-emcomm/>



Greetings from the skies are once again cloudy land :)

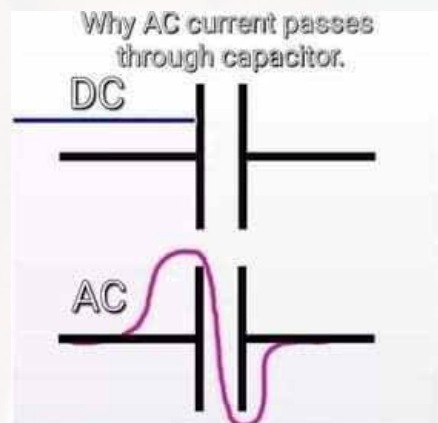
This month is almost over - thank god. For some reason despite the fact I turned 60 two weeks ago, January and February just don't resonate with me. Maybe it's an electrical thing. Who knows. Pun intended haha I'm patiently waiting for march - where the storms are wicked and gone in three days, Spring is just weeks away and there seems to be light at the end of the proverbial tunnel. And my chicken are laying eggs again - hey maybe I could sell them for \$18/dozen like in California!

I totally missed Winter Field Day this year. That took me be surprise as I was looking for "things" to fill up this newsletter. "Things" are always good folks - so send me goodies please. And thanks to those that do by the way! It sure helps...

Last on my list - I dove back into my other interests lately. Comet E3 ZTF is/was visible for a very short time for me to take pictures. The front page shows a what I managed to get by stacking 40 images taken over the weekend when the clouds parted sometime around 1am Saturday morning. Software makes it possible to see what the eye cannot see in the heavens. There are a few possible days left to try for better pictures but that depends on mother nature. We will see...

Cheers for now!

Eric  
N3SWR



"I love being married. It's so great to find that one special person you want to annoy for the rest of your life."

—Rita Rudner

### Topics of Interest

Have an idea you would like to share with your fellow hams? Interested in one of the new exotic digital modes and would like to get others interested in it too? Found a blog somewhere that you think others would find interesting? Members are encouraged to submit items of interest for publication. Submitted articles (are suggested) to be no more than a page or two in length and may be edited for content and grammar. The EPARA officers and newsletter editor reserve the right to determine which items will be included in The Beacon. The deadline for publication is the 15th of the month. The publication date will be at the end of each month. Copyrights are the property of their respective owners and their use is strictly non-profit/educational and intended to foster the spirit of amateur radio.



If you've taken pictures at an event and would like to submit them for possible inclusion in the newsletter, forward them to the newsletter editor. Please send action shots, if possible. Faces are often preferable over the backs of heads. Many hams may be way too overweight, so please consider using a wide-angled lens.

### Disclaimer

The Beacon is not representative of the views or opinions of the whole organization, and such views and opinions expressed herein are of the individual author(s).

# Contest Corral

# February 2023

Check for updates and a downloadable PDF version online at [www.arrl.org/contest-calendar](http://www.arrl.org/contest-calendar). Refer to the contest websites for full rules, scoring information, operating periods or time limits, and log submission information.

Start - Finish	Date-Time	Date-Time	Bands	Contest Name	Mode	Exchange	Sponsor's Website
1	2000	1 2100	3.5	UKEICC 80m Contest	Ph	6-char grid square	<a href="http://www.ukelicc.com/80m-rules.php">www.ukelicc.com/80m-rules.php</a>
2	0000	3 0300	7	Walk for the Bacon QRP Contest	CW	13 WPM; RST, SPC, name, mbr or pwr	<a href="http://qrptest.com/pigwalk40">qrptest.com/pigwalk40</a>
2	1800	2 2200	28	NRAU 10m Activity Contest	CW Ph Dig	RS(T), 6-char grid square	<a href="http://nricontest.no">nricontest.no</a>
2	2000	2 2200	1.8-28.50	SKCC Sprint Europe	CW	RST, SPC, name, mbr or "none"	<a href="http://www.skccgroup.com">www.skccgroup.com</a>
4	0000	5 2359	1.8-28, VHF/UHF	Vermont QSO Party	CW Ph Dig	RS(T), VT county or SPC	<a href="http://www.ranv.org/vtqso.html">www.ranv.org/vtqso.html</a>
4	0001	5 2359	28	10-10 International Winter Contest, SSB	Ph	Name, mbr or "0," SPC	<a href="http://www.ten-ten.org">www.ten-ten.org</a>
4	0600	4 1800	1.8-28	EurAsia HF Championship	CW Ph	RS(T), 6-char grid square	<a href="http://www.eurasia-contest.com">www.eurasia-contest.com</a>
4	1200	5 1200	3.5-28, 144	F9AA Cup, CW	CW	RST, serial	<a href="http://www.site.urc.asso.fr">www.site.urc.asso.fr</a>
4	1200	5 2359	3.5-28	Mexico RTTY International Contest	Dig	RST, XE state or serial	<a href="http://www.rtty.fmre.mx">www.rtty.fmre.mx</a>
4	1400	4 2359	1.8-28	Minnesota QSO Party	CW Ph Dig	Name, MN county or SPC	<a href="http://www.w0aa.org/mnqp-rules">www.w0aa.org/mnqp-rules</a>
4	1400	4 2359	1.8-28	FYBO Winter QRP Sprint	CW Ph Dig	RS(T), SPC, name, power, temperature	<a href="http://arizonascqrptions.apps-1and1.com">arizonascqrptions.apps-1and1.com</a>
4	1600	5 2359	1.8-28	British Columbia QSO Party	CW Ph	RS(T), BC district or SPC	<a href="http://www.ordaxcc.org/bcqp_rules.html">www.ordaxcc.org/bcqp_rules.html</a>
4	1900	5 1900	1.8-28	European Union DX Contest	CW Ph	RS(T), EU union region or ITU zone	<a href="http://www.eudx-contest.com/rules">www.eudx-contest.com/rules</a>
4	2300	5 0300	3.5-14	North American Sprint, CW	CW	Other's call, your call, serial, name, SPC	<a href="http://ncjweb.com/Sprint-Rules.pdf">ncjweb.com/Sprint-Rules.pdf</a>
6	1630	6 1729	3.5,7	OK1WC Memorial (MWC)	CW	RST, serial	<a href="http://memorial-ok1wc.cz">memorial-ok1wc.cz</a>
6	2000	6 2130	3.5	RSGB 80m Club Championship, SSB	Ph	RS, serial	<a href="http://www.rsgbcc.org/hf">www.rsgbcc.org/hf</a>
7	0200	7 0400	3.5-28	ARS Spartan Sprint	CW	RST, SPC, power	<a href="http://arsqrp.blogspot.com">arsqrp.blogspot.com</a>
8	0130	8 0330	3.5-14	NAQCC CW Sprint	CW	RST, SPC, mbr or power	<a href="http://naqcc.info">naqcc.info</a>
11	0000	12 2359	3.5-28	CQ WW RTTY WPX Contest	Dig	RST, serial	<a href="http://www.cqwwrtty.com/rules.htm">www.cqwwrtty.com/rules.htm</a>
11	1100	11 1300	7,14	Asia-Pacific Spring Sprint, CW	CW	RST, serial	<a href="http://jsfc.org/apsprint/aprule.txt">jsfc.org/apsprint/aprule.txt</a>
11	1200	12 1200	1.8	KCJ Topband Contest	CW	RST, JA prefecture or district code	<a href="http://www.kcj-cw.com">www.kcj-cw.com</a>
11	1200	12 1200	1.8-28	Dutch PACC Contest	CW Ph	RS(T), PA province or serial	<a href="http://pacc.veron.nl">pacc.veron.nl</a>
11	1200	12 2359	1.8-28,50	SKCC Weekend Sprintathon	CW	RST, SPC, name, mbr or "none"	<a href="http://www.skccgroup.com">www.skccgroup.com</a>
11	1400	13 0200	All, except WARC	YLRL YL-OM Contest	CW Ph Dig	serial, RS(T), SPC	<a href="http://ylrl.org/wp/yl-om-contest">ylrl.org/wp/yl-om-contest</a>
11	1500	12 1500	1.8-28	OMISS QSO Party	Ph	RS, SPC, mbr (if any)	<a href="http://www.omiss.net/Facelift/qso-party.php">www.omiss.net/Facelift/qso-party.php</a>
11	1600	11 1800	3.5-28	FISTS Saturday Sprint	CW	RST, SPC, mbr or "0"	<a href="http://fistsna.org/operating.html#sprints">fistsna.org/operating.html#sprints</a>
11	1900	11 2300	1.8	RSGB 1.8 MHz Contest	CW	RST, serial, UK district code (if UK)	<a href="http://www.rsgbcc.org/hf">www.rsgbcc.org/hf</a>
12	1300	12 1700	3.5,7	Balkan HF Contest	CW Ph	RS(T), serial	<a href="http://arabih.ba">arabih.ba</a>
13	0100	13 0259	3.5-14	CQC Winter QSO Party	CW	RST, SPC	<a href="http://www.coloradoqrpclub.org">www.coloradoqrpclub.org</a>
13	0100	13 0300	1.8-28	4 States QRP Group Second Sunday Sprint	CW Ph	RS(T), SPC, mbr or power	<a href="http://www.4sqrp.com">www.4sqrp.com</a>
13	1300	17 2359	All, except 60,30,17,12	ARRL School Club Roundup	CW Ph Dig	RS(T), class (I/C/S), SPC	<a href="http://www.arrl.org/school-club-roundup">www.arrl.org/school-club-roundup</a>
13	1630	13 1729	3.5,7	OK1WC Memorial (MWC)	CW	RST, serial	<a href="http://memorial-ok1wc.cz">memorial-ok1wc.cz</a>
14	0000	14 2359	1.8-7	PODXS 070 Club Valentine Sprint	Dig	Name, OM or YL, SPC	<a href="http://www.podxs070.com">www.podxs070.com</a>
15	1700	15 2100	1.2G	VHF-UHF FT8 Activity Contest	Dig	4-char grid square	<a href="http://www.ft8activity.eu/index.php/en">www.ft8activity.eu/index.php/en</a>
15	1900	15 2030	3.5	AGCW Semi-Automatic Key Evening	CW	RST, serial, 2-dig yr 1st used bug	<a href="http://www.agcw.de/contest/ista">www.agcw.de/contest/ista</a>
15	2000	15 2130	3.5	RSGB 80m Club Championship, Data	Dig	RST, serial	<a href="http://www.rsgbcc.org/hf">www.rsgbcc.org/hf</a>
16	0000	17 0300	14	Walk for the Bacon QRP Contest	CW	13 WPM; RST, SPC, name, mbr or pwr	<a href="http://qrptest.com/pigwalk20">qrptest.com/pigwalk20</a>
18	0000	19 2359	1.8-28	ARRL International DX Contest, CW	CW	RST, SP or power	<a href="http://www.arrl.org/arrl-dx">www.arrl.org/arrl-dx</a>
18	1200	19 1159	1.8-28	Russian PSK WW Contest	Dig	RST, 2 letter oblast or serial	<a href="http://rdclub.ru/russian-ww-psk-contest">rdclub.ru/russian-ww-psk-contest</a>
18	1900	18 2059	1.8-28	Feld Hell Sprint	Dig	RST, mbr, SPC, grid	<a href="http://sites.google.com/site/feldhellclub">sites.google.com/site/feldhellclub</a>
19	2100	19 2300	3.5-28	FISTS Sunday Sprint	CW	RST, SPC, mbr or "0"	<a href="http://fistsna.org/operating.html#sprints">fistsna.org/operating.html#sprints</a>
19	2300	20 0100	1.8-28	Run for the Bacon QRP Contest	CW	RST, SPC, mbr or power	<a href="http://qrptest.com/pigrun">qrptest.com/pigrun</a>
20	1630	20 1729	3.5,7	OK1WC Memorial (MWC)	CW	RST, serial	<a href="http://memorial-ok1wc.cz">memorial-ok1wc.cz</a>
22	0000	22 0200	1.8-28,50	SKCC Sprint	CW	RST, SPC, name, mbr or "0"	<a href="http://www.skccgroup.com">www.skccgroup.com</a>
22	2000	22 2100	3.5	UKEICC 80m Contest	CW	6-char grid square	<a href="http://www.ukelicc.com/80m-rules.php">www.ukelicc.com/80m-rules.php</a>
23	2000	23 2130	3.5	RSGB 80m Club Championship, CW	CW	RST, serial	<a href="http://www.rsgbcc.org/hf">www.rsgbcc.org/hf</a>
24	2200	26 2200	1.8	CQ 160m Contest, SSB	Ph	RS, SP or CQ zone	<a href="http://www.cq160.com/rules.htm">www.cq160.com/rules.htm</a>
25	0600	26 1800	3.5-28	REF Contest, SSB	Ph	RS, French department or serial	<a href="http://concours.r-e-f.org/reglements">concours.r-e-f.org/reglements</a>
25	1300	26 1300	3.5-28	UBA DX Contest, CW	CW	RST, ON section or serial	<a href="http://www.uba.be">www.uba.be</a>
25	1500	26 0159	1.8-28,50	South Carolina QSO Party	CW Dig Ph	SC: RS(T), SC county or SPC	<a href="http://scqso.com">scqso.com</a>
25	1800	26 0559	3.5-28	North American QSO Party, RTTY	Dig	Name, SPC+DC	<a href="http://www.ncjweb.com">www.ncjweb.com</a>
25	1800	26 0559	3.5-28	NA Collegiate Championship, RTTY	Dig	Name, SPC+DC	<a href="http://www.w9smc.com/nacc">www.w9smc.com/nacc</a>
26	1400	26 1700	3.5-28	High Speed Club CW Contest	CW	RST, mbr or "NM"	<a href="http://www.highspeedclub.org">www.highspeedclub.org</a>
26	1500	27 0100	3.5-144	North Carolina QSO Party	CW Ph Dig	NC county or SPC	<a href="http://ncqso-party.org/rules">ncqso-party.org/rules</a>
27	1630	27 1729	3.5,7	OK1WC Memorial (MWC)	CW	RST, serial	<a href="http://memorial-ok1wc.cz">memorial-ok1wc.cz</a>
27	2000	27 2130	3.5-14	RSGB FT4 Contest	Dig	4-char grid square	<a href="http://www.rsgbcc.org/hf">www.rsgbcc.org/hf</a>

There are a number of weekly contests not included in the table above. For more info, visit: [www.qrpfoxhunt.org](http://www.qrpfoxhunt.org), [www.nccsprint.com](http://www.nccsprint.com), and [www.cwops.org](http://www.cwops.org). All dates and times refer to UTC and may be different from calendar dates in North America. Contests are not conducted on the 60-, 30-, 17-, or 12-meter bands. Mbr = Membership number. Serial = Sequential number of the contact. SPC = State, Province, DXCC Entity, XE = Mexican state. Listings in blue indicate contests sponsored by ARRL or NCJ. The latest time to make a valid contest QSO is the minute listed in the "Finish Time" column. Data for Contest Corral is maintained on the WA7BNM Contest Calendar at [www.contestcalendar.com](http://www.contestcalendar.com) and is extracted for publication in QST 2 months prior to the month of the contest. ARRL gratefully acknowledges the support of Bruce Horn, WA7BNM, in providing this service.

# AMATEUR RADIO SPECIAL EVENT STATIONS!

12/05/2022 | 75/75 Contest Celebrating Our 75th Anniversary

Dec 5-Feb 18, 0000Z-2359Z, member call, Various towns and locations. Quarter Century Wireless Association (QCWA). Phone/CW only on 6, 10, 15, 20, 40, 80, and 160 meters. Certificate. request , certificate at, website. QCWA members contact 75 QCWA members in 75 days. Call "CQ QCWA". This is an operating event. [www.qcwa.org/1-worked-75-75-members-contest.htm](http://www.qcwa.org/1-worked-75-75-members-contest.htm)

02/01/2023 | 74th Anniversary of Merci Train Boxcar

Feb 1-Feb 28, 0000Z-0000Z, NV7AL, Las Vegas, NV. American Legion Paradise Post 149 and 40&8 Voiture 306. 7.074 7.250 14.074 14.250. QSL. Robert Bencsko - AD7J, 2548 Fort Lauderdale Drive, Las Vegas, NV 89156. This special event station is set up to raise awareness of the 40&8 "MERCY Train Boxcar" 74th Anniversary Watch for us on DX Summit QSL with SASE to AD7J <https://www.qrz.com/db/NV7AL>

02/01/2023 | JY1 Memorial Special Event

Feb 1-Feb 28, 0000Z-2359Z, N9SES, Lake Station, IN. ArabQrz.com. 14.025 14.076 14.250 21.025. QSL. Ayman Azar N9SES, 2861 Decatur St, Lake Station, IN 46405. Pse Email Comments Or Questions To N9SES Ayman Azar [admin@n9ses.com](mailto:admin@n9ses.com) <https://www.arabqrz.com/jy>

02/03/2023 | The Day the Music Died

Feb 3-Feb 5, 1800Z-2100Z, W0WND, Clear Lake, IA. North Iowa Amateur Radio Club. 10.136. Certificate. Donald Johnson, 665 W. 6th St, Garner, IA 50438. <https://thedaythemusicdied.w0wnd.net>

02/06/2023 | Super Bowl 57 Special Event

Feb 6-Feb 14, 0001Z-0001Z, W7ASC, Phoenix, AZ. CARL - Center for Amateur Radio Learning. 7.265 14.265 21.465 146.52. Certificate & QSL. W7ASC c/o: Thomas Boza NE7X, 13609 N. 49th Place, Scottsdale, AZ 85254-3505. eQSL via QRZ & LoTW Direct US Mail with SASE for Certificate or QSL. CARL is located in the Arizona Science Center, downtown Phoenix AZ. <https://www.qrz.com/db/w7asc>

02/09/2023 | 60th Anniversary of the YLISSB

Feb 9-Feb 12, 1323Z-1323Z, K4ICA, Venetta, OR. YL International Single Sideband System. 14.332 14.240-14.340 7.230-7.260. QSL. John Ellis, W5PDW, 26231 Hufsmith Conroe Rd., Magnolia, TX 77354. [y1system.org](http://y1system.org)

02/10/2023 | Smoky Mountain Amateur Radio Club 75th Anniversary Celebration

Feb 10-Feb 14, 2100Z-0200Z, W4OLB, Maryville, TN. S.M.A.R.C. Smoky Mountain Amateur Radio Club . 14.250MHz SSB 7.220MHz SSB 14.030MHz CW 7.030MHz CW. QSL. S.M.A.R.C c/o Paul Galentine, 103 Hatcher Ln. , Maryville, TN 37803. The Smoky Mountain Amateur Radio Club will be hosting a special event stations to celebrate 75 years here in East Tennessee. W4OLB.ORG

02/11/2023 | 1st Ever Olivia Digital Mode Weekend QSO Party, Valentine's Day

Feb 11-Feb 13, 1400Z-0200Z, NW7US, Anytown. Olivia Digital DXers Club. 14.071 7.071. Certificate. Tomas Hood, PO Box 110, Fayetteville, OH 45118. This is the FIRST ever weekend QSO party for Olivia. [OliviaDigitalMode.org](http://OliviaDigitalMode.org)

02/11/2023 | 2023 National Inventors' Day

Feb 11, 1400Z-2000Z, N2I, Edison, NJ. New Jersey Emergency Communications Team. 7.275 14.315. Certificate. Via Email -, Link will be on the N2I , QRZ Page. QSL Certificate via email; request link will be posted on the N2I [qrz.com](http://qrz.com) information page. We will operate from the Edison Center Museum in Edison, NJ.....this is the exact location where Thomas Edison and his team invented the Incandescent Light Bulb, Phonograph, and the Carbon Microphone for Bell's Telephone system. This location is also a Parks On The Air designated park - all QSOs will receive Parks On The Air contact credit. [nject.us](http://nject.us)

02/11/2023 | Commemorating first US Navy carrier air strike in WW2

Feb 11, 1700Z-2359Z, NI6IW, San Diego, CA. USS Midway Museum Ship. 14.320 7.250 14.070 PSK31 DSTAR on Papa system repeaters. QSL. USS Midway

DATE	GMT	RS	2WAY	MHZ	QSL	on.....MHz RST	QRM	QRN
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# AMATEUR RADIO SPECIAL EVENT STATIONS!

Museum Ship COMEDTRA, 910 N Harbor Drive, San Diego, CA 92101. [www.qrz.com/db/ni6iw](http://www.qrz.com/db/ni6iw)

02/14/2023 | GVARC Ladies Valentine Special Event

Feb 14, 1700Z-2200Z, WE7GV, Sahuarita, AZ. Green Valley Amateur Radio Club. 14.242. Certificate & QSL. Tom Lang, 1085 W. El Toro Rd, Sahuarita, AZ 85629. This event will be held at the Titan Missile Museum Discone antenna. [we7gv1@gmail.com](mailto:we7gv1@gmail.com)

02/17/2023 | HL Hunley Commemoration and Special Event

Feb 17-Feb 19, 1400Z-1900Z, N4HLH, Sullivans Island, SC. Trident Amateur Radio Club. 7.262 14.262. QSL. QSL Manager, N4HLH, P.O. Box 60732, North Charleston, SC 29419. Check website for specific day and times/frequencies. <https://www.tridenthams.org/hl-hunley>

02/18/2023 | Ice Station WØJH - Frozen Minnesota Lake Portable

Feb 18-Feb 20, 1600Z-2300Z, WØJH, Stillwater, MN. Stillwater (MN) Amateur Radio Association - SARA. 21.360 14.260 7.260 3.860. Certificate. Shel Mann, 1618 Pine St W, Stillwater, MN 55082. WØJH will operate portable from a frozen lake in Washington County, Minnesota (Grid Square EN34). In a meager attempt to drive away the remainder of Minnesota winter, the Stillwater Amateur Radio Association will be generating as much RF as possible over the President's Day long weekend. (Please help us!!) Certificates will ONLY be sent via e-mail in PDF format. (Send requests with standard QSL confirmation info to: [IceStation2023@outlook.com](mailto:IceStation2023@outlook.com)). There is no need to send a QSL card. Info: WØJH at [www.QRZ.com](http://www.QRZ.com) & [www.Radioham.org](http://www.Radioham.org) [www.radioham.org](http://www.radioham.org)

02/18/2023 | Thinking Day On The Air

Feb 18-Feb 19, 0000Z-2359Z, N4P, Lancaster, SC. YCARS. 14.305 7.235 147.030 18.135. QSL. Vicki Carnes, 1093 Outlaw Avenue, Lancaster, SC 29720. Thinking Day on the Air. We'll be set up at a local park: Andrew Jackson State Park, Lancaster County, SC. [ycars.org](http://ycars.org)

02/19/2023 | Worldwide Antarctic Program

Feb 19-Feb 26, 0000Z-0000Z, K4C, McDonough, GA. Worldwide Antarctic Program. 14.270 MHz 21.270 MHz 28.470 MHz 7.170 MHz. QSL. Robert Hines, K4MZU, 1978 Snapping Shoals Rd, McDonough, GA 30252. Annual celebration for over 50+ years of US amateur radio activity in Antarctica. [www.qrz.com/db/k4c](http://www.qrz.com/db/k4c)

02/20/2023 | Engineer's Week at W0CXX

Feb 20-Feb 24, 1700Z-1900Z, W0CXX, Cedar Rapids, IA. Collins Amateur Radio Club. 3.970 14.263. QSL. Engineer's Week at W0CXX, 1110 Lyndhurst Dr., Hiawatha, IA 52233. Main operation will be over the lunch hours (11:00AM Central to 1:00PM Central) to coincide with engineers taking their lunch break. [w0cxx.kb4sby@gmail.com](mailto:w0cxx.kb4sby@gmail.com)

02/20/2023 | George Washington's Birthday

Feb 20-Feb 22, 1800Z-2359Z, WS7G, Moses Lake, WA. Columbia Basin DX Club. 14.322/14.255 7.222/7.260 3.855/3.960. Certificate & QSL. Brian Nielson, 11650 Road 1 SE, Moses Lake, WA 98837. <https://cbn.homestead.com/ws7g.html>

02/22/2023 | Snowbird Field Day

Feb 22, 1500Z-2100Z, W7ASL, Mesa, AZ. Sunlife Amateur Radio Club. 14.230, CW, FT8, JS8Call; 7.200, CW, FT8, JS8Call; DMR Talkgroup 31041. QSL. Tom Goforth, 4324 East Dragoon Circle, Mesa, AZ 85206. <https://sunlifearc.org>

02/25/2023 | 19th annual "Freeze Your Keys" winter operating event

Feb 25, 1400Z-2200Z, W0EBB, Leavenworth, KS. Kickapoo QRP Amateur Radio Club. 7.035 CW 7.240 SSB 14.058 CW 14.325 SSB. QSL. Gary Auchard, 34058 167th Street, Leavenworth, KS 66048. [w0mna74@gmail.com](mailto:w0mna74@gmail.com)

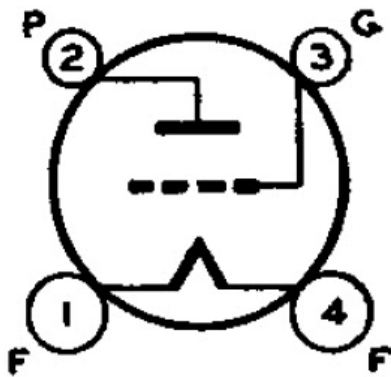
02/25/2023 | Cascade Radio Club 75th Anniversary of ARRL affiliation.

Feb 25-Feb 26, 1600Z-0400Z, W7EK, Bothell, WA. Cascade Radio Club. 3.925 7.250 14.250 21.250. QSL. Cascade Radio Club, 5505 189th St. SE, Bothell, WA 98012. [www.cascaderadioclub.org](http://www.cascaderadioclub.org)

## Power Amp Triode #31

This is a small directly heated power amplifier triode developed for the use in battery operated receivers. Such tubes are also often referred to as battery tubes.

The 31 shares the same pinout as most directly heated triodes which use the UX4 base. But it comes in a much smaller bottle. The coke bottle shaped version has the ST-12 size. This is the same size as the 27 for example. Being designed for battery operation means rather lowish plate voltage and more important very low filament power. This required the development of very efficient filaments. In the 31 the filament operates at 2V and only consumes a tiny 130mA. This translates to just 260mW filament power. Compare this to other types which need more than an Ampere and run on higher voltage. The typical plate voltage for this triode is 135V and the maximum is at 180V. In typical operation it only draws 8 to 10mA. Of course not much power output can be expected when only so little is put in. Still it can produce a whopping 375 milliwatts. Now that would be something to power hyper efficient horn speakers.



Anybody out there who is man enough to join the bragging contest of his audio buddies with that kind of power rating? I am prepared to take the challenge to build a suitable power amp around this tube. The rather highish plate resistance would require an output transformer in the 15k impedance range for single ended operation. Obviously it does not need a huge voltage swing to drive it to it's maximum power output, maybe the 30, another directly heated battery tube would be just right for the job. But that will be another story maybe. What I have used it for was in a line preamplifier only and there it worked extremely

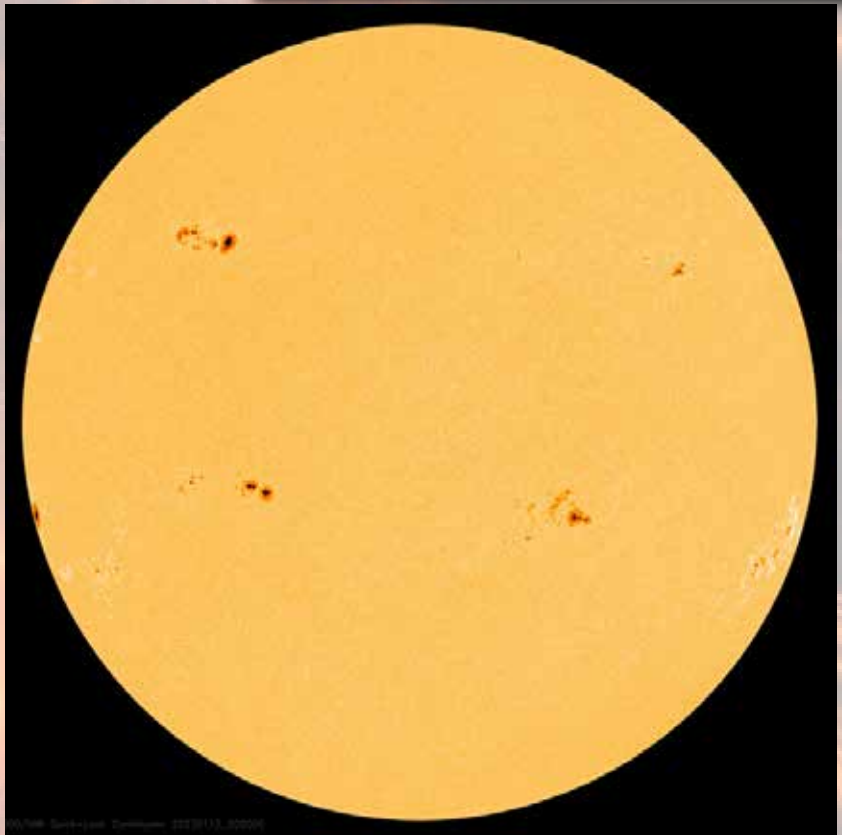
well as can be read in the previous post. I could also see this tube to work well in a headphone amplifier or as driver for other small power triodes, like the 71A or even the 45. Many possible uses for this little beauty! As was expected from it's excellent performance in the preamp it has exceptionally linear plate curves. Very typical of a directly heated triode.

Wow! Sunspot numbers up, geomagnetic disturbances down. What could be better? Okay, maybe Solar Cycle 19, but that was 66 years ago and by far the all time largest.

But this is now, we are in Solar Cycle 25, and this sunspot cycle is emerging better than the consensus forecast. It is predicted to peak about 30 months from now in Summer 2025.

Solar cycles tend to ramp up faster than they decline, so we look forward to great HF propagation for years to come.

There were six new emerging sunspot groups in our reporting week, January 5-11. The first two appeared January 5, the next on January 8, another on January 9 two more January 10 and still another on January 12, when the sunspot number was 151.



Average daily sunspot number rose from 97 to 135.9, and average daily solar flux from 157.8 to 181.2, compared to the previous seven days.

On Thursday, January 12 the noon solar flux was huge, 211.6, far above the 181.2 average for the previous week.

Average daily planetary A index declined from 15.4 to 6.7, and middle latitude A index from 10.9 to 6.1.

Compare the solar numbers to last year. A year ago in Propagation Forecast Bulletin ARLP002 the average daily sunspot number was only 42.4 (135.9 now) and average daily solar flux was 101.6 (181.2 now). 10 and 12 meters now have openings every day.

The solar flux prediction was revised dramatically upward between the Wednesday numbers in Thursday's ARRL Letter and the Thursday numbers in this bulletin, from 196 to 210 for January 13.

Predicted solar flux is 210 on January 13 and 14, then 208, 206 and 204 on January 15-17, 200 on January 18-19, then 180, 160, 130 and 135 on January 20-23, 140 on January 24-26, 145 on January 27, then 155, 155 and 160 on January 28-30, 170 on January 31 through February 2, 175 and 180 on February 3-4, 185 on February 5-6, then 180, 178 and 175 on February 7-9, 155 on February 10-12, 145 on February 13, 140 on February 14-16, 130 on February 17-18 and increasing to 160 by the end of the month. Predicted planetary A index is 5, 10, and 8 on January 13-15, 5 on January 16-17, then 10, 8, 10 and 8 on January 18-21, 5 on January 22-24, then 8, 22, 12 and 8 on January 25-28, 5 on January 29-31, then 12 and 8 on February 1-2, 5 on February 3-5, then 10, 12 and 8 on February 6-8, 5 on February 9-13, then 8, 15, 10 and 7 on February 14-17, and 5 on February 18-20.

# BASIC ELECTRONICS THEORY

## HAARP Thanks Amateur Radio Operators for Help with Latest Experiment 01/13/2023

On Tuesday, December 27, 2022, the High-frequency Active Auroral Research Program (HAARP) conducted its latest ionospheric experiment of bouncing radio signals off an asteroid passing near Earth's orbit (see the ARRL News story from December 23, 2022).

A frosty landscape surrounds antennas at the High-frequency Active Auroral Research Program site in Gakona, Alaska, on December 20, 2022. [JR Ancheta, UAF/GI, photo]

Amateur radio operators and radio astronomy enthusiasts were invited to monitor the test and send their results to HAARP for analysis. While the results of the experiment will take several weeks, Jessica Matthews, HAARP Program Manager, said the help was greatly appreciated. "So far we have received over 300 reception reports from the amateur radio and radio astronomy communities from six continents who confirmed the HAARP transmission."

HAARP officials say the results of the experiment could aid efforts to defend Earth from larger asteroids that could cause significant damage.

"We will be analyzing the data over the next few weeks and hope to publish the results in the coming months," said Mark Haynes, lead investigator on the project and a radar systems engineer at NASA's Jet Propulsion Laboratory in California. "This experiment was the first time an asteroid observation was attempted at such low frequencies," he said. "This shows the value of HAARP as a potential future research tool for the study of near-Earth objects."

The University of Alaska Fairbanks (UAF) operates HAARP under an agreement with the Air Force, which developed and owned HAARP but transferred the research instruments to UAF in August 2015.



## The Heartbeat of the Shortwaves

Shortwave station WWV has operated for over a century, and has broadcast precise time and frequency information for more than 50 years.

### Jen Glifort, KC1KNL

Every night, over 50 million devices in the US receive a signal containing time codes through their internal antennas and receivers, which then interpret the codes to ensure near-perfect synchronization. That signal has been coming from WWV in Fort Collins, Colorado, for over half a century.

Among many other things, the National Institute of Standards and Technology (NIST; [www.nist.gov](http://www.nist.gov)) is responsible for the maintenance and operation of shortwave stations WWV, WWVB, and WWVH (in Hawaii) through its Time and Frequency Division. Shortwave enthusiast Thomas Witherspoon, K4SWL, called WWV "the heartbeat of the shortwaves." He explained, "The NIST reference signals are ever-present and easily accessible here in North America and other parts of the world."

### Vintage Technology

Since 1965, WWV and its companion station, WWVB (often collectively referred to as "WWV"), have broadcast Coordinated Universal Time (UTC) to the exact second to the continental US. WWV is the oldest con-

tinuously active radio station in the country (see the sidebar, "The History of WWV"). WWVH, its Hawaiian counterpart, broadcasts the same information for the island state. Using long electromagnetic waves at 60 kHz — a frequency so low it can be received through buildings — WWVB's signal allows millions of timekeeping devices across the country to sync, usually in the middle of the night, when the signal is strongest. These devices contain small, internal antennas and receivers, which interpret the time codes sent by WWVB to maintain accurate readings of the time and the day of the year, as well as adjust for daylight saving time and leap years.

WWVB signals reach all these devices via the 60 kHz longwave band, but WWV and WWVH signals leverage the shortwave bands. There's no official definition of the "shortwave band," but it generally extends from the high end of the medium-frequency (MF) band to the end of the high-frequency (HF) band. Radio waves in the shortwave band are reflected off the ionosphere, which means they can be directed at certain angles that allow them to travel long distances, unlike some radio waves that use line-of-sight propagation and travel in straight



An aerial view of WWV. The station broadcasts six frequencies with their own antennas, which are all surrounded by a white fence. The lowest frequency has the tallest antenna, and it requires a flashing strobe to be visible to passing aircraft.

## The History of WWV

**1919:** NIST (then called the National Bureau of Standards) was assigned the call letters "WWV."

**1920:** The Bureau started testing the station, broadcasting musical concerts on Friday nights, and later broadcasting market news for the Department of Agriculture.

**1922:** It was decided that the station would transmit standard frequency signals.

**1927:** WWV started using quartz oscillators to improve the station's output frequency.

**1932:** The station moved to a Department of Agriculture site near Beltsville, Maryland, where it began broadcasting on 5, 10, and 15 MHz, which it continues to use today.

**1936:** Musical organizations suggested WWV add the 440 Hz tone (A above middle C), for the sake of tuning instruments.

**1940:** WWV was destroyed by a fire, but returned to the air in a nearby building 5 days later, using equipment salvaged from the burned station.

**1943:** A newly built station went on the air.

**1944:** WWV added the 2.5 MHz frequency as a way of reaching the nearby population. Over the years, the 20, 25, 30, and 35 MHz frequencies were also added to the station's broadcasts, but only 20 MHz is still used.

**1945:** Standard time announcements were broadcast using telegraphic code.

**1948:** WWVH opened on the island of Maui in Hawaii. It wasn't until 1968 that WWVH moved to Kauai, due to damage from the ocean. WWV and WWVH broadcast on the same frequencies, so they use different voices for their announcements to help listeners distinguish between the two stations. WWV uses a man's voice, and WWVH broadcasts a woman's voice.

**1950:** Voice announcements of time were added to WWV.

**1963:** WWVB opened in Fort Collins, Colorado.

**1966:** WWV moved from Beltsville, Maryland, to Fort Collins, where it shares land with WWVB. The new site was closer to NIST's labs in Boulder, Colorado, and improved the transmitted frequency with the use of atomic oscillators at the site.

**1967:** The station switched from transmitting local time to Greenwich Mean Time (GMT), and began transmitting its current format of Coordinated Universal Time (UTC), 1 year later.

**1971:** WWV started making time announcements every minute, rather than every 5 minutes.

lines. From the HF bands, WWV puts out 2,500 – 10,000 W on several frequencies (each on separate transmitters) to ensure the best possibility of being heard by its millions of listeners through hindrances like atmospheric conditions — conditions altered by the time of day — and interference caused by the seasons. NIST stations use incredibly precise atomic clocks to keep their time signals accurate.

In addition to broadcasting precise time signals, WWVB broadcasts standard frequencies, UT1 time

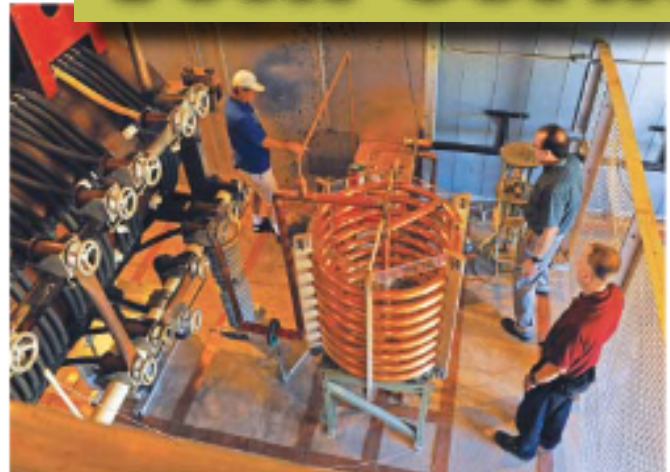
corrections, geophysical alerts, and more. The time-of-day broadcasts can even be heard by calling a dedicated phone number, which receives around 2,000 calls every day. Musicians can actually listen to WWV to tune their instruments, as the station also broadcasts the 440 Hz tone, which is the musical note A above middle C. WWV's signal is so reliable that NIST maintains a web page ([www.nist.gov/time-distribution/radio-station-WWV/WWV-and-WWVh-broadcast-outages](http://www.nist.gov/time-distribution/radio-station-WWV/WWV-and-WWVh-broadcast-outages)) dedicated to recording the few incidents that



Timing, signal-generation, and transmitting equipment can be found in the radio station's main building.



Inside of WWV.



The helix house that powers WWV's antenna array.

broadcasting has been interrupted for more than 5 minutes, since the year 2000 (on average, it occurs less than twice per year).

## WWV and Ham Radio

Thomas Witherspoon, K4SWL, first heard WWV as a child, when his father tuned to the shortwave station to listen to the time broadcasts and manually set his watch every Sunday. "I found the metronomic ticks hypnotic then," Witherspoon said. "And I still do." He founded the charity Ears to Our World (which closed in 2019), that sent shortwave radios to students and teachers in third-world countries, and is currently a blogger for *The SWling Post* (<https://swling.com/blog>), a website for fans of shortwave radio. As a kid, Witherspoon was amazed that the signal from WWV could be heard on his father's vintage RCA 6K3 console radio from over 2,000 miles away.

When Witherspoon was a child, many hams discovered the hobby through shortwave. Whether they were building a kit, tuning around the bands, or fixing up an old radio, they could rely on WWV's steady signal to confirm that they were receiving signals, and everything was working correctly. Witherspoon was given a Zenith Trans-Oceanic radio by his great aunt when he was 8 years old, leading him to a lifelong love of shortwave listening and an interest in amateur radio. He said, "WWV has been a constant companion in my radio world."

The era of radios like the Zenith has ended, but as technology has evolved, so has amateur radio. Fewer operators are getting their start through shortwave, or even through kit-building or homebrewing, as their predecessors once did. Many operators today are drawn to modern technology, enjoying the convenience of



WWV Chief Engineer Matt Deutch, NØRGT, checks the equipment.

digital modes like FT8 and JT65. As times change, some fear stations like WWV could get left behind.

## Averted Closure

In its 2019 fiscal budget to Congress, the Trump administration proposed cutting NIST's budget, which would have resulted in the closure of WWV, among other branches of NIST. Witherspoon explained at the time, "if WWV and WWVH were to close, those of us who rely on these stations as a point of reference for time, as well as propagation, navigation, astronomy, and receiver calibration, would have to find alternatives."

As technology has advanced, innumerable devices now rely on the internet and Global Positioning System (GPS) signals for timekeeping, making some see WWV as a relic of the past. However, the use of GPS and the internet for timekeeping has downsides. Unlike GPS, WWVB's low-frequency signal can reach clocks and watches inside buildings without issue. The

internet already syncs with millions of devices automatically, but it's dependent on the availability of a signal. Both could fail in times of emergency, whereas WWV would still be functional.

The devices reliant on WWVB are inexpensive, don't require much power, and work without an internet connection. Witherspoon compared these options by explaining that his bedside alarm clock automatically adjusts to WWVB and only requires two AA batteries for around 2 years of functionality, while his GPS-enabled Apple Watch needs to be charged every 2 days and must have an unobstructed signal to satellites in order to work.

## The Fate of WWV

Time hasn't run out for WWV just yet. WWV and its companion stations remained open throughout the 2019 fiscal year. Gail Porter, retired Director of Public Affairs for NIST, explained, "The Consolidated Appropriations Act of 2019 provided \$724.5 million for NIST's Scientific and Technical Research and Services, the budget category that funds the radio stations." More information about the legislation that funded WWV and

related stations for the 2019 fiscal year can be found at [www.congress.gov/congressional-report/116th-congress/house-report/9/1?overview=closed](http://www.congress.gov/congressional-report/116th-congress/house-report/9/1?overview=closed).

Commenting on the decision to fully fund WWV, Witherspoon said it was "possibly an indication that the radio community's voices were heard by those making budget decisions."

The Northern Colorado Amateur Radio Club (NCARC) worked with NIST to organize WWV's centennial celebration. NIST hosted a small event on October 1, 2019, while NCARC operated special event station WW0WWV on station property. After 100 years, it's clear that whatever WWV's place is in annual budgets, it will always have a place in radio history.

All photos courtesy of NIST.

Jen Gifort, KC1KNL, is a writer and editor. She can be reached at [jenglif@gmail.com](mailto:jenglif@gmail.com).

For updates to this article, see the [QST Feedback page](http://www.arrl.org/feedback) at [www.arrl.org/feedback](http://www.arrl.org/feedback).



You know it's a bad day when you get your wiener stuck in the snow





# January / February SST Round Up







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CQ SSTV de KG5JJ - Op. Charles



Op. Charles - Bella Vista, AR

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**KD4LT**



**73** **VE1PTR**







EPARA is running an SSTV net on the 1<sup>st</sup> and 3<sup>rd</sup> Thursdays of the Month, band conditions permitting. We sometimes slide +/- 3-4 KHZ on 3.845 MHZ to accommodate ongoing nets or QSOs. Come join us for some image exchanges!



KD2FTA

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# A Tri-Band Antenna without Radials for 2 Meters, 1.25 Meters, and 70 Centimeters

An innovative revision of a design the author originally published in QST in 2003.

Edison Fong, WB6IQN, and Tessa Fong, KJ6QXM

Twenty years ago, a single-band handheld transceiver would have been adequate for most emergency activities, because they were conducted on



[Edison Fong, WB6IQN, photo]

VHF. Today, both VHF and UHF are used for emergency communications by organizations such as ARES and RACES. In some areas, even the UHF amateur band is full. This was the primary motivation for introducing the DBJ-1 dual-band J-pole and the DBJ-2 roll-up portable version.<sup>1, 2</sup> Edison, WB6IQN, and his students have built thousands of these over the last 10 years for various ARES/RACES clubs and government agencies.

An often-repeated request was whether the 1.25-meter band could be added to the DBJ-1. In the San Francisco Bay Area, 1.25 meters has some FM voice channels, but its most important use is for packet radio.

Since the development of Outpost Packet Message Manager by Jim Oberhofer, KN6PE, 1.25-meter packet is not only popular in the Bay Area, but has spread nationwide.<sup>3</sup> Thus, one antenna that covers 2 meters, 1.25 meters, and 70 centimeters would be very desirable. This would simplify the need for multiple antennas during an emergency deployment. The 1.25-meter band is not harmonically related to any other ham band, and thus, its antenna dimensions for that band are not related to those in the 2-meter or 70-centimeter band. This makes impedance matching difficult, and the construction of such an antenna is not obvious.

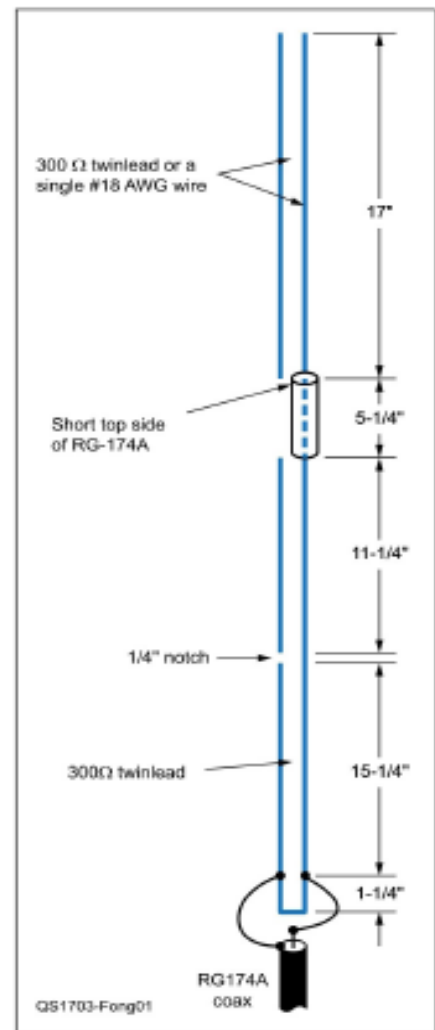


Figure 1 — The original DBJ-1 dual-band J-pole shows the approximate dimensions used when the antenna is inserted into a 3/4-inch OD Class 200 PVC pipe.

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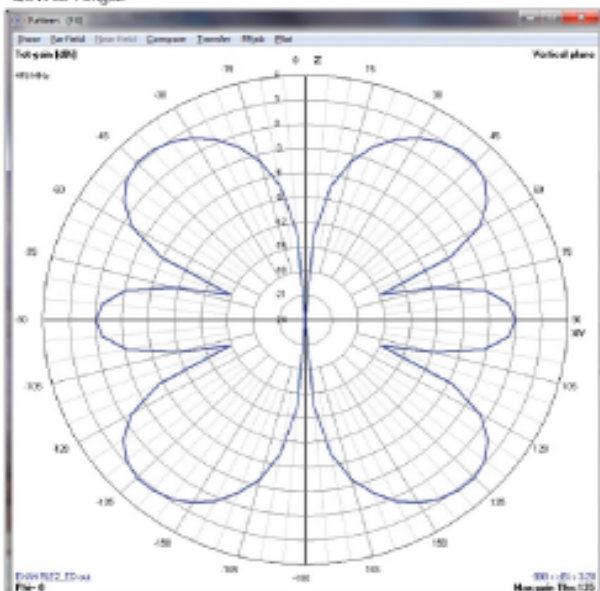


Figure 2 — A vertical half-wave dipole resonating on its third harmonic places a fraction of its energy in the horizontal lobes.

QS1709-Fong03

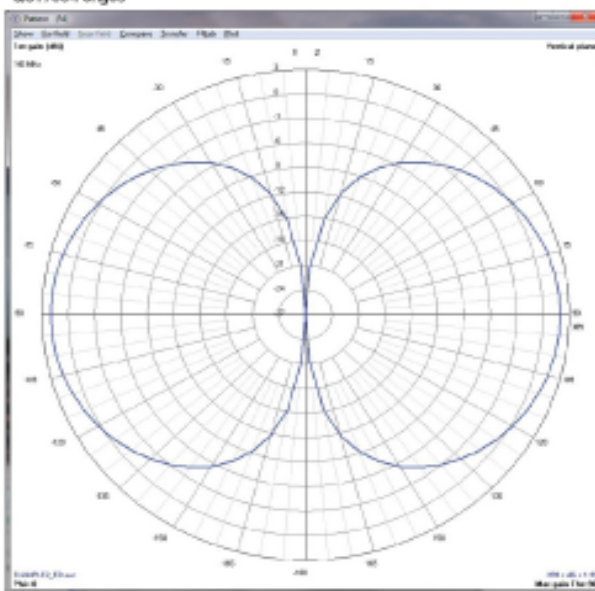


Figure 3 — A vertical half-wave dipole pattern has its maximum energy on the horizon.

If you already own a dual-band DBJ-1, this article will explain how to include the 1.25-meter band by adding some wire, a longer piece of RG-174 lead-in coax, and replacing the 5-foot section of PVC pipe with a 6-foot piece. After maybe an hour's worth of work, you will have a TBJ-1 — a tri-band J-pole — as shown next to Tessa Fong, KJ6QXM, in the lead photo.

### Requirements for an ARES/RACES Antenna

Interviews with multiple emergency coordinators, including American Red Cross and FEMA personnel throughout the country, resulted in a summary list of desired characteristics for a multi-band 2-meter, 1.25-meter, 70-centimeter antenna.

- The antenna must be easy to erect during an emergency, and should be of durable one-piece construction, free of radials.
- It should be no more than about 6 feet in length.
- It must be low cost; certainly far less

cost than commercially available tri-band antennas that retail in the \$180 range.

- Performance should be comparable to that of a dipole, and it should operate from a single feed line.

Because of the success of the DBJ-1, and the input we received from its users, maintaining the same form factor as the DBJ-1 was important. This also makes it easier for folks who already own a DBJ-1 and wish to add 1.25 meters. The DBJ-1 is deployed in emergencies, where users often do not have a technical background,

*Our goal was to add 1.25-meter coverage to the DBJ-1 with minimum effort and still achieve half-wave dipole performance on all three bands.*

so changing form factor was to be avoided. In summary, the antenna must be easy to deploy, rugged, low-cost, and it must perform well.

Could the popular DBJ-1 dual-band base antenna (shown in Figure 1) be adapted to also work at 1.25 meters, with minimal changes and no degradation of performance at 2 meters and 70 centimeters? The answer is “yes” — and with only an additional cost of about \$3 worth of materials, if you already own a DBJ-1. You can build the complete antenna for under \$5.

### Review of the Literature

Searching the literature, we found a tri-band (2-meter, 1.25-meter, and 70-centimeter) antenna by John Harris, WD4KGD.<sup>4</sup> It was a stacked tri-band

J-pole antenna — essentially three J-poles, where the coax for each antenna is routed through the copper pipe and combined at the base.

Our goal was to add 1.25-meter coverage to the DBJ-1 with minimum effort and still achieve half-wave dipole performance on all three bands.

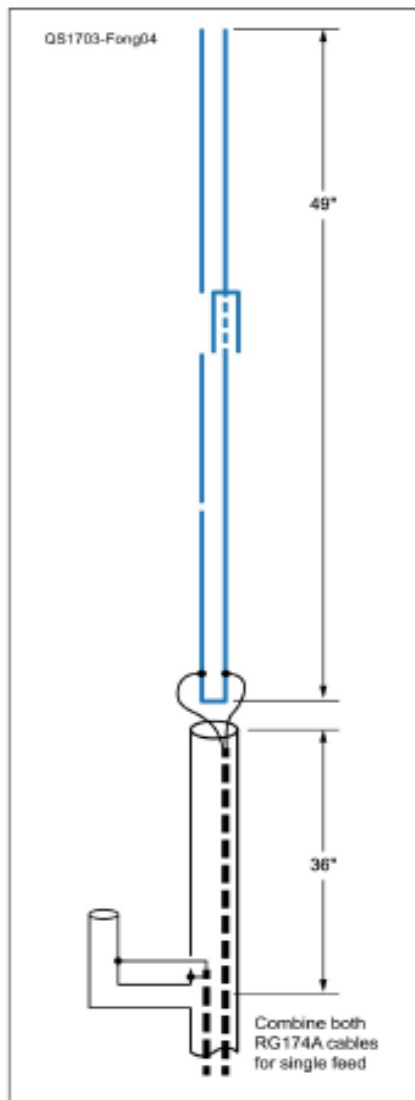


Figure 4 — The DBJ-1 dual-band J-pole stacked on top of a 1.25-meter band J-pole.

The Harris antenna fell short of this goal. Certainly, it is possible to obtain resonances on all three bands and, with some careful adjustments, even achieve reasonable SWR on all three bands with the Harris configuration. An experienced antenna designer will notice that this configuration suffers from the same drawback of using a 2-meter VHF antenna at UHF. All conventional antenna configurations resonate at harmonics, and thus can

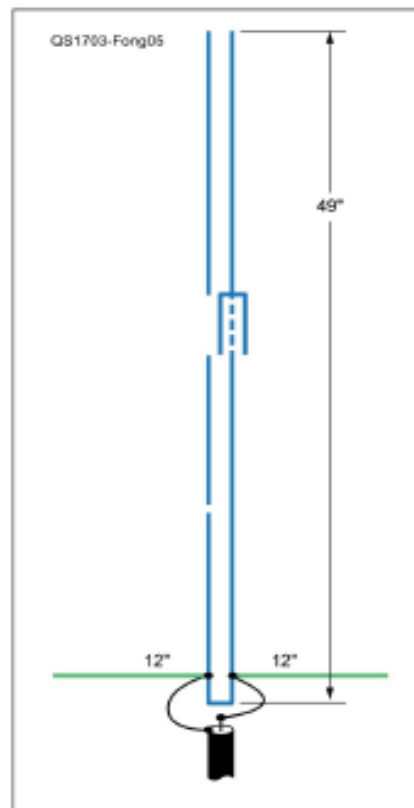


Figure 5 — The DBJ-1 dual-band J-pole with a 1.25-meter band dipole fed in parallel.

experience low SWR at odd integer harmonics. The Harris configuration is no exception. The VHF portion will also present a low impedance at UHF. This will be in parallel with the UHF section and thus present a lower impedance than desired. We also found that matching was difficult to achieve at UHF because the distance of the J portion of the antenna is limited by the right-angle elbows and T connectors in 1/2-inch copper pipe. With standard copper pipe fittings, the minimum distance is about 2 1/4 inches (independent of band), which does not result in a good transmission line at UHF, where a quarter wavelength is 6 inches.

More importantly, the elevation pattern at UHF will have a maximum at 45 degrees above the horizon, leaving only about 25% of the RF energy in

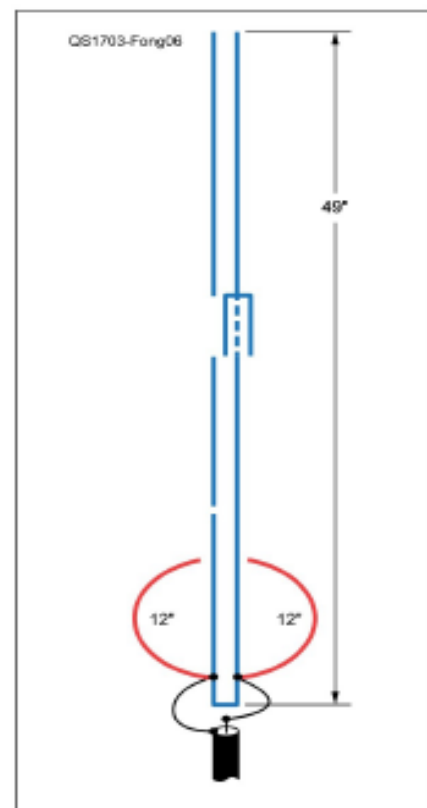


Figure 6 — The DBJ-1 dual-band J-pole with a 1.25-meter band loop antenna fed in parallel.

the horizontal plane, as seen in Figure 2. This pattern is not optimized for terrestrial propagation. The goal is to achieve a vertical dipole pattern on all bands, as shown in Figure 3.

### Experimental Prototypes

In the DBJ-1 shown in Figure 1, the input feed point uses the same tap point for both VHF and UHF. This is possible because UHF is the third harmonic of VHF. The UHF radiating element is the 11 1/4-inch length above the quarter-wave VHF matching stub, followed by a quarter-wave UHF decoupling stub. The UHF decoupling stub is shorted at the top, which transforms to an open at UHF at the bottom of the stub, and thus decouples the remainder of the antenna at UHF. The stub is not active at VHF. This configuration gives a good vertical half-

wave dipole pattern at both VHF and UHF (see Figure 3). At this point, we searched for options to add 1.25-meter operation to the DBJ-1.

#### Stacking J-poles

One technique to achieve 1.25-meter resonance was to stack the DBJ-1 on top of a 1.25-meter J-pole constructed with ½-inch copper pipe (see Figure 4). RG-174A is slipped through the ½-inch copper pipe to connect to the DBJ-1. The total length of the antenna becomes 8 feet, which is prohibitively too long for our purpose, and is not practical. We constructed a prototype of this configuration and, although it functioned, its aesthetics, the difficulty of construction, and cost did not meet the original requirements.

#### A Dipole Fed in Parallel

We thought that we could just construct a 1.25-meter horizontal dipole at the feed point of the DBJ-1, as shown

*The 1.25-meter band is not harmonically related to any other ham band, and thus its antenna dimensions for that band are not related to those in the 2-meter or 70-centimeter band.*

in Figure 5. That method worked, and the prototypes we built certainly had good resonances. The significant problem was that this 1.25-meter antenna was horizontally polarized. Also, it would protrude like radials, which did not meet the original specifications. While this idea did work, it was time to move on.

We attempted to bend the elements to a vertical direction. As soon as the 1.25-meter quarter-wavelength elements started to approach a vertical position, the SWR rose to unacceptable levels. This is because the elements coupled strongly to the VHF stub and coax shield.

#### A Nearly Vertical Loop Fed in Parallel

We also attempted to bend the horizontal dipole into a nearly vertical loop antenna (see Figure 6) to try to achieve vertical polarization characteristics. We were getting closer to the ideal antenna. The obstacle to overcome was to find a configuration where everything could be placed inside of the ½-inch PVC pipe, as in the DBJ-1 while maintaining the vertical polarization.

#### Evolution to the Helical Dipole

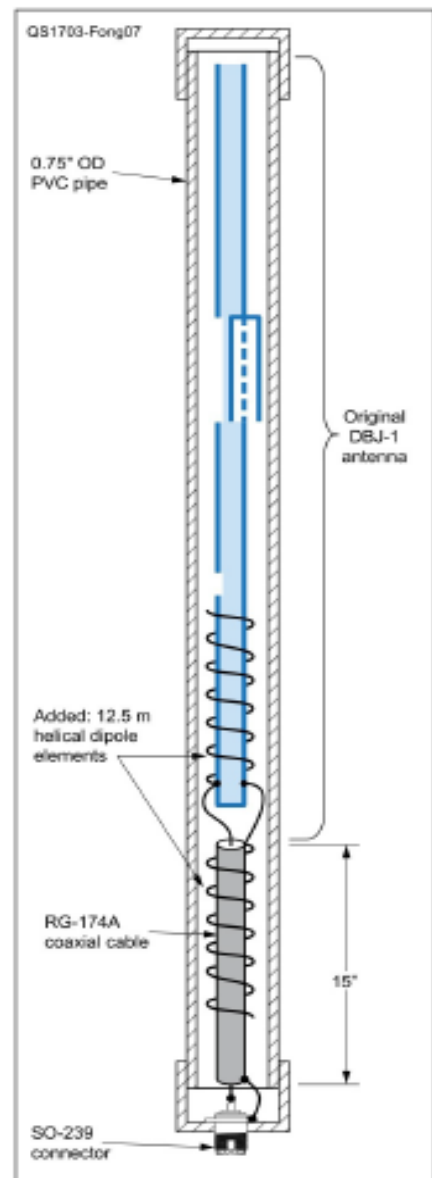
A simplified drawing of the evolved solution is shown in Figure 7. Starting with a DBJ-1 antenna, we wound one of the 12-inch-long, 1.25-meter band dipole elements (seen in Figure 5) into a helical dipole element upward around the bottom of the matching stub of the DBJ-1. We then wound a corresponding helical dipole element around the RG-174A coax lead. In essence, we constructed a vertically polarized normal-mode helical dipole that is resonant in the 1.25-meter band, and fed it in parallel with the same coax that feeds the rest of the DBJ-1

antenna. [Because the helix winding diameter is a small fraction of a wavelength, this helix — like the “rubber ducky” on a handheld transceiver — radiates a vertical polarization in the direction *normal* or broadside to its vertical axis. — Ed.] The completed antenna mounted on the roof is shown in the lead photo with Tessa Fong, KJ6QXM, standing next to it.

You can fine-tune the resonance by compressing or expanding the helix windings. The great thing here is that each band is tuned separately with almost no interaction.

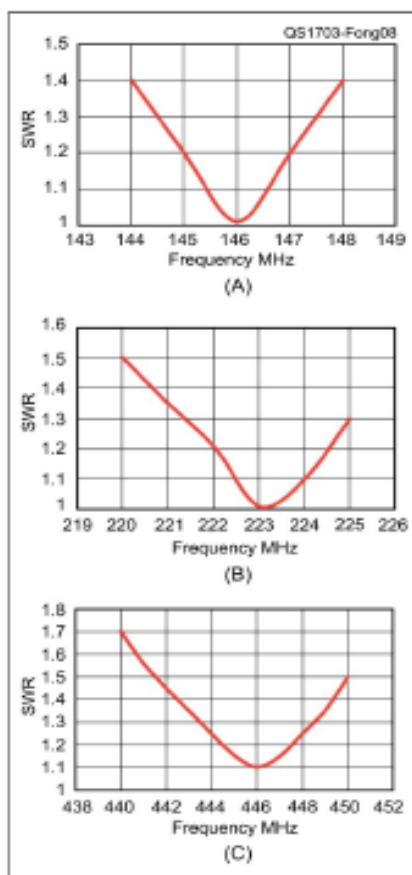
#### Constructing the Tri-Band J-Pole

The tri-band J-pole antenna is built



**Figure 7** — The tri-band antenna is based on the DBJ-1 antenna, with added helical dipole elements (not drawn to scale). It measures 5½ feet, and fits inside a 6-foot length of ½-inch, 200 psi PVC pipe.

around the DBJ-1 dual-band J-pole (see Note 1). This antenna is a 2-meter J-pole constructed from 300 Ω twin-lead that then utilizes a UHF decoupling stub to achieve half-wave dipole performance on both VHF and UHF. The following is a brief review of the

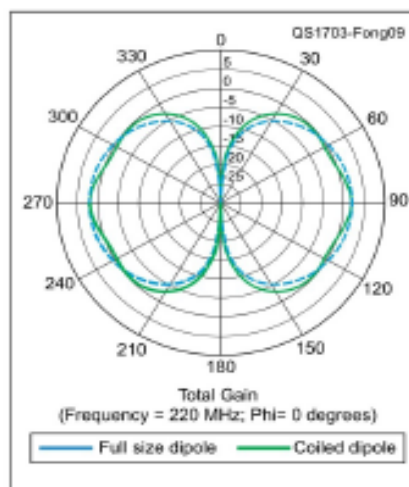


**Figure 8** — SWR measurements on 2 meters, 1.25 meters, and 70 centimeters are all within acceptable limits.

construction of that antenna. Referring to Figure 1, start with a 28-inch length of 300  $\Omega$  twinlead. We used JSC 1320-1000S ladder line, which we bought in bulk from Ham Radio Outlet.

Short the bottom of the twinlead. At about 1.25 inches up from the short, tap off the 50  $\Omega$  point with RG-174A coax cable. That cable should be longer than about 15 inches. Cut a  $\frac{1}{8}$ -inch notch about 15.25 inches from the 50  $\Omega$  tap point. The leaves about 11 $\frac{1}{4}$  inches above the notch for the UHF half-wave element.

Insert the antenna in a 6-foot long,  $\frac{3}{8}$ -inch diameter 200 psi PVC pipe, and measure the SWR. Trim the notch every  $\frac{1}{8}$  inch until you achieve reso-



**Figure 9** — A simulation of an ideal dipole at 220 MHz compared with the pattern of a helical dipole that has 12 feet of #14 AWG coated wire (mimics RG-174A coax) passing through the center of the helical dipole.

nance at 445 MHz. Next, add the quarter-wave RG-174A decoupling stub. Start with about 5.25 inches with a short at the top. Solder the bottom end center conductor lead — shown by a dashed line in Figure 1 — to the top of the 11 $\frac{1}{4}$ -inch UHF half-wave section. Measure the SWR. Trim the coaxial stub every  $\frac{1}{8}$  inch until resonance is achieved at 445 MHz. Again, remember to insert the antenna back into the PVC pipe before measuring the SWR. Although the thin-wall, 200 psi PVC pipe does not cause any measurable loss, it does slow down the speed of the signal (the velocity factor is less than one), which causes the resonant frequency to go down 1 to 2% after being inserted into the PVC pipe.

The last step to making the DBJ-1 is to add the 2-meter section. This is a 17-inch piece of #18 AWG wire or twinlead (either will work). Trim this for resonance at 146 MHz.

#### Adding the 1.25-Meter Helical Dipole

For the 1.25-meter addition, cut out two 12-inch pieces of #18 AWG solid copper wire. Construct the

1.25-meter band helices by using a  $\frac{1}{2}$ -inch diameter dowel rod as the coil form. Wind this for seven turns. Slip one piece through the quarter-wave VHF stub and the other piece through the RG-174A lead-in coax. Add the 1.25-meter top helix element wrapped around the twinlead, and the bottom helix wrapped around the RG-174A coax feed line. Solder the upper helix to the center conductor and the lower helix to the braided shield of the coax. We wound the helical dipole elements in the same direction. Figure 7 shows the added helices and the elements of the DBJ-1 antenna-fed with a 15-inch length of RG-174A coax cable that is attached to an SO-239 connector at the bottom of the assembly.

Tuning on the 1.25-meter band is straightforward. Spread the helices to about 8 inches and measure the resonant frequency with an SWR meter. To reduce the resonant frequency, spread the coils. Similarly, compress the coils to raise the resonant frequency.

#### Measured Results

From my experience, measuring the SWR at UHF with consistent results is difficult, but we have found that, near resonance, most ham instruments are quite accurate. The simplest way to make accurate and consistent measurements at VHF and UHF is with an in-line directional coupler such as Bird Technologies Model 43 Directional Wattmeter. The measurements shown in Figure 8 were performed with such an instrument, driven with 10 W. The SWR on all three bands was very acceptable. At 2 meters (see Figure 8A) and 1.25 meters (see Figure 8B), SWR is below 1.4 to 1, even at band edges. At UHF (see Figure 8C), the SWR is less than 1.5 to 1 from 441 to 450 MHz. This is typically more than adequate, because repeater input frequencies at UHF are in the 445 to 450 MHz range.

The bandwidth of the 1.25-meter sec-

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## ANTENNA ARCHIVES

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AMATEUR RADIO

tion is reduced about 30% compared to a vertical half-wave dipole because the elements are physically shortened in the helical dipole configuration. The SWR is below 1.5 to 1 throughout the 222 to 225 MHz band (see Figure 8B).

We could not find a simple method for modeling helical dipoles using *EZNEC*, and resorted to *FEKO*, a more advanced antenna simulator.<sup>5</sup>

*In essence, we constructed a vertically polarized normal-mode helical dipole that was resonant in the 1.25-meter band, and fed it in parallel with the same coax that feeds the rest of the DBJ-1 antenna.*

Keith Synder, KI6BDR, and Dr. Steve Stearns, K6OIK, of the Northrop Grumman Electromagnetic Systems Laboratory in San Jose, California, assisted in the modeling. A *FEKO* simulation of the vertical radiation pattern of the 1.25-meter portion of the antenna is shown in comparison with the pattern of an ideal dipole in Figure 9. In this simulation, there is a 12-foot length of #14 AWG insulated wire inserted through the center axis of the helical dipole. The #14 AWG wire mimics RG-174 coax because it is virtually the same diameter with plastic insulation. The difference between the vertical plane patterns of two antennas is negligible. There is some vertical distortion, but it is inconsequential.

## Strays

### QST Congratulates...

Charles "Buc" Fitch, W2IPL, of Avon, Connecticut, who received an "Outstanding Member" award from Chapter 14 of the Society of Broadcast Engineers last December. He has been a member for more than 30 years and a mentor to engineers throughout Connecticut. In the accompanying photo, Buc (right) is being presented the award by Chapter 14 chairperson Fred Krampits. [John Ramsey, photo]

## Conclusions

The TBJ-1 antenna is a novel, vertically polarized base station antenna that covers the 2-meter, 1.25-meter, and 70-centimeter amateur bands. The antenna requires no radials, is totally weather-protected, and is less than 6 feet tall. With some basic tools, it can be constructed with materials that cost under \$5. If one already owns a DBJ-1, the cost to add the 1.25-meter

band is about \$2 of wiring, including a longer piece of RG-174A lead-in coax, a 6-foot piece of 3/4-inch PVC pipe, and about an hour of time. Matching is excellent on all three bands, and

the bands can be tuned independently. This antenna meets the requirements set by ARES/RACES for low cost, ruggedness, easy deployment, and good performance.

Ed's students will gladly build you a working tri-band antenna. E-mail Ed at [edison\\_fong@hotmail.com](mailto:edison_fong@hotmail.com) for details.

### Notice:

*An application for a US patent on this tri-band antenna is currently pending. Individual hams and/or clubs are free to construct the TBJ-1 antenna, royalty free, on an individual and non-commercial basis, according to the plans and details in this QST article. — Edison Fong, WB6IQN.*

## Notes

<sup>1</sup>E. Fong, WB6IQN, "The DBJ-1: A VHF-UHF Dual-Band J-Pole," *QST*, Feb. 2003, pp. 38 – 40.

<sup>2</sup>E. Fong, WB6IQN, "The DBJ-2; A Portable VHF-UHF Roll-up J-Pole Antenna for Public Service," *QST*, Mar. 2007, pp. 38 – 40.

<sup>3</sup>J. Oberholzer, KN6PE, Outpost Packet Message Manager, Version 3, [www.outpostpm.org](http://www.outpostpm.org).

<sup>4</sup>J. L. Harris, WD4KGD, "A VHF/UHF 3-Band Mobile Antenna," *QST*, Feb. 1980, pp. 16 – 17.

<sup>5</sup>*FEKO* (FEIdberechnun fur Kiper mit Obeflache)

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Website: [www.qsl.net/n3is](http://www.qsl.net/n3is)



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License: Novice Technician General Advanced Extra

Address: \_\_\_\_\_

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