OUR 27TH YEAR!

EPARA BEACON

VOL. 7, NUMBER 3 THE OFFICIAL NEWSLETTER OF THE EASTERN PENNSYLVANIA AMATEUR RADIO ASSOCIATION MARCH 2023

NEXT CLUB MEETING: MARCH 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

From The President

Once again, I have sad news, Bill Connelly W3MJ has become a silent key. Bill has been part of EPARA and PARK for decades, Bill even served as club President several years ago. He will be missed and our Hamfest will not be the same with his absence on the PA system. Saying goodbye to members, many of whom I consider mentors, is the hardest part of being President. We have lost so many over the last few years.

We have several things to handle at this month's meeting. We will be approving the purchase of 500 feet of coax for the radio room antenna, this repair will be scheduled for the early spring. We also must finalize our plans for our appearance in the St. Patrick Day Parade. Also, in just a couple months from now is the beginning of Hamfest season, so we need to set the date for ours and get fliers made up. Spring is just around the corner so get ready for an active time as the temps warm up!

Well, that's it for now. Our next meeting will be on March 9th, hope to see you then.

Chris, AJ3C

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

CONTACT INFORMATION

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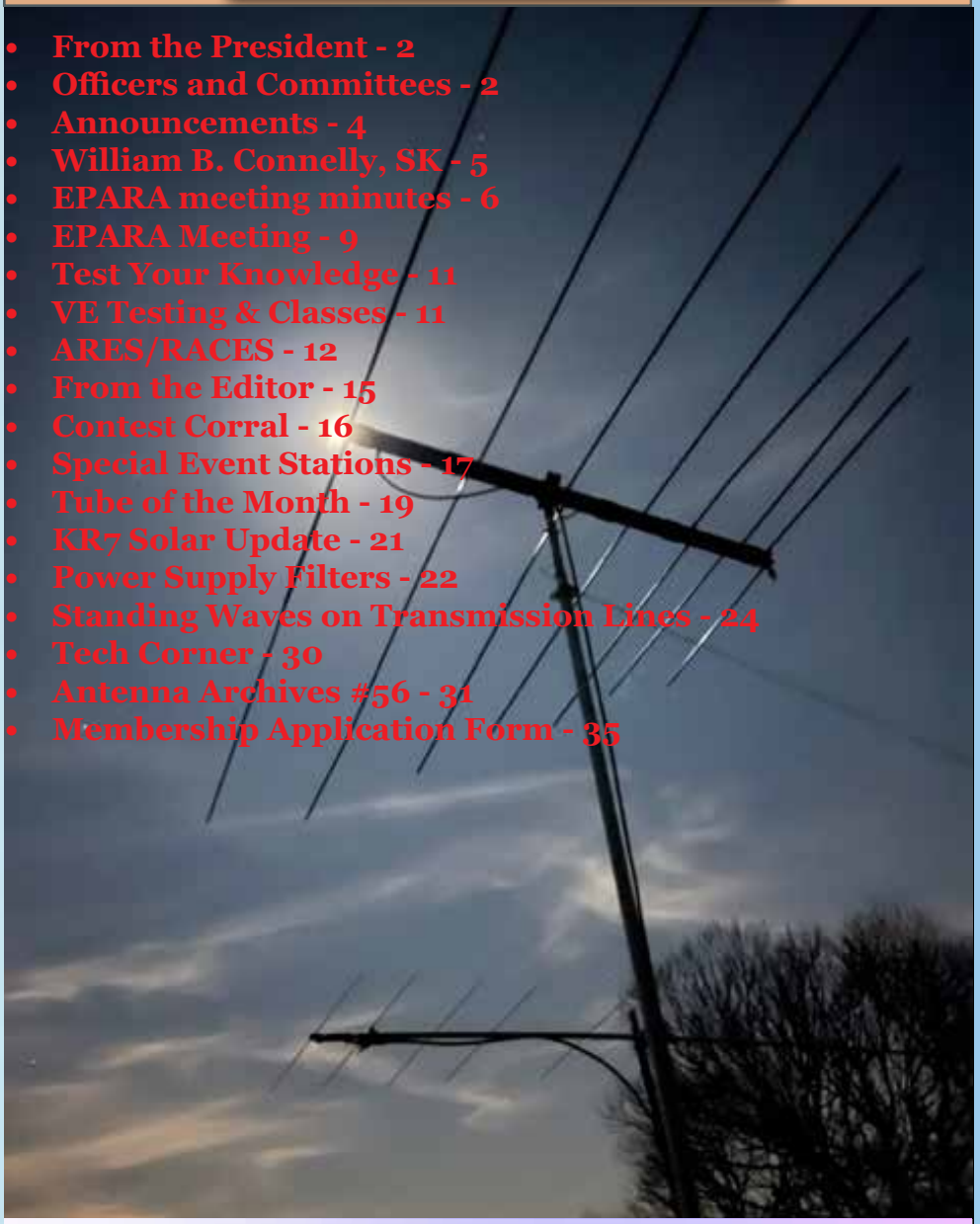
What's INSIDE this ISSUE



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

Announcements
AND UPCOMING EVENTS

EPARA Club Dues!
Club dues are now past due. Contact Scott KC3IAO via his email: KC3IAO@hobbyguild.com and you can send him a check or pay via PayPal.

Amateur Satellite FalconSAT-3 Nears Reentry 01/20/2023

Many amateur radio operators and satellite watchers have been predicting the date and time of reentry for FalconSAT-3 (FS-3). While all reentry predictions are something of a guessing game due to the large number of variables affecting the upper atmosphere, it is certain that the end for FS-3 will be coming very soon, possibly the week of January 16 - 21, 2023.

Yaesu Radios Donated to ARRL to Inspire Visitors and Young Hams

There are two new Yaesu transceivers in use at ARRL Headquarters in Newington, Connecticut. They arrived via a generous donation from Yaesu USA. The Yaesu FTDX101MP transceiver is a welcome addition to Studio 1 in W1AW, the Hiram Percy Maxim Memorial Station.

The company has donated an FTDX101MP and FTDX10, both HF/50 MHz transceivers. In arranging the donation, Yaesu Vice President, Sales and Credit Gary Doshay, KN6APR, urged that the radios be used by ARRL "to educate and assist your visitors and especially young enthusiasts for ham radio."
https://www.arrl.org/news/yaesu-radios-donated-to-arrl-to-inspire-visitors-and-young-hams

Digital Library of Amateur Radio and Communications is a Treasure Trove

Having a big bookshelf of ham radio books and magazines used to be a point of bragging right for hams. These days, you are more likely to just browse the internet for information. But you can still have, virtually, that big shelf of old ham books, thanks to the DLARC — the digital library of Amateur Radio and Communications.

A grant from a private foundation has enable the Internet Archive to scan and index a trove of ham radio publications, including the old Callbooks, 73 Magazine, several ham radio group's newsletters from around the globe, Radio Craft, and manuals from Icom, Kenwood, Yaesu, and others.

Some of this is only of historical interest. But some of the RF and electronic design information in here is timeless. Also, if you want to find information about that boat anchor you bought at the garage sale, this isn't a bad place to look for the original manuals. It reminded us, on a smaller scale, of the World Radio History site, where we often do research for Hackaday posts about things from the past.

https://hackaday.com/2023/02/20/digital-library-of-amateur-radio-and-communications-is-a-treasure-trove/

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.

Obituary

William B. Connelly, 80, of Stroud Township, died early Thursday morning, February 23, 2023, at St. Luke's Hospital - Monroe Campus. He was the husband of Kathleen (Poortstra) Connelly with whom he shared 27 years of marriage.

Born on December 24, 1942 in Paterson, NJ, he was the son of the late William E. and Esther (Douma) Connelly and lived in Monroe County for the past 27 ears.

He attended The Julliard School in New York, NY and played trumpet in the United States Army West Point Band for 24 years. Bill was also a professional trumpet player throughout New York City.

He was an active member of The Church of St. Luke in Stroudsburg where he was a Eucharist Minister, reader, and member of the Knights of Columbus. He was also a member of the Pocono Lodge #780 F&AM and the local amateur radio club.

In addition to his wife, surviving are three children, William Connelly, Brian Connelly and wife Jeanette, and Erin Connelly all of Florida; four step-sons, Chad Long and Heather of Mt. Pocono, Craig Long and wife Terri of Analomink, Zachary Long and wife Amy of Wilmington, NC, and Tyler Long and wife Brandy of Suprise, AZ; a grandson; and six step-grandchildren.

There will be a viewing on Tuesday, February 28th from 9:00 to 10:00AM at the William H. Clark Funeral Home, 1003 Main Street, Stroudsburg. A Mass of Christian Burial will follow beginning at 10:30AM at St. Matthew's Catholic Church, 200 Brodhead Avenue, East Stroudsburg with Rev. Michael Quinnan as celebrant. Private cremation will follow.

In lieu of flowers, memorial remembrances may be made to St. Jude's Children's Hospital or Women's Resources of Monroe County.

https://www.wmhclarkfuneralhome.com/obituary/william-connelly

EPARA GENERAL MEMBERSHIP MEETING AGENDA

EPARA Membership Meeting Minutes
February 9th *2023*
General Membership Meeting 7:30Pm

Open meeting:

Meeting called to order at 7:30 pm on February 9th, 2023 by Chris AJ3C

Declaration of Quorum.
Total attending **25**. Present at 911Center **18**. Present on Zoom **7.** Visitors present **8**

Pledge of Allegiance / Moment of silence:

Membership Meeting – Minutes Jan 12th 2023
Secretary - W3KCF:

Meeting minutes for Jan 12th 2023 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 Alex – KD2FTA 2nd by John – K3WH Motion Passed

Treasurer's report:

Treasurer's report: For January 31, 2023
Read by Scott – KC3IAO

Bank Account Statement Opening Balance Jan 31, 2023 statement.): $5153.44

Income:
Deposit: 01-2023: Dues$200.00,
50/50 - $50.00
Interest: $0.23

Expenses: $93.47 printer toner expense

Closing Balance: $5310.40

PayPal 1/31/2023 statement opening balance of $34.32 plus $195.00 in dues plus a $5.70 donation less $10.32 in PayPal fees to end with PayPal closing balance of $224.70.

Motion to accept by Ruth Ann – W9FBO Seconded by Martin – K3TOE Motion Passed

EPARA GENERAL MEMBERSHIP MEETING AGENDA

Correspondence:

- QSO card received from Italy, mailed in 2021, through the Bureau. Chris AJ3C will respond.
- Donation of a packet radio by widow of silent key Richard D Lake N1JZF.

Reports of officers and committee's:

Bill AB3ME – Program Committee

Dr. William E. Keicher KC1HTT presentation on "Physics, Engineering and Operation of a Low Power, Single Polarization, 144 MHz, Earth-Moon-Earth Amateur Radio Station" after General Meeting tonight.

Alex KD2FTA scheduled to make a presentation on software-defined radios (SDR) after next month's General Meeting.

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

Charlie KB3JUF – ARES/RACES:

Charlie KB3JUF will make a presentation at next ARES/RACES meeting on being a Net Control of an Amateur Radio Emergency Service net.

Charlie KB3JUF's new contact information: 272.213.8142 mobile and KB3JUF@gmail.com

Charlie reiterated that all involved in ARES need to be motivated. Make sure you attend our meetings on the 4th 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.

Ruth Ann, W9FBO – PIO:

EPARA will participate in Sunday March 19th St. Patrick's Day parade in Stroudsburg. Chris AJ3C volunteered truck. Mike W3MIK volunteered flatbed trailer. Brad KF6FOK volunteered portable HF rig.

Walt W3FNZ - Hamfest

EPARA Hamfest tentatively scheduled for Sunday September 17th. This date will be confirmed at next EPARA general meeting following his conversation with Moose Lodge 1336.

Chris AJ3C -- Instruction and Training:

VE sessions have started again on the 4th Friday each month at 6:00pm. General License class scheduled for April. 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.

EPARA GENERAL MEMBERSHIP MEETING AGENDA

Chris AJ3C – Website:
No Update

Bob W3BMM – Social Media:

New EPARA Groups.IO -- the club's new bulletin board on the cloud and group email service -- has been well received and active. Members are welcome to post any and all amateur radio-related questions and topics.

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

Al, KB3OVB: Membership:

As of the start of tonight's meeting, thirty-one (31) members have paid their 2023 due. Annual dues are now due.

Rosemarie KC3VMN has applied to join club. See Votes/New Members below.

Eric N3SWR – Newsletter:

Eric 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:

Alex KD2FTA stated that a calendar with the best EME date was forthcoming.

Old business:

Radio Room – Rig Update:

John K3WH generously donated the following items to the club and to MCARES: An ICOM 9700 transceiver with hand microphone, RX out module for SDR work (SMA RG316 cable) and remote software interface over Ethernet. A Yaesu FTDX10 transceiver with hand microphone, RX output module (SMA RG316 cable) for external SDR work. A SDRPlay SDR DUO dual channel 14bit ADC SDR receiver for connection to FTDX10 and IC9700. A Yaesu 30 Amp Linear power supply (13.8VDC). A Yaesu SP9000 external dual speaker. HP filters, LP filters and audio cables for the FTDX10 and IC9700 transceivers. A Diamond CP-5H 5 band vertical compact HF antenna for 40, 20, 15, 10 and 6 meters. A computer system including a mini-PC, monitor, keyboard, mouse, speaker, UPS and various cables, and software for both radios, RSPduo, Winlink, RSPUno, WSJ-T, com0com, Omni-Rig and Win4Yaesu suite are all installed.

EPARA GENERAL MEMBERSHIP MEETING AGENDA

New business:

911 Center Antenna

AJ3C noted that we need to replace the feed line for the OCF antenna. We need to form a team to measure, to order and to install a new feed line coax.

Net Controllers:

Alex KD2FDA noted that additional volunteer net controllers for non-MCARES EPARA nets would be beneficial. Ruth Ann W9FBO volunteered to be added to the NC rotation for the non-MCARES EPARA nets.

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

Any Additional Announcements

- **Equipment Auction Fundraiser**
    - Bill AB3ME proposed a once-a-year club-sponsored auction of equipment to raise proceeds for the club. This type of auction and club fund raising were the club's practice when he first joined the club.

Tonight's 50/50 Raffle was won by Dave – KE2KY

Adjournment…

Meeting was adjourned at 2015:

Motion to close by Charlie -KB3JUF 2nd by Al – KB3OVB Motion Passed.

Secretary
Kevin Forrest
W3KCF

EPARA MEETING

"Ain't nuthin' wrong with us, Doc!"

TEST YOUR KNOWLEDGE!

What percentage of power loss would result from a transmission line loss of 1 dB?

A. 10.9 percent
B. 12.2 percent
C. 20.6 percent
D. 25.9 percent

Last months answer was A. By reversing the transformer it becomes a step up transformer. A step up transformer with 1:4 ratio (reversed from 4:1) steps up the voltage by 4 times.

DMR
DIGITAL MOBILE RADIO

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!

VE Testing & Classes

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. 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!

AMATEUR RADIO CLASSES

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/

From the Editor

Eric, N3SWR

March is FINALLY here and it seems to have come in with a bit of wind. Typical I'd say. Next to no snow this winter and I'm not sure what to expect going forward. We have been known to get some serious storms in march, only to have the snow disappear in two days. Now those storms I love :)

Seems we are a bit "stuck" in a slow period with things to do lately. I do hope it picks up a bit soon. In the mean time, I've decided to pick up on my other hobbies - wood working, photography, marksmanship and more. Life has a lot to offer but never enough time!

Cheers for now!
Eric
N3SWR

Ah...Yes...Deviled Eggs

"I haven't spoken to my wife in years. I didn't want to interrupt her."
—Rodney Dangerfield

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

March 2023

Check for updates and a downloadable PDF version online at **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				Bands	Contest Name	Mode	Exchange	Sponsor's Website
1	1700	1	2100	144	VHF-UHF FT8 Activity Contest	Dig	4-char grid	www.ft8activity.eu/index.php/en
1	2000	1	2100	3.5	UKEICC 80m Contest	Ph	6-char grid	www.ukeicc.com/80m-rules.php
1	2300	5	2300	3.5-14	AWA John Rollins Mem. DX Contest	CW	RST, equipt type, year	antiquewireless.org
2	0000	3	0300	7	Walk for the Bacon QRP Contest	CW	Max 13 WPM; RST, SPC, name, mbr or pwr	qrpcontest.com/pigwalk40
2	1800	2	2200	28	NRAU 10m Activity Contest	CW Ph Dig	RS(T), 6-char grid	nrau.net/nrau-contests-in-general
2	2000	2	2200	1.8-28,50	SKCC Sprint Europe	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
3	0145	3	0215	(see rules)	NCCC RTTY Sprint	Dig	Serial, name, QTH	ncccsprint.com
3	0230	3	0300	(see rules)	NCCC Sprint	CW	Serial, name, QTH	ncccsprint.com
3	2000	3	2100	1.8-28	K1USN Slow Speed Test	CW	Max 20 WPM; name, SPC	www.k1usn.com/sst.html
4	0000	5	2359	1.8-28	ARRL International DX Contest, SSB	Ph	W/VE: RS, SP; non-W/VE: RS, pwr	www.arrl.org/arrl-dx
4	0000	12	2359	3.5,7,21, 28,144	Novice Rig Roundup	CW	Name, QTH; (optional rig)	www.novicerigroundup.org
4	0600	4	0800	7,14	Wake-Up! QRP Sprint	CW	RST, serial, suffix previous QSO	qrp.ru/contest/wakeup
5	0700	5	1100	3.5	UBA Spring Contest, CW	CW	RST, serial, UBA section (if ON)	www.uba.be
5	1200	5	1400	7	SARL 40m SET	Ph	RS, serial	www.sarl.org.za
5	1200	5	2200	3.5	NSARA Contest	CW Ph Dig	RS(T), Nova Scotia county or serial	www.nsara.ca
5	1800	5	2200	3.5	WAB 3.5 MHz Phone	Ph	RS, serial, WAB square or country	wab.intermip.net/Contests.php
6	1630	6	1729	3.5,7	OK1WC Mem. (MWC)	CW	RST, serial	www.memorial-ok1wc.cz
6	2000	6	2130	3.5	RSGB 80m Club Champ., Data	Dig	RST, serial	www.rsgbcc.org/hf
7	0200	7	0400	3.5-28	ARS Spartan Sprint	CW	RST, SPC, pwr	arsqrp.blogspot.com
7	1900	7	2100	3.5	AGCW YL-CW Party	CW	RST, serial, "YL" (if YL), name	www.agcw.de/contest/yl-cw-party
11	0000	11	2359	3.5-28	YB DX RTTY Contest	Dig	RST, serial	rtty.ybdxcontest.com
11	1000	12	1000	3.5-28	RSGB Commonwealth Contest	CW	RST, serial	www.rsgbcc.org/hf
11	1200	12	1200	3.5-28	EA PSK63 Contest	Dig	RSQ, EA province code or serial	concursos.ure.es/en/eapsk63
11	1200	12	1200	28	South America 10m Contest	CW Ph	RS(T), CQ zone	sa10m.com.ar/wp/rules
11	1200	12	2359	1.8-28,50	SKCC Weekend Sprintathon	CW	RST, SPC, name , mbr or "none"	www.skccgroup.com
11	1400	11	2000	3.5-28	AGCW QRP Contest	CW	RST, serial, pwr, mbr or "NM"	www.agcw.de/contest/qrp
11	1500	12	1500	1.8	Stew Perry Topband Challenge	CW	4-char grid	www.kkn.net/stew
11	1500	12	2100	3.5-28,50	Oklahoma QSO Party	CW Ph	RST, OK county or SPC	www.k5cm.com/okqp.htm
11	1800	12	0559	3.5,7	Tesla Mem. HF CW Contest	CW	RST, serial, 4-char grid	www.radiosport.org.rs
11	1900	12	1900	1.8-28	Idaho QSO Party	CW Ph	RS(T), ID county or SPC	www.pocatelloarc.org/idahoqsoparty
12	0000	12	0400	3.5-14	North American Sprint, RTTY	Dig	Other's call, your call, serial, name, SPC	ncjweb.com/Sprint-Rules.pdf
12	0700	12	1100	144	UBA Spring Contest, 2m	CW Ph	RST, serial, UBA section (if ON)	www.uba.be
12	0700	12	1700	3.5-28	FIRAC HF Contest	CW	RST, serial, "F" (if mbr)	www.firac.de
12	1800	13	0100	All	Wisconsin QSO Party	CW Ph	WI county or SPC	www.warac.org/wqp
13	0000	13	0200	1.8-28	4 States QRP Group 2nd Sunday Sprint	CW Ph	RS(T), SPC, mbr or pwr	www.4sqrp.com
13	1630	13	1729	3.5,7	OK1WC Mem. (MWC)	CW	RST, serial	www.memorial-ok1wc.cz
15	2000	15	2130	3.5	RSGB 80m Club Champ., CW	CW	RST, serial	www.rsgbcc.org/hf
16	0000	17	0300	14	Walk for the Bacon QRP Contest	CW	Max 13 WPM; RST, SPC, name, mbr or pwr	qrpcontest.com/pigwalk20
16	0030	16	0230	3.5-14	NAQCC CW Sprint	CW	RST, SPC, mbr or pwr	naqcc.info
16	1900	16	2059	3.5	BCC QSO Party	CW Ph Dig	RS(T), T-shirt size	www.bavarian-contest-club.de
18	0200	20	0159	3.5-28	BARTG HF RTTY Contest	Dig	RST, serial, 4-dig UTC	www.bartg.org.uk
18	1200	19	1200	1.8-28	Russian DX Contest	CW Ph	RS(T), oblast or serial	www.rdxc.org
18	1200	19	1200	3.5-28, 144	F9AA Cup, SSB	Ph	RST, serial	www.site.urc.asso.fr
18	1400	18	1800	144,432	AGCW VHF/UHF Contest	CW	RST, serial, pwr class, 6-char grid	www.agcw.de/contest/vhf-uhf
18	1400	19	2359	No WARC	Virginia QSO Party	CW Ph Dig	Serial, VA county or SPC	www.qsl.net/sterling/VA_QSO_Party
19	0700	19	1100	3.5	UBA Spring Contest, SSB	Ph	RS, serial, UBA section (if ON)	www.uba.be
20	1800	20	2059	3.5,7	Bucharest Digital Contest	Dig	RST, serial	yo3test201x.blogspot.com
21	1700	26	1700	3.5-28	CLARA Chatter Party	CW Ph	RS(T), name, SPC	clarayl.ca/chatter-party
23	2000	23	2130	3.5	RSGB 80m Club Champ., SSB	Ph	RS, serial	www.rsgbcc.org/hf
25	0000	25	2359	1.8-28,VHF	FOC QSO Party	CW	RST, name, mbr (if any)	g4foc.org/qsoparty
25	0000	26	2359	1.8-28	CQ WW WPX Contest, SSB	Ph	RS, serial	www.cqwpx.com/rules.htm
26	0600	26	1000	50	UBA Spring Contest, 6m	CW Ph	RS, serial, UBA section (If ON)	www.uba.be
27	2000	27	2130	3.5-14	RSGB FT4 Contest	Dig	4-char grid	www.rsgbcc.org/hf
29	2000	29	2100	3.5	UKEICC 80m Contest	CW	6-char grid	www.ukeicc.com/80m-rules.php

There are a number of weekly contests not included in the table above. For more info, visit: **www.qrpfoxhunt.org**, **www.ncccsprint.com**, and **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** *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!

02/17/2023 | 550th Anniversary of the Birth of Nicolaus Copernicus (1473-2023)

Feb 17-Mar 5, 0000Z-2359Z, SN550K+, Various locations, POLAND. Polish Amateur Radio Association. All bands, all modes. Certificate & QSL. see website, for QSL and certificate, information, POLAND. Call signs: SSN550K, SN550O, SN550P, SN550E, SN550R, SN550N, SN550I, SP550K, and SN550NC https://550mk.pzk.org.pl

03/06/2023 | 100 Years of WWV Time and Frequency Broadcasts

Mar 6-Mar 12, 0000Z-2359Z, WW0WWV, Various towns and states. WWV Amateur Radio Club. 7.048 7.248 14.048 14.248. QSL. WWV ARC, PO Box 273226, Fort Collins, CO 80527. This is an operating event, on all HF bands, CW, SSB and standard digital mode frequencies. QSL via LOTW, OQRS and PO Box 273226, Fort Collins, CO 80527 wwvarc.org

03/11/2023 | Commemorating the launching of the USS Midway March of 1945

Mar 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 Museum Ship COMEDTRA, 910 N Harbor Drive, San Diego, CA 92101. www.qrz.com/db/ni6iw

03/14/2023 | Commemorating Buckingham Air Field/Lee County Mosquito Control

Mar 14-Mar 16, 1400Z-2100Z, W4LX, Fort Myers, FL. Ft Myers Amateur Radio Club. 28.340 21.350 14.240. Certificate & QSL. FMARC, Po Box 061183, Fort Myers, FL 33906. In Honor of the Men who trained at the Buckingham Army Airfield. Established in 1942. Its primary mission during World War II was to train the aerial gunners who would defend bombers. In 1942 and 1943, "During its operational lifetime, it graduated almost 48,000 aerial gunners." WWW.FMARC.NET

03/14/2023 | PI Day - David Sarnoff Radio Club, Princeton, NJ

Mar 14, 0000Z-2359Z, N3P, Burlington, NJ. David Sarnoff Radio Club. 14.031 MHz 14.314 MHz 7.031 MHz 7.227 MHz. QSL. Don Corrington, 7 Pinewald Lane, Burlington, NJ 08016-3421. n2re.org

03/15/2023 | Celebrating 104th Birthday American Legion

Mar 15, 1600Z-2200Z, AF4CB, Cartersville, GA. Carl Boyd Post 42 American Legion Amateur Radio Club. 7.242 SSB 14.342 SSB 7.074 FT8 14.074 FT8. QSL. Joel Myers, 513 Cassville Rd., Cartersville, GA 30120.

03/15/2023 | VOTA

Mar 15-Mar 21, 0000Z-2359Z, W1DGL, Prescott, AZ. Yavapai Amateur Radio Club. 28.400 21.250 14.275 7.225. Certificate & QSL. Yavapai Amateur Radio Club, P.O. Box 11994, Prescott, AZ 86304-1994. fix_broke_airplanes@hotmail.com

03/18/2023 | Cherry Blossom Special Event Station

Mar 18, 1400Z-2000Z, W4BKM, Macon, GA. Macon Amateur Radio Club. 14.240 7.225. Certificate. Macon Amateur Radio Club, P.O. Box 4862, Macon, GA 31208-4862. https://maconamateurradioclub.wordpress.com

03/18/2023 | Nebraska Sandhill Crane Spring Migration

Mar 18-Mar 19, 1600Z-2359Z, W9WKP, Lincoln, NE. Southeast Nebraska Amateur Radio Club. 14.265 14.325 7.225 7.285. Certificate. SENARC C/O Charles Bennett KD0PTK, PO Box 67181, Lincoln, NE 68506. Nebraska Sandhill Cranes Spring Migration.Among the greatest wildlife spectacles on the continent. Roughly a million Cranes make a stop in Nebraska's Platte River Valley. Times are daily. senebrradioclub@gmail.com

03/18/2023 | Walk for Water Charleston 2023

Mar 18, 0000Z-2359Z, W4W, Goose Creek, SC. Carolina SideWinders of the Lowcountry. 14.316 7.216 14.074 10.136. QSL. Carolina SideWinders, 318 Jennie St., Goose Creek, SC 29445. The Carolina

Amateur Radio Special Event Stations!

SideWinders will be putting on a SES to let people know on March 25, 2023 9:00 a.m. Riverfront Park, North Charleston, SC we will be walking so others don't have to. Around the world, more than 2.2 billion people do not have access to safe water. Water Mission raises funds and awareness to fight the global water crisis. https://watermission.org/ km4sw_614@yahoo.com

03/18/2023 | Western Mass Council Scouts BSA WHOA weekend

Mar 18, 1300Z-1900Z, W1M, Russell, MA. Western Mass Council Scouts BSA. 7.190. QSL. Tom Barker, 329 Faraway Road, Whitefield, NH 03598. Monthly outdoor activity program sponsored by the Western Mass Council BSA.

03/19/2023 | 59th Anniversary of Green Valley, Arizona

Mar 19, 1700Z-2100Z, WE7GV, Sahuarita, AZ. Green Valley Amateur Radio Club. 14.242 14.245 14.248. Certificate & QSL. Tom Lang, 1085 W. El Toro Rd, Sahuarita, AZ 85629. Celebrating the 59th Anniversary of Green Valley, Arizona. WE7GV will be using the discone antenna at the Titan Missile Museum. Go to WE7GV at QRZ.com for qsl & certificate mailing info.

03/19/2023 | Kentucky Bourbon Trail

Mar 19, 1300Z-2100Z, K4KJQ, Lexington, KY. Bluegrass Amateur Radio Society . 7.230 7.245 7.260 7.265. Certificate & QSL. Bluegrass Amateur Radio Society , P.O. Box 13206, Lexington, KY 40583. bluegrassars.org

03/20/2023 | FMCA-ARC Spring Rally/POTA

Mar 20-Mar 23, 0000Z-2300Z, W4B, Americus, GA. Family Motor Coach Association. 7.280 7.240 14.260 14.290. QSL. Dennis Tuchalski, N9WDQ , 5854 Moro Rd, Moro, IL 62067. Celebrating motor coach camping / President Jimmy Carter home / POTA activations www.fmcaarc.com

03/25/2023 | Battle of Horseshoe Bend 209th Anniversary Commemoration

Mar 25, 1600Z-2200Z, N4H, Alexander City, AL. Lake Martin Amateur Radio Club K4YWE. 14.320 29.000. Certificate & QSL. Michael Courtney, 96 Alabama Drive, Alexander City, AL 35010. www.facebook.com/k4ywe

03/29/2023 | National Vietnam War Veterans Day

Mar 29, 1800Z-2100Z, N3TAL, Lanham, MD. American Legion Post 275 Radio team. 7.275Mhz +/- LSB. QSL. American Legion Post 275 ART Team, 8201 Martin Luther King Jr Hwy, Lanham, MD 20706. n3tal.275@gmail.com or www.qrz.com/db/n3tal

03/29/2023 | Vietnam Veterans Day

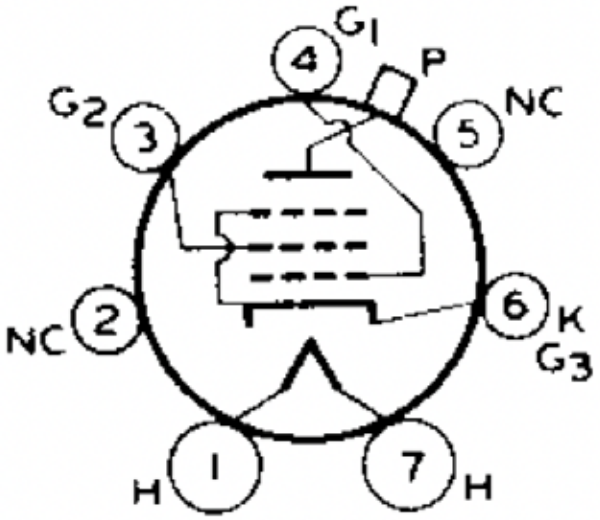
Mar 29, 1500Z-2030Z, W5KID, Baton Rouge, LA. Baton Rouge Amateur Radio Club. 7.040 7.250 14.040 14.250. QSL. USS Kidd Amateur Radio Club, 305 S. River Rd., Baton Rouge, LA 70802. CW, SSB, FT8 Operation aboard the USS Kidd (DD-661), a World War II Fletcher-class destroyer. www.qrz.com/db/w5kid

03/31/2023 | 165th Annual Tater Day Festival - Yam It Up!

Mar 31-Apr 3, 0000Z-2359Z, KI4HUS, Benton, KY. Marshall County Amateur Radio Association. 3.820 7.250 14.325 28.350. QSL. Steve French, KM4JZJ, 3640 Olive Hamlett Rd., Benton, KY 42025. For a QSL card, send your card along with an SASE to Steve French - KM4JZJ www.facebook.com/groups/861322314291904

The 1625 - transmitting beam power amplifier

The 1625 was designed for use as AF amplifier or modulator as well as for RF amplification. Except for the heater it is identical to the 807. The 1625 has a 7 pin base and a small top cap for the plate connection. It is an indirectly heated tube with a 12.6V heater which consumes 0.45A. It is electrically and mechanically identical to the 807 with the only exception that the latter is heated with 6.3V / 0.9A. While it was intended to be used in Class AB2 configuration where it can deliver up to 120W, there are 807s used in singe ended amps and in triode connection as well.



The 1625 is electrically identical to the 807, except for the heater requirements and base cap. At 12.6 Volts the 1625 would have been designed for mobile equipment. The base looks like UX7 but is slightly different and is designated as U7B (medium).

The parameters given are for single ended use. When used in a class AB1 push pull pair with 600 Volts on the anode an output power of 65 Watts was normal.

These valves were much used in medium power amateur radio transmitters for high level modulation. In this use the output transformer, called a modulation transformer, would be impedance matched to the anode circuit of the RF power valve. The audio power would increase or decrease the amplitude of the RF envelope.

The 807 itself was a workhorse of the HF bands. As a transmitter power amplifier (shown in the lower table) operating in class C producing 40 Watts of RF, it would need a pair of in push pull to generate the 20 Watts of audio required to fully modulate the valve. Other modulation systems operating on the screen grid would require much less audio drive but with less RF output.

The 1625 - transmitting beam power amplifier

1625; 1626

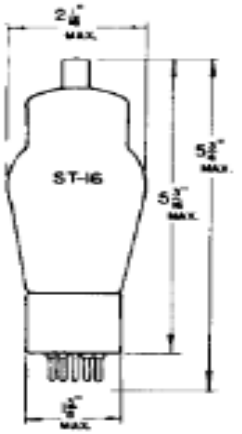
TUNG-SOL

TRANSMITTING BEAM POWER AMPLIFIER 1625

UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.45 AMPERES



RATINGS

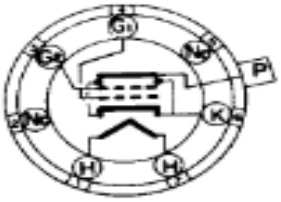
HEATER VOLTAGE (AC/DC)	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	750	VOLTS
MAXIMUM SCREEN VOLTAGE	350	VOLTS
MAXIMUM PLATE DISSIPATION	30	WATTS
MAXIMUM SCREEN DISSIPATION	3.5	WATTS

DIRECT INTERELECTRODE CAPACITANCES (WITH EXTERNAL SHIELD)

CONTROL GRID TO CATHODE	11	μμf
PLATE TO CATHODE	7	μμf
MAXIMUM GRID TO PLATE	.2	μμf

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

RF CLASS C AMPLIFIER OR OSCILLATOR



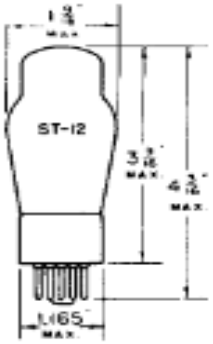
HEATER VOLTAGE (AC/DC)	12.6	VOLTS
HEATER CURRENT	0.45	AMP.
PLATE VOLTAGE	600	VOLTS
SCREEN VOLTAGE	200	VOLTS
GRID CURRENT	6.0	MA.
SCREEN CURRENT	10	MA.
PLATE CURRENT	100	MA.
POWER OUTPUT	35	WATTS
GRID RESISTOR	10000	OHMS

TRANSMITTING TRIODE 1626

UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.25 AMPERES



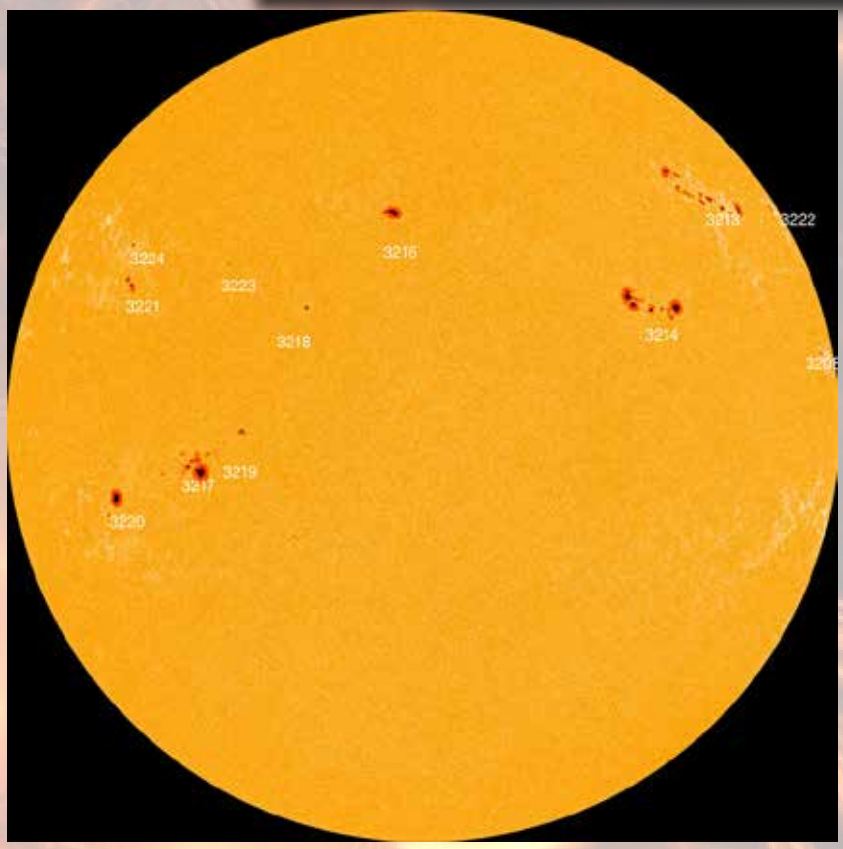
RATINGS

HEATER VOLTAGE (AC OR DC)	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	250	VOLTS
MAXIMUM GRID VOLTAGE	-150	VOLTS
MAXIMUM PLATE DISSIPATION	5	WATTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE (AC OR DC)	12.6	VOLTS
HEATER CURRENT	0.25	AMP.
PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-32	VOLTS
PLATE CURRENT	25	MA.
PLATE RESISTANCE	2500	OHMS
MUTUAL CONDUCTANCE	2500	μMHOS

PLATE 1383-1 DEC. 15 1943



At 0725 UTC on February 15 the Australian Space Weather Forecasting Centre issued a geomagnetic disturbance warning: "A CME impactoccurred around 2200 UTC on February 14. Bz has been southward for the majority of time since impact and there is a chance of G1 geomagnetic conditions." Bz is the north-south direction of the Interplanetary Magnetic Field (IMF).
They predicted a disturbance for February 15-16.
They issued a new warning on February 17 at 0206 UTC: "A partial halo CME observed on 15-Feb is due to impact Earth's magnetosphere late on 17-Feb or early 18-Feb UTC. G1 geomagnetic conditions are expected on 18-Feb, with a slight chance of G2.

Average daily sunspot numbers increased from 95.1 to 182.4, and average daily solar flux from 155.9 to 196.4.

Geomagnetic activity also rose, with average daily planetary A index going from 11.7 to 13.7, and middle latitude numbers from 7.6 to 10.7.

The most active days were at the beginning and end of the week, with planetary A index at 21 on February 9 and 29 on February 15. On those two days the college A index at Fairbanks, Alaska was 33 and 46. The quietest day was Monday, February 13 when the planetary A index was 4.

The outlook for the next month seems modest, with predicted solar flux at 155, 160, 155, 145 and 135 on February 17-21, 125 on February 22-23, 130 on February 24-26, 140 on February 27 to March 1, 145 on March 2-3, then 150, 155 and 165 on March 4-6, 180 on March 7-13, 170 on March 14-15, 160 on March 16-18, and 150 on March 19, 140 on March 20-21, and 135 on March 22-25.

Predicted planetary A index is 22, 30, 12, 8 and 12 on February 17-21, 10 on February 22-24, then 5, 5 and 8 on February 25-27, another 5, 5, and 8 on February 28 through March 2, then 5, 5 and 16 on March 3-5, then 18, 15 and 8 on March 6-8, and 5 on March 9-20, then 10 on March 21-23, and 5, 5 and 8 on March 24-26, and another 5, 5 and 8 on March 27-29.

Power-Supply Filters

December 1952 QST Article

Here's a topic - power supply filter design - that never goes out of style. It was originally published in a 1952 issue of QST magazine. Without bothering to worry about source and load impedances, this brief tutorial on the fundamentals of power supply filter design using series inductors and parallel capacitor combinations. Author Gabriel Rumble offers a rule-of-thumb type formula for guessing at a good inductor value based on peak-to-average expected current. This is by no means a comprehensive primer on power supply filter design and is directed more toward someone new to the concept of removing or reducing noise and AC ripple from the output of a DC power supply.

PowerSupply Filters - Fundamental Facts for the Beginner

By Gabriel P. Rumble, EX-W5BBB

If the requirement is pure (that is, unvarying) direct current, the rectifier outputs shown in a previous article1 will not fill the bill.

We must use the properties of L and C (or sometimes R and C) to iron out the ripples in the rectified current.

If a condenser is placed in parallel with the load on a half-wave rectifier, as shown in Fig. 1A, the voltage between alternations does not drop to zero, because the condenser charges during the conducting half-cycle and discharges through the load during the nonconducting half of the cycle, as shown in Fig. 1B.

A comparison of the output waveforms shown previously should make it clear why the output of a full-wave rectifier is easier to filter than that of a half-wave rectifier. In either case, the condenser will by-pass some of the ripple around the load. The greater the capacitance, the slower the RC decay and the shallower the ripple.

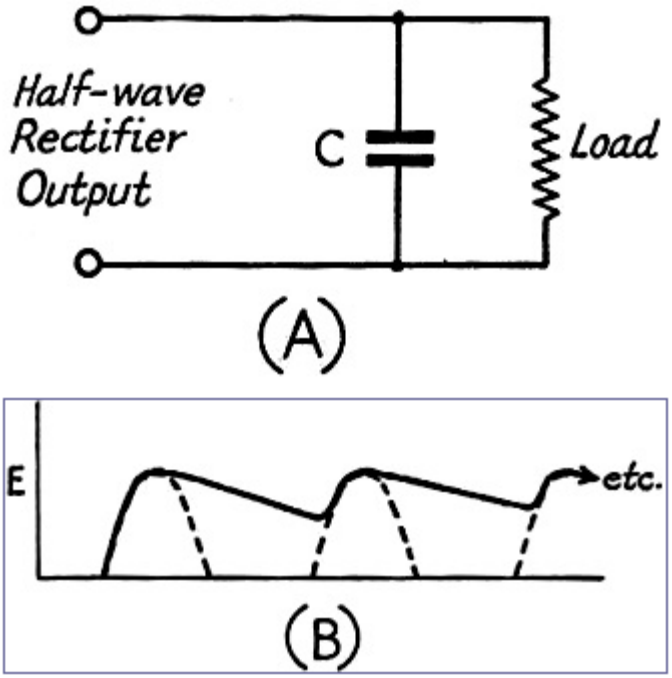


Fig. 1 - The discharge of a condenser connected across the load resistance helps to smooth out the bumps in the output of the rectifier.

The action of a condenser in a filter circuit is analogous to that of shock-absorber springs in a wagon traveling over a cobblestone road. We can further smooth out the ride by adding weight to the wagon. This step is comparable to the addition of a choke (inductance) to the filter circuit, as shown in Fig. 2A. The elasticity of the condenser and the inertia of the inductor are being utilized to smooth out the ripples that would otherwise exists across the load. Further filtering and the consequent approach to pure direct current may be accomplished by additional sections of filter, as shown in Fig. 2B. (Suggestion: Consult your favorite textbook on the interesting subjects of resonant filters and swinging chokes.)

If the full rectifier output voltage is applied to the condenser, as shown in Fig. 2A, the filter is said to be of the condenser-input type. If, instead, the ripple voltage first undergoes an IXL drop before being applied to the condenser, as illustrated in Fig. 2B, the filter has choke input. (Suggestion: Look up the subject of critical inductance.)

A comparison of the voltage regulation of supplies having condenser and choke input is shown in Fig. 3 (p. 130). With condenser input, the output voltage varies considerably with varying loads. With choke input, the output is almost constant for a wide range of load variation. The variation occurring in this flat range is caused by the d.c. resistance of the choke and rectifier resistances and the leakage reactance of the transformer. However, in well-designed components these are usually quite low. The load current at which the knee of the curve occurs is dependent on the inductance of the input choke. The greater the inductance, the smaller the value of load current at which the curve starts to flatten out.

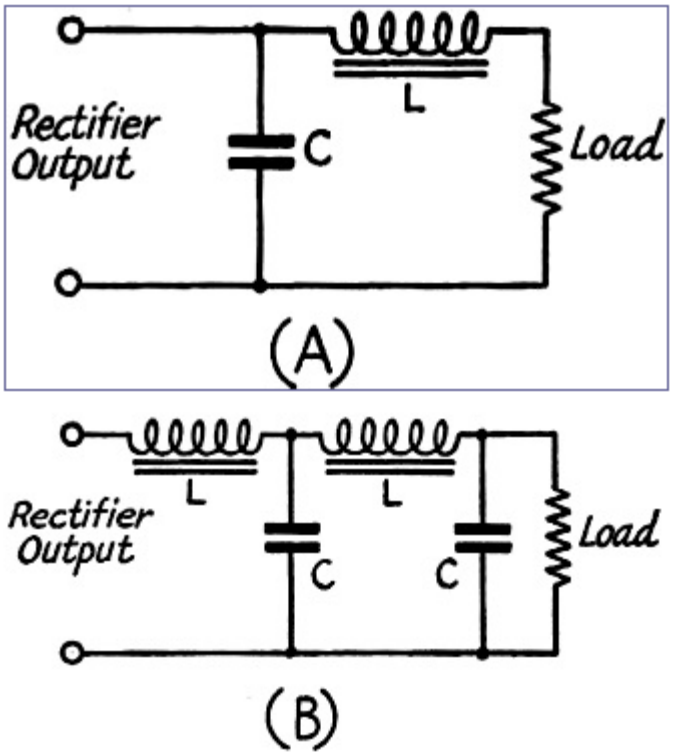


Fig. 2 - A choke in series with the load provides further smoothing. If additional filtering is required, a second filter section may be added.

In addition to providing a flatter characteristic, the use of choke input has another advantage. It reduces the ratio of peak to average current passed by the rectifier. If it were desired to design a rectifier for a fixed load current of I amperes and E volts, and if it were further desired that the peak rectifier current should exceed the average by only P%, then the inductance, L, in henrys, of the input choke, should be ***L = E / (10*P*I), where:***

L is inductance in Henries

E is peak voltage

I is peak current

P is peak-to-average current ratio

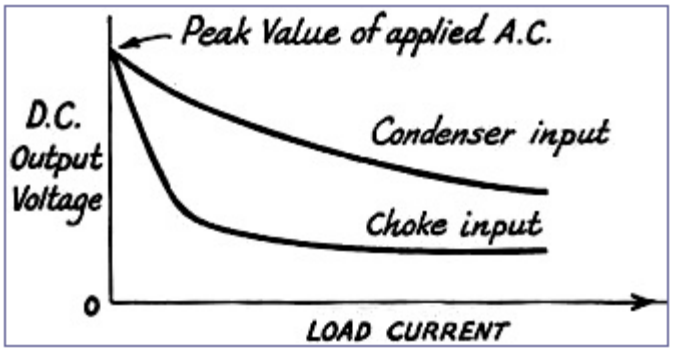


Fig. 3 - Comparison of the voltage regulation with condenser- and choke-input filters.

The knee of the characteristic will occur at a current of P*I amperes. If it were desired to have the knee at a lower current, a smaller value of P would be selected and a higher L would be called for. Where good regulation down to low values of load current is not of interest, and the values of full-load current and rectifier current rating permit, the values of P above 5 per cent will usually be more economical.

Filter chokes are usually placed in the ungrounded side of the rectifier output. If the choke is placed in series with the transformer and ground, the capacitance of the secondary winding of the transformer to grounds tends to by-pass the choke.

If the expected current drain on a rectifier is very slight, resistors, which are comparatively inexpensive, may be used in place of the chokes. A 1000-ohm resistor, for example, will do just as much filtering as 1000 ohms of inductive reactance at any given ripple frequency. It should be stressed that this is practical only when the load resistance is much higher than the filtering resistance. Also, the d.c. voltage drop in the filter resistor and its adverse effect on regulation must be taken into account.1 Rumble, "How Rectifiers Work," QST, October, 1952, p.42.

Standing Waves on Transmission Lines

December 1942 QST Article

In this article from a 1942 issue of QST magazine, author T.A. Gadwa employs a standing wave mechanism analogy that I don't recall having read before - that of a dam on a river. The river is the transmission line with a lake as the source (presumably) and then he imagines a dam load. The dam standing waves, per his description, have phase and amplitude characteristics that depend on how tall the dam wall is relative to the surface height of the dammed river. An extensive array of graphs is provided showing how the current of the dam standing waves react to the dam transmission line termination impedance. I always wonder when seeing electrical-mechanical parity examples whether, as with this case, there are any dam magazine articles out there that use an electrical transmission line to help fellow civil engineers understand their dam designs?

Standing Waves on Transmission Lines

A Method of Line Matching Based on Graphical Comparison

By T. A. Gadwa, SC.D., W2KHM

Section of transmission line with its terminating load - RF Cafe

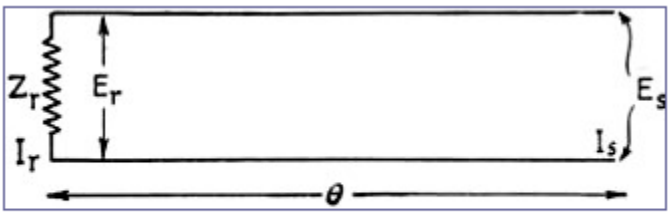


Fig. 1 - Section of transmission line with its terminating load.

Fig. 1 - Section of transmission line with its terminating load.

Standing waves are often a problem to amateurs who attempt to use untuned transmission lines for their antennas. The elimination of these waves is often difficult because of a lack of understanding of the principles involved. Using the analogy of water waves in a canal is often helpful in visualizing the factors that influence the operation of transmission lines. Suppose the canal has a dam at one end and a wave is created at the opposite end. This wave traveling toward the dam is reflected back to the starting point. Now if the height of the dam is lowered sufficiently to allow the initial wave to splash over, then no return wave or reflection is produced. In the radio-frequency application, the canal corresponds to the transmission line and the dam to the load or antenna.

Terman1 has analyzed the position and magnitude of standing waves on lines for several different types of loads. Everitt2 has derived equations that make it possible to establish the character of these waves. If one neglects the line losses, which are usually small for relatively short lengths of line, the calculation is simplified considerably. At radio frequencies, such lines may be assumed to behave as pure resistances. The current at any point on the line for any type of load is given by the equation:

$$I_s = I_r \left(\cos\theta + j\frac{Z_r}{R_o}\sin\theta\right) \quad (1)$$

The voltage at any point is given by the equation:

$$E_s = E_r \left(\cos\theta + j\frac{R_o}{Z_r}\sin\theta\right) \quad (2)$$

where Is = current at any point in the line

Ir = load current at output or receiving end of line

Es = voltage at any point on line

Er = voltage at output or receiving end of line

Zr = load impedance

Ro = characteristic impedance of line

θ = distance from point to output or receiving end of line

2π radians = 360° = 1 wavelength

$j = \sqrt{-1}$ - indicating 90° phase shift

+ j for inductive reactance

- j for capacitive reactance

The load may be any of the combinations shown in Fig. 2. The character of the standing waves that are associated with each case will be discussed.

The load may be any of the combinations shown in Fig. 2. The character of the standing waves that are associated with each case will be discussed.

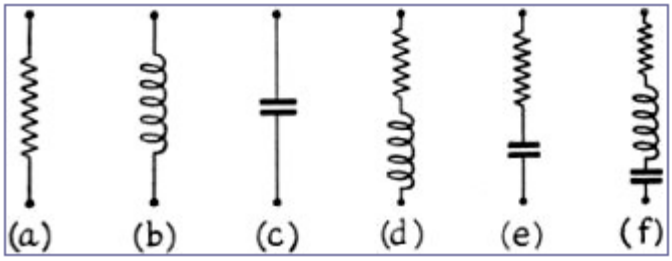


Fig. 2 - Possible combinations of resistance and reactance which may make up the load impedance, Z_r

If a voltage is applied or a current induced at the sending end of a transmission line and the receiving end is an open circuit, a wave traveling toward the open circuit is reflected wholly since no power is absorbed. This reflected wave combines with the incident wave to form standing waves. Waves that can be measured as average values of current or voltage are called standing waves. The readings are all positive since no account is taken of phase between the current and voltage. The results are represented as positive values plotted as ordinates above the horizontal axis. At the open circuit, the voltage is reflected in phase since the incident and reflected voltages are equal and their sum is not zero, while the current is reflected out of phase since the incident and reflected currents are equal and their sum is zero. If the average current or voltage along the line is measured, maxima and minima are found at regular intervals from the receiving end of the line. The current distribution for an open circuit is shown in Fig. 3-1. Only a half wavelength is shown as the cycle is repeated for additional lengths of line. To avoid confusion that might result if voltage were superimposed, only the current wave-forms are plotted. There is always a current minimum or node at the receiving end and at every half-wavelength point back along the line, and a current maximum or loop at every quarter wavelength. Furthermore, the voltage is maximum or a loop at each current minimum or node and there is a voltage minimum or node at each current maximum or loop. It is evident that maximum and minimum values of either voltage or current occur exactly 1/4 wavelength apart.

If the receiving end is short-circuited, a wave starting down the line is reflected and again standing waves are found. Here the positions of the maximum and minimum have been shifted and appear as in Fig. 3-2. At the short circuit, the incident and reflected voltages are out of phase and their sum is zero, while the current is reflected in phase and the sum of the two components is not zero.

If an appropriate pure resistance equal to a constant known as the characteristic impedance of the line is connected as a receiving load, a wave starting down the line is absorbed completely and no reflection is possible. The current and voltage are constant at all points, with no maximum or minimum, as shown in Fig. 3-5. Since all actual lines have losses, the current and voltage diminish slowly toward the load, as indicated in Fig. 3-6. Such lines are known as flat lines. This load impedance is dependent only on the physical properties of the line: the conductor diameter, conductor spacing and type of insulation or dielectric. Its value for an open-air two-wire parallel line is calculated by the formula:

$$R_o = 276 \log (2S)/D \quad (3)$$

where Ro = characteristic impedance of line in ohms

S = spacing between conductor centers in any units.

D = diameter of one conductor in same units

If the load resistance is less than the line impedance but not a short circuit, the standing waves are similar to the short circuit load except that the minimum current is greater than zero, as shown in Fig. 3-4. If the load is made greater than the line impedance but not infinite (open circuited), the standing waves are as shown in Fig. 3-3. It is evident that the maximum and minimum currents occur in the same positions as in the case of the open-circuit load, but the maximum-to-minimum ratio is less. The ratio approaches the value of unity as the load approaches the characteristic impedance.

If the load is an inductive reactance equal to the characteristic impedance, Fig. 2-B, no power is absorbed and standing waves are as shown in Fig. 3-9. The line behaves similarly to a short-circuit load except that the waves are shifted toward the receiving or load end. The current is zero at 1/8 wavelength from the load and maximum at 1/4 wavelength farther along and then every 1/2 wavelength to the sending end. As the inductive reactance is increased from values less than to greater than the characteristic impedance, the standing waves are shifted toward the receiver or load end as can be seen by comparing Figs. 3-7, 3-9 and 3-11.

When the load is a capacitive reactance, Fig. 2-C, equal to the characteristic impedance, no power is absorbed and standing waves are present in the form given in Fig. 3-10. The line behaves similarly to an open circuit except that the standing waves are all shifted toward the receiving or load end. A current maximum occurs at 1/8 wavelength from the load and every 1/2 wavelength toward the sending end of the line. As the capacitive reactance is reduced from greater than to less than the characteristic impedance, the standing waves are shifted toward the receiver as can be seen by comparing Figs. 3-12, 3-10 and 3-8.

There are many other possible combinations of resistance in series or parallel with either or both inductive and capacitive reactances, Figs. 2-A to 2-F. This discussion is confined to series circuits, since any parallel circuit can be transformed into an equivalent series circuit. Theoretically there are 4 X 4 X 4 + 2 or 66 combinations where the individual components are less than, equal to or greater than the characteristic impedance. A series circuit of resistance, capacitance and inductance behaves like a resistance in series with either inductance or capacitance, depending upon the frequency, except at resonance where it is resistive only. This limits the actual

number of cases to 3 X 3 X 3 + 2 or 29. For series loads of resistance and inductance, the wave forms are given in Figs. 3-13 to 3-21. For series loads of resistance and capacitance, the wave forms are given in Figs. 3-22 to 3-30.

If the load is composed of resistance and reactance whose total impedance is equal to the line impedance, the maximum or minimum current or voltage always occurs at exactly 1/8 wavelength from the receiver load, regardless of the resistance to reactance ratio. This can be seen by comparing Figs. 3-31, 3-32 and 3-33 for inductive and resistive loads and Figs. 3-34, 3-35 and 3-36 for capacitive and resistive loads. The maximum-to-minimum ratio of current or voltage approaches unity as the resistance-to-reactance ratio increases.

When the total load impedance and the resistance component are each greater than the line impedance, an increase in inductive reactance shifts the waves back from the load end, as can be seen by comparing Figs. 3-19, 3-20 and 3-21. Similarly, a decrease in capacitive reactance shifts the waves back from the load end, as can be seen by comparing Figs. 3-30, 3-29 and 3-28. This effect of reactance change upon wave shift is in the opposite direction to the shift obtained with reactance loads only.

With a series inductive reactance and resistance load whose total impedance is greater than the characteristic impedance, the minimum current is always less than 1/8 wavelength from the receiver.

With a series capacitive reactance and resistance load whose total impedance is less than the characteristic impedance, the maximum current is always less than 1/8 wavelength from the receiver.

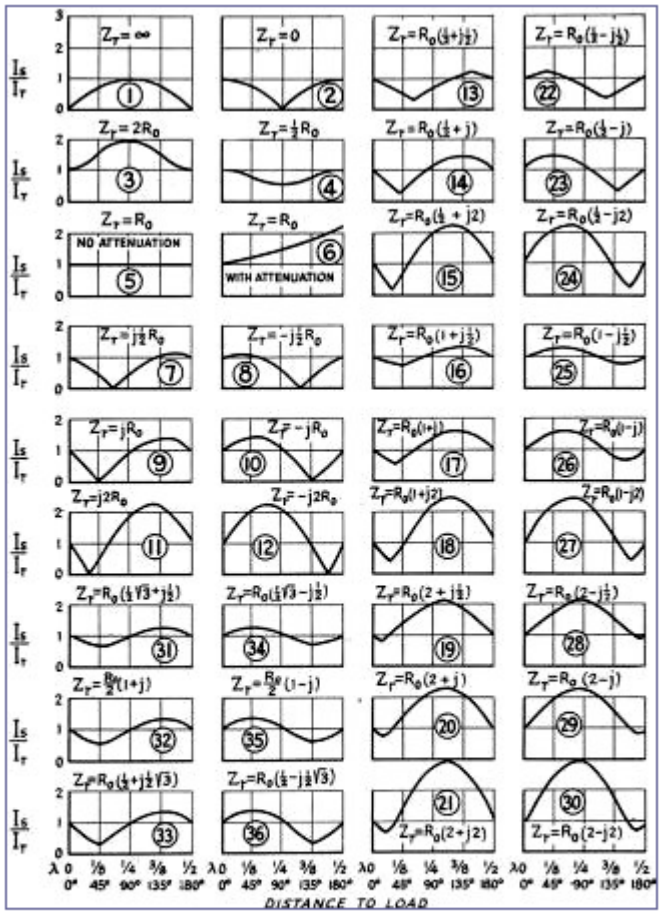


Fig. 3 - Positions and relative magnitudes of standing waves for various load impedances. The curves show the ratio of current at the point on the line considered to the current in the load.

Some of the curves for current may be applied for the distribution of voltage as well. The line current for the open circuit load is also the line voltage for a short circuit load. The line current for the short circuit load is also the line voltage for an open circuit load. Similarly, Fig. 3-22 represents the voltage for load conditions in Fig. 3-17 and vice versa. Also Fig. 3-26 represents the voltage for load conditions in Fig. 3-13 and vice versa. The voltage and current at some points on the line may rise above the sending and receiving values because of the resonant effect of the transmission line.

Matching the Antenna

An antenna is a series-resonant circuit and may act as a load for the transmission line. In most cases it is inconvenient or impossible to secure a direct match between the line and antenna. It is then necessary to insert some sort of impedance transformer between the antenna and receiver terminals of the line in order to present a load equal to the line impedance. An antenna acts like a pure resistance at resonance, is capacitive and resistive at lower frequencies, and is inductive and resistive at higher frequencies; or, for a given frequency, the antenna is capacitive and resistive if too short and inductive and resistive if too long. The reactance of a series resonant circuit is shown in Fig. 4. The resistance of an antenna changes with frequency or length and is maximum at

resonance. The resistance and reactance of an antenna may also be represented as shown in Fig. 5.

Before it is possible to obtain an impedance match and a flat line, the antenna must be tuned to resonance either by adjustment of its length or by inserting a series inductance if too short or a series capacitance if too long. The recognized method is to excite the antenna parasitically and obtain maximum antenna current by tuning. This is laborious and requires accurate measuring equipment. Neither can the exact length of the antenna be calculated for resonance. Many avoid this step by erecting the complete antenna sys-tem and attempting to obtain a flat line by trial and error in antenna tuning and impedance-transformer adjustments. This procedure may result, in rare cases, in obtaining a flat line. It is evident that the number of variables is too numerous to achieve the desired results with a minimum of experiment. At this point a working knowledge of standing waves will enable one to establish the condition of the antenna or the transmission-line load. A scheme is proposed whereby, after determining the relative magnitude and position of the maximum and minimum or loop and node of voltage or current, the antenna condition is indicated by comparison with various curves for different types of loads.

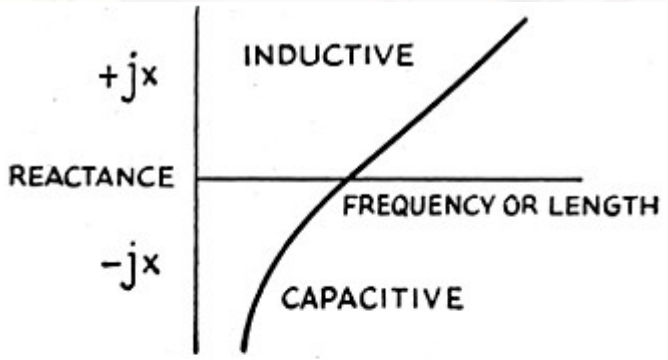


Fig. 4 - Reactance variation in a series-resonant circuit.

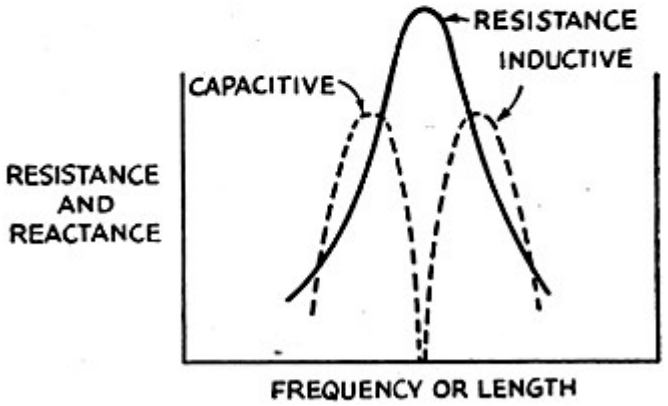


Fig. 5 - Resistance and reactance variation in an antenna, looking into a current loop.

The complete set of curves shown in Fig. 3 covers all possible combinations of loads that may be encountered. By the recognized mathematical methods of differential calculus, the maximum and minimum positions have been calculated by differentiating the line current Is of equations (1) and (2) with respect to the distance θ, equating to zero and solving for θ. Some of these equations are of second degree and require solution by the quadratic equation method.

The idea in adjustment is to shift the minimum or maximum current to the 1/4 wavelength position (to eliminate the reactive component) and then to reduce the maximum-to-minimum ratio to unity by impedance transformer adjustment. The procedure is to supply sufficient power to the transmission line, with the antenna system in position, to permit measurement of the line current or voltage, starting at the load if possible, and then by measurement at equal small intervals to establish the location of the maximum and minimum voltage or current. In most cases it is preferable to locate the current nodes or minima rather than the voltage, because the change in current per unit length of line is more rapid and easier to detect. One-sixteenth wavelength intervals are sufficiently close to enable one to plot a curve of current or voltage vs. distance to the load. If it is impracticable to start at the load it is permissible to begin at any multiple of a half wavelength from the load, since the standing waves are repeated along the line to the sending end. Radio-frequency waves travel more slowly on transmission lines than in air, so that the length of a wavelength for an open-wire line is usually about 97.5 per cent of that in air.

If maximum or minimum current or voltage occur at points other than at multiples of 1/4 wavelength from the load, the antenna is non-resonant and must first be tuned to resonance by whatever method is desirable. If the maximum current occurs between the load and 1/4 wavelength, the antenna is capacitive or too short and must be lengthened or series inductance added.

If minimum current occurs between the load and 1/4 wavelength, the antenna is inductive or too long and must be shortened or series capacitance added. If maximum or minimum current or voltage occur at 1/4 wavelength from the load, the antenna is resonant but the impedance match is incorrect. The impedance transformer then should be adjusted until the maximum and minimum values are equal or the standing wave ratio is unity.

All the wave forms shown can be encountered during the process of tuning the antenna and matching the line impedance. As the antenna ap-proaches resonance and the impedance match becomes nearly correct, the waves may look like Figs. 3-16 or 3-25. Poor adjustments may yield waves like Figs. 3-21 and 3-30.

It must be emphasized that no adjustment at the sending or transmitter end of the line will change the position of the standing waves. This adjustment will only control the degree of coupling and the amount of power delivered to the line and antenna. A reactive component always appears at the sending end if standing waves are present. It is evidenced by the necessity for resetting the plate tank tuning capacity to obtain minimum plate current when the line is coupled. All adjustments must be made first to the antenna and then to the impedance transformer for the elimination of standing waves. For efficient reception, a proper impedance match must be made at the receiving end. In this case the antenna is at the sending end and the receiver at the output of the line.

With this approach to the standing wave problem, that elusive flat line should be easily realized by all amateurs using untuned transmission lines for their antennas.

1 Terman, Radio Engineering.

2 Everitt, Communication Engineering.

Amateur Satellite FalconSAT-3 Nears Reentry

Many amateur radio operators and satellite watchers have been predicting the date and time of reentry for FalconSAT-3 (FS-3). While all reentry predictions are something of a guessing game due to the large number of variables affecting the upper atmosphere, it is certain that the end for FS-3 will be coming very soon, possibly the week of January 16 - 21, 2023.

Radio Amateur Satellite Corporation (AMSAT) Board Member and FS-3 control operator, Mark Hammond, N8MH, said he will try to have the satellite operational for its final hours. The satellite has only been available for approximately 24 hours each weekend due to weak batteries.

The FalconSAT-3 satellite. [Photo courtesy of AMSAT]

FalconSAT-3 was built in 2005 and 2006 by cadets and faculty in the Space Systems Research Center at the US Air Force Academy (USAFA) in Colorado Springs, Colorado. It is the fourth in a series of small satellites designed, built, and operated there as part of a capstone course, which brings together about 30 cadets each year from several different academic departments.

Nearly 700 cadets at the USAFA obtained their amateur radio licenses as part of training to operate FalconSAT-3 and other USAFA satellites. They have taken that knowledge, understanding, and value of amateur radio into their Air Force service and industry. Since FalconSAT-3, the USAFA Astronautics Department has built and operated one additional satellite and has two more queued for launch. The space operations curriculum and the ground station are being rebuilt and configured for these new space assets.

Since its launch on an Atlas V rocket from Cape Canaveral in March 2007, the satellite has been through three mission phases. The first phase was operation of the science payloads. The second phase was used as a tool for training cadets in the space operations squadron, students in undergraduate space training in California, and graduate students at the Air Force Institute of Technology. The satellite's third phase was an on-orbit resource for amateur radio and amateur-satellite services operation managed by AMSAT.

Radio Amateur Satellite Corporation, AMSAT, logo; blue text with a red graphical globeFor amateur radio service the downlink is at 435.103 MHz transmitting 1 W into a quarter-wave whip antenna. The uplink is at 145.840 MHz and the receiving antenna is a quarter-wave whip antenna on the opposite side of the satellite. All UHF and S-band equipment on National Telecommunications and Information Administration licensed frequencies has been disabled. The VHF receiver is very sensitive. Modulation is 9600 bps GMSK for the uplink and downlink. The broadcast call sign is PFS3-11, and the BBS callsign is PFS3-12, Unproto APRS via PFS3-1.

The core avionics were designed and built by Mark Kanawati, N4TPY, and Dino Lorenzini, KC4YMG at SpaceQuest, and have performed remarkably well for nearly 16 years in orbit. Jim White, WD0E, was the lead engineer for FalconSAT-3 at the USAFA and managed the design, construction, testing, and early operations of the satellite.

The success of FalconSAT-3 is an excellent example of how amateur radio can be integrated into the curriculum of an education institution for the benefit of the students and the amateur radio service.

-- Thanks to Sasha Timokhov, VE3SVF; Jean Marc Momple, 3B8DU; Mark Hammond, N8MH; AMSAT Operations, and AMSAT News for the information contained in this story.

MARCH 1976
$1.50

73 AMATEUR RADIO ANTENNA ARCHIVES #56

Bicycle Rim Antenna for 20 Meters

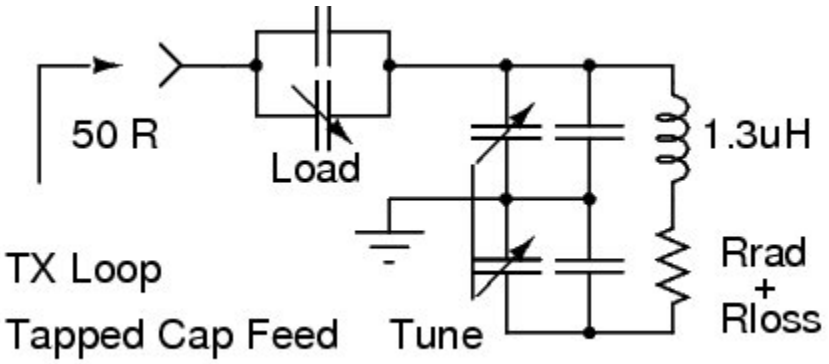
Several months ago I was walking home from the post office, nearing my place I saw it was "clean-up week", the curb dotted with various piles of junk people had put out to be disposed off by the council pickup. The pile outside my block of units had mostly busted furniture, but one item caught my eye, an Aluminum bicycle rim. I dug it out and took a closer look. The spokes and hub were all rust-pitted chromed steel, and physically it was for a child's bike, only around 580 mm in diameter, but the Aluminum itself looked to be in good shape. Antenna was the immediate thought, so I carried it back to the shack.

The spokes and hub where removed and discarded. The rim had a join where steel pegs had been inserted into cylindrical openings in the extrusion and epoxy used to close and secure the join, forming the round shape. I used a cut-off wheel on the rotary tool to cut through the join, breaking the rim so I might measure and feed it.

Experiments

The rim is roughly 1.3 uH of inductance. This is a good fit with the "ring" inductor formula. I experimented with the loop of metal for some months before I finally settled on making it into an antenna for 20 meters. The efficiency is fairly poor on 40 meters and even somewhat marginal on 20, but on the higher bands it is an exceptional antenna. I even tuned it up on 11 meter CB and listened around, hearing not much but some Asian fishermen and the usual brain dead 27.355 MHz crowd. It is self-resonant near 6 meters (distributed capacitance about 8 pF) and is therefore limited to upper-HF, roughly 30-10 meters.

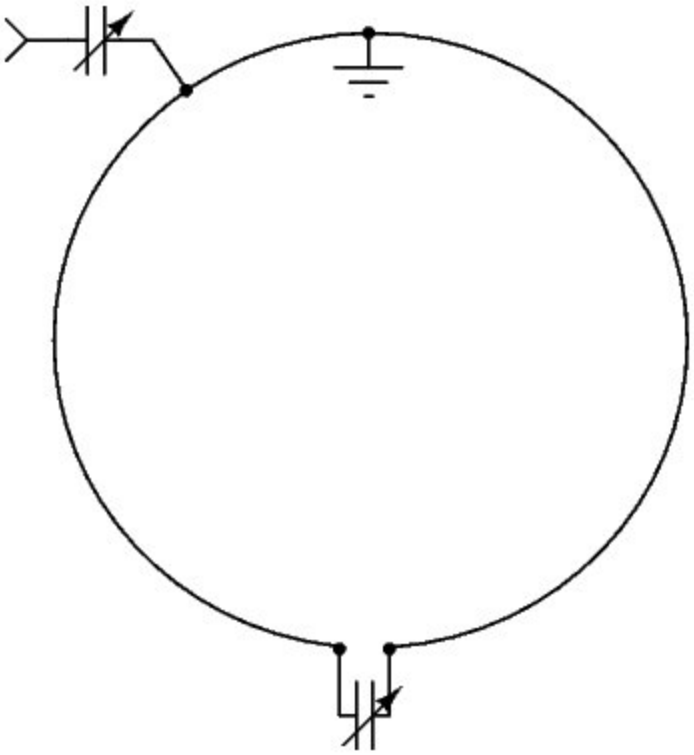
For its life on 20 meters I chose the more electrically straight forward and tunable taped-capacitance feeding arrangement. The disadvantage of this arrangement is that it is a bit more difficult to tune, as the match and tune capacitances affect each other, but some iteration finds a good match quite quickly.



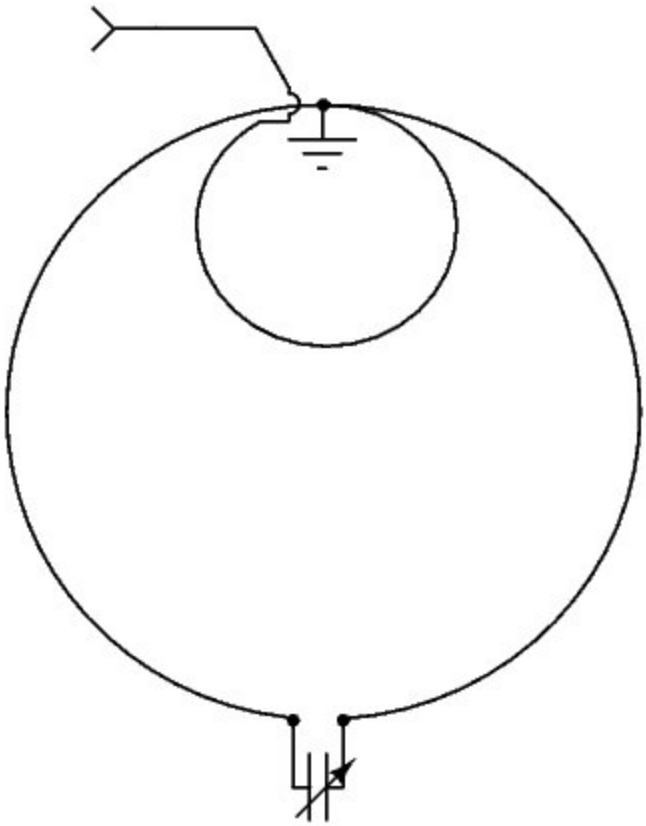
I did experiment with small coupling loop and gamma matching. Both work just fine but are a bit fiddly if you want to change bands a lot. Small driven loop has the advantage that you can twist the coupling loop with respect to the resonated loop to adjust the matching, and can pass the coax feed right through the main loop at its nodal-point where it has a voltage minimum. The rim had a hole directly opposite the join where the tire valve likely was placed, this allowed hanging the loop by its coaxial feed. While interesting experiments and valuable lessons for future experiments, I like the tune/match capacitor coupling I ended up with.

Alternative Loop Feeds

Gamma Match

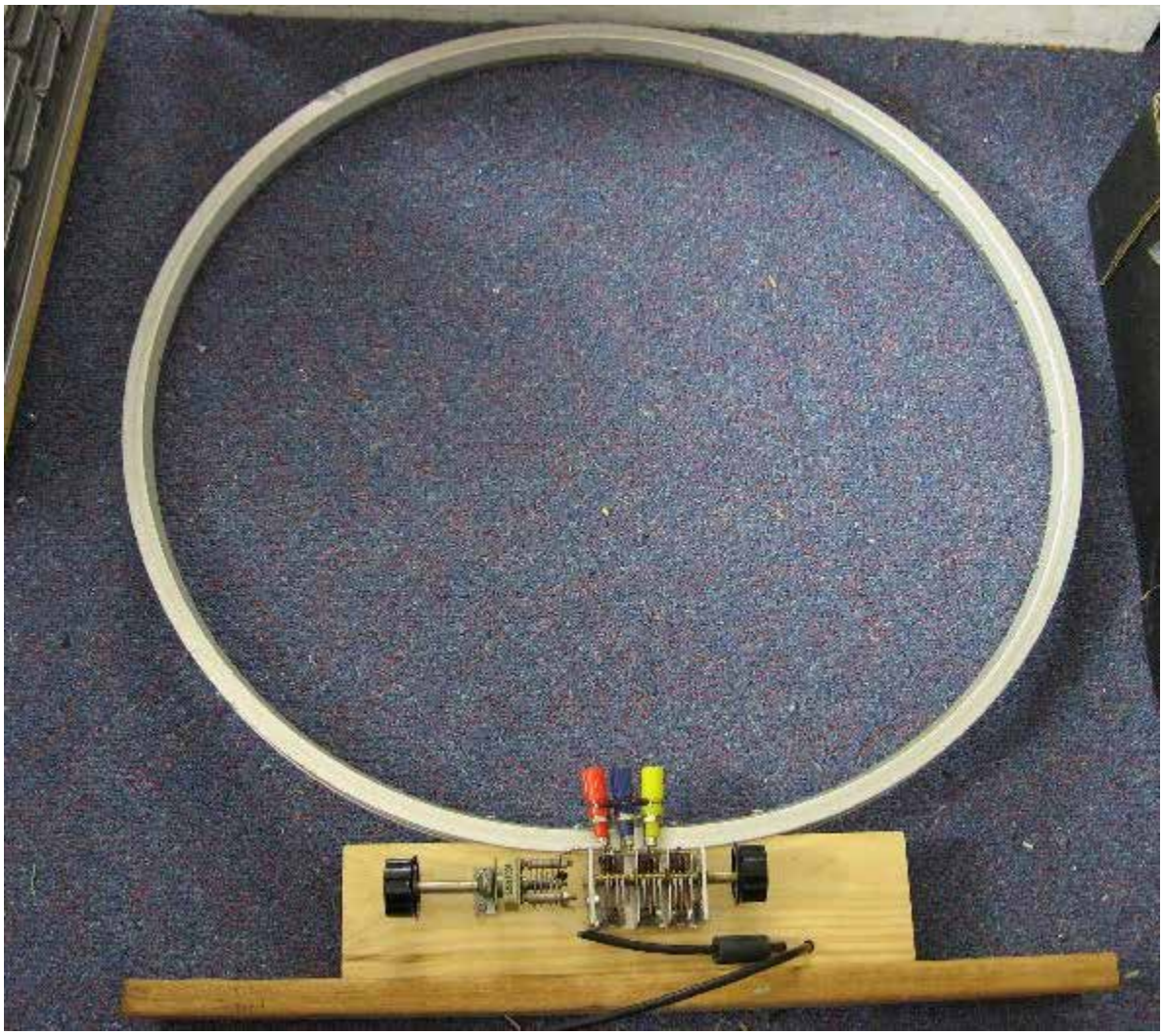


Coupling Loop



Construction

The loop was screwed to a piece of timber (a poor insulator unfortunately) as a base. The tuning and matching capacitors were screwed to the timber base as well and the coaxial feed fed though some holes in the timber as strain relief. The tuning gang was used in “split-stator” mode to reduce losses, leaving it with a capacitance range of about 20 pF. Some binding posts were used to allow different silver-mica transmitting capacitors to be put across the loop to shift bands.



Two 160 pF capacitors are used for 20 meters, giving an equivalent capacitance of 80 pF. The loop tunes about 13.9 to 14.6 MHz, and the 2:1 VSWR bandwidth exceeds this.

The matching capacitor is a fixed 18 pF in parallel with a 10 pF trimmer. This value was determined experimentally with a signal generator, mini C-jig, and return loss bridge as the best arrangement for matching the loop over the frequency range of interest without excessive touchiness in the tuning.

Notes

Power handling is limited by the capacitors. The Silver-Mica caps used are rated to only 200 Volts, but for my current QRP use this isn't a problem. Efficiency if affected a little bit by using binding posts instead of soldered connections for the capacitors as well. I'll probably solder the caps in place permanently once I settle on them, but I am hoping to find higher voltage ones on eBay first.

The connection to the Aluminum of the rim is made with nickel plated hardware, thick copper wire and lots of star washers, etc. Ideally it should be spot-welded, as should all the rotor plates in the capacitor to the shaft and the stator to their connections. The stator plates are copper, I've never seen a capacitor quite like this one before, it would be possible to solder them together to reduce the losses. The rotor plates are Aluminum, the shaft brass, which presents more of a problem. The shaft has an inbuilt coaxial reduction drive with a 1/8" shaft that comes out of the middle of the 1/4" one. I'm having problems finding a suitable knob.

A ferrite suppression bead was slipped over the coax feed-line near the feed-point to reduce a slight interaction with the coax position/body capacitance upon return-loss seen while experimenting.

Credit: http://www.vk2zay.net/article/158

MEMBERSHIP APPLICATION

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License: Novice Technician General Advanced Extra

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How did you get interested in Ham Radio?

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