THE eQRM

The BVARA in Beaver County Pennsylvania

February 2016

THE eQRM

On the Cover : This is a wonderful evening picture of the Beaver River as it empties into the Ohio River. (From the Monaca side of the Ohio River) The picture was found on Yahoo images. Spirng is on the way, Summer nights will soon be here. I can't wait!

CHECK IN TO THE NETS

Wednesday 2 Meter

8:30PM on 145.310 MHz pl 131.8

Wednesday 10 Meter

9:00PM on 28.470 MHz

Bulletins

Hamfests & General Announcements

What do you mean no local Hamfest this month ?

The good news is there will be a local hamfest in April.

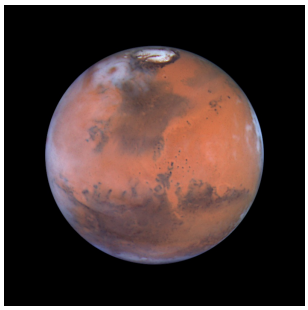
TWO RIVERS AMATEUR RADIO CLUB INC. W3OC McKEESPORT, PA.

Sunday Apri 24, 2016 8am - 2pm

This Month

BVARA Club feature presentation:

This Month's Speaker :
Rich Soltesz K3SOM

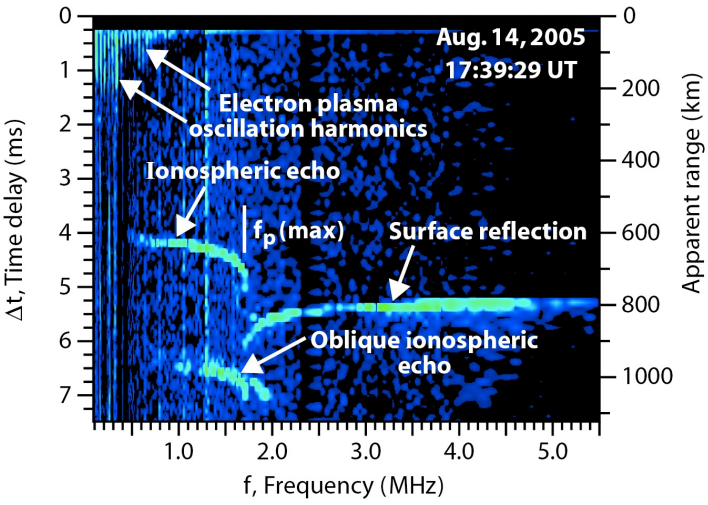


Topic :
Radio Propagation on Mars

Including:
Continuing with our BVARA Presentation Series this year, with the help of our 'Time Machine', our topic this month takes us on a trip to the near future at a time when colonies have been established on the surface of Mars. Our adventure begins with the recent history of scientific exploration of our planetary neighbor and a comparison of similarities with and deviations from Earth.

We'll examine the ionosphere around Mars together with recent measurements that will give us insight into high frequency propagation from point to point on the surface of the planet. Given the distances involved between our two planets, we'll also explore path losses, time delays, and other factors that make individual DXing back to Earth nearly impossible without 'borrowing' Deep Space communications equipment for personal use.

But wait, there's more! Given our unique circumstances, if we are in charge of ham radio guidelines on Mars, several interesting scenarios present themselves. Global contests, WAC (Worked All Colonies) awards, ham band allocations, call signs and prefixes, and other topics begin to present themselves. What about putting a repeater on each of the moons of Mars? One of them appears to travel from East to West in the sky while the other moon moves from West to East to a surface observer. "Woo-Who!" This is one exciting presentation you won't want to miss!



Rich's Background:
Extra Class Ham, Licensed since 1962, VE,
B.S. Electrical Engineering

More this Month

VE TEST SESSIONS

Beaver County Emergency Services Center

351 14th Street
Ambridge, PA 15003

Tests begin promptly at 5 pm, March 10, 2016.

All classes of amateur radio license tests are administered.

ALL candidates MUST bring ALL of the following:

1. 2 forms of I.D. - one MUST be a photo I.D.
2. A pencil AND a pen with blue or black ink.
3. The original AND a photocopy of any valid ham license.
4. The original AND a photocopy of any C.S.C.E.
5. The test fee of $15 - cash, check, or money order.

For more information, contact :
Rich Soltesz, K3SOM
(724) 847-0610
k3som@arrl.net

WEEKLY

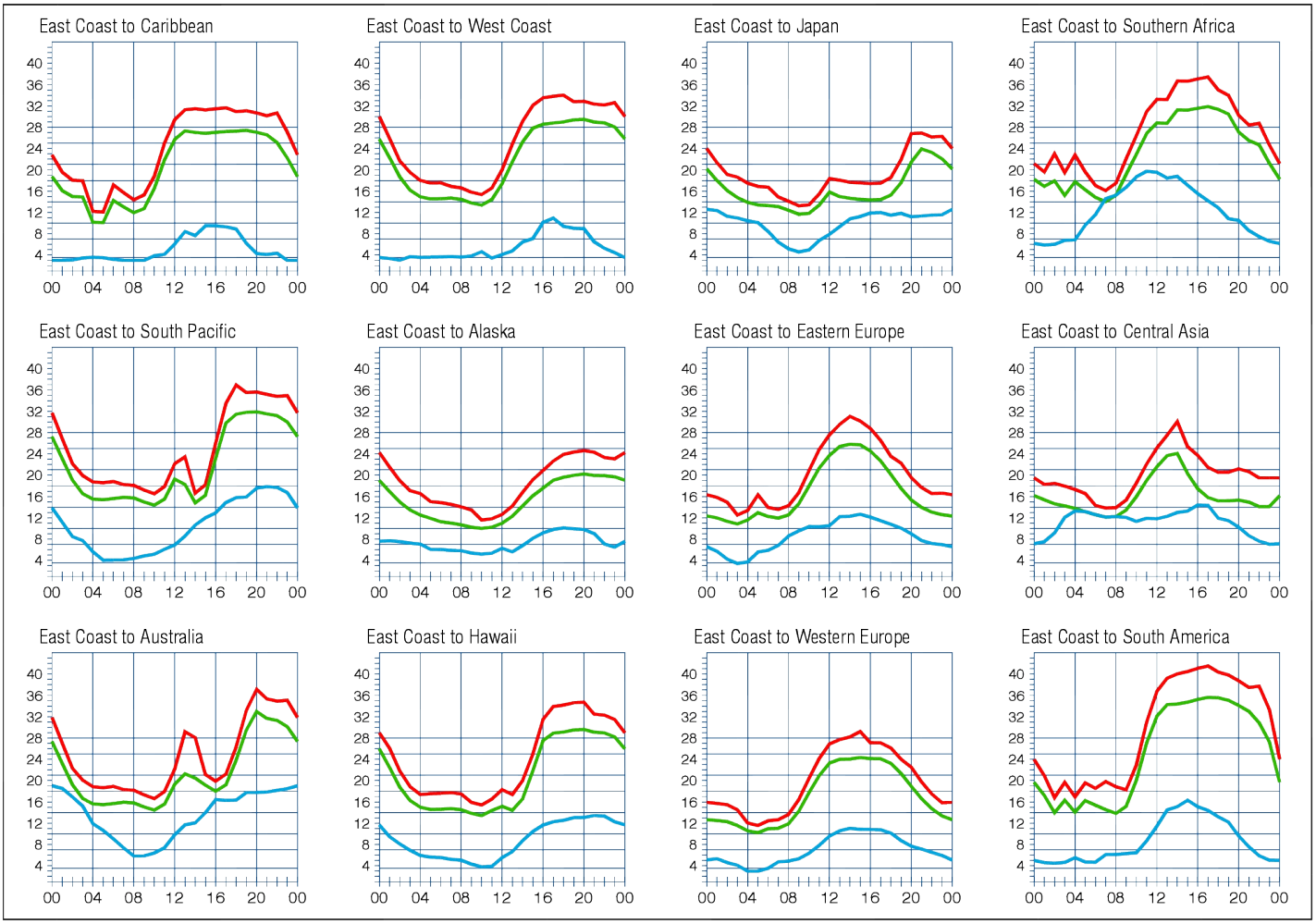
Thursday Morning Breakfast

The BVARA meets every Thursday at Steak 'n Shake in Center Township, by the Beaver Valley Mall, at 10:00 AM. All radio amateurs are encouraged to come join us at our

See you Thursday at

Propagation Charts

From the ARRL



When are the bands open? These charts, generated using CAPman, show probabilities for average propagation in the Month of March. On 10% of the days of this period, the highest frequencies propagated will be at least as high as the upper red curves (HPF, highest possible frequency) and on 50% of the days they will be at least as high as the green curves (MUF, classical maximum usable frequency). The blue curves show the lowest usable frequency (LUF) for a 1500-W CW transmitter. For SSB or a lower power transmitter, the LUF will be somewhat higher than the blue curves indicate. The horizontal axes show Coordinated Universal Time (UTC) and the vertical axes frequency in MHz. These predictions assume an observed 2800-MHz solar flux value of 113.

PROPAGATION

The East Coast propagation chart listed above is for March 2016.
If you would like more information on how to read these charts, or for more information on propagation in general, please visit http://arrl.org/propagation

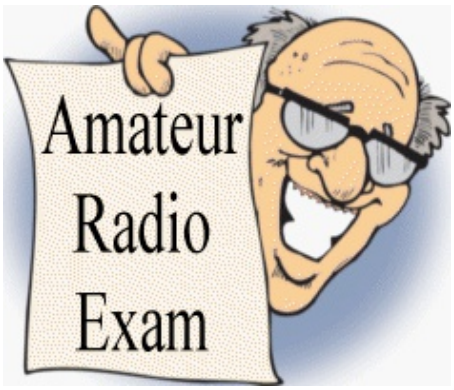
RACES / ARES

eQRM Urges All County Hams to Participate

As a matter of editorial opinion, the eQRM urges all Beaver County licensed amateurs to participate in the County's RACES and ARES programs.

Any Beaver County Amateur that is interested in participating in the RACES/ARES programs can do so by checking into the Beaver County Public Service Net which meets every Monday evening at 8:30 PM local time on the N3TN 146.850 MHz repeater (131.8 PL)

New License and Upgrades BVARA VE Testing



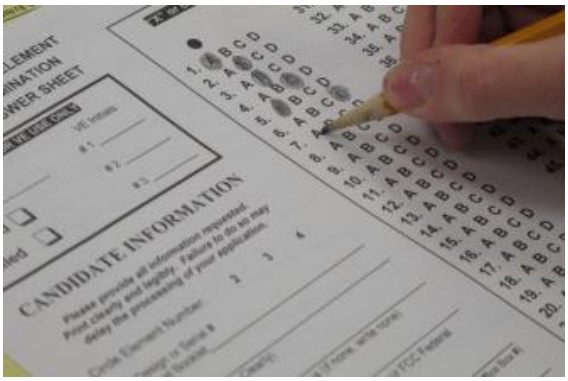
Congratulations!

On Feb 11th, 2016 six people were tested for Ham Radio licenses. Five of the six were successful.

John Cencich - K8JQO from Eighty Four, PA passed his General Class Exam.

Four students from Carnegie Mellon University took their Technician Class Exams and were successful.

Neal S. Bhasid, Pittsburgh PA - KC3GLD
Daniel L Arnett, Butler PA - KC3GLE
Paul Pan, Pittsburgh, PA - KC3GLF
Ashrith Balakumar, Pittsburgh PA - KC3GLG



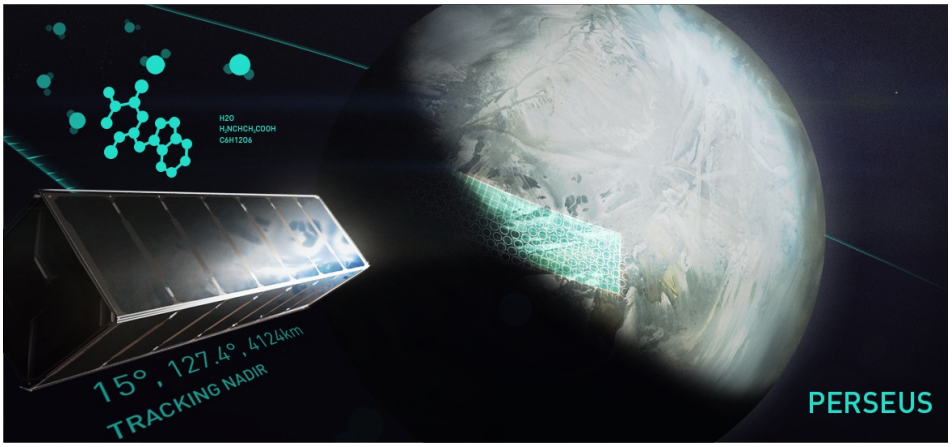
Something interesting about the new licensees

Five students from Carnegie Mellon University took their Technician Class Exams. Four of the five were successful and included:

Neal S. Bhasid, Pittsburgh PA - KC3GLD
Daniel L Arnett, Butler PA - KC3GLE
Paul Pan, Pittsburgh, PA - KC3GLF
Ashrith Balakumar, Pittsburgh PA - KC3GLG

Each student has a different major, Ashrith was asked why they were all interested in obtaining their ham radio license. His response:

"We are part of the Planetary Robotics Institute at Carnegie Mellon University led by Prof. Red Whittaker. Within that, we are a group of all undergraduates trying to pursue the ultimate goal of sending a Cubesat called "PERSEUS" into low earth orbit. PERSEUS will autonomously determine its own orbit without external aid such as GPS, by utilizing cameras and computer vision. This technology aims to allow navigation of small, cheap satellites on other planets.



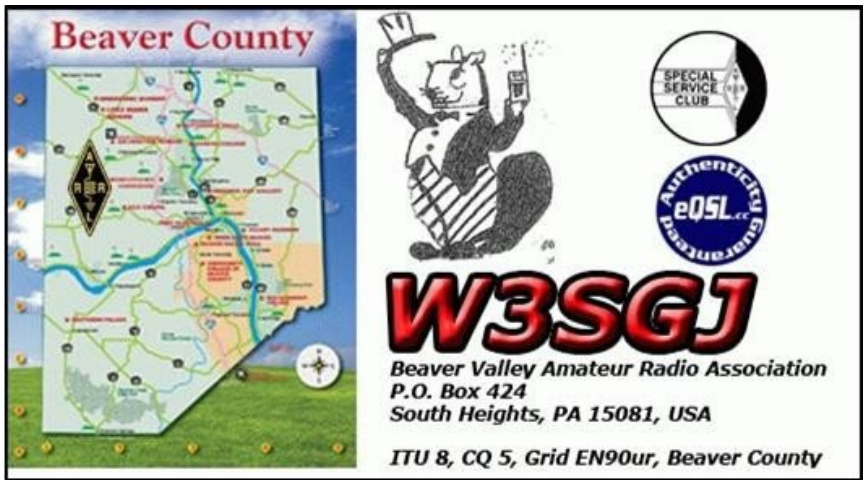
As a first test of this, we will be flying a high altitude balloon as an analog to a satellite. During the March and April time frame we will be launching a series of balloons to approximately 100,000 ft. We will be using APRS radio to track our balloon, hence the need for our technician license.

I hope this gives you a high level look at our project, let me know if you have any questions. I will give you heads up to when we are launching our balloon (using my call sign) so you guys can track it."

It seems like there is never a dull moment with this hobby!

Who We Are

Membership Information and Club Officers



2015 BVARA OFFICERS

President: Jack Spencer, KZ3Z
Vice President: Dick Hanna, K3VYY
2nd Vice Pres.: Rob Miller, N3OJL
Treasurer: Pam Spencer, W3PMS
Secretary: Norm Trunick, K3NJT
Director: Bob Winkle, N3AZZ
Director: Bob Croft, KB3RHN
Trustee: Rich Soltesz, K3SOM

MONTHLY MEETINGS

E-Board meetings are now held the Saturday before the monthly club meeting.

VE testing begins at 5:00.

Regular meetings are at 6:30.

All meetings are held at
Beaver County
Emergency Services Center
351 14th Street
Ambridge, PA 15003
on the second Thursday of every month (unless otherwise stated).

MEETING DATES 2016

Mar 10
Apr 14
May 12
Jun 09
Jul 14
Aug no meeting
Corn Roast Aug 20th
Sep 08
Oct 13
Nov 10
Dec no meeting
Christmas Party (TBA)

Membership Information

By becoming a Member of the BVARA, You can help secure the future of Amateur Radio in Beaver County. Additionally, the BVARA receives a portion of each ARRL Membership you purchase!

Join the BVARA and ARRL

Sign up for:	Price	Quantity	
☐ BVARA FULL MEMBERSHIP	20.00	_____	
☐ BVARA STUDENT MEMBERSHIP	15.00	_____	
☐ BVARA ASSOSIATE MEMBERSHIP	10.00	_____	
☐ CHILD UNDER 21 IN HOME	5.00	_____	
☐ ONE YEAR ARRL MEMBERSHIP	49.00	_____	* ARRL driven increase
	DONATION	_____	
ARRL MEMBER ? YES NO	TOTAL	_____	

Your license class (If you have one)

☐ Technician
☐ General
☐ Advanced
☐ Extra

Name _____

Address _____

_____

Email _____

Phone _____

Your Call sign _____ Exp.date_____

Your Signature _____

Make check or money order payable to:
The Beaver Valley Amateur Radio Association, P.O. Box 424
South Heights, Pa 15081

Troubleshooting Your Radio Equipment

NEW HAM COMPANION

By Harry Ricker, KC3MX
34 Cross Ridge Court
Germantown, MD 20874

You awake one Saturday morning, eager to check into your favorite net. But when you turn on the radio, nothing happens. This is the moment that all hams dread. Your equipment doesn't work, and you have visions of expensive repair bills and several weeks or months off the air. You desperately hope that nothing serious is wrong. But, remembering that terrific thunderstorm last Thursday evening, it becomes clear that your radio has been hit by lightning. All those sensitive integrated circuits must be blown up. "Great," you think. "I can't hear anything even with the volume turned all the way up. My receiver is blown for sure."

When this happened to me, I was certain that my $1000 solid-state radio was badly damaged. However, by using basic troubleshooting methods, I determined that the problem was a short in the microphone connector that had locked the radio in transmit mode. The problem was easily fixed at no cost!

Something like this is going to happen to you. It's inevitable. When it does, you need to apply sound principles of equipment troubleshooting before you decide to turn your rig over to a radio shop. Most equipment problems are caused by operator error, and defective cables and connectors. When equipment is sent to the shop for repair, the technician may not be able to fix it *because the failure was not in the equipment.*

At the first sign of trouble, do the following:

❑ Check the positions of all the operating controls.

❑ Check all of the mode indications and verify the mode.

❑ Check all the cables and connections of your equipment.

Eliminate the Operator First

Most problems can be easily solved by examining the controls. For example, you turn on your radio, but don't hear audio. Check the audio-gain control. Is it turned down? Is the squelch turned up so that the audio output is muted? Don't laugh! When this happened to me the first time, I was stumped—until I took a look at the squelch setting.

Another common operator error involves transmitting CW with the transceiver set to the *SSB* mode. When you try to transmit, nothing happens. This problem is easily identified by referring to the mode indicator. Sometimes, the source of this problem is not obvious. For example, some radios have a *control-lock* button that disables the front panel controls. If this button is pressed by mistake, the radio appears to be unresponsive to any commands—because it *is*!

When checking your control settings, be sure to include your cables and accessories. Suppose you turn on your transceiver and tune across the band without hearing a single signal. Is the band dead? Tuning to another band, you discover that it's dead also. This makes you suspicious, and you begin to think that your receiver has failed. Well, maybe not.

Troubleshooting your radio equipment is easier than you think. If you follow these troubleshooting techniques, you'll be able to solve most problems yourself without the cost of expensive repairs.

First, verify that the antenna is connected. If this doesn't reveal the problem, check all your cables and connectors to make sure they're hooked up correctly. If you have an antenna switch, is it in the correct position? If you have an antenna tuner, check to see that it's tuned to the correct band. A tuner acts like a filter. If your transceiver is tuned to 10 meters, but your tuner is set for 80 meters, your tuner attenuates the 10-meter signals. Finally, be sure to check the attenuator setting on your rig. I operated during a contest once with my 20-dB attenuator switched on. I couldn't understand why the band conditions were so poor. By the time I discovered my error, the contest was over!

When operating VHF FM via a repeater, verify that your controls are set properly before transmitting. If you fail to access a repeater when using an H-T, low battery voltage may be the culprit. (Most H-Ts provide a low-battery indicator. Check this first.) If the repeater requires a CTCSS tone to activate, is your CTCSS function switched on? Is the correct tone selected? Make sure the repeater offset is set to the proper value. This is a *very* common problem. If the repeater is listening 600 kHz *below* the output frequency, you can't activate it with your offset switched to 600 kHz *above*!

Always Check Your Cables and Connectors

Seasoned hams know that the most failures occur in the cable and connectors. Connectors are especially vulnerable because they're constantly being connected and disconnected. The first step after verifying your control settings is to check that the connectors are screwed in tightly. When you encounter a high SWR or a low output-power indication, look for a loose connector first.

After you have checked for loose connectors, look for *shorted* or *opened* cables. Shorts are often caused by poorly soldered connectors or crushed cables. Open cables are usually caused by broken wires at the connector. Use a VOM (volt-ohm meter) to check your cables. Disconnect both ends of the cable and remove it from the equipment. (Don't assume that the cable is not connected to a short circuit. Remove the cable.) Switch the meter to the resistance scale (2000 ohms full-scale or less) and measure the resistance between the center pin of the coaxial connector and the shield. If a short circuit is present, the resistance will be nearly zero (see Fig 1).

If the cable isn't shorted, you're not out of the woods yet. You need to check for an opened cable. Connect your VOM between the center pins of both connectors. Then connect your VOM between the outer shells of both connectors. The resistance should be zero in both cases. If it isn't, you have a break in the cable.

If you've followed all these steps and you still haven't discovered the problem, it's time to get out your equipment manual and review the troubleshooting section. This section gives possible causes for common symptoms. It is important that you read and study it before you decide to open up your radio.

Use All Your Senses

Don't be deterred by the difficulty of performing repairs on your own equipment. Some problems that seem impossible to solve turn out to be simple to fix. When the

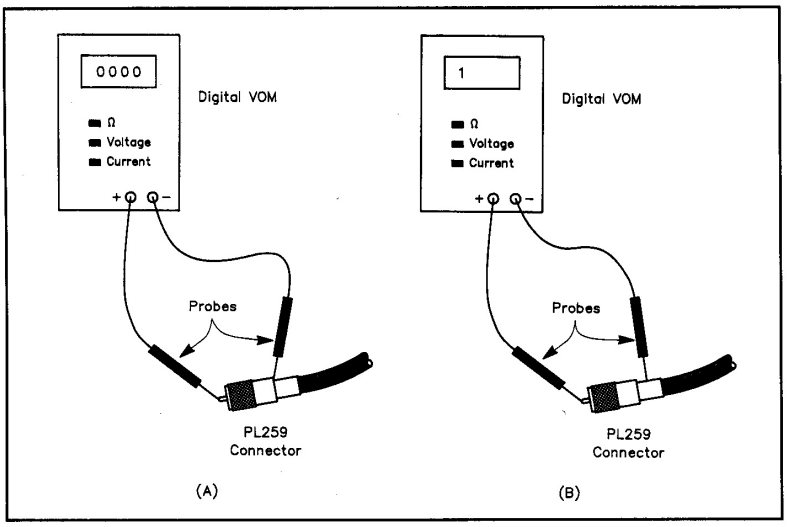


Fig 1—A volt-ohm meter (VOM) can be used to check for defective cables. A reading of zero resistance indicates a short (A). An infinite resistance reading indicates an open circuit (B). With this particular meter, a 1 on the far left side of the display indicates infinite resistance. When measuring from the center conductor to the shield, a good coaxial cable should show infinite resistance (open). If the meter indicates a short, check the connector.

controls of my 2-meter hand-held stopped working, I was prepared for an expensive repair bill. The radio failed to respond to the controls. I couldn't enter frequency or change the mode. Surely the microprocessor had failed.

I opened the radio to determine if I could replace the chip. While inspecting the circuit board, I noticed that a small metallic particle was shorting two of the printed circuit traces. When I removed it, the radio worked perfectly!

The moral of the story is: Carefully inspect your radio. After you open the case, look for short circuits, loose or broken connections, and burned components. Smell is as important as sight. Smell your radio for burned components. Look for burned spots or evidence of arcing. Take your time. You never know what you may find.

To Fix or Not to Fix

Once you've completed your inspection, you need to decide whether to take your radio to a repair shop. At this stage you should read the troubleshooting section of the *ARRL Handbook*. It will give you ideas on how to troubleshoot your equipment. Call the manufacturer's service department or a repair shop that specializes in your brand of radio and see if they have a simple cure. Some problems can be diagnosed over the phone! Ask if this is a problem that occurs frequently because of a design deficiency in the transceiver. If the technician thinks that the problem can be fixed, be sure to get a cost estimate. As an additional precaution, get a second opinion. Call another repair shop and compare the results of the two estimates.

After you obtain the repair estimates, consider the following: Were the technicians confident that the problem could be fixed for a reasonable cost? Were the technicians familiar with a similar problem that they had successfully repaired? Finally, consider if the problem is something simple that you can fix yourself. If the repair estimate is high, consider troubleshooting it yourself—at least to the point where you can verify that the problem is not a simple, low-cost repair. But if you don't have a good grasp of electronics, and you don't know someone who does, send the radio to the shop.

Three Ironies of Troubleshooting

Troubleshooting is a process of eliminating the possible failures, one-by-one. It is ironic because, most of the time, the culprit is not what you expect.

The First Irony: Whenever you are absolutely certain that you have correctly guessed the cause of a failure, you will be wrong.

This is my primary rule for troubleshooting. When you've deduced the cause of failure, you also need to think about the cost of being wrong!

The Second Irony: Whenever you believe that an expensive, hard-to-find component is the cause of your failure, you will be wrong.

In other words, you should check and replace the inexpensive components *first*, before you attempt to replace the expensive parts.

The Third Irony: The amount of effort required to replace a component is inversely proportional to the probability that it has failed.

Putting it another way, don't go after the hard-to-replace components until you eliminate all other possibilities.

If you decide to fix the equipment yourself, make the simple, low-cost repairs first and the high-cost repairs last. For example, if your tube-type radio has low output power, it's reasonable to suspect the final amplifier tubes. Don't rush to buy new ones, though. Arrange to have a friend lend you his tubes and see if that fixes the problem. Check the suspect tubes on a tube tester. Be sure to check the driver tube, too. Once you've *verified* that you need new tubes, *then* it's time to get out your checkbook.

Clear Thinking is Important

It is very easy to get into trouble when attempting to repair your own equipment. *Clear thinking is the most important troubleshooting tool you have.* Don't hurry to fix the problem. This is always disastrous. Hurry causes panic, which prevents clear thinking. Before you dig into the problem, plan a course of action. Read your equipment manual and the troubleshooting section of the *ARRL Handbook* to refresh your memory. The following story shows how panic can magnify a small problem into a big problem.

I connected my 2-meter all-mode transceiver to a power supply with the wrong polarity. Of course, the radio didn't work. Discovering my mistake, I corrected the polarity, but the radio still didn't work. Swearing at myself for gross stupidity, I was sure that I had destroyed my expensive radio. Panic and anxiety took over. I desperately needed to fix the problem.

I visually checked the fuse, and it looked good. Because I was in a panic, I proceeded to make a series of blunders. Opening up the case, I began looking for damaged components. Using my VOM, I discovered a short circuit between the power supply terminals of the radio. I tried to test the power supply protection diode. It indicated a short to ground. Convinced that the diode was bad, I attempted to remove it from the circuit. During this process I broke the diode. After an hour I managed to remove the broken diode and install a replacement. I reconnected the radio and it *still* didn't work!

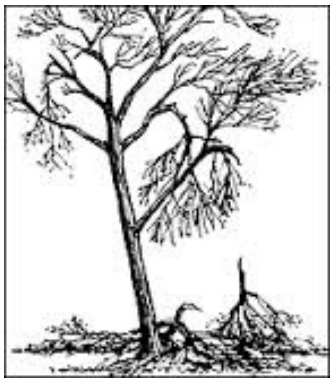
I had missed something, but what? Stopping to think for the first time, I decided to recheck the fuse. It was bad! Even though the fuse *looked* good, a resistance check with my VOM showed an open circuit. The broken fuse wire was hidden by the cap at the end of the fuse. A new fuse solved the problem.

The problem was simple—a blown fuse. I violated my own troubleshooting rules by thinking that the failure was in the radio—and I was wrong. However, my primary error was not stopping to think clearly. I just assumed that the fuse was good because it *looked* good! But, panic clouded my judgment and I magnified a simple blown fuse into a major repair operation.

Harry Ricker, KC3MX, became a ham at age 15. Amateur Radio was the inspiration that led to an electrical engineering career in satellite communications. Harry holds an Extra Class license and is an active operator on HF QRP and 6 meters. He teaches Amateur Radio license classes sponsored by the Montgomery Country Amateur Radio Club. QST

Bits and Pieces

Please keep safety in mind before every warm weather task you get involved with.



The winter here in Beaver County has been very mild. February had the coldest temperatures so far this winter. Did you get your indoor winter projects completed? Better hurry. Temperatures for the second week of March are forecast to be in the seventies. The other night we had powerful winds as a cold front came through. I had many branches fall. Some of those limbs were quite large! I was rather surprised that the plastic guard on my pole mounted outside light was torn off by these powerful winds. I feel lucky that none of my radio related equipment suffered damage.

No matter how small the task, plan ahead, think safety. With the winter weather beginning to break, our radio interests turn to outdoor rotor inspection, tower inspections, inspection of other antenna supports, antenna inspection, antenna repair or replacement, coax repair, grounding inspection and more. As we start our many warm weather activities think about the safest way to go about it.

As always my motto

is...

Safety! Safety!Safety!

photos from

Google images

Contest Corral — March 2016

Check for updates and a downloadable PDF version online at **www.arrl.org/contests**.

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	1900	1	2100	3.5	AGCW YL-CW Party	CW	RST, serial, name	www.agcw.org
2	2000	2	2100	3.5	UKEICC 80 Meter Contest	Ph	4-Character grid square	www.ukeicc.com/which-contest
5	0000	6	2359	1.8-28	ARRL International DX Contest, SSB	Ph	W/VE: RS, SP. Non-W/VE: RS, power	www.arrl.org/arrl-dx
5	0600	5	0800	7-14	Wake-Up! QRP Sprint	CW	RST, serial, suffix of previous QSO	qrp.ru/contest/wakeup/333-wakeup-eng
5	1800	6	1359	1.8-28	Open Ukraine RTTY Championship	Dig	Region (S/P/canton, etc), serial	uarl.com.ua/openrtty/2015-rules/rtty2015e.txt
6	0700	6	1100	3.5	UBA Spring Contest, CW	CW	RST, serial, UBA section (if any)	uba.be/hf/contest-rules/spring-contest
6	1100	6	1700	28	DARC 10-Meter Digital Contest	Dig	RST, serial	www.darc.de
6	1200	6	1400	7	SARL 40 Meter Simulated Emergency	Ph	RS, serial	www.sarl.org.za
7	2000	7	2130	3.5	RSGB 80 Meter Club Championship, Data	Dig	RST, serial	www.rsgbcc.org/hf
8	0200	8	0400	3.5-28	ARS Spartan Sprint	CW	RST, SPC, power	arsqrp.blogspot.com/
9	2300	13	2300	7-14	AWA John Rollins Memorial DX Test	CW	RST, eqpt type, eqpt year	www.antiquewireless.org
12	0800	12	1359	3.5-28	Nauryz DX Contest	CW Ph	RS(T), oblast or ITU zone	www.nauryz-dx-contest.com
12	1000	13	1000	3.5-28	RSGB Commonwealth Contest	CW	RST, serial	www.rsgbcc.org/hf
12	1200	13	1200	28	South America 10 Meter Contest	CW Ph	RS(T), CQ zone	sa10m.com.ar/cqsa10m_rules.html
12	1200	13	2359	1.8-50	SKCC Weekend Sprintathon	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
12	1400	12	2000	3.5-28	AGCW QRP Contest	CW	RST, serial, power, mbr or "NM"	www.agcw.org
12	1400	13	2000	3.5-50	Oklahoma QSO Party	CW Ph Dig	RS(T), county or SPC	k5cm.com/okqp2016rules.pdf
12	1500	13	1500	1.8	Stew Perry Topband Challenge	CW	4-character grid square	www.kkn.net/stew
12	1600	13	1600	3.5-28	EA PSK63 Contest	Dig	RSQ, province code or serial	concursos.ure.es/en/eapsk63/bases
12	1800	13	0759	3.5	Tesla Memorial HF CW Contest	CW	RST, serial, 4-character grid square	radiosport.org.rs/HFTeslaMemorial
12	1800	13	1800	1.8-50	QCWA QSO Party	CW Ph Dig	Yr licensed, name, SPC or QCWA chptr	qcwa.org/2016-qso-party-rules.pdf
12	1900	13	1900	1.8-28	Idaho QSO Party	CW Ph Dig	RS(T), county or SPC	idahoncj.info/qsoparty/rules.htm
13	0000	13	0400	3.5-14	North American Sprint, RTTY	Dig	Other's call, your call, serial, name, SPC	ncjweb.com/Sprint-Rules.pdf
13	0000	13	0400	3.5-14	North American SSB Sprint Contest	Ph	Other's call, your call, serial, name, SPC	ssbsprint.com/rules
13	0700	13	1100	144	UBA Spring Contest, 2 Meter	CW Ph	RS(T), serial, UBA section (if any)	uba.be/hf/contest-rules/spring-contest
13	1200	13	2200	3.5	NSARA Contest	CW Ph Dig	RS(T), Nova Scotia county (if any)	nsara.ve1cfy.net/?page_id=82
13	1800	14	0100	All	Wisconsin QSO Party	CW Ph Dig	County or SPC	www.warac.org/wqp/wqp.htm
13	1800	13	2200	3.5	WAB 3.5 MHz Phone	Ph	RS, serial, WAB square or country	wab.intermip.net/Contests.php
14	1800	14	2059	3.5-7	Bucharest Contest	CW Ph Dig	RS(T), serial, YO sector or country	yo3test201x.blogspot.ro/p/blog-page.html
15	1700	20	1700	3.5-28, 144	CLARA Chatter Party	CW Ph	RS(T), name, SPC	www.clarayl.ca
16	2000	16	2130	3.5	RSGB 80 Meter Club Championship, CW	CW	RST, serial	www.rsgbcc.org/hf
17	0030	17	0230	3.5-14	NAQCC CW Sprint	CW	RST, SPC, mbr or power	naqcc.info/sprint201602.html
19	0200	21	0200	3.5-28	BARTG HF RTTY Contest	Dig	RST, serial, 4-digit UTC time	www.bartg.org.uk
19	1000	20	1000	VHF-UHF	SARL VHF/UHF Analog/Digital Contest	CW Ph Dig	RS(T), 6-character grid locator	www.sarl.org.za
19	1200	20	1200	3.5-28, 144	F9AA Cup, SSB	Ph	RS, serial, license, country or F dept	www.site.urc.asso.fr
19	1200	20	1200	1.8-28	Russian DX Contest	CW Ph	RS(T), 2-ch oblast or serial	rdxc.org/asp/pages/rulesg.asp
19	1400	20	0200	1.8-144	Louisiana QSO Party	CW Ph Dig	RS(T), parish or SPC	laqp.louisianacontestclub.org
19	1400	19	1800	144, 432	AGCW VHF/UHF Contest	CW	RST, serial, power, 6-ch grid locator	www.agcw.org
19	1400	20	2359	All	Virginia QSO Party	CW Ph Dig	Serial, county or SPC	www.qsl.net/sterling/VA_QSO_Party
19	1700	19	1859	1.8-28	Feld Hell Sprint	Dig	RST, mbr, SPC, grid	sites.google.com/site/feldhellclub
20	0700	20	1100	3.5	UBA Spring Contest, SSB	Ph	RS, serial, UBA section (if any)	uba.be/hf/contest-rules/spring-contest
21	0100	21	0300	1.8-28	Run for the Bacon QRP Contest	CW	RST, SPC, mbr or power	fpqrp.org/pigrun
23	0000	23	0200	1.8-28	SKCC Sprint	CW	RST, SPC, name, mbr or power	www.skccgroup.com
24	2000	24	2130	3.5	RSGB 80 Meter Club Championship, SSB	Ph	RS, serial	www.rsgbcc.org/hf
26	0000	26	2359	1.8-144	FOC QSO Party	CW	RST, name, mbr (if any)	g4foc.org/qsoparty
26	0000	27	2359	1.8-28	CQ WW WPX Contest, SSB	Ph	RS, serial	www.cqwpx.com/rules.htm
30	2000	30	2100	3.5	UKEICC 80 Meter Contest	CW	4-character grid square	www.ukeicc.com/which-contest

All dates refer to UTC and may be different from calendar dates in North America. Times given as AM or PM are local times and dates.
No contest activity occurs on the 60, 30, 17, and 12 meter bands. Mbr = Membership number. Serial = Sequential number of the contact. S/P/C = State, Province, DXCC Entity. XE = Mexican state. *Data for Contest Corral is maintained on the WA7BNM Contest Calendar at* ***www.hornucopia.com/contestcal*** *and is extracted for publication in* QST *2 months prior to the month of the contest. The ARRL gratefully acknowledges the support of Bruce Horn, WA7BNM, in providing this service.*
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.

Some Interesting Links

What do Ham operators do?
www.reddit.com/r/NoStupidQuestions/comments/2ovgx9/what_do_ham_radio_operators_do_just_talk_to_other/

KB6NU's Ham Radio Blog http://www.kb6nu.com/

65 Great Things About Ham Radio http://www.cq-amateur-radio.com/cq_great_things.html

Ham Radio forum, dipole troubleshooting http://www.hamradioforum.net/threads/6764-Dipole-antenna-problems

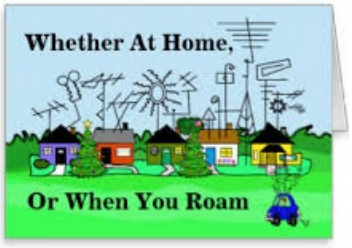
PL259, connectors, soldering http://www.k0bg.com/coax.html

Tuning your radio, antenna SWR http://www.hamuniverse.com/testingswr.html

Maker introduction to Ham Radio http://makezine.com/2015/06/30/a-makers-introduction-to-ham-radio/

Amateur Radio Newsline Report http://www.arnewsline.org/

Dr. Tamitha Skov Space Weather for Radio Amateurs http://spaceweather.tv/category/amateur-radio-resources/



The Amateur's Code

CONSIDERATE ...never knowingly operates in such a way as to lessen the pleasure of others.

LOYAL ...offers loyalty, encouragement and support to other amateurs, local clubs, and the American Radio Relay League, through which Amateur Radio in the United States is represented nationally and internationally.

PROGRESSIVE ...with knowledge abreast of science, a well-built and efficient station and operation above reproach.

FRIENDLY ...slow and patient operating when requested; friendly advice and counsel to the beginner; kindly assistance, cooperation and consideration for the interests of others. These are the hallmarks of the amateur spirit.

BALANCED ...radio is an avocation, never interfering with duties owed to family, job, school or community.

PATRIOTIC ...station and skill always ready for service to country and community.

Antenna Basics

Feeding the Beast—Transferring Radio Frequency Energy from Your Transmitter to Your Antenna

by Don Keith N4KC

It occurs to me that we will soon have an influx of relatively new operators to the HF amateur radio bands, newcomers who may or may not have experience with or knowledge of the compromises involved with building antenna systems. They may try to get by cheaply and quickly, just to get a taste of the new spectrum now available to them. And in the process, they may have a less than satisfying experience.

I won't attempt to even delve into the antennas themselves. There are myriad sources for information, including books like the ARRL Antenna Handbook and in discussion forums on sites like eHam.net and QRZ.com. An especially good discussion of simple antennas is available on the excellent website of L. E. Cebik, W4RNL, located here. Mr. Cebik also has an interesting three-part discussion of the popular G5RV antenna, which allows use on several amateur bands.

I would recommend to any newcomer that he or she learn along the way but keep it simple in the beginning. By all means, get an antenna up so you can be on the air, joining in on the fun! But for the time being, avoid phased arrays, delta loops, and exotic hunks of metal in the sky. For the moment, stick with dipoles, verticals, or simple loops. They are easier to play with and you might learn something from installing them. Remember, making mistakes is one of the most effective ways of learning, too. If you purchase commercially made antennas, be sure to follow the manufacturer's directions closely, including recommendations for properly getting the RF from your radio/amplifier to the antenna itself.

And that will be the subject of this article—the feeding of your antenna…getting as much radio-frequency energy from the transmitter to the antenna as possible, and trying to make sure as much of the precious RF is emitted into space so someone halfway around the world can hear you. There are several potential combinations of feed systems and matching units that are commonly used by amateurs. For our purposes, we will consider the following simpler and more typical ones:
--Coaxial cable with no matching unit except what might be internal to the transmitter
--Coaxial cable with an external outboard matching unit
--Open wire or ladder line with or without an external outboard matching unit

Wait, what is this "matching unit" stuff? You mean a "tuner?" Actually, an antenna tuner is a matching unit, and one quite often employed by hams, but there are other means and devices for matching rigs to antennas that are not "tuners." These devices are technically a part of the antenna system (so are the antenna, the dirt beneath it, the trees in the area, your kid's bicycle propped against your vertical, the mountain fifteen miles away, and the ionosphere miles above our heads, but we don't have control over most of that stuff). Matching units allow the operator to vary the capacitive and inductive reactance seen by the transmitter in

order to get a better "match," to allow as much of the radio frequency energy coming from the transmitter to be transferred to the antenna and into the air as possible.

Let's talk "matching" for a moment. Most transmitters and outboard amplifiers today are designed to work best when they are outputting radio frequency into an impedance of 50 ohms. The operator has very little control over the load impedance of the typical transistorized transceiver today, and not much more control over the output impedance matching of a common outboard amplifier. However, the impedance presented by different antenna systems at different frequencies can vary widely and the operator may need to dramatically vary the reactance values the transmitter encounters in order to try to get a better transfer of power to the feedline first, and possibly to the antenna itself. There are other matching devices, such as baluns ("balanced—unbalanced transformers"), mechanical devices like so-called gamma matches at the antenna feed point, and even relays that switch in and out all sorts of odd components in what is sometimes a Rube Goldberg-type setup. For the purpose of this article, let's consider the matching unit to be either an antenna matching device internal to your radio or a similar external device, either of which is typically called an "antenna tuner." (I quibble here because we are not actually "tuning" the antenna. We are attempting to get the output circuit of the transmitter into synch with the impedance of the feed line and/or the antenna and everything else that makes up the "antenna system.")

Antenna coax cable

Typical coaxial cable--an inner conductor, plastic dielectric, woven shield, and plastic covering.

Antenna coax connector

Screw-on coax connector, *PL259-type.*

Coaxial cable, or simply "coax," is a very popular means of getting radio frequency energy from transmitter to antenna. The more popular types are already designed to offer 50 ohms impedance (or relatively close), are easy to work with, can be run in close proximity to other cables, tower legs, or metal objects, and use simple connectors that can be securely attached to the transmitter and the antenna. Coax is a good choice for an antenna such as a dipole that is designed to be used on only one operating band (or odd multiple harmonics of that band). Such an antenna, properly constructed and cut close to the preferred operating frequency so as to be in reasonable resonance, will show impedance close enough to 50 ohms that your feedline and your transmitter output circuit will be happy and everything will be in harmony. The maximum amount of energy possible will be moved from transmitter to feed line to antenna and emitted into space.

But what about very broad amateur bands, like 75/80 meters, or those bands that require more antenna-per-hertz, like 160? It is asking a lot of a piece of wire and its feedline to be close to resonant across such a wide band. Even if the wire is cut for the middle of the band, it may be considerably out of resonance—offering impedance that is a long way removed from 50 ohms—when you try to use it at the extreme ends of the

band. This creates the phenomenon we call “standing waves.” Simply put, standing waves are currents that are reflected—due to a mismatch—back from the feed point of the antenna, returning back down the feedline toward the transmitter. SWR—or “standing wave ratio”—is a way of expressing the amount of your outgoing power that is getting reflected back down the feedline. (This is a rather simplistic description of a decidedly complicated thing that is going on, but I believe it is accurate and will suffice for this discussion.)

Let me state here that achieving a low SWR is not a bad thing, though it is not necessarily a critical one. But I thought SWR was evil incarnate! Don’t all the manuals for my rig scream about getting the SWR to 1.5-to-1? Won’t it burn up my radio before the credit card bill even shows up? Isn’t all that power that gets sent back in the direction of the shack wasted? And isn’t it wasted in the form of heat? Am I not charged to get no worse than a 1-to-1 match or they’ll revoke my license?

Not necessarily. The RF energy does not necessarily go back into your radio or get burned up in the feedline. A portion of it is simply sent right back up the feedline each time it is reflected down it—traveling at the speed of light. If the feedline has relatively low loss, you really don’t lose much of the RF at all. Most of it is eventually sent out into the ether by the antenna. The fact that some of it made a lot of trips up and down the feedline before it was emitted into space is immaterial. Granted, a very large SWR does cause enough heat, even in the lowest loss feedline. It can cause damage to the cable and anything close to it. That is why most modern radios employ a circuit that cuts back power and eventually ceases operating if presented with a severe mismatch at the antenna output circuit.

Now, how does this apply to that nice, easy-to-use coax? Compared to some possible transmission lines, a good quality coaxial cable is relatively low loss. But as the type you use gets smaller, as the frequency on which you plan to use it gets higher, as the length of cable you have to use to run from your rig to the antenna gets longer, and as the type of dielectric (the stuff that separates the two conductors inside the cable) changes, the amount of signal you lose in the wire goes up, up, up. If you are feeding an antenna that is close to 50 ohms, using transmission line that is near 50 ohms, and operating close to the antenna’s resonant frequency, you should not have a real problem. If you have fairly good coax and, if operating on the HF bands, a run of less than 200 feet or so, and your antenna is resonant for the frequency you are transmitting on, you will do fine. But if the load is mismatched at the antenna, if you are seeing a higher amount of reflected power, you may be losing more precious signal than you thought. And that could explain why nobody answers your calls or when you do make a contact, they tell you that you are “down in the mud.”.

Here’s what is happening. Let’s say you lose 20% of your 100 watts of output power because of natural loss in the coax cable as the RF energy is making its way up to the antenna. And let’s say you have a high SWR because you are attempting to operate the antenna system a long way out of resonance, or because the antenna is not designed to be used on the band you are using. To keep the math simple, let’s say that 30% of your original RF is be getting shoved back down the cable in the form of standing waves. Well, you lose 20% of that as it goes back toward the transmitter, too, because you have the same natural loss in the cable going that way as you did going toward the antenna. You have now lost half your original power, and what’s left still of the original RF energy will dutifully go right back up the feedline again! It loses 20% more, warming up your coax nicely. And once again, 30% of that quickly diminishing power that reaches the feed point gets

reflected yet again, right back down the line, and gets another 20% of it carved away by the loss of the cable. As you see, the power is waning quickly!

Again, for a number of reasons, coax is an excellent choice as a feedline for most antennas, and especially dipoles and beams. It is almost—in forms that have even less loss at those frequencies—the exclusive choice at VHF and UHF. But there is one very important caveat: coax is best used when feeding a resonant or close-to-resonant antenna. You may find that an antenna cut to the middle of a band will work just fine all the way across the band. That may be true, but don't expect it to work much place else. There are an almost infinite number of frequencies in the amateur bands where you may want to transmit and receive in which an antenna will not be anywhere near resonant, and where that non-resonance will induce a honking big SWR.

Well, you say, there is a simple solution! All you have to do is use the tuner inside your radio, or break out the catalog and buy an outboard tuner that will match your output to much broader impedance loads. That way, you reason, you can use a single dipole on a bunch of ham bands because the tuner manufacturer says it will tune up a rig to about anything. You have seen the reviews of tuners that will match a transmitter and its coax to a set of box springs, a ten-penny nail, a linguini noodle.

Sorry, but that is not really the issue here. Yes, a good tuner can convince your rig that it is working into a nice, comfortable 50-ohm load, even if the antenna is ridiculously non-resonant and presents a very lopsided SWR, transferring all that power to the antenna and flinging it around the world. You can sit there and transmit all day, your transmitter running cool, not even threatening to shut down because of an excessive SWR. The meter on the tuner might say 1.2-to-1 or 1.3-to-1, so everything must be working great. Well, don't kid yourself. All you have really done is lie to the transmitter output circuit, fooling it into trying to send all that RF into a badly mismatched antenna system. You have cranked in the correct ratio of capacitive and inductive reactance for both you and your radio to think everything is peachy. But remember, those unavoidable standing waves are still coursing up and down your feedline, maybe invisible to your radio and tuner meter, but that reflected and re-reflected power is growing fainter and fainter with every trip up or down the coax. And only a small amount of your transmitter power is actually being sent out into space to be detected by that DX station you keep trying to call.

So coax is not a good choice at all for using an antenna on multiple ham bands? It can be! First, if you learn some antenna theory, you will discover that some antennas, such as a dipole, are resonant on odd multiples of the lowest frequency band for which it was measured and cut. A closed loop is actually resonant on all multiple harmonics of the lowest frequency for which it was designed to be resonant. You can use coax and get some degree of resonance on several bands. But remember, if you cut a dipole for, say, 3.75 megahertz in the middle of the 75/80 meter band, it will really not be close to resonance in any other amateur band, except, in a stretch, 17 meters. If you play with the length, though, you might be able to move the range in somewhat and pick up some other bands, with an SWR that is not such a power killer and can be tamed by most internal tuners. Maybe not the best situation, but it might get you on the air on a few bands.

Don't give up on the antenna tuner, either. While you are not solving the real problem by installing the tuner at the transmitter end of the feedline, you can, instead, put it near the antenna feed point so that you are

actually tuning both transmitter and feedline to match the antenna. This eliminates a great deal of that bouncing SWR and its loss as it surges up and down the coax. Even if you put the tuner somewhere in the feedline rather than right at the feed point, you can eliminate a portion of the lossy coax, with the less amount of cable between the antenna and the tuner, the better.

There are a few problems with this plan, though. You need a tuner that is designed to be exposed to the elements if you have to put it outside, if there is not protective structure close enough to house it. If you try to put the unit at the feed point of the antenna—the most ideal place—you need some way to support its weight. And, in most cases, you need to get voltage to the tuner to operate its components remotely. I think you can see how that complicates the matter.

So, there is no such thing as an easy coax-fed antenna that can be used on more than one ham band? Or one that is resonant for the entire length of a particular band? Not true. There are several antenna choices that can help you solve the coax problem. You can research the fan dipole, for example, in which a single run of coax can be used to feed dipoles cut for several bands. Other antennas can be designed to be relatively broad-banded, such as the log periodic beam. And, the truth is, SWR is probably not a big problem on a well-designed dipole with good quality coax if you only intend to use it on a single band or odd multiple harmonics. Even the internal tuner in most rigs will easily allow you to overcome any resulting mismatch, and if the coax has relatively low loss and the run length of your feedline is not excessive, you probably will not lose an appreciable amount of power.

But suppose you want a single multi-band antenna. A good choice is a dipole, cut to be ½ wavelength long on the lowest band on which you want to use it, fed with open wire feedline, and fed with a matching unit or units. (The formula for determining the length of such a dipole is 468 divided by the frequency in megahertz—for 3.75 mHz, that would be just under 125 feet).

Open wire feedline? Isn't that something your grandfather might have used? Actually, such feedline is enjoying something of a comeback. There are now ten amateur high-frequency bands, and in an effort to work as many of those bands as possible with as few antennas as necessary, resourceful hams have turned to…well…an oldie but goodie.

Ladder line feedline for amateur radio antennas

True ladder line, as constructed and sold by W7FG.

There are variations of this type transmission line, such as true air-dielectric open line, so-called twin lead like folks used to use for the TV antenna when folks had TV antennas, window line, and ladder line. Each name describes the type design of the feedline that keeps two conductors evenly separated from each other for the length of the line. The characteristic impedance of such feedline can range from 200 to over 600 ohms depending on several factors, such as the material used to space the two conductor wires apart and how far apart the wires are. But one thing is constant: the distance

between the two conductors must remain the same for the entire length of the feedline or it begins to mess with the impedance of the line.

I know what you are thinking. If a dipole is in the neighborhood of 50 ohms already, then are we not introducing a serious mismatch by feeding it with some wires that may be 600 ohms? The simple truth is, it does not matter nearly as much as it does with coax. This type of transmission line has such low loss in a run of reasonable length that the standing waves on the line are eventually mostly radiated in the form of "good" RF, and those trips up and down the line are a relatively small factor.

There are ways to get the match closer before we depend on an antenna tuner—internal or external, at the rig end of the feedline or at the antenna feed point—to make the transmitter happy. Many hams use a current balun (remember, that is a balanced/unbalanced transformer) at some point in the ladder line to step the impedance down to something closer to 50 ohms. They hook the two conductors of the balanced line to one side of the balun and then run coax from the other side—the lower impedance side—to the transmitter. This also solves a rather knotty problem with open wire feed line. It is very susceptible to being affected by any nearby metal or cables. You should never run open wire feedlines down a tower leg, along a metal gutter, or adjacent to other cables or feedlines. This will almost certainly lead to problems tuning an antenna system that contains this type transmission line. Even trees or wet vegetation can alter the performance of air-dielectric feedline.

This is just one reason why many hams reject balanced transmission line. There is also the problem of attaching ladder line to your radio. You most likely have coax connectors on the rear panel of the rig. Many tuners also have only coax or single wire connectors. How in the world can you hook that stuff up to that nice screw-on connector on the back of the radio? Glue or duct tape are not the answers!

Once again, the answer is the balun. It may be external, outside somewhere, maybe at the feedpoint of the antenna, maybe somewhere in the line, maybe where the line needs to enter the shack. Then a short run of coax is used for entry into the house, next to those other cables, the gutters, and the air conditioner ducts. Or it may be right next to the rig with a short coax jumper to the antenna connection on the radio in order to avoid long runs of lossy coax. Or, more commonly, next to your antenna tuner, which will be necessary to tune to the broad impedance range the antenna will present as you move about the various ham bands. The balun could also be inside the antenna tuner if it has a "balanced" antenna connection.

A dipole fed with open wire line or one of its variations is, by definition, a "balanced" antenna. That type transmission line is called "balanced line." They go together nicely. But the output circuit of your transmitter is most likely unbalanced. So is coax. So is the coax connector output of your tuner. Some tuners offer a balanced output, relying on a balun inside its case—typically a 4-to-1 type balun, changing the impedance, say, from 300 ohms at the antenna feed point to about 75 ohms on the other side of the device. But there are also special tuners designed to match the unbalanced 50-ohm transmitter output circuit to a balanced antenna system. There have been several articles in the various ham magazines about designing and constructing balanced tuners, and several manufacturers produce them as well.

Antenna Basics

Before the more convenient-to-use coax came along, amateurs almost all used open wire transmission lines, primarily because they were simple and could even be constructed using easy-to-locate and cheap materials. They weren't as concerned as we are with the problems of matching their transmitter to antennas fed with ladder line. That was because the output circuits of transmitters in those days were much broader and adjustable. But the main reason was because the stuff worked very well and got more of the RF to the antenna and out into the ether.

Now, with little loading to be done internally to our solid state transceivers, we have, in effect, moved the matching circuit from inside the radio, out onto the desktop in the form of an "antenna tuner." However, with the desire to use an antenna on a broader range of bands, and in an effort to get as much power to the antenna and have it radiated, ladder line and its cousins are making a respectable comeback. Several distributors sell such line at reasonable cost, and their web sites even offer interesting commentary on its use, selecting baluns, and the recommendations for physically and electrically connecting it to the antenna.

So there we have it, a look at the two primary types of antenna feedlines—coax and open wire—and the various ways of using it to achieve a better antenna system. Neither is a right or wrong choice, a better or worse one. As you will discover in our hobby, there are advantages to about any way of doing something, and there are disadvantages, too. And with antennas and feedlines, the truth is everything is a compromise, and there is no perfect system. But some are "more perfect" than others.

It can be a lot of fun, trying to devise ways to make those compromises as limited as you can, all in the quest for having that station on the other end of the QSO say, "You're kidding! You're not running 100 watts. You're 20 over S9 here!"

Note : I talked to Don Keith N4KC to obtain permission to use his article in this month's newsletter. Don has been a Ham for over fifty years. He got interested in Ham Radio when he was thirteen years old. He has written books and many articles on Ham Radio. After our conversation, I conclude He is a gentleman Ham. I am glad to have met N4KC. Thanks Don for giving me permission to use your Antenna article in our newsletter!

If you would like to contact Don his web site is WWW.donkeith.com or his email don@donkeith.com

Of concern to BVARA members

Christmas Party :

Mark Kavic will present his findings from approaching several area restaurants for packages and prices for our next Christmas dinner, BVARA members will vote on which one to place reservations for at the meeting, please show up if you have any input you would like to share.

Membership Dues :

Membership dues are past due. Please come to the 10 March BVARA Club meeting or see one of the Club Officers to get your 2016 membership up to date.

Our location in Pennsylvania.