



VOLUME 70 ISSUE 7
July 2019

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Board	<u>Mike Anderson, WV7T</u>

* In final year of 2-year term

+ One year officer position

All officers can be contacted at: boardmembers@ppraa.org

Monthly Ham Breakfast



Big Train, 808 Garden of the Gods Road

8 AM Saturday, Aug. 3, 2019

All are warmly invited to come on down and join us!



July PPRAA Club Meeting

The July 10th 7PM club meeting will be at the Golden Corral on Palmer Park and Powers Blvd (just east of Powers Blvd).

1970 Waynoka Rd, Colorado Springs, CO 80915 (719) 591-9870

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HOW SWR COMPARES TO ACTUAL LOSS

Many station operators have a high concern with SWR (Standing Wave Ratio). Therefore, how much loss is there with SWR's over 1:1?

Many SWR meters give the loss on the meter front. It gives a percentage of reflected power. It can state, a 3:1 SWR has a reflected power of 25%. That sounds like a lot of loss, but what is the loss in db where it counts?

To determine the actual loss in db it is necessary to figure it at the frequency you are using. The lower the frequency the less loss you will have for the same SWR at a higher frequency.

Most feedlines match the transmitters well at 50 ohms. Terminating the end of the feedline with a resistive load results in the least loss you can have. This could be dummy load or a perfectly matched antenna system that will measure a 1:1 SWR.

However, if the mismatch is higher than a 1:1 because you are off the center frequency of the antenna, you are introducing a reactive load. This is where the capacitive reactance (X_c) is not equal to the inductive reactance (X_L). So, how bad is it?

The math is not real complicated, but is a little involved. Therefore, I am going to skip it and give some figures just to give an idea of the losses.

One of the major determining factors is the loss of your feedline per length. Most manufactures will give the loss in db per frequency at 100 feet. db loss will increase with frequency.

To give an example. The loss of RG/213 coax at 14.2 MHz is rated at .795 db of matched line per 100 feet. Therefore, 150 feet of coax would have a loss of 1.193 db.

Let us say we have a mismatch of a 4:1 SWR. On your SWR meter it looks bad. However what is the actual loss on 14.2 MHz in db with 150 feet of coax?

Doing the calculations that you can find in most hand books calculates to be a loss of .93 db. Your ear needs 1 db to detect a change in volume. Your radio on average requires 6 db per 1 "S" unit.

This loss at a 4:1 SWR would barely be noticeable. If your are using the lower frequencies the loss at 4:1 SWR becomes even less. Of course, the higher the frequency the more db loss you will have.

Up to 30 MHz the losses are not severe. However you can image how the db loss will soar at vhf and uhf frequencies. When operating the higher frequencies it is important to maintain a low SWR between the antenna and feedline.

On the HF frequencies, you can see that SWR is not near as critical. That is one of the reasons a simple matching device at the radio will work well to protect the transmitter and give negligent loss due to a relatively high SWR.

73,
Ralph WD0EJA JULY 2019

BILAL COMPANY

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FLORISSANT, CO. 80816 U.S.A PH/FX: 719/687-0650
wd0eja@isotronantennas.com

2018 Megafest

– A big thanks to all attendees and vendors who turned out to support us this year and make it a great event. Boy Scout Troop 8 sold coffee & donuts, burgers & brats, chips, and sodas. The weather was great and everyone seemed to have a great time.

Congratulations to this years raffle winners:

- Grand Prize: Icom IC-7300 HF/50MHz Transceiver (with RT Systems programming kit) – Rob Roller, N7LV (7461)
- Second Prize: Icom ID-4100A VHF/UHF Dual Band D-STAR Transceiver (with RT Systems programming kit) – Sam Witte, KE0QMJ (500)
- Third Prize: Alinco DJ-500T Dual Band Handheld (with RT Systems programming kit) – David Kline, K0IID (5765)
- Fourth Prize: MFJ-226 Graphical Antenna Analyzer – Ryan Eastlake, KE0MIH (5262)
- Fifth Prize: Yaesu FT70DR C4FM FDMA FM Dual Band 5W HT (with RT Systems programming kit) – Brian Wilborn, N0QQQ (764)
- Sixth Prize: Yaesu FT60R 144/430 MHz 5W FM HT (with RT Systems programming kit) – Mike Anderson, WV7T (297)
- Seventh Prize: MFJ-993BRT Remote Antenna Tuner 1.8-30MHz 300W – Brian Wilborn, N0QQQ (5536)
- Eighth Prize: Hy-gain AV-6160 HF Vertical 160-6m 1500W 43ft Antenna – Christopher Schroeder, WX0CAS (3717)
- Ninth Prize: DX Engineering \$100 Card – Don Decker, KA0GWS (5964)
- Tenth Prize: 2018 ARRL Handbook – Skip Juhasz, WB2UFV (2530)

MIKE ANDERSON, WB0LEY

Many years ago as a teenager (I was one once!) I was given a fictitious book about Amateur Radio (sure sounded exciting). A few years passed and while I was attending high school in Colorado, I met my first "elmer."

Ron Seats, K0LZD, was the electronics instructor at school and through his tireless efforts and the help of Rosie Lewis, WA0MNL, I became WN0EQM in May 1971.

There just didn't seem to be enough hours in a day to make contacts. One evening I was chatting in CW (it's all Novices had then, including crystal control, no VFOs) with my friend David Hamula, WN0FHQ, and I fell asleep on the key. Dave had to call my mother on the phone to come to the shack and wake me up so I'd stop transmitting a dead carrier.

No one ever told me how to properly tune up a transmitter, so with no manual I just peaked up everything and . . . BOOM! No more filter capacitors! I spent my Novice internship with a fine Amateur club, the Pikes Peak Radio Amateur Association of Colorado Springs, CO.

Not being all that bright with theory, but very good at CW, taking the General exams (the old 50 question test) in Denver was not a festive event. Five written exams had come and gone when WN0EQM expired. I was bummed out! Depressed! Fortunately with Article 97.79D, I was still able to ham in a fashion.

Forty-five days after 'EQM became history (attempt number six) I finally passed the General and in August 1973 WB0LEY was born.

A year and eight months in the Navy (four at Great Lakes, IL) and four exams later, WB0LEY changed from General to Advanced. The license caught up with me in the Philippine

Islands at the moment my ship was pulling out to sea.

After doing four years in "Uncle Sam's Canoe Club," I returned to Colorado to attend college at the University of Southern Colorado with my long-time friend Martin Roe, WB0JNV (Amateur buddies since high school). I then set forth on a journey to scale Amateur Radio's highest mountain . . . the Amateur Extra!

In the passage of time, I married my XYL Rhoda, formerly KN0YFP. She's now KB2BZY and is a Technician

working on General. It was a funny coincidence — her license expires on my Navy retirement date (wonder if that means something?).

After 10 years and 10 exams, in November 1987 I finally made it to the summit of Amateur Radio. I passed the Extra!

So in the course of 18 years, with 22 Amateur exams, I became an Amateur and made it to the top and I have an Amateur XYL, very rare vintage too! She doesn't mind my getting that new rig. Don't you wish you had one, too (the Amateur wife that is!)?

So it seems apparent to me that dreams can come true! □

Written September 1990 and published in Worldradio magazine.

I thought I would repeat the following information article that was in last month's Zero Beat in case anyone missed it

World Scout Jamboree Gearing Up for Significant Amateur Radio Presence

Amateur Radio will be a part of this summer's 24th World Scout Jamboree in West Virginia, the first World Jamboree held in North America since 1983. The Jamboree has chosen the theme "Unlock a New World." Thousands of Scouts and Scout leaders from some 200 countries are expected to attend. The Jamboree's Amateur Radio Exhibit will use the call sign [NA1WJ](#) -- **North America's 1st World Jamboree**. It will be on the air during the event, July 22 until August 2, at the Summit Bechtel Reserve, hosted by Canada, Mexico, and the US. Amateur Radio testing is expected to begin as early as July 14. Operating frequencies will be posted in real time via [Facebook](#) and [Twitter](#) or via an [NA1WJ email group](#).



"The goals of the Amateur Radio station at the World Scout Jamboree are to introduce Amateur Radio to Scouts and Scout leaders through hands-on participation in two-way communication with other stations across the globe. This activity will also serve as the Amateur Radio voice of the Jamboree," the [World Scout Jamboree Amateur Radio Exhibit Operational Vision document](#) states. Other facets of Amateur Radio at the Jamboree will include Amateur

Radio direction finding (ARDF), Amateur Radio satellite contacts, and a scheduled Amateur Radio on the International Space Station (ARISS) contact with an ISS crew member.

"We also expect to launch one or two balloons with Amateur Radio payloads and track them as they cross the Atlantic," the vision document continues.

Organizers are encouraging radio amateurs around the globe to get on the air during the World Jamboree to help NA1WJ demonstrate Amateur Radio for Jamboree visitors.

The 2019 World Scout Jamboree operation at the Summit Bechtel Scout Reserve will take advantage of lessons learned by the K2BSA Amateur Radio operation during the 2013 and 2017 USA National Jamborees. It will also take advantage of the existing infrastructure, which includes three VHF/UHF repeaters installed by Icom America, as well as the utility poles for installing antennas. K2BSA ham gear stored in West Virginia includes antennas, rotators, and cables.

Evening operation from NA1WJ will involve at least two operators using the buddy system. VHF/UHF repeaters will offer full coverage of the Jamboree area via handheld transceivers, facilitating networking as well as emergency communication. The exhibit will include an Amateur Radio station with the special event call sign W8J.

The demonstration station will include multiple operating positions offering a variety of modes. These include six stations with 100 W HF transceivers, computer logging software, and large



screen computer displays; two VHF/UHF stations for demonstrations and repeater monitoring, and two satellite communication systems. The antenna farm will include two HF directional antennas, three HF dipoles, three HF vertical antennas, VHF/UHF verticals and satellite antennas with azimuth and elevation control, a trailer-based crank-up tower, a five-band Yagi, a 40-meter rotatable dipole, and a 6-meter Yagi.

Each station will be able to accommodate four participants at a time, plus one control operator. The goal is to give each participant up to about 10 minutes of operating time.

ARISS Seeks Hosts for Ham Radio Contacts with Space Station Crew Members

Starting on April 1, Amateur Radio on the International Space Station ([ARISS](#)) will accept applications from US schools, museums, science centers, and community youth organizations (working individually or together) interested in hosting contacts with orbiting crew members on the International Space Station (ISS). Contacts will be scheduled between January 1 and June 30, 2020.

Each year, ARISS provides tens of thousands of students with opportunities to learn about space technologies and communications through Amateur Radio. The program provides learning opportunities by connecting students to astronauts aboard the ISS through a partnership between ARRL, AMSAT, and NASA, as well as other Amateur Radio organizations and worldwide space agencies. The program's goal is to inspire students to pursue interests and careers in science, technology, engineering, and mathematics (STEM) and Amateur Radio.

ARISS says enthusiasm sparked by a school contact has led to an interest in ham radio among students and to the creation of ham radio clubs in schools. Some educators have even become radio amateurs after experiencing a contact with an ISS crew member.

ARISS is looking for organizations capable of attracting large numbers of participants and integrating the contact into a well-developed, exciting education plan. Students can learn about satellite communications, wireless technology, science research conducted on the ISS, radio science, and any related STEM subject. Students learn to use Amateur Radio to talk directly to an astronaut and ask their STEM-related questions. ARISS will help educational organizations locate Amateur Radio groups who can assist.

The deadline to submit proposals is May 15. Proposal webinars for guidance and questions will be offered on April 11 at 7 PM EDT (2300 UTC) and on April 16 at 9 PM EDT (0100 UTC on Wednesday, April 17). [Advance registration](#) is required. [More details](#), such as expectations, proposal guidelines, and the proposal form, are on the ARISS website.



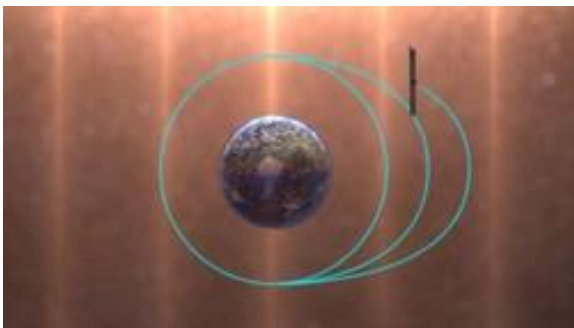
Astronaut Chris Hadfield, VA3OOG, speaks to students from NA1SS in 2013.

LightSail 2 Launches, Will Transmit CW Beacon

The Planetary Society's [LightSail 2](#) CubeSat, launched on June 25, will transmit Morse code from space on 437.025 MHz, within the Amateur Radio 70-centimeter band. LightSail is a citizen-funded project to send a small spacecraft, propelled solely by sunlight, into Earth's orbit. The innovative satellite is due to be deployed on July 2 from Prox-1, a Georgia Tech student-built spacecraft. Once deployed, LightSail 2 will automatically transmit a beacon packet every few seconds, which can be decoded into 238 lines of text telemetry describing the spacecraft's health and status, including everything from battery status to solar sail deployment motor state.



LightSail 2 lifted off from Kennedy Space Center, Florida, carried by the SpaceX triple-booster Falcon Heavy rocket. The launcher also carried aloft two dozen US Air Force spacecraft.



"During its ride to orbit, LightSail 2 was tucked safely inside its Prox-1 carrier spacecraft," The Planetary Society said post-launch. "The Falcon Heavy upper stage's payload stack released Prox-1 about an hour and 20 minutes after liftoff, at an altitude of roughly 720 kilometers (446 miles). Prox-1 will house LightSail 2 for one week, allowing time for other vehicles released into the same orbit to drift apart so each can be identified individually."

LightSail 2 team members will soon converge at Cal Poly San Luis Obispo in California, where the spacecraft's mission control is located. Once LightSail 2 is released from Prox-1, the team will spend several days checking out its systems before commanding its dual-sided solar panels to deploy. Following that, the spacecraft's solar sails will be deployed in approximately 2 weeks.

Two US Naval Academy student-built satellites carrying Amateur Radio payloads were on the launch. BRICSat-2 (call sign USNAP1) will function as a 1.2/9.6 kB APRS digipeater on 145.825 MHz. Telemetry will be transmitted on 437.975 MHz. PSAT-2 also will operate on 145.825 MHz with APRS to voice and DTMF to voice/APRS, and it will carry a 28.120 MHz up/435.350 MHz down PSK31 transponder. An SSTV camera will transmit on the same downlink. --
Thanks to The Planetary Society, Bob Bruninga, WB4APR, and AMSAT News Service



Upcoming events

PPRAA Face book

<http://www.facebook.com/pages/PPRAA-Pikes-Peak-RadioAmateur-Association/185833894769325?v=wall>

Contests and Events

WA7BNM contest calendars link

<http://www.hornucopia.com/contestcal/>

Major Events

PPRAA Megafest

- Saturday July 27, 2019
- Lewis-Palmer High School, Monument, CO
- More info under Megafest tab above

2019 ARRL Rocky Mountain Division Convention

- Friday August 8 thru Sunday August 10, 2019
- Weber State University Union Building
- West Campus Drive, Ogden, UT 84201
- More info [here.](#)

Denver Radio Club Hamfest

- 18 August 2019
- Jefferson County Fairgrounds, Golden, CO
- More info [here.](#)

PPRAA Annual Picnic

- Saturday, 24 August 2019
- 1000-1500 MDT
- Food served around 1230
- Pot Luck (Bring a salad, side dish, or dessert)
- Club provides burgers, brats, drinks
- Location: Pavilion 2 Black Forest Regional Park

Colorado QSO Party

- Saturday August 30, 2019

WWV Centennial Special Event Station

- 28 September – 2 October 2019
- On Air and Fort Collins, CO
- Operators needed
- More info [here.](#)

BARCfest

- Sunday, 6 October 2019
- Boulder County Fairgrounds, Longmont, CO
- More info [here.](#)

JOTA-JOTI – Jamboree-on-the-Air/Internet

- 18-20 October 2019
- More info [here.](#)

TechFest – 2019

- Saturday November 2, 2019
- More info [here.](#)

2020 ARRL Rocky Mountain Division Convention**Hamcon Colorado 2020**

- Thursday, 6 August 2020: DX University
 - Friday August 7 thru Sunday August 9, 2020
 - Keystone Conference Center
 - Keystone, Colorado
 - More info [here.](#)
-
-

PPRAA 75 years Special Event Station**PPRAA Veterans' Day Special Event Station****PPRAA Pearl Harbor Day Special Event Station**

- QSL to: PPRAA, PO Box 16521. Colorado Springs, CO 80935-6521
- No need to send a SASE, we will send cards to all confirmed contacts.

Subject: WWV Centennial Celebration and special event amateur radio station

Date: Jan 22, 2019 5:29 PM

1/22/19

Pikes Peak Radio Amateur Association, AF0S

To whom it may concern,

The Northern Colorado Amateur Radio Club (NCARC) is planning a special event amateur radio station to commemorate the 100th anniversary of radio station WWV. The National Institute of Standards and Technology (NIST) lists their celebration for October 1, 2019 (see attached press release). NCARC plans to operate a multi-station, multi-modal 24-hour effort for 5 days from September 28 through October 2, 2019. NIST and NCARC have been in collaboration but had to suspend planning when the government shutdown starting December 22, 2018.

Our committee decided we needed to reach out on our own; there appears to be no end in sight. We look forward to an eventual resolution, returning to planning this event with NIST, to their own press release, and to putting on a wonderful celebration of a major technological and historical milestone at the end of September 2019.

The enormous effort will require a large number of hams. While we will have some of our club members as operators, we know this effort is way more than we can do on our own. It would be our pleasure to share this experience with other clubs and amateurs who may have an affinity to WWV.

We plan to have an open application period, beginning mid to late February, no later than March 1. We will post the most current information on the Operators page of our website. Application instructions and requirements will be posted as soon as they are available.

We encourage you to consider a beautiful fall visit to Fort Collins and Wellington, Colorado! It will be a serious operating event, we think potentially akin to a DXpedition, but also should be a huge amount of fun and something to be proud of and remember.

Please share the press release with your club members, and do check on the event website, WWV100.com <<http://wwv100.com/>>, WWV100.org <<http://wwv100.org/>>, or WWV100.net <<http://wwv100.net/>>, often. It may take some time for the government to return to normal when it does re-open, but we will report any updates as we learn about them and can make them public.

Thank you and 73,
Dave Swartz, W0DAS
WWV Committee, NCARC

You shop. Amazon gives.

Amateur Radio Emergency Links Info

Amateur Radio and Emergency Communications

<https://alertfind.com/amateur-radio-and-emergency-communications/>

Disaster Preparedness on a Budget

<https://couponfollow.com/research/disaster-preparedness-on-a-budget>

From the annals of PPRAA history

June 1982:

Field Day is this month. The club will operate as a 3A station, with HF SSB, HF CW, and VHF. The Hammy was awarded to Jake NØCYR, Rosie WAØMNL and Duane N7BTE for their efforts on the swapfest. Jim Kervinch of the Colorado Springs gave the program on power line safety. He had live high-voltage demonstrations.

Unable to make reservations at the Black Forest picnic ground for the picnic, the club will try for the pavillion at Bear Creek Park. There will be a fox hunt on June 6, which will meet at Godfather's Pizza on Fillmore St. The June meeting will be on severe weather, presented by a meteorologist from the National Weather Service.

ARRL Outgoing QSL Bureaus

www.arrl.org/outgoing-qsl-service

ARRL affiliated-club stations may use the service when submitting club QSLs for its members in bulk ("pooling" their members cards together in one package) by indicating the club name inside the package. Club secretaries should check club affiliation on the ARRL web site to ensure that their affiliation is current. In a "pooled" package, each club member using this service **must also be an ARRL member**. Cards should be sorted "en masse" by prefix and a proof of membership should be enclosed for each ARRL member. QSLs for unaffiliated club calls may also be sent via the outgoing bureau to foreign destinations if the trustee of the club call is a member in good standing. The trustee's proof of membership must be included with the club call-QSLs.

Parker Radio Association

PPRAA Team,

Be sure to join us for our weekly nets Monday and Tuesday evenings!

First, Monday, at 8:30pm, on D-Star XRF223B, the PRA holds its D-Star net. There is plenty of conversations from everything digital to the latest projects and devices... from DStar / DMR / Fusion / Brandmeister / Hotspots, and even CW. This can be accessed via your local hotspot. Also, many have linked via the WOCDS 2M repeater as well. Considering our KOPRA repeater is being relocated, using the WOCDS 2M side would be best (please follow common/courteous practice when linking).

Second, at 8:00pm on Tuesday, is the PRA weekly analog net on the WOCFI 448.675 – (100Hz) repeater. This is a great way to catch up on the happenings of the PRA and is a great environment to ask any question related to the hobby or to give yourself some bragging rights on a recent license, upgrade, or new piece of equipment.

We'll see you on the air!

73,

KØPRA

Your Friends at the Parker Radio
Association

www.facebook.com/parkerradioassociation
[on parkerradio.org](http://parkerradio.org)
[@ParkerCORadio](#)



PPRAA VE EXAMS (MONTHLY)

PPRAA VE session has relocated and will be held at 10:00 am on the second Saturday of the month at **EL Paso OEM, Mark Dabling near Fillmore, Colorado Springs, CO 80908**. This may soon be changing to a different address.

TESTING IS FREE. Applicants will need the following items at the session:

1. A valid **PHOTO ID**, driver's license preferred (if you do not have a valid photo ID, please call for alternative identification requirements).
2. Your **FRN NUMBER** (now required – this includes children).
3. Your **ORIGINAL amateur radio license** (if any) **AND a PHOTOCOPY** for the VE Team to keep.
3. The **ORIGINAL of any relevant CSEs** you have **AND a PHOTOCOPY** for the VE Team to keep.

PPRAA VE Team policy, as with many VE Teams, is to not allow same day retests on failed exams. Anyone passing their Technician Class examination at a PPRAA test session will receive a free year's membership to the Pikes Peak Radio Amateur Association.

Dennis Major NOABC, PPRAA VE Contact, 719-213-1109

Jim Bishop kd0kql@hotmail.com, 719 332-5283



MARC VE EXAMS

(January, March, May, July, September, November)

The Mountain Amateur Radio Club (MARC) VE Team conducts VE exam sessions in Woodland Park every odd month at 10 am on the first Saturday in the Community Meeting Room of the Woodland Park Library, 218 East Midland Avenue. The MARC VE Team is affiliated with the ARRL/VEC and examinations for all classes of license will be offered.

Full information, including driving directions to the Woodland Park Library, is available under "VE Sessions" on the MARC website at <http://www.nx0g.org/ve.html> or contact Wes Wilson (KØHBZ) at k0hbx@arrl.net or call (719) 687-8758.

If attending, please BE SURE to bring the following items to the session:

A valid PHOTO ID, driver's license preferred (if you do not have a valid photo ID, please call for alternative identification requirements).

- 1. Your FRN NUMBER** (now required – this includes children).
- 2. Your ORIGINAL amateur radio license** (if any) **AND a PHOTOCOPY** for the VE Team to keep.

is also sold by DX Engineering. You can find them via the links below:

<http://www.ke7x.com/successful/ordering-the-successful-ham-radio-operator-s-handbook>

Here is a link that describes the book in more detail:

<http://www.ke7x.com/successful>

Follow us on www.facebook.com/KE7XBOOKS to keep up-to-date on book news and to be notified of book discounts at www.lulu.com.

This book has 267 pages, 211 figures and diagrams, and 53 tables of data to make understanding the sometimes complicated ham radio operations much easier. The book follows KE7X's philosophy of presenting material in several forms to accommodate people with different learning styles -- reading, visualizing, hands-on -- with the many figures and text explanations and there are hands-on exercises throughout the book that can help you learn more about your particular radio.

Follow us on www.facebook.com/KE7XBOOKS to keep up-to-date on book news and to be notified of book discounts at www.lulu.com.

One instructor for new and advanced ham classes has said, "This book is exactly what is needed. I've seen some other books targeting the new hams that are less than satisfying both technically and in content but this one is right on the mark and covers so much information that I so often get asked about, during and after teaching classes."

Here are more details on the content:

- With nearly 110 years of ham radio experience between them, the authors are still excited about the challenges this wonderful hobby offers. *The Successful Ham Radio Operator's Handbook* will guide you when exploring some of these.
- Its goal is to help new operators and returning old-timers learn about the breadth of exciting ham radio activities and challenges available today.
- It answers the question "Why is ham radio relevant in the Internet age?"
- It covers a wide range of topics, helping the reader to understand the excitement of different facets of ham radio and to choose a challenging and exciting activity to pursue.
- It helps the reader better understand how the radio works. Many hams only use a small fraction of the features of their radio. For example, if you understand how a noise blanker or a roofing filter or the AGC works, you will be able to more easily use these, and other, features of your radio to your benefit.
- It provides exercises designed to apply the knowledge to cement your understanding of how your radio works without being radio-specific. It is good for all makes and models.
- It helps the reader get enough background to understand much of the jargon hams who pursue special activities, such as the various digital modes, VHF contesting and moon bounce. It quickly takes the novice reader to higher level of understanding and provides URLs and websites that help the reader go deeper into new interests.
- Antennas remain a key area where all hams can still successfully experiment and create

a key part of their station. This book provides information to help new hams get started cutting their own verticals and dipoles. It explains why some popular multiband antennas may have compromises that impact performance.

- It gives practical guidelines about choosing transmission lines and building and using baluns and chokes.
- Digital modes such as RTTY, PSK and the new WSTJ modes are explained. The computer-to-radio connections needed for these modes are discussed and illustrated.
- Many hams are motivated by public service and emergency preparedness. This book describes typical local emergency organizations and national networks.
- Hams who like to operate while traveling will find practical information on reciprocal international agreements and how to get permission to operate legally.

Online Practice Test Sites



Study for your Amateur Radio License exam:

[Technician \(2014-2018\)](#)

[General \(2015-2019\)](#)

[Amateur Extra \(2016-2020\)](#)

[Other...](#)

HamExam.org Amateur Radio Practice Exams

Log in using <https://hamexam.org> or click [register](#) to create an account. If this is your first visit to the site, please read my brief [introduction](#).

QRZ.COM <https://www.qrz.com/hamtest/>

Eham <https://www.eham.net/exams/>

AA9PW.COM

Membership Application
Pikes Peak Radio Amateur Association, Inc.
P.O. Box 16521, Colorado Springs, Colorado 80935

Date: _____ ☐ New Membership ☐ Renewal

Name: _____

E-mail address: _____

Address: _____

City: _____ State: _____ Zip: _____

Call: _____ License Class: _____ Telephone: _____

Are you an ARRL member? ☐ Yes ☐ No

Additional Name: _____ Call _____ Class _____ ARRL member? ☐ Yes ☐ No

Additional Name: _____ Call _____ Class _____ ARRL member? ☐ Yes ☐ No

Additional Name: _____ Call _____ Class _____ ARRL member? ☐ Yes ☐ No

- ☐ Full Member - \$15.00
- ☐ Full Member over 65 - \$10.00
- ☐ Free - VE Signature Required:

- ☐ Family Membership (same address) - \$18.00
- ☐ Family Membership (both over 65) - \$12.00