



VOLUME 71 ISSUE 1
January 2020

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Board	<u>Mike McLaughlin, K0JT*</u>
Board	<u>Stefan Kochis, K0EYE*</u>
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



Omelets Etc, 1337 Interquest Pkwy Saturday, 1 February 2020

All are warmly invited to come on down and join



January PPRAA Club Meeting

The Jan. 8th 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](tel:7195919870)

40TH YEAR ANNIVERSARY!



What are those things up there?
60 foot tilt over tower at our location.
160, 80, 40, 20, 17, 15 and 10 meter Isotron Antennas.
www.isotronantennas.com

THE BEST WAY TO OPERATE HF

**EASY INSTALLATION
EXCELLENT PERFORMANCE
DURABLE CONSTRUCTION
CC&R FRIENDLY (XYL ALSO)**

PLEASE FORWARD THIS ARTICLE TO THOSE YOU FEEL WOULD BE INTERESTED.

NVIS

Have you heard of this? It stands for NEAR VERTICAL INCIDENT SKYWAVE.

Why would knowing about this be useful?

Many radio operators are interested in DX or long distant contacts, but not all. There are many applications where contact is desired a short distance away, under 400 miles. This is where NVIS plays a part.

The radio waves travel near-vertically upwards into the ionosphere, where they are refracted back down and can be received within a circular region up to 650 km (400 miles) from the transmitter. If the frequency is too high (that is, above the critical frequency of the ionospheric F layer), refraction fails to occur and if it is too low, absorption in the ionospheric D layer may reduce the signal strength.

There is no fundamental difference between NVIS and conventional skywave propagation; the practical distinction arises solely from different desirable radiation patterns of the antennas (near vertical for NVIS, near horizontal for conventional long-range skywave propagation).

The dipole therefore, is the more practical for NVIS over a vertical antenna.

The most reliable frequencies for NVIS communications are between 1.8 MHz and 8 MHz. Above 8 MHz, the probability of success begins to decrease, dropping to near zero at 30 MHz. Usable frequencies are dictated by local ionospheric conditions, which have a strong systematic dependence on geographical location. Common bands used in amateur radio at mid-latitudes are 3.5 MHz at night and 7 MHz during daylight, with experimental use of 5 MHz (60 meters) frequencies. During winter nights at the bottom of the sunspot cycle, the 1.8 MHz band may be required.

So, how high should your antenna be for NVIS. Right where you have it. The low frequencies are very reliable on NVIS even if your antenna is quite high. It is more of a function of wavelength above ground rather than feet or meters. At 60 feet you are only 1/4 wave on 40M. This height is fine for NVIS.

How do you use it?

NVIS is dependent on time of day, season, your latitude and the band you select. As you listen to the various bands you will start to see a pattern of which bands work at different times and seasons.

This phenomenon provides very reliable HF communications. It defies obstacles such mountainous or rough terrain. It is excellent communications for emergency work and is used regularly for this.

While the old sun seems to be on sabbatical, you can enjoy HF using NVIS.

73,
Ralph WD0EJA

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FLORISSANT, CO. 80816 U.S.A
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wd0eja@isotronantennas.com

Everything should be made as simple as possible, but not simpler

By Dan Romanchik, KB6NU

"Everything should be made as simple as possible, but not simpler" is a quote attributed to Albert Einstein (<https://quotationcelebration.wordpress.com/2017/01/07/everything-should-be-made-as-simple-as-possible-but-not-simpler-albert-einstein/comment-page-1/>). Here's one way to apply this principle in amateur radio, specifically to code practice oscillators.

A week ago, my friend, Paul emailed me:

"I am planning on teaching a two-hour introduction to Morse code to 14 girls ages 8 to 9 *[[Paul's granddaughter is a Girl Scout.]]*. I plan on having the girls build a code practice device. I need your help in selecting a low cost buzzer and battery holder. Please take a look around and see would you can find. I would like to limit the power to one or two AA batteries."

I replied that I'd be happy to help him with the demonstration, and offered the following advice:

"A while back, I built the QRPGuys' K7QO Code Practice Oscillator (<https://qrpguys.com/k7qo-code-practice-oscillator>). It uses a CR2032 coin battery.

"Unfortunately, they don't sell it anymore, but the assembly manual is still online (https://qrpguys.com/wp-content/uploads/2017/03/cpo_assy_012616.pdf). The assembly manual doesn't call out specific parts, but here are some Amazon SKUs:

- B00J4BK0NS, Black 3V Electromagnetic Type Piezo Buzzer, 20 pcs/\$6.58
- B06XF3K4NP, Coin Cell Button Battery Holder, 30 pcs/\$9
- B008SNZUYC, 3 Pin PCB Mount Female 3.5mm Stereo Jack, 10 pcs/\$5.40
- B071RMD6FD, 1/8" 3.5mm Stereo Male Connector, 10 pcs/\$7

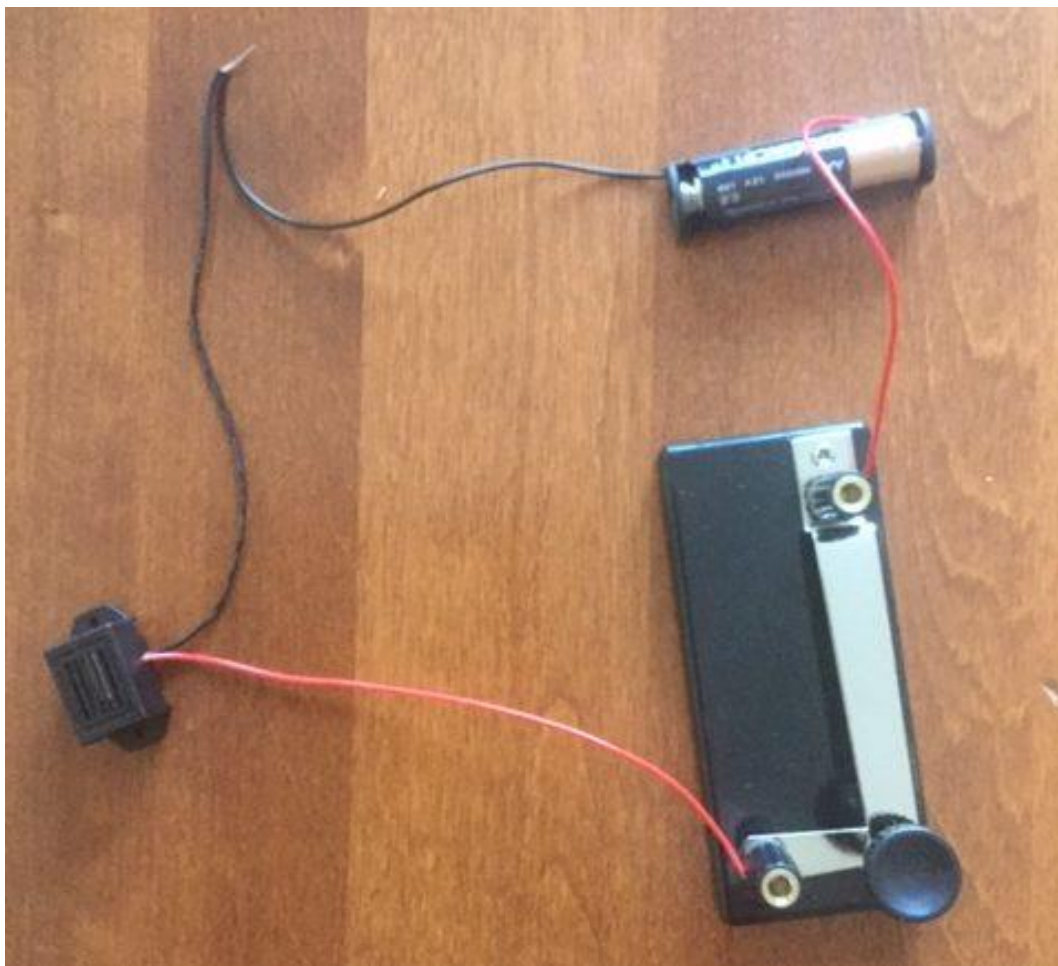
"Batteries are available at the dollar store for about 30 cents each. So, you could do the whole thing for less than \$5 for sure, even with a printed circuit board, which I would suggest that we do. Heck, if you ask nicely, the QRPGuys might even give us the artwork, or even better, have some boards still in stock. Even if they have neither, you should be able to get the boards in plenty of time."

Later that day, Paul replied:

Thanks, Dan, for the information and making yourself available to help. I am just going to use a buzzer, key, and battery. The buzzer has a frequency of 400 Hz.

- <https://www.xump.com/science/Buzzer-Leads15V.cfm>
- <https://www.xump.com/science/ContactKeySwitch.cfm>
- <https://www.xump.com/science/Single-AA-Battery-Holder.cfm>

And this morning, he sent me this photo, noting, "FYI. Also sounds great."



I think that this is as good an example of "Everything should be made as simple as possible, but not simpler" as there can be. I've volunteered to help Paul with his class. That will be fun, too.

=====

Dan Romanchik, KB6NU, is the author of the KB6NU amateur radio blog (KB6NU.Com), the "No Nonsense" amateur radio license study guides (KB6NU.Com/study-guides/), and often appears on the ICQPodcast (icqpodcast.com). When he's not trying to keep things as simple as possible, but not simpler, he likes to build stuff and operate CW on the HF bands.

ARRL Reshapes Podcast Offerings for 2020

In conjunction with the launch of its new [On the Air](#) magazine, which is aimed at those just beginning their journey in amateur radio, ARRL is reconfiguring its podcast lineup.

Heading up the new schedule will be a free companion podcast to the bimonthly *On the Air* magazine. The monthly *On the Air* podcast will take a deeper look into select features and projects from the magazine. Each month, host and *On the Air* Editorial Director Becky Schoenfeld, W1BXY, will offer additional resources, techniques, and hints to help less-experienced radio amateurs to get the most from the magazine's content.



In addition to the podcast, ARRL Product Development Manager Bob Inderbitzen, NQ1R, will curate a free *On the Air* blog featuring content from the communicators and makers who are the driving force of amateur radio today. The blog will highlight opportunities and activities available to new licensees. The *On the Air* blog is intended as an

entry point into the world of amateur radio for those seeking original voices and perspectives. Readers will be [invited](#) to take part in the conversation by sharing their stories and experiences.

ARRL's current [So Now What?](#) podcast will cease production in January, as the full complement of *On the Air* content is rolled out. The [catalog](#) of *So Now What?* episodes is available for listening or downloading.

ARRL So Now What? Episodes

If you're a newly licensed Amateur Radio operator, chances are you have lots of questions. This biweekly podcast has answers! "So Now What?" offers insights from those who've been exactly where you are now.

16. Navigating the Nets

Published on: Thu, 14 Nov 2019 00:15:00 -0500

<http://www.arrl.org/arrl-net-directory>

<http://www.arrl.org/resources/nets/client/netsearch.html>

15. Halloween and Throwback Special

Published on: Thu, 31 Oct 2019 09:52:00 -0400

Listen in as we talk with Jen Glifort, KC1KNL, about her article from the July 2018 edition of QST, Yippee-Ki-Yay: The Role of Radio in Die Hard.

Read the free article

here! <http://www.arrl.org/files/file/QST/This%20Month%20in%20QST/July2018/Glifort.pdf>

Other topics include scary movies and radio communications.

#ThrowbackThursday #Halloween #Amateur Radio #RadioCommunications #DieHard

14. "Ham" Lingo

Published on: Thu, 17 Oct 2019 00:15:00 -0400

14. "Ham" Lingo

13. You're Not "Just" a Tech

Published on: Thu, 03 Oct 2019 00:15:00 -0400

Featuring Andy Milluzzi, KK4LWR.

12. Demystifying the Language of Morse Code

Published on: Thu, 19 Sep 2019 11:45:00 -0400

Check out our video on Instagram of Joe Carcia, NJ1Q, demonstrating dots and dashes on the morse code keyer! <https://instagram.com/p/B2mSGIxDOxw/>

11. Contesting with ARRL's Contest Program Manager, Paul Bourque, N1SFE.

Published on: Thu, 22 Aug 2019 13:03:00 -0400

[ARRL Contests Landing Page](#)

10. SATERN'S involvement in Hurricane Season using Amateur Radio

Published on: Thu, 08 Aug 2019 10:57:31 -0400

[Emergency Disaster Services](#)

9. Tips on using Coaxial Cable

Published on: Thu, 25 Jul 2019 08:00:00 -0400

Here you can find further information on topics discussed in this episode: [ARRL on Feed Lines](#) [Coaxial Cable info](#)

8. Fan Questions

Published on: Thu, 11 Jul 2019 13:18:00 -0400

This episode is based off questions from you, the fans! These are the links and projects referenced in this

episode: <http://physics.princeton.edu/pulsar/k1jt/wsjitx.html> http://www.qsl.net/kp4md/wsp_rmodes.htm <http://wsprnet.org/drupal/wsprnet/map> https://en.wikipedia.org/wiki/skip_dist_ance <https://www.arrl.org/files/file/Technology/tis/info/pdf/ab18-16.pdf>

As always, if you have a question, please email us at sonowwhat@arrl.org

Thanks for listening!

7. Available Operating Modes to Us New Hams

Published on: Thu, 27 Jun 2019 12:00:00 -0400

Check out our IGTV Video! [The sounds of Morse Code, FT8, Voice, and CW with amateur radio!](#)

6. Highlights from Hamvention

Published on: Thu, 13 Jun 2019 13:22:00 -0400

Listen to these exclusive interviews right from Hamvention 2019!

You'll hear Michelle Patnode, W3MVP, interview on site; Tommy Gober, N5DUX, Jet Jurgensmeyer, KE0UWZ, Tamitha Skov, WX6SWW, Sarah Byrne, Valencia Simpson, Tony Milluzzi, KD8RTT, and Andy Milluzzi, KK4LWR!

5. Getting In on Field Day

Published on: Thu, 30 May 2019 00:15:00 -0400

Find a Field Day Station near you by accessing the Field Day Locator: <http://www.arrl.org/field-day-locator>

4. Finding The Right Club for You

Published on: Thu, 02 May 2019 00:01:00 -0400

Find a Club! <http://www.arrl.org/clubs>

3. All About Safety

Published on: Thu, 18 Apr 2019 00:01:00 -0400

3. All About Safety

2. Covering the Rules on Calling CQ

Published on: Thu, 04 Apr 2019 00:00:00 -0400

2. Covering the Rules on Calling CQ

1. The New Ham Radio Starter Pack

Published on: Thu, 21 Mar 2019 00:00:00 -0400

A look at the types of equipment that new hams need to get started on their amateur radio journey, and the importance of doing your research.

(Intro)

Published on: Thu, 07 Mar 2019 00:00:00 -0500

Meet the hosts and begin your journey into Amateur Radio.

Major Events

The Swapfest

- Sunday February 16, 2020 (0900-1300)
- Adams County Fairgrounds
- Brighton, Colorado
- More info [here.](#)

LARC Fest

- Saturday, April 4, 2020 (0800-1400)
- Boulder County Fairgrounds
- Longmont, Colorado
- 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
 - Location: Parker, CO
 - 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.

2019 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 the rains held off until the event had ended. Everyone seemed to have a great time.

Congratulations to this years raffle winners:

- Grand Prize: Complete Ham Radio HF Station (with RT Systems programming kit) – Levi Young, KE0TLO
- Second Prize: Icom IC-2730A VHF/UHF Dual Band Transceiver (with RT Systems programming kit) – Gerald Nixon, N0AD
- Third Prize: Yaesu FT65R VHF/UHF 2 Meter/70cm Dual Band FM Handheld (with RT Systems programming kit) – Jackie Donnell, W0JED
- Fourth Prize: MFJ-929 200W Auto Tuner – Gerald Nixon, N0AD

- Fifth Prize: MFJ-269C Analyzer – Jason Foster, KB5TPT
- Sixth Prize: LaCrosse C83100 Weather Station – Benjamin Jolly, KE0NRZ
- Seventh Prize: Heil Pro Set Media Pro Headset – Jim Escue, KB0UDV
- Eighth Prize: 2019 ARRL Handbook – David Riese, WB0SDW
- Ninth Prize: Yaesu VX6R Ultra-Rugged Handheld (Donated by CMRG) – James Burnett, WB0GMR
- Tenth Prize: DX Engineering \$100 Gift Certificate – Earl R Watkins, II, AE2RW

Unraveling the Mystery of 1 × 1 Call Signs

The [1 × 1 Special Event Call Signs](#) system offers a way for clubs, groups, or even individuals to use a short call sign of special significance to the amateur community. These 1 × 1 call signs are [reserved](#) in advance for use in conjunction with short-term special events and commemorative operations. The FCC does not assign 1 × 1 call signs, so they are not "official."

On the matter of special event call signs, the FCC says, in Section 97.3(a)(11)(iii) of the Amateur Service rules: "The call sign is selected by the station licensee from a list of call signs shown on a common database coordinated, maintained and disseminated by the amateur station special event call sign data base coordinators. The call sign must have the single letter prefix K, N, or W, followed by a single numeral 0 through 9, followed by a single letter A through W or Y or Z (for example K1A). The special event call sign is substituted for the call sign shown on the station license grant while the station is transmitting."

The FCC also says in Section 97.119 (d): "Additionally, the station must transmit its *assigned call sign* at least once per hour during such transmissions." This requirement tends to be widely flouted, however.

A 1 × 1 Special Event Call Sign aids other radio amateurs by calling attention to the special event or other occasion. 1 × 1 call signs may be used for a variety of purposes, such as conventions, festivals, dedications, anniversaries, commemorations, and ARRL Field Day. Even local events qualify.

There are 750 1 × 1 Special Event Call Sign possibilities, and radio amateurs of any license class may reserve one as far as a year in advance to use for up to 15 days. Of course, 1 × 1 Special Event Call Signs are recycled. It's first come, first served. See the [Frequently Asked Questions](#) page for more information.

The FCC has selected coordinators to approve and post 1 × 1 Special Event Call Sign reservations to a [searchable database](#). -- *Thanks to The Radiogram (Portage County Amateur Radio Society newsletter)*

You shop. Amazon gives.

PPRAA VE Session

Monthly on the second Saturday

Pikes Peak Regional Office of Emergency Management

3755 Mark Dabbling Blvd, Colorado Springs, CO 80907, USA

Organizer: ve@ppraa.org

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

January 1981:

Front page of Ø Beat has a good article on Nikola Tesla, pioneer of radio. Fifty-three people attended the Christmas party last month at the Iron Springs Chateau. Sounds like everyone had a good time. Meeting place for the December meeting and this coming meeting is Sabin Jr. High School, at 7:30 pm. Don Lohse and Doug Moloney receive kudos for arranging a fine Christmas party. AAØL, KAØGJO, NØAVY and NØDV came in first place, multi-op mode, in Colorado for the 1980 ARRL September VHF QSO Party! The Hammy in December went to Bill Allen NØATE, for passing out the wrong date for the Christmas party to a number of members. Dave Vierling NØDV's memory keyer won first place at the December home-brew night. Board meeting night is changed to the first Monday after the club meeting (apparently it used to be the first Monday of each month at about 7:30 pm.) The board is looking at either April 12 or 26 for the swapfest to be held at Peterson AFB. A newly formed Colorado Springs Contest Club will have its first meeting on January 11 at 2 pm at NØST's home. The club is trying to get some HF activity going on 21.125 as an HF happening. Autopatch codes are published for the 735/135 KBØNN Pikes Peak Community Repeater. This is an open autopatch. Dues for the club are going up from \$6 to \$12 for regular membership.

ARRL Outgoing QSL Bureaus

www.arrl.org/outgoing-qs1-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 Pikes Peak Regional Office of Emergency Management
3755 Mark Dabling Blvd, Colorado Springs, CO 80907, USA

Organizer: ve@ppraa.org

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** (Please obtain in advance of the session).
3. Your **ORIGINAL amateur radio license** (if any).
4. The **ORIGINAL of any relevant CSCEs** 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.

Jim Bishop kd0kql@hotmail.com, 719 332-5283
Dennis Major NOABC, PPRAA VE Contact



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 k0hbz@arrl.net or call (719) 687-8758.

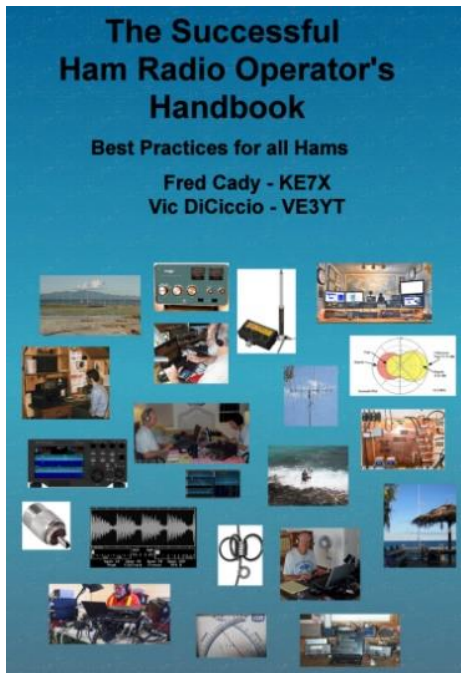
If attending, please BE SURE to bring the following items to the session:

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 Please obtain in advance of the session).
- 2. Your ORIGINAL amateur radio license** (if any) **AND a PHOTOCOPY** for the VE Team to keep.
- 3. The ORIGINAL of any relevant CSCEs** you have **AND a PHOTOCOPY** for the VE Team to keep.

4. **Cash, Check or Money Order for \$15** (standard ARRL VE Fee). Checks and money orders should be made out to MARC and covers all the different exams you wish to take at the VE session.

MARC VE Team policy, as with many VE Teams, is to not allow same day retests on failed exams. For already licensed hams, MARC members should be monitoring the MARC repeater system 146.820- or 448.650- (both 107.2 Hz) if you need help with talk-in. 73 Dean Buckhouse



The Successful Ham Radio Operator's Handbook

This new book is aimed at new or returning hams to help them understand the practical aspects of the hobby, how to use their radios, build antennas and baluns, and get on the air successfully. In it you will find explanations of how the various parts of your ham radio - the transmitter and receiver – work, plus how these are being implemented using software defined radio technology. Operating techniques for VHF/UHF repeaters, HF radio DXing techniques, and the new digital modes are covered. Radio propagation, antennas, transmission lines, SWR and the mysteries of baluns are explained. Building your HF station, choosing a radio, connecting your radio to a computer, and mobile and portable operation are extensively covered.

Both the pdf and spiral-bound printed versions are available from Lulu.com, and the print copy 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 \(2018-2022\)](#)

[General \(2019-2023\)](#)

[Amateur Extra \(2019-2020\)](#)

[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