

New Ham Kit

Courtesy of



Information to help get you "On the Air"

Before getting started, I want to thank the East Greenbush Amateur Radio Association for creating this guide. We have “borrowed” it from them with their permission and modified it for our use.

Congratulations on Getting Your New Amateur Radio License!

It’s exciting to pass your licensing exam... and it’s also probably a little intimidating.

Now What?

You’re likely asking yourself: “OK, what now? How do I get on the air? Where can I get help and guidance? Who can answer my questions about radios, antennas and what gear I need? What should I buy and where can I buy it? How much do I have to spend? “Once I get set up, how do I operate, make contacts and what do I say?”

Well, don’t worry. Those are the same questions every new ham has asked since Amateur Radio began. Luckily, there’s plenty of help to get you up and running -- and comfortable with your new hobby. And, this guide is designed to get you on your way!



Join the Club!



First, consider joining a local radio club. This will put you in contact with other local hams who are happy to help you get started and answer your questions. Plus, most clubs have “Elmers” -- these are the folks who have been hams for many years and who offer a wealth of knowledge and experience. Elmers are a great resource and they stand ready to guide you. They also know what it’s like to be a new ham -- because they were new hams themselves at one time. It’s tradition for hams to lend a hand to one another -- so take advantage of their knowledge. If you are interested in joining NRHARC -- the North Richland Hills Amateur Radio Club -- you’ll find an application in this packet. If you live out of the area, a quick Google search can help you find a club closer to your

home, or you can become a virtual member and attend our meetings via ZOOM!

Peat and Repeat

Also in this packet is information on Amateur Radio repeaters, including how they work and how you can use them to get on the air. A Technician Class license will give you privileges on VHF and UHF bands, and this is where you’ll likely begin. Plus, dual-band portable VHF/UHF hand-held radios can be very inexpensive, with some as low as \$30. So you can get on the air without busting your budget and then upgrade your gear as you advance -- both in experience and license class.

You’ll also find that the Internet can be a great resource. There are many sites dedicate to ham radio, including information on best operating practices, news updates, equipment reviews and YouTube videos on a wide range of topics. You will also find Amateur Radio equipment manufacturers and retailers on-line, giving you to opportunity to compare gear, specifications and prices. Most clubs also have websites and many maintain resource pages with links to sites dedicated to ham radio.

NRHARC’s website has such a resources page, as well as updates and news about club activities and events. We have downloads for antennas, past presentations, our Bylaws and Constitution. You’ll find it at: nrharc.org.

The Band Plan

Also in this information packet is a copy of the “Band Plan” published by ARRL - the American Radio Relay League. This plan shows you all of the frequencies assigned to Amateur Radio and which portions are available to each license class: Technician, General and Amateur Extra. The plan also indicates which types of operation are assigned to the various

bands, such as CW (Morse Code), Single Side Band (SSB) Phone, data and so forth. It's important that you only transmit in the bands allowed by your license and to limit them to the appropriate type for the band in which you are operating. (Note: some license classes are no longer issued, but amateurs can still operate if there's is still valid. These include Novice and Advanced class licenses).



You Worked Hard to Get Your License! Now Get On the Air!

Your amateur radio license opens the world to you. Now, we invite you to maximize your enjoyment of ham radio by joining the North Richland Hills Amateur radio Club. If you are not from here, find a local club to your location or you can join and attend our meetings virtually from wherever you have an internet connection! Here's all the benefits you'll enjoy for the low annual membership fee of just \$20 as an individual or for a family.

- **Monthly membership meetings** with topics designed to enhance your knowledge of amateur radio! Meetings are held the fourth Monday of each month (We ZOOM and YouTube Live these meetings).
- **Meet other hams** and make new friends with similar interests;
- **Weekly Net on 2m** – Join other hams on our net and practice using your radio;
- **Contests** – NRHARC participates in several contests throughout the year. Come join us!
- **Annual Field Day** with a great chance to practice your emergency operating skills, temporary station setup, and more! It's a great learning experience, and a lot of fun;
- **Club Repeaters** available to members to extend the reach of their radios.
- **VE Test Sessions** where you can upgrade your license;
- **Access to the club's Discord Chat server**, a great place to chat and ask questions;
- **Annual Holiday Party!** A January tradition of fun, food, friends and raffles!
- **Elmers** to help you learn. Senior members of NRHARC are a great resource for answering your questions;
- **Involvement in community** events and emergency communication services, a foundation of ham radio and NRHARC.

When emergency communications are needed, NRHARC members are there to help.

Use the coupon below or got to hamclubonline.com and join NRHARC there.

APPLY NOW!

NRHARC Membership Application

(please print clearly)

Date of Application: _____

Name: _____

Call Sign: _____

Address: _____

City: _____

Zip: _____ Email: _____

License Class: _____

Home Phone: _____

Cell Phone: _____

Are you an ARRL Member? Yes: _____ No: _____

NRHARC Membership Type: Individual/Family - \$20/year _____

After July 1: \$10 _____

Make checks payable to **NRHARC**

Mail To: NRHARC, PO Box 821426, North Richland Hills, TX 76180

Getting You On the Air -- Repeaters

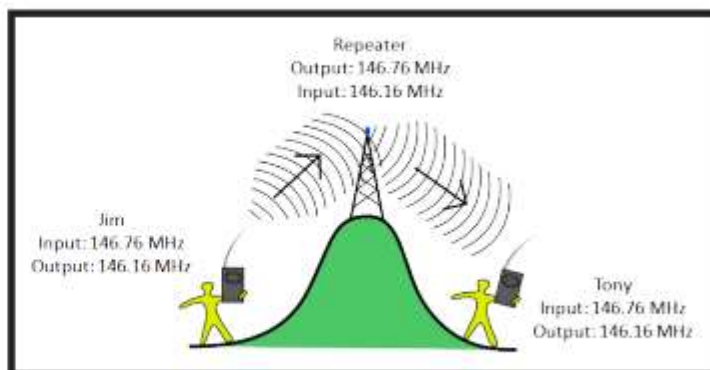
Repeater Basics: Repeaters extend the range of your VHF or UHF radio by relaying your relatively weak signal to other stations, by using a higher power system that's usually located at a high elevation which maximizes its coverage. NRHARC operates several repeaters for the benefit of all hams to help extend the range of your radios and they are listed below. Repeaters work by receiving on one frequency and then re-transmit at exactly the same time on a second "offset" frequency.

For example, on the 2 meter ham band these frequencies are 600 kHz (or 600 kilohertz) apart. On other bands, the offsets are different. As a general rule, if the output frequency (transmit) of the repeater is below 147 MHz, then the input frequency (listening) is 600 kilohertz lower. This is referred to as a negative offset. If the output is 147 MHz or above, then the input is 600 kilohertz above. This is referred to as a positive offset. For example: The club's VHF repeater is 147.270+ which means you listen on 147.270 and you transmit on 147.870 (adding 0.6 MHz).

Virtually all ham radios sold today set the offset once you have chosen the operating frequency automatically.

However, this chart shows the offsets for different bands in case you ever need the information:

Output Frequency	Input Frequency Offset
51-52	- 0.5 MHz
52-54	- 1.0 MHz
144.51-144.89	+ 0.6 MHz
145.11-145.49	- 0.6 MHz
146.0-146.39	+0.6 MHz
146.61-147.0	-0.6 MHz
147.0-147.39	+0.6 MHz
147.6-147.99	-0.6 MHz
223-225	- 1.6 MHz
440-445	+ 5.0 MHz
445-450	- 5.0 MHz
918-922	-12 MHz
927-928	-25 MHz



PL tones: PL, an acronym for Private Line, is Motorola's proprietary name for a communications industry signaling scheme called the Continuous Tone Coded Squelch System, or CTCSS. It is used to prevent a repeater from responding to unwanted signals or interference. Tone Squelch is an electronic means of allowing a repeater to respond only to stations that encode or send the proper tone. In other words, if a repeater is set up to operate only when a PL tone of say, 94.8 Hz is heard by its receiver, then it will allow the transmitting station access. If your station, (your mobile, base or hand held) does not transmit the tone that the repeater receiver has been programmed for, when you key up, then the receiver of the repeater does not hear you and will not be usable by your station until you set the proper tone in your radio to be transmitted when you key your mic. If a repeater is "In PL mode" that means it requires a CTCSS tone (PL tone) to activate the repeater.

NRHARC maintains the following repeaters. Remember, they can only be accessed by using the listed PL tones.

2m – 145.370 110.9 PL

70cm - 441.750 100.0 PL

These repeaters are free to use and are open to all amateurs to use.

How do you make a call on an Amateur Repeater?

That most exciting day just arrived! You now have passed your Technician Class exam and have been issued your first call sign by the FCC.

You have your station all set up and you are ready for your first contact on a repeater! You chose a local repeater frequency and dial it up on your rig. First, **LISTEN AND LISTEN SOME MORE.....** to make sure that the repeater is not already in use.

NOW BRAIN CRAMPS SET IN! "What do I do? What do I talk about? Will I remember all those rules, regulations, theory and all that other stuff I had to study?"

The simple answer is..... probably not..... but don't worry!

When you are satisfied that the repeater is not in use, set your transmitter power to the minimum and increase only as needed to make contact with the repeater, begin with the call sign of the station you are trying to contact followed by your callsign. e.g. " (THEIR CALL SIGN) this is (YOUR CALLSIGN). If you don't establish contact with the station you are looking for, wait a minute or two and repeat your call.

If you are just announcing your presence on the repeater it is helpful to others that may be listening if you identify the repeater you are using AND your callsign. e.g. "This is (CALL SIGN) monitoring on the 84 machine" -- or you could also say "This is (CALL SIGN) monitoring on 146.84." This allows people that are listening on radios that scan several repeaters to identify which repeater you are using.

So, you just keyed your mic, gave out your call sign and now you hear.....your call sign and someone coming back to you with his call sign..... he or she un-keys and the repeater is waiting for YOU!

First thing.... try to write his call sign down and if he gives his name, that too. Lots of good operators recognize a new ham instantly on the air and they will guide you with patience, understanding, maybe some fun prodding and picking at you to get you to relax and have fun with your new license.

He or she will WELCOME you!

A good operator will never make you feel unwanted on the air. He may ask you to repeat your call sign just to make certain he understood who he is talking to and if you forget to give your name, he will ask for it. Most hams don't like to talk to a "call sign", so getting names and also locations helps to start the conversation.

If you make mistakes.... the other station will most likely let you know what you did wrong and inform you as to the correct way in a friendly manner.

Don't be surprised if your new contact asks you all the questions instead of the other way around. He or she is just trying to get you to feel relaxed on the air. As your experience grows in ham radio, always try to remember your first contact and how excited and nervous you were. Now it's your turn and you are the one responding to a new ham and his first contact! Make him or her feel at home and..... be a good operator..... like your first contact was!

Repeater ID.....you and it!

You must transmit your call sign at the end of a contact and at least every 10 minutes during the course of any communication. You do not have to transmit the call sign of the station to whom you are transmitting. Never transmit without identifying. For example, keying your microphone to turn on the repeater without saying your station call sign is illegal. If you do not want to engage in conversation, but simply want to check if you are able to access a particular repeater, simply say " (your call sign..... testing)."

Remember! This is not CB radio!

Don't use CB lingo on any ham band such as 10-4, what's your 20, etc..... and don't say BREAKER!

Using the words BREAK, or BREAK, BREAK or BREAK, BREAK, BREAK or any combination of them on Ham radio is used ONLY for EMERGENCIES. The word "break" or combinations of it carries many different meanings in the ham community and in the English language.

According to THE EMERGENCY COORDINATOR'S MANUAL: The word "break" is never used UNLESS there is an emergency."

If a station needs to report an emergency, STOP TRANSMITTING IMMEDIATELY and allow the other station access to the frequency.

Talking to other stations:

Use plain language on a repeater. If you want to know someone's location, say "Where are you.... or what's your location?" If you want to know whether someone you're talking with is using a mobile rig or a hand-held radio, just ask: "What kind of radio are you using?" You get the idea. Most repeater use is of a "local" nature so signals will be usually of very high quality. The use of the phonetic alphabet is very helpful at times.

Don't call "CQ" to initiate a conversation on a repeater. Just simply listen to make certain the repeater is not in use and then key your mic and say your call sign and "listening". If someone happens to be listening and they want to talk to you they will respond.

Getting Experience

One of the best ways of getting experience is by participating in public service events where local radio clubs provide communications support. Such events include 5k road races, Halloween Pumpkin Patrols, and emergency communication drills held by local ARES groups (Amateur Radio Emergency Services). Check with local clubs to learn about their public service activities. These types of events provide real-world hands-on experience that's invaluable.

The Future - HF!

Once you get on the air, chances are you'll want to do more -- including upgrading your license to gain more operating privileges. Passing your General license exam will open up a whole new world to you, including the enjoyment and thrill of long-distance communications on the HF bands with hams hundreds or even thousands of miles away. As a Technician you will have access to the 10m band but it is limited. It will require a different radio and antenna setup. You can work a lot of DX on 10m when the conditions are right as a Technician.

The General exam is not difficult -- if you are willing to invest some time studying. There are many study guides available, both in book form and on-line. We suggest the W5YI guides. They are easy to use and really good. There are also practice tests on-line so that you can check your knowledge and understand where you need to focus your studies. There are even cell phone apps you can download and install so that you can study wherever and whenever you have a free moment!

As always, remember that Elmers are always ready to help you learn and understand. The concepts behind what makes radio work may seem overwhelming and intimidating, but the basic theory is not hard to understand, especially once you begin your journey on the air! We look forward to hearing you on the air! Welcome!

How do you Check into a Net?

1. Wait for the Net Control Station (NCS) to begin the net.
2. Speak only when the NCS asks for check-ins or calls you unless...
3. If you have an emergency, say your callsign plus "emergency" or "mayday" or "BREAK, BREAK, BREAK" at any time
 - a. The NCS will stop the net and call you immediately.
4. When the NCS asks for check-ins, key up for 1 second and release the PTT to see if someone else is trying to check-in at the same time. If the repeater/channel is clear, key up again and say:
 - a. Your callsign
 - b. Your first name
 - c. Your location (ex. North Richland Hills, Wautaga)
 - d. Indicate if you have traffic for the net
5. The NCS will read back the check-ins heard at some point in the process. If your information is not correct, wait for the NCS to ask for more check-ins and check-in again and inform the NCS about your correct information.
6. The net may involve various types of exchanges depending upon the nature of the net. The NCS will call you at the appropriate time when it's your turn. **Don't forget to ID at the beginning and end of your transmission.**
7. When you are done, pass control back to NCS – ***"This is KB5WCK passing back to net"***.
8. If you hear the repeater ID'ing, stop transmitting and allow it to complete.

Join us every Thursday evening @ 7:30 pm CST on the 145.370 repeater. (145.370 – pl 110.9)

Sample QSOs (KB5WCK is calling in all cases, KB5FPW is answering)

- **Calling or answering a CQ on SSB (This is on HF or VHF SSB)**
 - **CQ CQ DE Kilo Bravo 5 Whiskey Charlie Kilo, KB5WCK**
 - KB5WCK this is Kilo Bravo 5 Foxtrot Papa Whiskey, KB5FPW
 - **KB5FPW this is KB5WCK you are 5 9, 59 here in North Richland Hills, TX. My name is Jeff, Juliet Echo Foxtrot Foxtrot QSL?**
 - KB5WCK, this is KB5FPW, you are also 5 9, 59 here in Jackson, MS. My name is Ken, Kilo Echo November.
 - <Proceed with your conversation...>
 - **Ken, thank you for the nice QSO. KB5FPW this is KB5WCK, 73.**
 - Thank you Jeff, all the best. KB5WCK this is KB5FPW, 73 and 88.
- **Calling or answering a CQ on CW**
 - **CQ CQ CQ DE KB5WCK KB5WCK K**
 - KB5WCK DE KB5FPW
 - **KB5FPW TU UR 5NN 599 NAME IS JEFF JEFF QTH IS NORTH RICHLAND HILLS TX NORTH RICHLAND HILLS TX QSL?**
 - QSL KB5WCK UR 5NN 599 NAME IS KEN KEN QTH IS JACKSON MS JACKSON MS QSL?
 -
 - **TU KEN FER NICE QSO, 73 es GDX. KB5FPW DE KB5WCK SK**
 - TU JEFF 73, 88. KB5WCK DE KB5FPW SK
- **QSO via Repeaters(FM)**
 - After listening to make sure repeater is not in use: **KB5WCK monitoring**
 - KB5WCK this is KB5WCK, good morning/afternoon/evening. Name here is Ken
 - **KB5FPW, good to meet you Ken, name here is Jeff**
 - <continue conversation, iding every 10 minutes>

- KB5FPW, 73 Ken, KB5WCK clear

So, what is 73, 88, and 59?

While operating on Amateur Radio, you may hear these “codes” on the air. What exactly do they mean and when do I use them?

Here are some codes used by ham radio operators and what they mean:

73 – Best Regards (and please, it is not 73’s, that would be Best Regardses 😊) Use this at the end of your QSO

88 – Love and Kisses You would probably use this when communicating with family or significant others (as with 73, the plural is not 88’s as that would be Love and Kisseses)

59 – Used to tell the other operator that his signal is clear and perfectly readable. This is part of the RST system shown below:

R – Readability – Understanding what is said and how well. On a scale of 1 to 5, the readability of your signal with a “5” being perfect with no difficulty.

S – Strength – On a scale of 1 to 9, indicates how strong your station’s signal is. A “1” is a very faint signal. A “9” is an extremely strong signal.

T – Used for morse code signal reports. Indicates on a scale of 1 to 9 the quality of the tone of the morse code “dits and dahs”. From a “60 cycle harsh tone” a (1) to a “very pure tone” of a (9).

R = READABILITY

- 1 -- Unreadable
- 2 -- Barely readable, occasional words distinguishable
- 3 -- Readable with considerable difficulty
- 4 -- Readable with practically no difficulty
- 5 -- Perfectly readable

S = SIGNAL STRENGTH

- 1 -- Faint signals, barely perceptible
- 2 -- Very weak signals
- 3 -- Weak signals
- 4 -- Fair signals
- 5 -- Fairly good signals
- 6 -- Good signals
- 7 -- Moderately strong signals
- 8 -- Strong signals
- 9 -- Extremely strong signals

T = TONE

- 1 -- Sixty cycle a.c. or less, very rough and broad
- 2 -- Very rough a.c. , very harsh and broad
- 3 -- Rough a.c. tone, rectified but not filtered
- 4 -- Rough note, some trace of filtering
- 5 -- Filtered rectified a.c. but strongly ripple-modulated
- 6 -- Filtered tone, definite trace of ripple modulation

- 7 -- Near pure tone, trace of ripple modulation
- 8 -- Near perfect tone, slight trace of modulation
- 9 -- Perfect tone, no trace of ripple or modulation of any kind

Tips for Learning CW

Why learn CW?

- It's a fun and rewarding "journey"
- DX with 100 watts and a wire? No problem!
- Every day can be Field Day!

When Learning CW:

- **Do ...**
 - Use Fahrnsworth, Koch, and "words-worth" methods
 - Make a plan, set S.M.A.R.T. goals
 - Find a buddy, take a class, use peer pressure
 - Start learning to send immediately
 - Practice every day
 - Celebrate successes, accept setbacks
 - **Get on the air!**
- **Don't ...**
 - Count **dits-n-dahs** – ever!
 - Write down characters as you copy
 - Start with a straight key or a bug
 - Practice too long at any one sitting
 - Use CW decoders or a keyboard
 - Try to learn another skill at the same time

Resources

- **Training Classes**
 - Long Island CW Club
 - CW Academy
 - ARRL Practice Files
 - W5IY group CD's (\$)
- **On-the-Air Activities**
 - 3905 Century Club CW Nets
 - NAQCC QRS Nets
 - **W1AW Bulletins**
 - CW Novice "Safe Zones"
- **Learning Apps**
 - CWOps Morse Code Trainer (WWW)
 - Learn CW Online (WWW)
 - Ham Morse (iPhone)
 - Just Learn Morse Code (Windows)

- Morse Runner (Windows)
- RufzXP (Windows)
- SpeedCalls (MAC)

“CW is for those that don’t have much to say and want to take a long time to say it”

What is Ham Radio?

■ A man in Dallas receives a data transmission from an orbiting satellite. He forwards the data to a university in Norway, to help the students with a science project.

■ During a Colorado wildfire, communications assistance from volunteer Amateur Radio operators helps save lives and property.



■ A woman in Connecticut uses a pocket-sized handheld radio when she's out of cell phone range to talk to her friends in North Carolina.

This unique mix of fun, public service, and experimentation is the distinguishing characteristic of Amateur Radio, also called "ham" radio.



US Amateur Radio Bands

US AMATEUR POWER LIMITS — FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

Amateurs wishing to operate on either 2,200 or 630 meters must first register with the Utilities Technology Council online at <https://utcc.org/plc-database-amateur-notification-process/>. You need only register once for each band.

2,200 Meters (135 kHz)



630 Meters (472 kHz)

5 W EIRP maximum, except in Alaska within 496 miles of Russia where the power limit is 1 W EIRP.

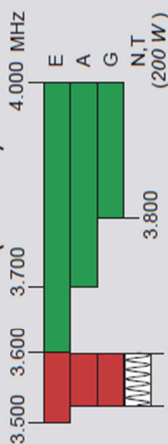


160 Meters (1.8 MHz)

Avoid interference to radiolocation operations from 1.900 to 2.000 MHz



80 Meters (3.5 MHz)

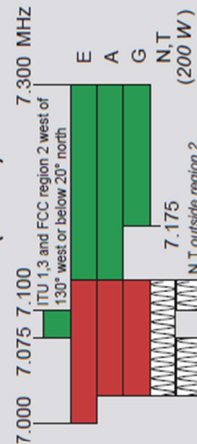


60 Meters (5.3 MHz)



General, Advanced, and Amateur Extra licensees may operate on these five channels on a secondary basis with a maximum effective radiated power (ERP) of 100 W PEP relative to a half-wave dipole. Permitted operating modes include upper sideband voice (USB), CW, RTTY, PSK31 and other digital modes such as PACTOR III. Only one signal at a time is permitted on any channel.

40 Meters (7 MHz)



See Sections 97.305(c), 97.307(f)(11) and 97.301(e). These exemptions do not apply to stations in the continental US.

30 Meters (10.1 MHz)

Avoid interference to fixed services outside the US.



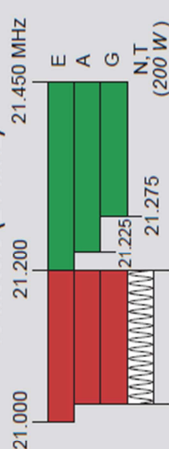
20 Meters (14 MHz)



17 Meters (18 MHz)



15 Meters (21 MHz)



12 Meters (24 MHz)



10 Meters (28 MHz)



6 Meters (50 MHz)



2 Meters (144 MHz)



1.25 Meters (222 MHz)



*Geographical and power restrictions may apply to all bands above 420 MHz. See The ARRL Operating Manual for information about your area.

70 cm (420 MHz)*



33 cm (902 MHz)*



23 cm (1240 MHz)*



All licensees except Novices are authorized all modes on the following frequencies:

2300-2310 MHz	10.0-10.5 GHz †	122.25-123.0 GHz
2390-2450 MHz	24.0-24.25 GHz	134-141 GHz
3300-3500 MHz	47.0-47.2 GHz	241-250 GHz
5650-5925 MHz	76.0-81.0 GHz	All above 275 GHz

† No pulse emissions

KEY

Note: CW operation is permitted throughout all amateur bands.
MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz.
Test transmissions are authorized above 51 MHz, except for 219-220 MHz

- [Red bar] = RTTY and data
- [Green bar] = phone and image
- [Blue bar] = CW only
- [Yellow bar] = SSB phone
- [Cyan bar] = USB phone, CW, RTTY, and data
- [Orange bar] = Fixed digital message forwarding systems only

- E = Amateur Extra
- A = Advanced
- G = General
- T = Technician
- N = Novice

See ARRLWeb.org at www.arrl.org for detailed band plans.

ARRL We're At Your Service

ARRL Headquarters:
860-594-0200 (Fax 860-594-0259)
email: hq@arrl.org

Publication Orders:

www.arrl.org/shop
Toll-Free 1-888-277-5289 (860-594-0355)
email: orders@arrl.org

Membership/Circulation Desk:

www.arrl.org/membership
Toll-Free 1-888-277-5289 (860-594-0338)
email: membership@arrl.org

Getting Started in Amateur Radio:

Toll-Free 1-800-325-3942 (860-594-0355)
email: newham@arrl.org

Exams: 860-594-0300 email: ve@arrl.org

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ARRL WAS Map

Worked All States

ITU-9

Dashed lines mark
ITU zone boundaries.

ITU-2

ITU-3

ITU-6

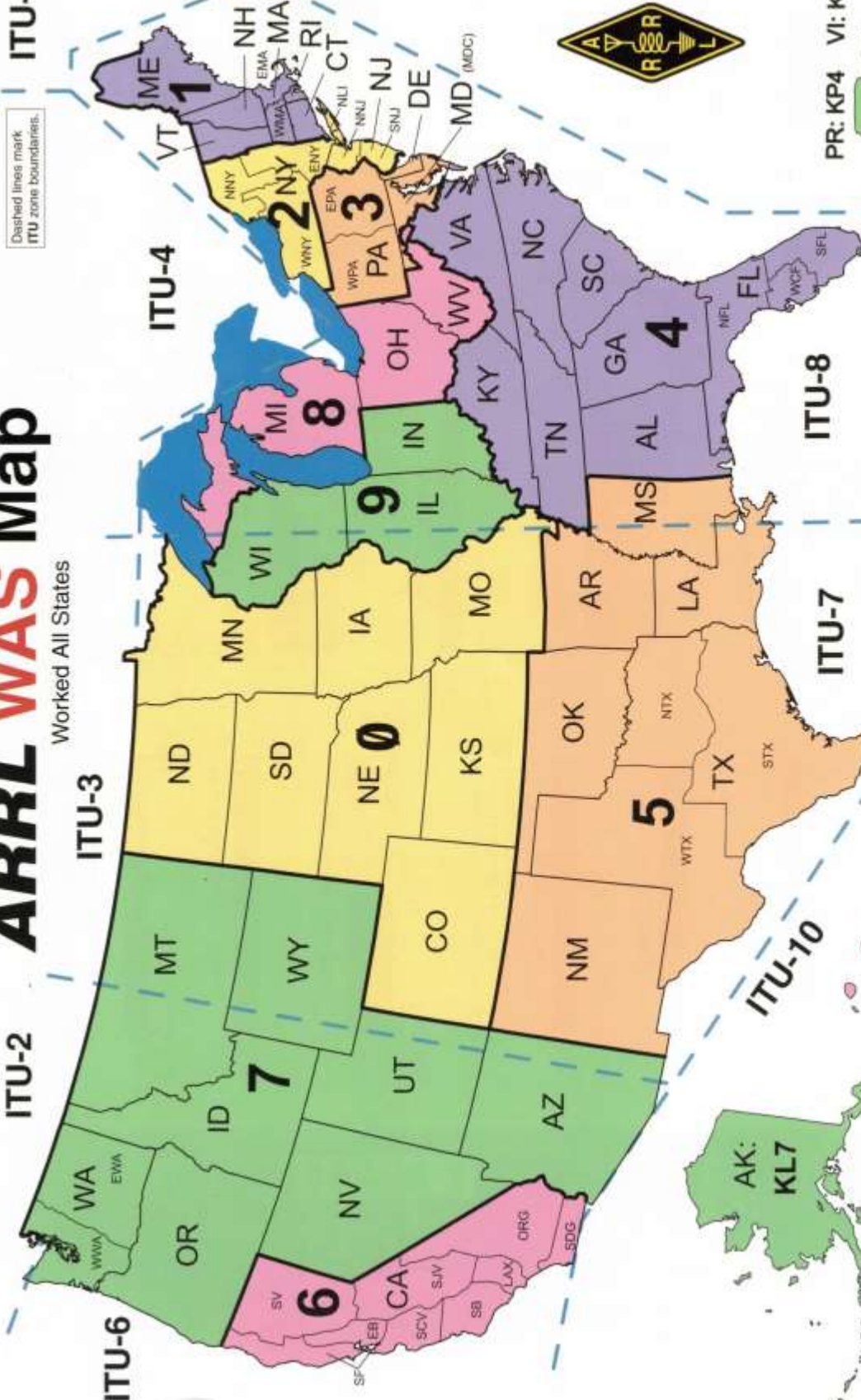
ITU-4

ITU-7

ITU-10

ITU-8

ITU-11



PR: KP4 VI: KP2

ITU-11

ARRL We're At Your Service

ARRL Headquarters
Publication Orders
Membership/Circulation Desk
Getting Started in Amateur Radio
Exams
ARRL on the World Wide Web
www.arrl.org
860-594-0200 (Fax 860-594-0259)
Toll-Free 1-888-277-5289 (860-594-0355)
Toll-Free 1-888-277-5289 (860-594-0338)
Toll-Free 1-800-326-3942 (860-594-0355)
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HI and Pacific: KH6

ARRL The national association for
AMATEUR RADIO

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Amateur Radio...

Serving Your Community



Events such as marathons and bike-a-thons; fund-raisers such as walk-a-thons; celebrations such as parades; and exhibits at fairs, malls and museums — these are all large, preplanned, non-emergency activities.

Amateur Radio people (also called "hams") are well known for our communications support in disaster and post-disaster situations. But did you know we also provide communication services to the public during special events?

How Amateur Radio Works With Event Sponsors and Public Safety Officials

We're called "amateurs" because we are not paid. Our services are provided at no charge. Like amateur sports, we do it for the love of it! We may be called "amateurs," but our communications services are professional.

Amateurs and their equipment can interface with both public safety efforts and event organizers.

Our equipment can be made operational quickly inside a building, in a mobile command post or out in field units.

Hams are trained, organized volunteers willing to meet the communications needs of the event sponsor.

Police and fire radios are for tactical or operational traffic in emergencies. Amateur Radio offers administrative radio communications options for use in your overall management and coordination of the event.

Hams have a readiness to receive specific training for your individual event.

You have instant communications from the starting line to the finish line, the official's area, net control, water stations, aid stations, medical facilities, sag wagons, floats, grandstands, parking areas, review stands and medical command facilities.

Once the necessary introductions have been made, the rest is easy because Amateur Radio people are indeed the experts in meeting communications requirements of every sort. This is what we love to do!

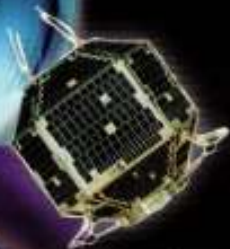
Our radio messages can go to just one location at your event, or event-wide, instantly. Hams can even track the locations of multiple mobile units in real time and display them on a map.

**It's symbiotic.
You need us,
and we want
to help.**



22 THINGS YOU CAN DO WITH AMATEUR RADIO:

TECHNOLOGY THAT'S AS COOL AS YOU WANT TO MAKE IT



EXPAND YOUR WORLD

1. Talk around the world without the Internet or cell phones. Use your own "Internet" when the "other one" is down.
2. Send your voice, text and pictures to unusual places, both near and far.
3. Create your own network of ham radio friends and send instant text messages without cell phones.
4. Meet awesome people from all over the U.S. and around the world, on-the-air and in person at ham radio events.

EXPLORE AMATEUR RADIO

5. Talk through satellites or with astronauts on board the International Space Station.
6. Send messages in code—learn Morse code.
7. Be a signal sleuth, "Fox" hunt for hidden radio signals, and with GPS—GeoFox!
8. Investigate the many new combined radio-Internet communication techniques.
9. Try a new sport—Radiosport: Compete-on-the-air for awards and fun!
10. Send a message around the world using less electricity than a nightlight.

PUT RADIO TO WORK

11. Become a weather spotter and help your community prepare for weather events.
12. Use Amateur Radio to control models, robots, or even drones.
13. Support recovery efforts in emergencies.
14. Earn badges and patches through Scouting programs and participate in worldwide radio events.



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(Continued from front)

15. Use your radio for community service! Provide communications for a bike race or a marathon.
16. Track your friends, pets, or wildlife using your ham radio.
17. Take ham radio along when you go hiking or camping. You'll never be out of contact with ham radio!
18. Collect weather and flight data by releasing and tracking a high-altitude balloon.
19. Learn how radio is used to explore space.

GO BEYOND THE MENU: CREATE TECHNOLOGY

20. Do it yourself, build and test your own gear.
21. Experiment with new software applications for radio, or create your own.
22. Learn the radio science that powers cell phones, Bluetooth and all of the hottest wireless technologies.

FIND OUT WHAT OTHER YOUNG HAMS
ARE UP TO AT: WWW.ARRL.ORG/YOUTH

There are over 700,000 Amateur Radio (otherwise known as "ham") operators in the United States and 3 million worldwide. To get your Amateur Radio License you'll need to take a 35-question, multiple choice exam. **Anyone—of any age—can be on-the-air as an Amateur Radio operator!**



ADVENTURE IS WAITING...



ARRL The national association for
AMATEUR RADIO®
225 Main Street • Newington, CT USA 06111
(860) 594-0200 • www.arrl.org



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Membership Application

Application for use by ARRL Affiliated Clubs

Contact Information

- ☐ I am a **brand new member** or my membership has been lapsed for 2 or more years. My club will keep \$15 of my dues.
☐ I am **renewing** (includes lapsed members of less than 2 years). My club will keep \$2.00 of my dues.

Name _____ Call Sign _____

Address _____

City _____ State _____ ZIP _____

Email _____ Phone _____

Date of Birth ____/____/____ Get an annual birthday coupon (US only)

My Family Member is Joining or Renewing: (\$10 per member)

Name _____ Call Sign _____

Name _____ Call Sign _____

Your Annual Membership Dues – Circle Your Choice/s.

	1 Year	2 Years	3 Years	
US	\$49	\$95	\$140	Monthly QST via standard mail for US members
Youth	\$25			Must be 21 years old or younger AND the oldest licensed Radio Amateur in the household
Canada	\$62	\$120	\$177	Monthly QST via standard mail for Canadian members
International	\$76	\$147	\$217	Monthly QST via standard mail for International members
International/Canada – no print QST	\$49	\$95	\$140	Digital QST only
Family	\$10	\$20	\$30	Must reside with primary member and have corresponding membership dates; no extra copies of QST
Blind	\$10	\$20	\$30	No QST delivery; all other member benefits apply. Requires a one time signed and dated statement of Legal Blindness

Additional membership options available online at www.arrl.org/join. US Memberships include \$21 per year for subscription to QST. Dues are subject to change without notice and are non-refundable. Only one free book and one monthly issue of QST per family. Memberships may not be combined with any other promotion or special offer.

- ☐ I do not want my name and address made available for non-ARRL related mailings.

Payment Information

Please charge my ARRL dues less my club's commission. I have paid the commission directly to my club.

\$ _____ Total Charge to: ☐ Visa ☐ MasterCard ☐ Amex ☐ Discover ☐ Check Enclosed

Card Number _____ Expiration Date _____

Card Holder's Signature _____

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Toll free (US) 1-888-277-5289 or 860-594-0200 • www.arrl.org/join

Useful Links

- **Station Building, Antennas and Operating**
 - Station Project Blog – stationproject.blog
- **Radio Programming**
 - RT Systems Programmers – <http://www.rtsysteminc.com>
 - Chirp – <http://chirp.danplanet.com/projects/chirp/wiki/Home>
- **Satellites**
 - AMSAT Sat List – <http://amsat.org/two-way-satellites>
 - AMSAT Sat Status – <http://amsat.org/status>
- **EchoLink**
 - Registration and Software – <http://echolink.org>
- **Antennas and Baluns**
 - Buckmaster OCF Dipole – <http://hamcall.net/7bandocf.html>
 - Balun Designs – <http://www.balundesigns.com>
 - Buddipole Antennas – <http://www.buddipole.com>
 - Max Gain Systems Push-up Masts – <http://mgs4u.com/fiberglass-push-up-masts>
 - End-Fed Antennas – <http://www.lnrprecision.com/store/EndfedZ-Antennas-c10468543>
- **Software**
 - DXLab Logging Suite – <http://www.dxlabsuite.com>
 - WSJT-X – <http://physics.princeton.edu/pulsar/k1jt/wsjsx.html>
 - JTAlert – <http://hamapps.com>
 - GridTracker – <http://gridtracker.org>
 - N3FJP – <http://n3fjp.com>
 - Ham Radio Deluxe – <http://hamradiodeluxe.com>
 - FL Suite of apps, FLRig, FLDigi, etc – <http://www.w1hkj.com>
 - MacLoggerDX – <http://dogparksoftware.com/MacLoggerDX.html>
- **Repeaters (FM, Dstar, Fusion)**
 - Repeater Book – <https://repeaterbook.com>
 - ARRL Repeater Directory (Printed)
 - Applications – (ex. iPhone, Android, RFinder)
 - Rfinder Web – <http://www.rfinder.net/websearch.html>
 - DMR Texas – <http://dmrtexas.net>
- **QSL'ing**
 - LoTW – <http://lotw.arrl.org>
 - QRZ – <http://qrz.com>
 - eQSL – <http://eqsl.cc>
 - ClubLog – <http://clublog.org>
- **Interesting Links**
 - Part 97 – <http://www.ncvec.org/page.php?id=320> , <http://www.arrl.org/files/file/Regulatory/<arch%208,%202018.pdf>
 - Question Pools – <http://www.mcvec.org/page.php?id=356>
 - Near Real-Time MUF Map – <http://www.spacew.com/www/realtime.php>
 - Propagation View – <https://www.swpc.noaa.gov/phenomena/ionosphere>
 - Band Plan – <http://www.arrl.org/band-plan>
 - FCC license search - <http://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp>