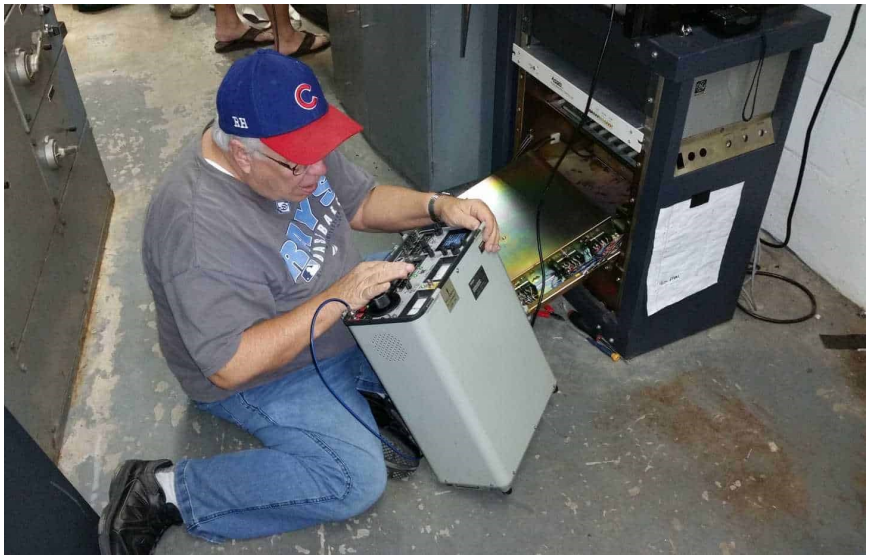
Microvolt

September 2024

A repeater is a radio station that can receive a signal and re-transmit that signal, often with greater signal power. To many of us, it's an engineering marvel that can help us communicate with others using a mere handheld radio over significant distances that might otherwise be unavailable to us.

Most newly licensed hams experience their first contacts by using FM repeaters, typically on 2 meters. You don't really need to know ***how a repeater works*** to effectively use a repeater, but you should understand ***how to work a repeater*** to be an effective repeater operator. Let's explore what all that means.



Cover – Repeaters

Technically, a repeater can be configured in a number of ways, but for our purposes, we're going to keep it simple. Let's assume our repeater uses FM on 2 meters or 70 cm.

A typical FM repeater is set up with an input frequency, an output frequency, and a tone. Using the drawing below of Jim, Tony, and their 2-meter FM repeater as an example, let's walk through that operation.

The repeater has been programmed such that its output frequency (the one it uses to ***transmit its signal***) is set to, say, 146.760 MHz. Why this frequency? Because its owner consulted with the ***Frequency Coordinator*** to get that frequency assigned to his 2-meter FM repeater per its location and power level.

The repeater has also been programmed such that its input frequency (the one it uses to ***receive your signal***) is set to 146.160 MHz. Why this frequency? Because its owner understands that 1) since his repeater is a 2-meter FM repeater, it must use a 0.6 MHz ***offset***, the difference between the repeater input and output frequencies and 2) he understands that the input frequency must be 0.6 MHz less than the output frequency in Utah, determined as follows:

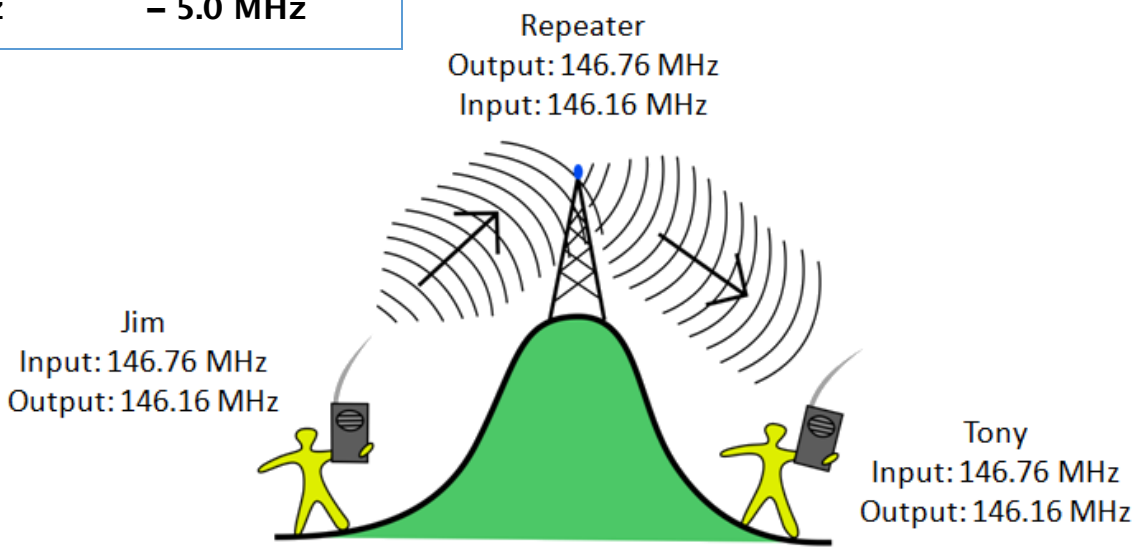
Repeater output is	Repeater input is
> 147.000 MHz	+ 0.6 MHz
≤ 147.000 MHz	– 0.6 MHz
any 70 cm MHz	– 5.0 MHz

With their radios both programmed to match these, when Jim presses his PTT, the "146.760" on his radio display automatically changes to "146.160" to let him transmit (output) from his radio to the repeater's input. The repeater then receives the signal on 146.160 MHz and sends it, or "re-transmits it" out everywhere on 146.760 MHz, its output, allowing Tony to receive it on 146.760 MHz, his input.

In addition to the above, and missing from the diagram, most repeaters require a sub-audible (you can't hear it) ***tone*** sent to it from your radio, to enable its "re-transmit" feature. Without this tone, the repeater requiring it will simply ignore your signal.

Also missing from this discussion is the idea of ***bandwidth***. All Utah amateur FM repeaters use the WIDE bandwidth setting, so be sure to set that instead of NARROW, or your signal might not sound as expected. Most other US FM repeaters also use a WIDE bandwidth, but be sure to check the band plan in other states whose repeaters you plan to use.

Microvolt editorial staff



Club news

UARC doesn't hold a July or August club meeting, so there's not much to show you. However, Club Intelligence has spotted two of our most well-known members actually enjoying themselves at a meeting of a Utah County club that shall go unmentioned.

You can view past club meeting presentations on our YouTube channel: ***https://www/youtube.com/c/UtahAmateurRadioClub***

(Photos courtesy KNØJI)

Notice to all UARC members in good standing

The Utah Amateur Radio Club is governed by its bylaws, last amended in October of 2002, and a lot has taken place in 22 years. As a result, our bylaws have fallen out-of-date, requiring us to update them, but the proposed changes must be approved by a vote of the membership. We are required to notify the voting club members in good standing at least 48 hours prior to taking such a vote, ***so this serves as your notification***.

We're also required to hold the bylaws modification vote at an in-person meeting with a quorum of 10% of the voting membership in attendance, and because we have members scattered across the country, this will not be a trivial task. We plan to vote on proposed bylaws changes ***at the start of our 12 September 2024 in-person meeting*** if we can attract enough members to constitute a quorum.

So, if you're able, please, PLEASE attend at least the first part of the September meeting, and invite any fellow club members you know. The location of the September club meeting is room 2230 of the Warnock Engineering Building on the University of Utah campus. This only serves as a meeting notice; you can see the actual proposed amendments on the next page.

Thank you,
UARC Board

UARC is now officially a 501(c)(3) non-profit

After long last, UARC has finally received the letter from the IRS in July 2024 indicating our club is officially designated as 501(c)(3) non-profit status, paving the way to a number of opportunities going forward.

End of the printed and mailed Microvolt

We're about to reach the end of a long era. Or rather, we're about to embark on a new era. Starting with the January 2025 issue, *Microvolt* will no longer be mailed out in printed form, and will be available in digital form (online) only. The December 2024 issue will be the final issue that we plan to print and mail to members generally. If you'd like a printed copy, and don't have reasonable access to a color printer, please reach out to us at **uarc@xmission.com**

A special announcement

We, the UARC Board of Directors, propose that our bylaws be modified to accommodate the growth of the club and the digital age that is prompting us to update our communication methodology. Specifically, we are attempting to change 1) upon what conditions we should decide to hold meetings and 2) what constitutes a voting quorum in the club, to amend the bylaws and fill leadership roles.

Here are the two bylaws sections as they currently stand:

SECTION IV: AMENDMENTS

The **Bylaws** may be adopted and amended by a two-thirds (2/3) majority vote of the **membership** present at any duly called meeting (provided they constitute a **quorum** as defined in **Section VII**). Proposals for **amendments** shall be submitted in writing to all **members** of the **Club** one month before the actual vote.

SECTION VII: MEETINGS

Meetings shall be held at least once each month except in July and August. A regular date, time, and place for the **meeting**, excepting **special meetings**, shall be selected by the **Board of Directors**, but may be altered by a majority vote of the **membership**. **Special meetings** may be called by the **President**. He/she shall be required to call a **special meeting** upon receipt of a written request signed by five (5) or more voting members.

All **members** shall be notified at least forty eight hours before the time set for a **meeting**. The voting **members** present at any duly called **meeting** shall constitute a quorum for all purposes. However, the election or removal of **officers** or change of **Bylaws** shall require a minimum of ten per cent of the voting **members** to constitute a quorum.

Here are the proposed replacements for the above two bylaws sections:

SECTION : MEETINGS

Meetings shall be held at least once each month except in July and August. The Board of Directors shall select a regular date, time, and place for the meeting, excepting special meetings. Special meetings may be called by the President who shall be required to call a special meeting upon receipt of a written request signed by twenty-five (25) or more voting members. All members shall be notified electronically at least forty-eight hours before the time set for a special meeting.

SECTION : VOTING

The election or removal of officers or amendment of Bylaws shall require a minimum of five percent of the voting membership present to constitute a quorum. The voting members present at any duly called meeting shall constitute a quorum for all other purposes.

A special announcement, cont'd

Justification for the above proposal:

1. If, for example, to learn how voting is administered in the current bylaws as written, the reader knows the rules are in there, but the only way to find it is to read the whole document.
2. Furthermore, as soon as you think you've found an answer to the question of voting (again as an example) in the section labeled AMENDMENTS the reader is directed to yet another section titled MEETINGS to obtain the other portion of the answer to that particular question.

Hence there are actually two topics intermixed in the current bylaws, and each topic is referenced by its own section with its own label. The proposed MEETINGS section contains nothing in it that does not directly pertain to running the meetings, and the proposed VOTING section contains nothing but direction on voting.

Our hands are currently tied with the original (and current) bylaws; these changes untie our hands.

You can download and examine the original full bylaws document at

https://user.xmission.com/~uarc/bylaws.html

You can visit the UARC page that displays the full bylaws document, with proposed changes in red at

https://user.xmission.com/~uarc/bylaws_proposed_changes_202409a.html

*Send your questions to **uarc@xmission.com***

For your information

Microvolt has expanded!

Your club newsletter *Microvolt* is now longer than the 8 pages you might be used to. See the rest of the story in the online version, located at

https://user.xmission.com/~uarc/Microvolt/2024/September2024.pdf

Homebrew Night 2024

Thursday 10 October 2024 is our annual Homebrew Night, starting at 7:00 pm. Bring your ideas, your gear, and your enthusiasm to the Warnock Building!

License classes

Salt Lake:

General : Tuesdays 7:00 pm to 9:00 pm
147.160+ MHz (127.3 Hz tone)

Orem:

Technician : 4 Tuesdays, 6:30 to 8:30 pm
Sep 17, Sep 24, Oct 1, Oct 8
Visit **psclass.orem.org** to register ($10)
Orem Traffic Training Room, 95 E Center St
HamStudy.org account required
Email **nojiratz@hotmail.com** for info

Exam sessions

Salt Lake County:

- Email Garth Wiscombe W7PS **w7ps@arrl.net**
  Sep 30, Oct 28, Nov 25
- Email Rick Morrison W7RIK **w7rik@arrl.net**

Utah County:

- Wed 18 Sep 7:00 pm : **Provo** : **signup**
- Sat 21 Sep 2:30 pm : **Provo** : **signup**
- Sat 21 Sep 10:00 am : **Eagle Mtn** : **signup**

Club repeaters

Farnsworth Peak : 146.620– MHz (no tone)
Scott Hill : 146.620– MHz (no tone)
Lake Mountain : 146.760– MHz (no tone)

SDRs and beacons

Northern Utah WebSDR : **sdrutah.org**
KK7AVS SDR : **k7xrd.club**

N7RIX SDR : **https://sdr.n7rix.com**
K7JL beacon 28.2493 MHz

HF remote and club transceiver stations

If you'd like to learn how to get started using the remote stations, visit the **HF remotes link** on the **club website** :

https://user.xmission.com/~uarc/HFRemote.html

How can I help?

Whether you're an experienced professional or a raw beginner, the club can always use your help. Reach out to the club leadership by sending an email to **uarc@xmission.com**

Also, if you'd like to see something added to this page, please email **editor@utaharc.org**

Spotlight – Russ Long KK7QQO

Russell "Russ" Long KK7QQO first became interested in ham radio over 30 years ago. He's enjoyed listening to scanners and shortwave radio. His older brother Ken, N7FIV (now SK) had his Extra Class license, and kept encouraging Russ to get into the hobby, but Russ never got his amateur radio license because he had a hard time with Morse code.

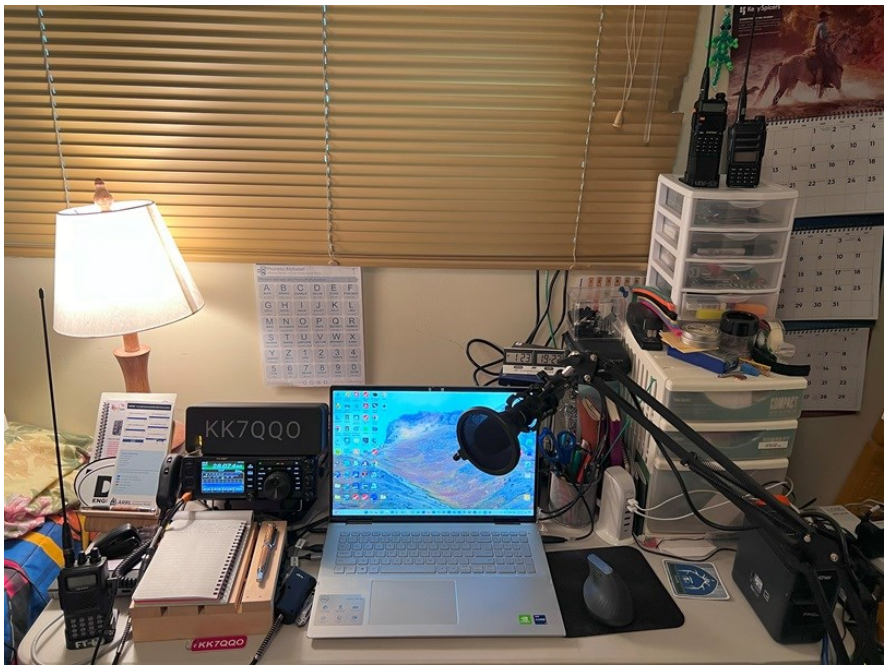
This past January, Russ's friend who shared a common interest in Boy Scouts and wood carving mentioned that he was renewing his amateur radio license. Russ told his friend about his frustration over not being able to pass the "code" requirement needed to get licensed, but when his friend told him that the "code" was no longer required, Russ decided to take the plunge.

He started studying in earnest, and passed the test at the end of January 2024. Russ took his exam remotely, administered by the Last Frontier Amateur Radio Society in Kodiak, Alaska.

Once he obtained his Technician license, Russ became active in VHF and UHF. He's now a member of ARRL, UARC, the Taylorsville ARC, Utah VHF Society, and regularly participates in the Crossroads Social Net Monday through Friday. He's made several friends in ham radio and has learned a lot during the previous few months.

This past June, Russ upgraded to General Class, and the timing couldn't be better. Recently, he purchased a new radio that allowed him get on HF and he began experimenting with different antennas. He now has bragging rights to a contact with a DXpedtion on Easter Island.

Russ has worked for several companies as a software developer, but is now retired. He and his wife Paula have a son, a daughter and 3 grandchildren. Russ says his wife is very supportive of him.



He enjoys wood carving and photography, is active in his church and enjoys meeting people.

73, Russ. We wish you the best in all you do!

73, Linda Reeder N7HVF

Microvolt is the official publication of the Utah Amateur Radio Club, Inc. (UARC), 3815 S 1915 E, Salt Lake City, UT 84106, and is published monthly. Reprints are allowed with proper credits to *Microvolt*, UARC, and authors. Online versions located at **https://user.xmission.com/~uarc/Microvolt**

We encourage you to submit original pictures (highest resolution), articles, software and hardware descriptions, appropriate humor, and responses to editorials. Email your content, pictures attached, to the editor at **editor@utaharc.org** by the 20th just prior to the target month.

The **Utah Amateur Radio Club** was organized under its present name in 1927, although its beginnings may date back as early as 1909. In 1928, it became affiliated with the American Radio Relay League (club #1602) and is now a 501(c)(3) non-profit organization. It holds a club station license with the call sign W7SP, a memorial to Leonard "Zim" Zimmerman, amateur radio pioneer in the Salt Lake City area.

The club meets each month except July and August, and meetings are usually held on the second Thursday of the month at 7:30 PM in the University of Utah's Warnock Engineering Building, room 2230.

Club membership is open to anybody interested in amateur radio; a current license is not required. Dues are $20 per year, including a *Microvolt* subscription, which cannot be separated from membership. Those at the same address as a member who has paid the $20 can obtain a membership without a *Microvolt* subscription for $12. Send dues to club secretary James Bennett, 4960 W 5400 S, Kearns, Utah 84118. Send address changes to **kk7avs@gmail.com**

Tax-deductible monetary contributions are gladly accepted. Send directly to club treasurer Shawn Evans, 1338 S Foothill Dr, #265, Salt Lake City, Utah 84108-2321. For in-kind contributions, please contact **uarc@xmission.com** to make arrangements.

UARC maintains the 146.620– and 146.760– repeaters, which are administered by the UARC Repeater Committee. Direct comments and questions to any committee member. The 146.760– repeater is on IRLP node 3352.

Call the **UARC Ham Hotline** at **801-583-3002** for amateur radio information, including club, testing, meeting, and membership information. Leave a message, and we'll make an effort to return your call.

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UARC 2024 Board

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For late-breaking news listen to the UARC Information Net, Sundays at 8:30 pm on 146.620– or visit the announcement page.

We are grateful to the management of our internet service provider XMission, for the donation of our web service. For account information go to https://xmission.com/ or call 801-539-0852

EIN : **99-0407768**

Utah Business Registration : **575790-0140**

Editorial – Repeater operation terms

Many of us are acquainted with using a repeater and are familiar with terms associated with repeater operation by amateurs. But, not everybody who's licensed knows them well, and there are some slang and other repeater-related phrases that are good to know. Here's a quick review of some of the more common ones you might encounter:

- A repeater has an ***input frequency*** and an ***output frequency***. What you hear from the repeater is from its output frequency, and when you press the PTT, you're sending your signal to its input frequency. The difference between these two frequencies is called the ***repeater offset*** or ***repeater shift***, and whether the offset is "plus" or "minus" is called the ***shift direction***.
- To ***open a repeater*** means the repeater is able to hear you well enough to perform its repeat function. Typically, a repeater also requires a ***repeater tone*** to open the repeater.
- If a person is not able to ***hit the repeater***, it means he's unable to open the repeater. So, ***hitting the repeater*** means the repeater can hear and acknowledge your transmission.
- If you're not ***in the repeater***, it possibly means your radio is not set to the proper offset, or is on simplex to the repeater output frequency.
- When you hear somebody ***on the repeater***, and there's no background noise or hiss in his audio, it means he's ***full quieting into the repeater***.
- After you release your PTT at the end of your transmission to the repeater, you might hear a ***courtesy tone***, which is often a beep followed by a short, sharp sound, known as the ***squelch tail***. You might then hear the ***repeater ID***, which is the repeater giving its call sign, often in Morse code.

- While hearing somebody attempting to talk ***through a repeater***, meaning he's trying to use the repeater, you might hear a syllable here and there, but maybe not a full sentence, because the signal keeps ***cutting in and out***. We tend to say that he's not ***holding the repeater***, meaning that the repeater is only occasionally hearing him.
- Sometimes you might hear somebody who's ***tying up the repeater***, meaning that he and a friend are talking on it so long that others who might want to use it have little chance to use it for themselves.
- A person can talk on the repeater so long that he might ***time out the repeater***, which causes its ***time-out timer*** to disable the repeat function and ***reset*** or ***reboot the repeater***.
- Excessive timeouts can cause the repeater to ***go down*** until the ***repeater trustee*** can restore it to normal operation.
- Many repeaters are linked together by the internet or other means. We call that a ***repeater system***, and the repeater you use to get onto that system is a ***linked repeater***.
- Finally, there are times when you might want to communicate on the repeater output frequency, which operation is called ***talk-around*** because you're talking around the repeater and not going through it. A similar operation takes place if you talk ***on reverse***, meaning you send on the repeater output frequency and listen on the repeater input frequency. This can be useful for communicating with somebody who might be having a difficult time hitting the repeater.

Anything to add? Email ***editor@utaharc.org***

Letters to the editor

Dear Editor:

Why is coax 50 ohms? I mean, why not some other value?

Corey in South Jordan

Dear Corey:

The fact is, coaxial cable exists in a variety of impedances, especially 50 ohms and 75 ohms. To answer your amateur question, however, back in 1929, two researchers at Bell Labs calculated, then experimented to find the coaxial cable with the lowest loss at 4 MHz to support a thousand simultaneous long-distance telephone signals. It turned out that they needed to find a compromise between the highest voltage and the highest power capabilities, and they determined that 50 ohms was the optimal value.

Dear Editor:

I'm torn. Which rig should I get for POTA activation?

Charles in Mona

Dear Charles:

Maybe I can help you narrow it down. Since you're targeting POTA and not SOTA, you probably don't need to concern yourself quite so much about size because you won't likely be packing your rig on your back. And since you'll likely want 2-meter SSB capability, and might not want to take more than one rig, that'll require a "shack-in-the-box" unit. Finally, you'll need to decide on whether you should purchase new or can get away with used equipment. Most (like me) have had good experiences with purchasing used rigs, but I've heard the horror stories of a few who had inherited somebody else's problems. So, I recommend you purchase new, and if you do, that leaves you with the **Yaesu FT-991A**. It goes for a pretty penny, but it's a pretty radio.

There you go. Plus, the 991A has the added bonuses of a built-in tuner and a built-in TNC, in case you wanted to do digital, such as FT8 or Winlink. And it presents you with an array of switchable modern RF filters and a waterfall display, which can help you locate those elusive contacts! Ya know, I don't have a 991A, but maybe I just talked myself into getting one!

Dear Editor:

Which coax type is best for ham radio?

Jim in Draper

Dear Jim:

Your *best* coaxial cable choice will primarily depend on your target band(s), its price, and its length. Here's a nutshell guide to help you decide:

Band	Length	Coax
VHF/UHF	< 50 ft	RG-8X
VHF/UHF	> 50 ft	LMR-400
HF	< 100 ft	RG-8X
HF	> 100 ft	LMR-400

I don't recommend RG-58 for VHF longer than 15 feet or HF longer than 30 feet. I recommend LMR-400 over RG-213 and RG-8 because LMR-400 exhibits lower loss for the price point. The very best is probably Andrew Heliax LDF, which is often used on repeater installations, but it's way too expensive, overkill, and difficult to install for us mere mortals.

Send your questions to ***editor@utaharc.org***

Tech corner – Portable repeater kit

Every once in a while I find myself with a group of ham radio operators who need to communicate with each other, but are somewhat spread out, or separated by some hills. At those times, it's convenient to use a local repeater to allow us all to stay in contact over the distances. But occasionally there are simply no repeaters available to us, so the ability to set up a temporary and portable repeater of my own has come in really handy.

I've **demonstrated previously** how to set up a cross-band repeater, including all the rules that govern its usage. This time, I'll explain how to create a complete portable kit for one, making it easy for you to pack it around and quickly set up the repeater when you need it. I list the TYT TH-7800 mobile radio because it's inexpensive, can do cross-band repeat, and is very available as of the date of this article. Other cross-band capable mobile radios work just as well.

Parts list

One **Apache 3800 weatherproof case**

One **TYT TH-7800 mobile radio**

One **12 VDC 12 Ah LiFePO$_4$ battery**

One **Diamond RH205 telescopic antenna**

12-foot **RG-8X coaxial cable, PL-259**

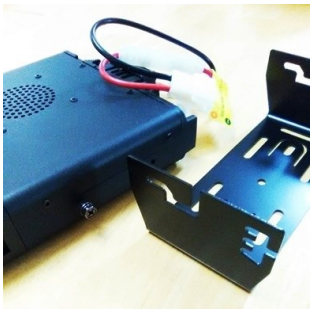
One **PL-259 to BNC female angle adapter**

Two **Anderson Powerpole 30 A connectors**

One **Anderson Powerpole F2 adapter cable**

Radio and case construction

Loosely install the four 4-mm mounting screws in the sides of the radio, and slip the mounting bracket under the mounting screws to sit the radio at an angle, then secure all four mounting screws.




The Apache 3800 case is an inexpensive Pelican-style replica of similar dimensions and comes with two layers of pick-and-pull foam inserts, carrying handle, and weatherstrip seal. Beginning with the bottom insert, lay the radio on the foam and carefully tear apart the vertically rectangular foam cubes around the radio so that the radio is slightly larger than the cutout cavity, allowing for a slightly compressed fit. Re-insert the remaining foam inserts into the case.

Install a pair of 30 A Anderson Powerpole connectors to the bare ends of the power cord that's included with the radio, leaving the T-connector intact, to connect to the mating T-connector that's already on the power wires from the rear of the radio.

Tech corner – Portable repeater, cont'd

Install the F2 adapter cable onto the battery F2 tabs, and charge the battery if it isn't already fully charged.

Attach the PL-259 to BNC angle adapter to the antenna BNC connector.

Program the mobile radio with frequencies local or particular to your needs. This list should include one 2-meter repeater output frequency and one 70-cm repeater output frequency, ***both set to simplex operation***, for use as your cross-band repeater frequencies.

Disconnect the microphone from the radio and place the microphone in the slot you created for the radio, away from the mounting bracket. Lay the power cord on the microphone cord. Insert the battery, the coiled coax, and the antenna in their respective slots. Complete the assembly by carefully inserting the radio in its slot.

That completes the portable repeater kit installation.

Tech corner – Portable repeater, cont'd

Testing the portable repeater kit

Remove all the parts from the case except the foam inserts, and assemble them. Extend the antenna, and turn on the radio. Turn the left-side channel to the 2-meter frequency and the right-side channel to the 70-cm frequency intended for the cross-band repeater.

Momentarily press the center button (the one with only a white square), then turn the upper knob (of the "Main" side) until the display reads "X-RPT" as shown. Momentarily press the upper knob so that the display now reads "XSTART" as shown. Press the upper knob once more, and the transceiver is now a repeater, and the "Main" symbol disappears altogether, as shown.

Tech corner – Portable repeater, cont'd

Instruct the users of your repeater to tune to one of the two frequencies, but again setting them for simplex operation, since their HTs might automatically set them with an offset.

The portable repeater kit does have its limitations. For example, the suggested antenna works well in many situations but might not get your signal out as well as another type, which can be mounted higher. It might be in your best interest to purchase or build an antenna you can set on a mast in a tripod, for example. Also, the kit is vulnerable to weather and onlookers, possibly making it necessary to house it within a tent or other structure after removing it from the case. Furthermore, the included battery might not last as long as you need, depending on your usage.

Let me repeat

A portable repeater kit is inexpensive, easy to assemble, and just as easy to set up. For a group of ham operators that's spread out across hilly or wooded terrain and away from the reach of open repeaters, this kit can be a time-saver, if not a life-saver, keeping you in contact with each other. And if you're willing to live with its limitations, or compensate for them, it can serve you well.

Finally, as mentioned in the link above, be sure to ID from the portable repeater on both sides of the radio. Simply announcing your call sign through the portable cross-band repeater doesn't satisfy the Part 97 identification requirement of identifying from the source. This is why mountaintop repeaters are programmed to automatically announce their call signs: they're required to ID from the source, just like us.

Noji Ratzlaff KNØJI

Strays – Repeater fundamentals

If you're new to ham radio, you might have already discovered how to talk with a friend or check into a net through a repeater. Still, some find that repeater communication is a little challenging, whether they're new or experienced. Let's walk through some basics on how to send your voice through a repeater.

The necessary settings on your radio include frequency, offset, shift direction, and tone. Even after making sure these are set correctly, you still might run into a few problems, so let's talk about those.

Frequency

To set your frequency, make sure your radio is in "Frequency Mode" or "VFO" then punch in the six-digit frequency. For the 146.780 MHz repeater, for example, press 1-4-6-7-8-0 and you're set.

Offset

For 2 meters, the **offset is 0.6 MHz** (same as 600 kHz), so your offset should read 000.600. For 70 cm, the **offset is 5.0 MHz**. If your radio is capable of ARS (automatic repeater shift), simply enable that feature.

Shift direction

In much of the US, the shift direction ("SFT-D") is **negative** if your frequency is **147.000 MHz or less**, and **positive** if it's greater than 147.000 MHz. The ARS feature will also take care of this setting.

Tone

The tone (formerly "PL tone") is a kind of *password* required by the repeater to enable the re-transmit function. Most Utah repeaters require a tone, and many in Utah require **100.0 Hz**.

Troubleshooting

If your necessary settings are all correct, you might still run into a few problems, including:

- **Antenna**

If people on the repeater can't hear you well, you just might need to get a **better antenna**, such as a **Signal Stick** or a **J-pole** or a **mag-mount** antenna.

- **Location**

If you're transmitting from within your house, your vehicle, or behind a hill, your signal might become compromised. If moving a few inches doesn't help, **try stepping outside**.

- **Bandwidth**

In Utah, the repeater bandwidth must *always* be set to **Wide** (±5 kHz deviation). If you set your radio to Narrow, you might sound loud through the repeater, but a bit distorted.

- **Microphone**

If you're using the built-in microphone on your HT (handheld transceiver), you'll need to **speak very close to it**. If you're using a hand microphone, you need to keep your mouth an inch away from it. With any microphone, don't speak directly into the microphone, but **across its face**, to prevent puffing.

Also, if you begin speaking right after you press the PTT (press-to-talk) button, the first word you say might get cut off of your conversation, so **wait a second** before you begin speaking.

- **Proximity**

If you're trying to communicate with a ham who's **less than fifty feet** from you (within the same house or with a vehicle in the next lane), you could experience *desense* (desensitization), in which one radio is being overwhelmed by the nearby-frequency signal (offset) of the other radio, which won't likely happen if you're both on simplex.