

DIY

Worthwhile projects you can build on your own



Portable repeater kit

Every once in awhile 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 real handy.



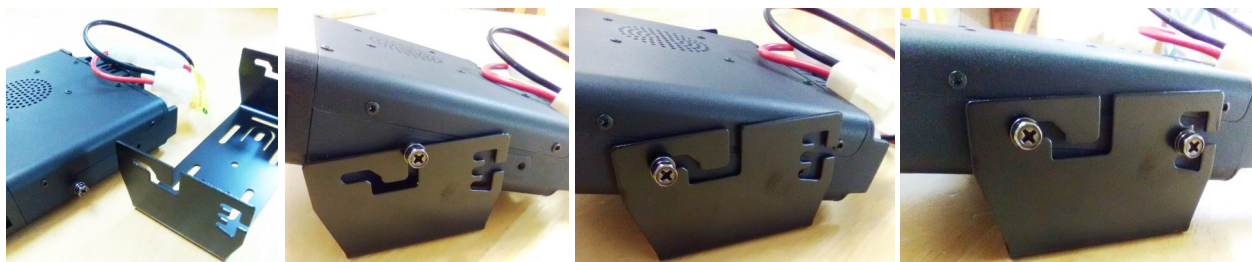
In a previous issue of the club newsletter (*UVARC Shack*, April 2018, p. 14), I demonstrated [how to set up a cross-band repeater](#), including all the rules that govern its usage. This time, I'll explain how to create a complete portable kit for one, making it easy for you to pack it around, and quickly 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 SLA 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

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.

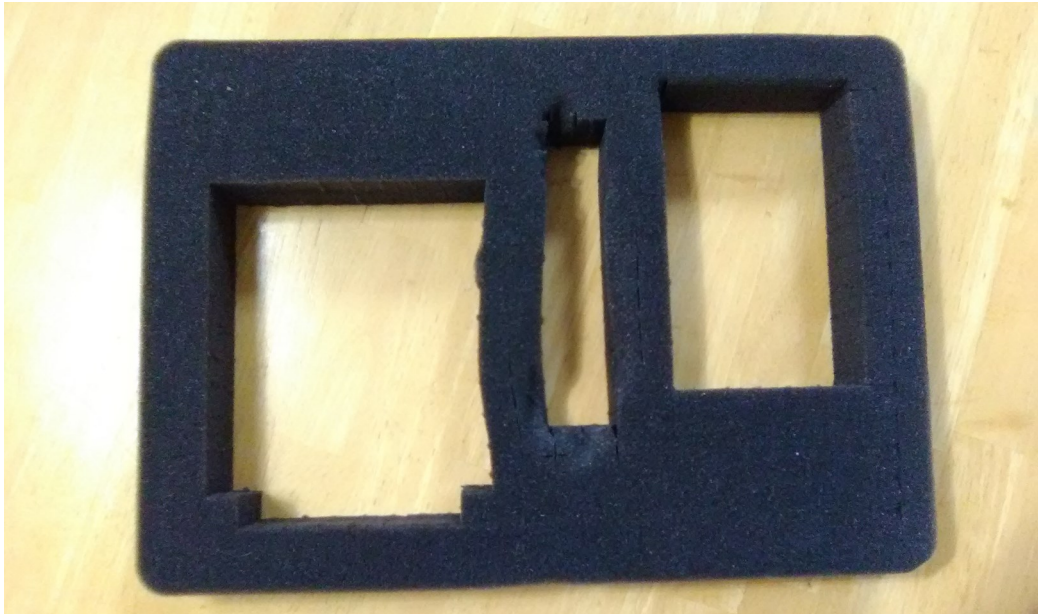


The Apache 3800 case is an inexpensive Pelican-style replica of similar dimensions, and comes with two layers of pick-and-pull foam inserts, carrying handle, and weatherstrip seal. Beginning with the bottom insert, lay the radio on the foam, and carefully tear apart the vertically rectangular foam cubes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

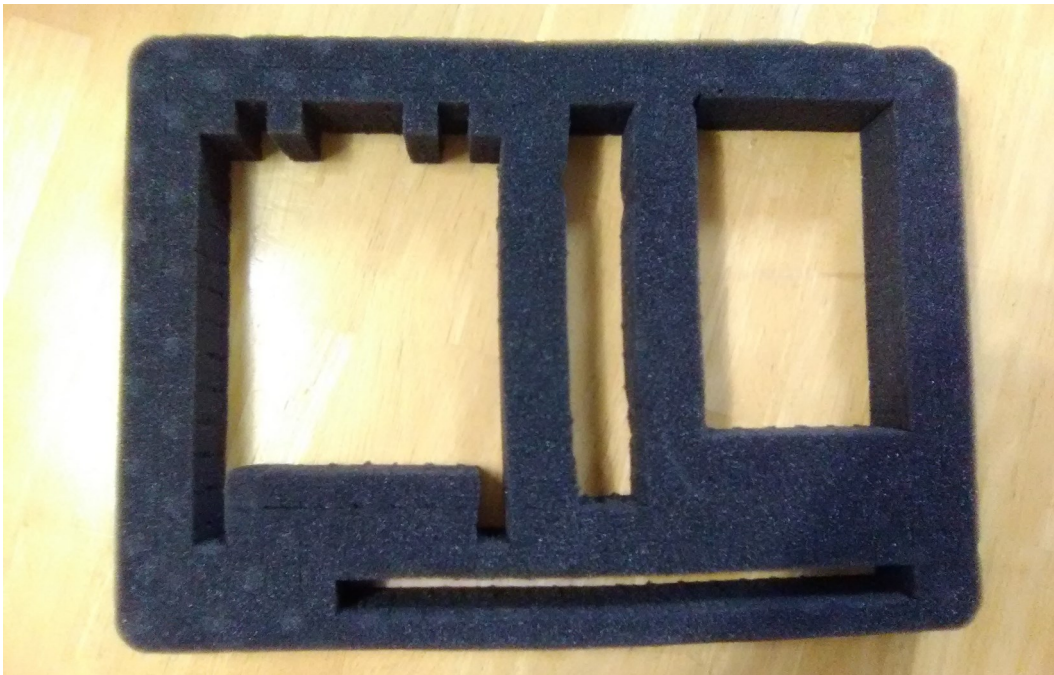


DIY, continued

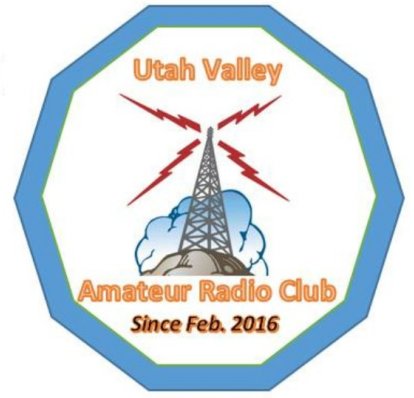
Portable repeater kit



Bottom foam insert, showing the cut-outs



Top foam insert, showing the cut-outs



DIY, continued

Portable repeater kit



Install a 30 A pair of Anderson Powerpole connectors to the bare end 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.



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.



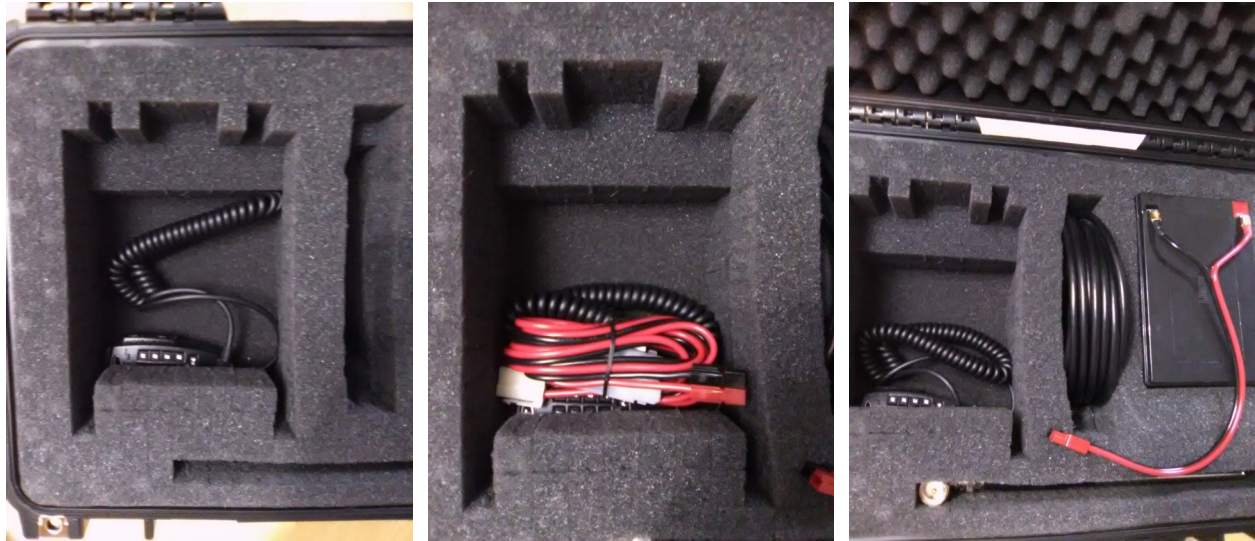


DIY, continued

Portable repeater kit



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.





DIY, continued

Portable repeater kit



Testing the portable repeater kit

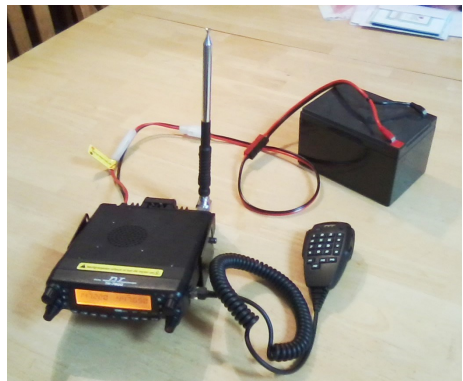
Remove all the parts from the case except the foam inserts, and assemble them. Extend the antenna, and turn on the radio. Turn the left-side channel to the 2-meter frequency, and the right-side channel to the 70-cm frequency, intended for the cross-band repeater.

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.



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 and 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, 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.



The assembled repeater kit



Let me repeat

A portable repeater kit is easy to assemble, and it's 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.

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