From the Help Desk – September 2025

Note – this is the first of an ongoing series of related articles that will each take a look at some facet of radio selection, installation, or operation as suggested by actual questions received from Club members or other amateur operators. While this inaugural column is rather lengthy, most will not be anywhere near as long. The subject matter in play here is responsible for the length.

Q: I am getting ready for a road trip to Florida, and I want to put a radio in the car for the trip, and then possibly make it a permanent installation afterwards. What would you suggest in terms of equipment, installation, and the best way to program the radio?

A: I might suggest several different approaches here, depending upon just which bands you may want to have available in the car, whether or not you are bothered by drilling holes in the interior panels, and what is available as to antenna mounting and positioning. Let's take a look at some options, starting with the radio.

Several very compact radios are available. A good choice for a two-band set might be the TYT TH-8600 2m/70cm transceiver. This is the set that I have in my own POV for VHF/UHF use. The TH-8600 is a 25-watt miniature set capable of two-way comms on the 144-148 MHz and 420-450 MHz band segments. The radio is a mere 4.2" wide, 1.8" high, and 5.4" deep, weighing only about 3-1/2 pounds. While the faceplate is not removable, the radio is compact enough to fit in minimalistic spaces and is light enough that the strong interlocking strip fasteners can hold it to the dash if necessary. This radio boats 200 memory channels and dual VFO display. The mic has a full numeric keypad, making control via the mic a snap. Programming is via a custom cable that plugs into a rear-panel data port and utilizes a USB connection to the PC. The antenna connection for a dual-band 2m/70cm antenna is via a single SO-239 socket on the radio rear panel. While antenna choices here are almost endless, I personally like and recommend the UAYESOK two-band dual-mast compact magnetic-base antenna, installed near the center of the vehicle roof if possible.

If instead a three-band radio is desired, a good choice might be the BTECH UV-25X4 tri-band transceiver. While I also own one of these units, I have not yet installed it. It too is a 25-watt unit (a 50-watt version, the UV-50X4, is also available, but is somewhat larger), operating on frequencies from 136 to 174 MHz, from 220 to 225 MHz, and from 400 to 520 MHz. Note that some of these ranges extend beyond the legal limits of the amateur bands in the USA. This unit is *tiny!* It measures only 3.85" wide by 1.83" high by 4.65" deep, and weighs an amazing 0.9 pounds. Its size and weight also lend themselves well to a Velcro®-type of temporary mount. While accessing all three available bands in this radio would require the use of a tri-band antenna, it can, of course, be utilized as a dual-band unit with a standard 2m/70cm antenna, connected via the SO-239 connector on the radio rear panel. A suitable antenna here might be the Nagoya TB-320A tri-band antenna, but other choices are available including the quad-band KT-7900 antenna that I purchased. Programming is via a standard Baofeng-type programming cable, which is then tied into the radio mic port via the specialized "Y" cable that ships with the radio.

Both of the above radios come in at just about $135 plus tax and shipping; the antennas mentioned are about $30 to $40 each. So, let's talk about the installation of these two units.

Because all else depends upon the location of the radio itself, that location must be selected at the outset. A typical location for a dash-mounted radio might be below and to the left of the steering wheel. Another popular choice is to mount the radio to the side of the center console, which often places the radio at ninety degrees to the viewer. In many cases, most of the radio control is accomplished by way of the buttons on the mic, so all that is really necessary as far as the radio itself goes is to be able to see and read the front panel frequency display. Once the user has become familiar with the radio, actually needing to refer to the front panel is greatly reduced. However, if the radio has a "remote" type of removable face plate (front panel), the options become much broader. For example, the radio body can be installed underneath the driver's seat with the wire-connected face plate mounted to or on top of the dashboard or even on the steering column shroud.

Wherever (and however) you ultimately decide to install the radio body, it must be secured against free movement. This is important both to protect the radio *and* to protect the vehicle occupants in the event of a sudden stop or impact. As a driver, I certainly would not want a four-pound projectile accelerating towards my head during an emergency stop.

Protection of the radio revolves around keeping extraneous vibration and bouncing of the radio to a bare minimum. Most if not all modern radios are assembled using lead-free assembly methods, but there is a clear-cut reason why lead-free solder is not permitted in any mission critical equipment such as aircraft avionics, medical or healthcare appliances, and in most military applications. Lead solder joints simply will not remain intact over time, and motion or vibration can accelerate their failure, thus hastening the demise of the equipment. Do your part to help avoid such early failures by properly securing all radios in fixed locations. Your bank account will thank you later.

It is recommended that the radio chosen for vehicle installation be as small as possible while still providing the requisite features. For example, a typical dual-band 2m/70cm unit should provide at least the following features:

- easily readable display with large numerals in a clean typeface;
- adjustable squelch control;
- full CTCSS access (50 discrete frequencies available);
- simple programming method (non-complex or complicated), preferably via CHIRP;
- a number of memory slots for storage of favorite frequencies, the more the better;
- compact size;
- integrated cooling fan;
- simplified switching between VFO and MEM modes;
- at least 25 watts RF output on 2m and 20 watts RF output on 70cm bands; and
- mic with capability to control the radio via buttons on the mic.

Once you have selected a radio and determined how and where to mount it, it is time to move on to the antenna. You must choose an antenna mounting location that will give good performance while permitting the antenna to be securely mounted. I have had the Amazon-purchased UAYESOK dual-band antenna on my POV for almost four years now, with absolutely no problems. The magnetic base is strong, but is well padded to avoid damage to the vehicle. I have never knocked it off the roof despite its having hit low-hanging tree limbs on several occasions. Its installed position at the center of the roof provides the best possible ground plane, which in turn offers the most desirable radiation pattern.

Routing of the antenna cable is an area where some thought must be given. It is important to choose a cable path that will not cause chafing or cutting of the cable, while still maintaining the water-exclusion capability of the door seals through which the cable will probably need to pass. It is often possible to work the cable into the gap under the door seal, dressing it in such a manner that any drip lines formed will release their water load on the outside of the seal. Many modern vehicles have dual-lipped door seals. In such cases, place the cable so that it lies between the lips, routing it so that it follows the door frame down to a point where the cable can be brought inside the vehicle without compromising the seal's integrity. Inside the vehicle, run the cable along and, if possible, under the carpet at the door sill, ultimately bringing it to the location of the radio.

Be sure to leave sufficient extra coaxial cable length near the radio to permit removal of the radio from its mount while still connected to the antenna. For example, it may at some point become necessary or desirable to set the radio on the seat while programming and testing it. Some radios have data ports that are very difficult to access without being able to actually see the rear panel of the radio. Some require the removal of a screw-retained cover in order to access the data port. The extra cable length can be stowed under the dashboard or under the seat, depending upon the installation location of the radio.

If it becomes necessary to drill any holes in order to accommodate the antenna coaxial cable feedline, be sure to drill the hole(s) large enough for the cable connector to pass through. Then, afterwards, be prepared to seal the hole around the cable using a rubber grommet with a membrane in its center. A grommet such as the Keystone #778 is an ideal choice for this purpose. It has an OD of 1.125" and fits a 1" hole in panels up to 0.062" thick. The center membrane has an expandable 0.25" hole at its center, and fits cables up to 0.3125" in diameter. The seal is necessary to a) prevent chafing of the cable, b) to exclude dust, dirt, and water, and c) to support the cable where it passes through the panel.

Once the antenna cable has been routed and the antenna installed, it is time to move on to the power provision. Despite the fact that some radios are shipped with so-called cigar lighter plugs for the power connection, it is ***NEVER*** advisable to use such a connection for the radio power. On most if not all vehicles, the cigar lighter power capability is far beneath that required by the radio. Usually, the wiring to the cigar lighter socket is no more than about a 20AWG wire, certainly not adequate for the eight to ten amperes (or

more) required by the radio during TX operation. The general rule of thumb for 20AWG stranded wire is 3.5A continuous duty. Remember that although the radio *will* receive OK with low current supplied, it will *not* transmit properly under those conditions, with different results depending upon the radio and the current available. The radio may simply shut down, or it may attempt to transmit to the best of its ability. Such transmissions can be full of spurious signals and distorted audio.

The recommended method of connecting power to the radio is to run the heavy-gauge twin-lead wire from the radio directly to the battery. At the battery, connection is made to each of the battery posts *if the vehicle does not have an alternate auxiliary power connection scheme.* Many newer vehicles require that any such direct-power connections be made to a dedicated connection point designed and provided specifically for that purpose. Either way, it is necessary to fuse the wire leads as close to the source connection point as is possible. If the harness supplied by the radio manufacturer has a fuse in each lead (the positive and the negative), it is very important to maintain that methodology when making your power connections. On the other hand, if the radio manufacturer fused only the positive lead, it is acceptable to do the same when making your connections. In case it is necessary for some readers, I will mention that the standard color-coding of the power cable is red for positive and black for negative.

The reason that the two fuses are important if the manufacturer shipped the radio with two fuses is because some radios use both the positive and negative leads as incoming power lines, meaning that the black lead dos not connect directly to the chassis of the radio, but is instead tied into some of the circuitry as a power supply feed. The purpose of mounting the fuses as close to the power source connection is so that the *entire length* of the power line(s) will be protected against short circuits, potentially from chafing in the vehicle.

Once again, wherever the power lines feed through from the engine compartment (or other battery location) into the cabin of the vehicle, the power lines ***must*** be protected from chafing and the opening must be sealed as with the antenna cable. Be sure to route the power lines in such a manner that there is no probability of burning on hot under-hood parts, no probability of pinching or chafing of the wires, and no interference with any moving parts under the hood. Also as with the antenna cable, allow for some extra wire length at the radio mounting location so that the radio can be removed from its mount while still connected to power.

If running the power lines to the battery is beyond your skill level, don't feel bad! I was a heavy-duty truck mechanic for many years, but I had a local garage run my power feed to the battery when I first installed my radio in the POV. That shop has a lift and can easily get to the area of the firewall where the wires needed to pass into the cabin. Many independent garages and most car audio shops will run these wires for you for a small fee, and it only takes a few minutes to do the job with the correct equipment available.

Once the power is available at the radio, it is time to make that connection. For this purpose, I fully endorse the use of Anderson Powerpole® connectors. You will need four connector bodies (two red and two black), and then you will need a total of four crimp-on terminals. The crimp-on terminals used for this purpose are available in three different sizes, rated for current and related to wire gauge. The 15A, 30A, and 45A crimp-on connectors all fit into the same connector bodies. Select two pairs of crimp-on connectors appropriate for the wire sizes involved here – the two attached to the radio and the two coming from the battery. Installing the crimp-on terminals to the wires and then into the connector body is a simple task with the proper equipment, but you may want to see the process demonstrated at least once so that you know how to do the job. The GCARC Clubhouse has the connectors, terminals, and crimp tool all available at the test and repair bench. Don't forget to contribute to the replenishment kitty if you use Club supplies.

Anderson Powerpole® connectors are *"gender-less"* connectors, meaning that any body of a given size will mate with another body of that same size. This makes connecting to the radio quite simple. With an Anderson Powerpole® connector pair installed to the power wire coming from the battery and another set installed to the power leads on the radio itself, these two connector sets will simply plug into each other, observing the colors when making the connection.

With all of the connections to the radio made, all that is left is to program and test the radio. In many cases, the programming is easily handled with the CHIRP computer software package. Programming is a topic for another article, so I will not go into it in depth here. However, I will mention a few pertinent pointers about using CHIRP to program a radio…

- be sure to update CHIRP to the most recent release so as to have the best possible list of radio definitions;
- it may be necessary to use a radio definition other than the actual make and model of radio at hand, as the radio that you are programing may be a clone of a different and previously defined make and model; and
- be sure to save all data files developed with CHIRP against future needs.

If planning a road trip, you may want to use *Repeater Book* or some similar reference to identify all of the repeaters along your proposed route of travel. In that way, you can then program each of the repeaters identified, in route sequence, into an empty segment of the radio's memory range, making it easy to move from one repeater to another as you travel down the highway. On the return trip, the sequence will still work, except that it will be used in reverse order.

I hope that this information will be useful to anyone planning such an installation. While it is *not* intended to be a comprehensive, cover all the bases type of explanation, it should nevertheless help to get you started with the job.