

# Build An Indoor FM Antenna



One of the biggest barriers to good FM reception is the lack of a proper antenna. The wire dipole that comes with most receivers and tuners seldom does the job, so here is how to build something with a little more gain and greater versatility. Tethered to the tuner by coaxial cable, this antenna can be moved about the room to find the spot for ideal reception, and it can be put neatly out of the way when not in use.

I have found this antenna to be much more sensitive than the usual wire dipole. Perhaps this is due to the fact that it is free-standing. A wire dipole must be fastened to a wall, which is sure to degrade its performance. The same antenna position doesn't always work for different stations, however, even when they share the same transmitting antenna. Moving the antenna just a few feet can make a big

difference. Since the antenna described here is so easy to move around, you can usually find a position where reception is good and noise-free.

Years ago, all FM stations used horizontal polarization, which made it necessary to use a horizontal antenna for reception in order to avoid a loss in signal strength of 10 to 20 dB. Now most stations use circular polarization, which works with both horizontal and vertical antennas.

The antenna shown here is a variation on the vertical quarter-wave type. Usually, the ground plane is horizontal, but here the rods that form the ground plane have been pointed downward. This increases the impedance from 50 to 70 ohms, which is better suited to FM tuners and allows the rods to serve as a tripod to support the antenna's base.

The antenna itself is of the same kind of rod as the legs. I used collapsible replacement antenna rods, which are available from most radio/TV supply shops. In fact, any metal rod that can be worked into the configuration shown will serve the same function. The minimum length required, however, is 28 inches.

The base of the antenna is a small project box—a plastic case with a metal cover. These are available from Radio Shack. Also required are a coaxial chassis connector, type F-61, and a solder lug.

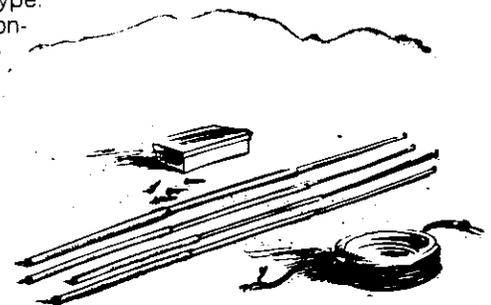
You will need a drill to complete this construction project. First, make a hole in the center of the plastic project box's bottom. Screw the antenna rod in

Illustrations: Gary Howland

## PARTS LIST

- 4 Replacement antenna masts (e.g., Radio Shack #15-232, if still available, or #270-1405).
- 1 Plastic project box with metal cover (e.g., Radio Shack #270-230 or #270-231).
- 1 Chassis-mount F-61 coax connector (e.g., Radio Shack #278-212).
- 1 75-ohm coaxial cable with F connectors, length to suit (e.g., Radio Shack #15-1531, 16 feet; or #15-1534, 25 feet).
- 1 75/300-ohm balun transformer (e.g., Radio Shack #15-1253); needed only for tuners without 75-ohm inputs.
- 1 Solder lug; if unavailable use solderless ring tongue (e.g., Radio Shack #64-3030, #64-3070, or #64-406).
- Miscellaneous: Short wire, 4 washers (optional).

A complete kit of parts is available for approximately \$12 (plus sales tax for New York residents) from: Rivera, 1845 52nd St., Brooklyn, N.Y. 11204. Supplies of kits at this price are limited, however, so send a self-addressed stamped envelope, and Rivera will advise you of updated prices and delivery dates, where necessary.



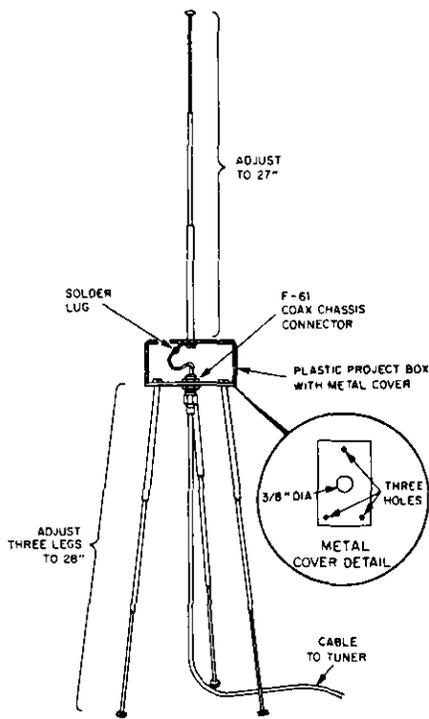


Fig. 1—Construction diagram.

place, with its retaining screw and the solder lug inside the box. It helps to bend the solder lug before passing the screw through it, to allow clearance for the wire that will have to be attached. It's also not a bad idea to use washers on the screw.

Next, drill a hole for the coax connector in the center of the metal cover. You will have to make a  $\frac{3}{8}$ -inch hole. It is suggested that you start with a  $\frac{1}{8}$ -inch bit, or thereabouts, then enlarge the hole to  $\frac{1}{4}$  inch. Now use a  $\frac{3}{8}$ -inch bit. If you don't have one, it may be possible to enlarge the hole with a rattail file. When the hole is completed, smooth the edges with a file.

Next, make three holes for the legs—one in the center of a short side, the other two in the corners of the opposite side. Be sure to allow sufficient clear-

ance, both inside and outside the case, when selecting where to drill these holes. Use a punch to "dimple" the metal before drilling. This keeps the drill bit from walking away from the spot you selected and choosing its own place for a hole. If you don't have a punch, you can use a hammer and a nail—just be sure to tap lightly.

Now pass the coaxial connector through the  $\frac{3}{8}$ -inch hole and secure it with the nut that came with it. (The nut should be on the inside of the box.) Attach the legs securely. Solder the shortest possible piece of wire to the solder lug on the antenna rod and to the solder tab of the coax connector. (Solder assures a secure connection and prevents corrosion from degrading the electrical contact.) Secure the cover with the four screws provided with the project box.

Extend each leg to a length of 28 inches and the antenna rod to 27 inch-

es, as shown in Fig. 1. Gently force the legs apart, bending the metal cover until the legs splay out just enough to provide a stable base.

The coax cable should come down to the surface on which the antenna rests before beginning its horizontal run; this prevents interference with the antenna. If your tuner or receiver has 75-ohm inputs, use them. Otherwise, you will need a balun transformer even though it slightly decreases signal strength. You may also find that minor adjustments to the rods' length will improve performance. In general, if your rods allow such telescoping, lengthening the rods will yield good results on lower numbered stations, while shorter rods will perform better on the higher numbered ones. In my location, one length—29 inches for the legs, 28 inches for the antenna—works well for all the stations I listen to.



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Illustrations: Gary Hovland

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