Joe Carr's Radio Tech-Notes

Connecting the Transmission Line to the Antenna

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Wire antennas have been popular with amateur radio operators and shortwave listeners since the very earliest days of radio. Indeed, luminaries such as Heinrich Hertz and Guglielmo Marconi used wire antennas, at least some of the time.

Figure 1 shows a typical wire antenna kit. Although you can obtain all of the materials separately, the kits are usually quite reasonable compared with the price of the individual components. The typical kit contains 25 to 50-meters of stranded copper wire, a length of coaxial cable (possibly with the cable ends already installed), two end insulators, and either a center insulator or a BALUN transformer of some sort (a center insulator is shown in Fig. 1).

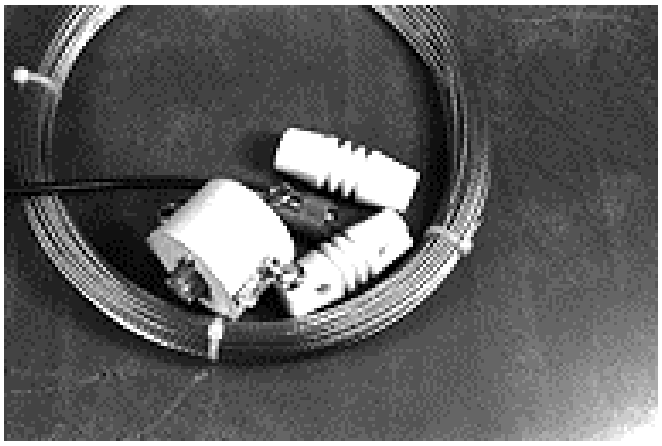

Fig. 1

If you opt for buying the components separately, then you'll find a variety of materials on the market.

There are two forms of insulators used in wire antennas: *center insulator* and *end insulators*. A center insulator is provided to permit connecting the wires of the antenna to the coaxial cable transmission line. The term "center insulator" refers specifically to half wavelength dipole antennas, but the same component can also be used on other forms of coaxial fed antennas regardless of where it is positioned. In some cases, the center insulator is replaced with a BALUN (BALanced-UNbalanced) transformer. For half wavelength dipoles the BALUN transformer should have a 1:1 impedance ratio. For other forms of antenna 4:1 or other impedance ratios are used.

End insulators are used to support the ends of the antenna. One side of the insulators is connected to the antenna wire, and the other to a rope or other form of support. Many end insulators are ribbed in order to lengthen the electrical path between the ends of the

insulator, while keeping the mechanical size smaller. In some crude antennas an end insulator is used to replace the center insulator, but that is not a recommended practice.

Splicing Wires

It is often necessary to splice two wires together when erecting wire antennas. Many premature antenna failures can be traced to improperly soldered wires. Figure 2 shows the basic method. Bare the ends of the two wires (remove insulation) and then bring the wires together side-by-side. Wrap one wire over the other five or more times (seven turns is usually recommended). Next, wrap the other wire over the first the same number of turns. When the wires are fastened together in a strong mechanical bond, then solder them. The purpose of the solder is to ensure a good electrical connection and guard against weathering. Solder does not provide mechanical strength, so should not be used for such.

Fig. 2

Connecting a Single Downlead

Figure 3 shows how the downlead and antenna wires are connected to each other. The antenna wire is passed through the hole in the insulator, with about 4 to 7-inches of free end, and then wrapped around on itself. The normal practice is to make six to ten wraps, with seven being the most common specification. Once the wire is wrapped properly, then tin it with a coat of solder. If a single wire downlead is to be used, then it can be wrapped in a similar manner, and then soldered to the main antenna wire.

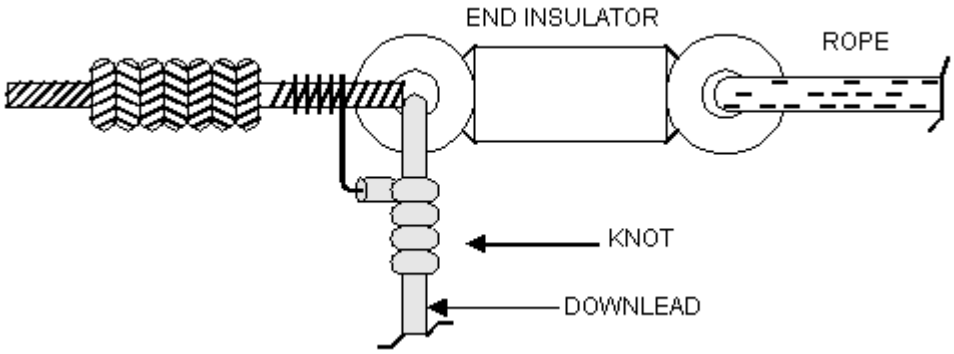

FIG. 3

NOTE: *Don't use the solder until you've checked the antenna for resonance and know it's right. Also, don't depend on solder for mechanical strength, it has none. The purpose of the solder is to ensure the integrity of the electrical connection, especially in*

weathering conditions. The reason why the wire is wrapped around itself seven times is to provide the mechanical integrity needed, as well as making a good electrical connection. The solder is needed, but keep in mind that most of the electrical connection and all of the mechanical connection is provided by a good, tight wrap, not by solder.

Figure 4 shows the same sort of insulation for a center insulator. In this case, however, the wire is passed through the eyelet bolt, wrapped around itself (soldered), and then connected to the terminal on the insulator. Most center insulators of this sort have large spade lugs for the electrical connections. The wire is laid onto the space provided, and then the connector is crimped over on the wire. It is then soldered.

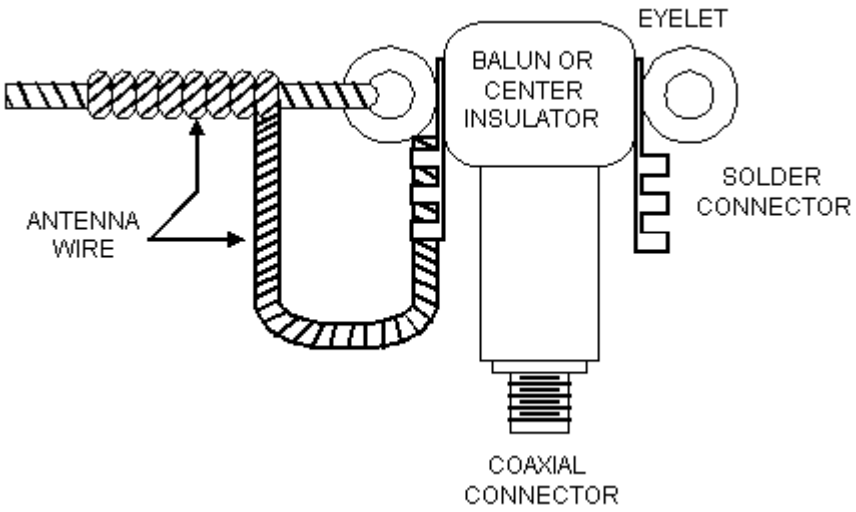

FIG. 4

The spade lugs on the center insulator are almost invariably a bit corroded when you receive them, as indicated by the fact that there is no luster to the metal. It's not a bad idea to take a wire brush or bit of sandpaper and scrap away the surface crud, leaving a bright shiny surface to which solder adhere easily. I've seen a number of bad antenna installations (and done some myself) that failed either right off, or after only a short period, because the solder connections weren't cleaned before heat was applied for soldering.