

7/8-inch hardline coax connectors construct your own at low cost

Increased Amateur use of the VHF and UHF bands has generated more interest in "hardline" coaxial cables because of their inherent low loss. Other articles have addressed one of the prime pitfalls of hardline use for Amateurs — coaxial connectors. Most discussions deal with connectors for CATV cable and develop methods for adapting UHF style connectors to this cable.¹⁻⁴ I'll deal with the modification of a commercially available "N" style connector for use on 7/8-inch, 50-ohm hardline.

7/8-inch hardline cable

Commercial 50-ohm hardline of the Heliax™ variety is quite expensive; if you can afford that, the cost of connectors is probably not a major concern. But, 7/8-inch Prodelin cable is available through a surplus dealer* for a fraction of the cost. The cable comes in any length up to 7500 feet and is made to rigid government tolerances with a thick, noncontaminating vinyl jacket that allows direct burial. (Tables 1 and 2 list the hardline characteristics.) Though Prodelin™ cable is much cheaper than Heliax, commercial connectors can run \$75 apiece. Because I wanted to use this high-grade 7/8-inch cable without the prohibitive expense of the mating connectors, I began to evaluate other alternatives.

connector "specs"

Requirements for any good connector include:

- minimal discontinuity in line impedance,
- no electrolytic action between dissimilar metals, and
- resistance to moisture penetration.¹

An "N" style connector maintains excellent impedance matching and power handling properties at frequencies exceeding 450 MHz. UG-982 or UG-982/A connectors fit the requirements perfectly by providing a high-quality male "N" connector with a moisture resis-

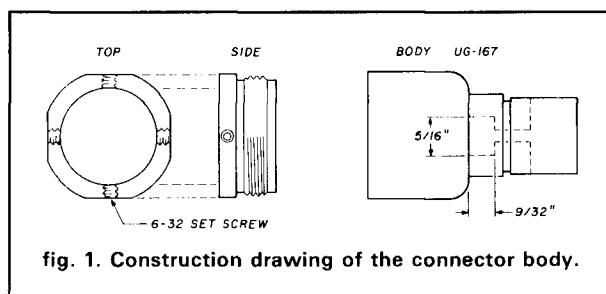


fig. 1. Construction drawing of the connector body.

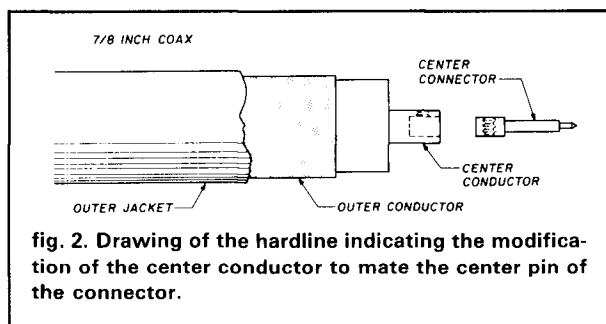


fig. 2. Drawing of the hardline indicating the modification of the center conductor to mate the center pin of the connector.

tant body that is easily adapted to 7/8-inch Prodelin-style hardline using simple tools. These connectors are common at hamfests and are also available from a number of sources.** Prices vary between \$2 and \$12 depending on source and condition.

materials and tools

Table 3 lists the common tools (found at any hard-

* A. G. W. Enterprises, Inc., RD -10, Route 206, Vincentown, New Jersey, 08088.

**The R.F. Connection (Joel G. Knoblock, Proprietor), Suite 11, 213 North Frederick Avenue, Gaithersburg, Maryland 20877 and Nema, 12240 NE 95 14th Avenue, N. Miami, Florida 33161.

By John M. Mathis, M.D., WA5FAC, 6270 Mt. Chestnut Road, Roanoke, Virginia 24018

Table 1. Physical and electrical properties of the Prodelin hardline

- 50-ohm impedance
- 7/8-inch aluminum corrugated shield
- Copper-clad aluminum solid center conductor
- Foam dielectric
- Black heavy-duty, noncontaminating outer jacket
- Can be directly buried

Table 2. Attenuation in dB/100 feet

Frequency (MHz)	RG8A/U-RG214/U	7/8-inch Hardline
3.5	0.30	0.10
7.0	0.45	0.14
14	0.66	0.19
21	0.83	0.23
50	1.35	0.37
144	2.5	0.70
220	3.3	0.90
450	4.8	1.3

Table 3. Materials

- Electric drill
- Rotary rasp (to be used with drill)
- Hacksaw
- Needle-nose pliers
- Pocket knife
- Soldering iron
- File
- 6-32-inch tap and no. 36 drill
- 7-32 and 9-32-inch drills
- Five 6-32 x 1/4-inch set screws
- Dremel tool and rotary saw blade (optional)

ware store) which were used to modify the connector and prepare the cable ends.

Refer to the construction drawings (figs. 1 and 2) during the fabrication procedure described below:

1. Cut through the black vinyl with a sharp knife. (I recommend wearing leather gloves.) Stabilize the cable with a clamp or vise. Grab the free end of the vinyl with a pair of needle-nose pliers and peel it off the aluminum outer conductor. Warming the vinyl makes this process easier. Remove about 1-1/2 inches of the black vinyl.

2. With a small hacksaw (or Dremel tool with rotary saw blade), cut through the corrugated aluminum shield 7/8 inch from the end. Try not to cut deeply into the foam dielectric. Now cut diagonally across the 7/8-inch section of shield. Peel the aluminum shield off the dielectric with a pair of needle-nose pliers (like opening a sardine can).

3. Using a pocket knife, remove the end 7/16-inch of foam dielectric from the center conductor.

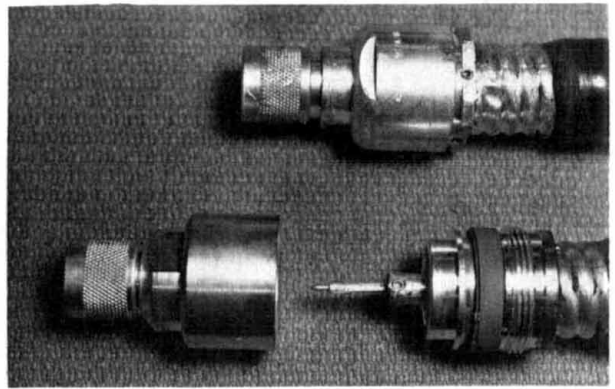


fig. 3. Partially and fully assembled connectors are pictured on 7/8" hardline coax.

4. With the 7/32-inch drill, center then make a hole 11/32 inch deep in the center conductor. Using a 9/32-inch drill, enlarge the proximal 1/16 inch of this hole leaving only the copper outer jacket of the center conductor.

5. Prepare the center pin by tapping the hole already present in the side collar to accept a 6-32 x 1/4-inch tap screw. Insert the tap screw until it contacts the opposite inner wall of the pin. With the soldering iron, fill the remaining hollow portion of the pin with solder. This stabilizes the otherwise thin wall of the pin and provides a pretapped hole for the set screw. Remove the set screw for now.

6. Hold the center pin alongside the center conductor and mark the location of the tapped hole. (Location may vary slightly with different manufacturers' pins.) Drill and tap this hole for a 6-32 inch also. Now insert the center pin into the center conductor. Align the set screw holes, insert the 6-32 x 1/4-inch set screw, and tighten. Fold the 1/16 inch of outer copper jacket over the pin body and solder the two together. (This will take at least a 150-watt iron.) If you botch the job, just cut the center conductor off and start again with step no. 2.

7. Locate the back collar of the UG-982; next we will

a flat edge every 90 degrees. Drill and tap each of these flattened edges for a 6-32-inch set screw.

8. Place the collar in a vise (the jaws of the vise should contact only the flattened edges, not the threaded portion). Don't overtighten the vise. With the rotary rasp, widen the inner diameter of the collar so that it fits snugly over the corrugated aluminum shield. Go slowly and check your progress often.

9. The connector is now ready for final assembly. Place the collar (with four 6-32 x 1/4-inch set screws) and moisture-proof "O" ring assembly over the cable. Slide on the main connector body and engage the threads between the connector collar and body. First tighten

the collar and body of the connector together; then secure the four set screws to the aluminum outer jacket. (Figure 3 shows both partially and fully assembled hardline connectors.)

10. Waterproof the connector body and adjacent cable with 1-inch heat shrink. Silicone rubber* along the edges of the heat shrink finishes the job.

In my installation, I have 500 feet of 7/8-inch hardline between my shack and the top of my tower. Multiple measurements have revealed that the hardline, with adapted connectors, meets hardline specifications (table 2) with no measurable loss due to the connectors.

*GERTV 162-302 tubes are available from the **HAM RADIO** Bookstore for \$9.95, plus \$3.50 shipping and handling.

references

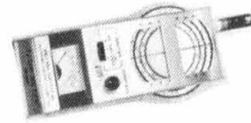
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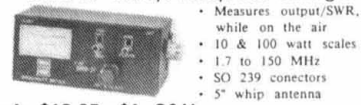
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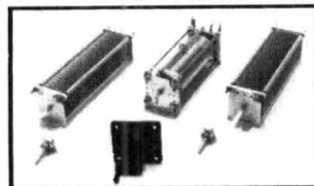
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