

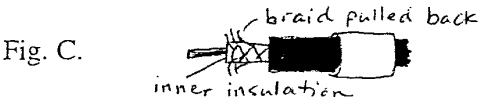
- Take the coaxial wire stripper and strip the cable as shown in Fig. A.



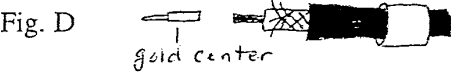
- Slip the barrel of the BNC connector over the stripped wire (Fig. B).



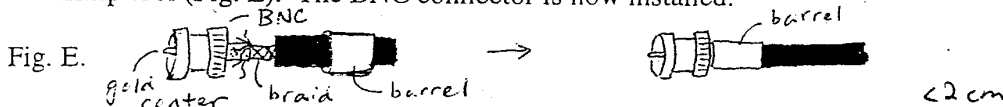
- Lift the braided wire of the coaxial cable away from the inner insulation a bit (Fig. C).



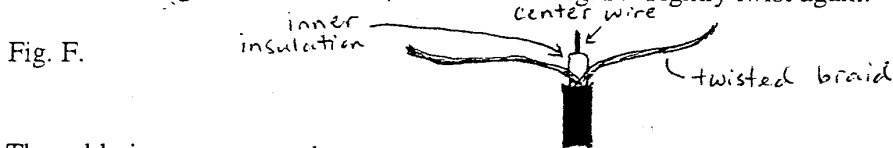
- Take the small gold center of the BNC connector and slip over the small silver wire in the center of the coaxial cable as shown in Figure D.



- Crimp the gold center to the wire with the hex crimp tool.
- Take the remaining part of the BNC connector and slip over the gold center until you hear a snap. Make sure the braided wire will touch the base of the BNC connector part you just put on. *It can be useful to use needle nose pliers to gently pull the wire with the gold center through the BNC.*
- Push the braid down against the base of the BNC connector. The point is to make sure that electrical current can flow from the braided portion of the coaxial cable into the large, silver portion of the BNC.
- Push the BNC barrel over the braid and base of the BNC and crimp in place with the hex crimp tool (Fig. E). The BNC connector is now installed.



- At the opposite end of the cable, use the wire stripper to expose about 5 cm of braided wire. Use a dissecting needle to separate the braid into two sections. Twist each section tightly. Use the wire stripper to expose the inner wire inside the insulation. Tightly twist this wire and then trim it to a length of about 1 cm, as shown in Fig. F. Tightly twist again.



The cable is now prepared.

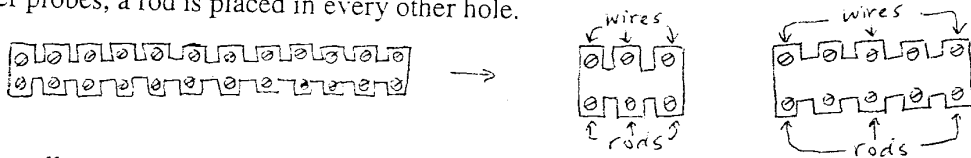
Preparing the Stainless Steel Rods

- Use a bolt cutter to cut rods to the desired length, plus 1.5 cm. For example, if you want 20 cm probes, cut rods 21.5 cm long. Each probe requires 3 rods of equal length.

Preparing the Barrier Strips and Assembling the Probe

1. Use the pruning shears to cut the barrier strip into sections of either 3 holes for 10 cm probes or 5 holes for 20 and 30 cm probes (Fig. G). For 10 cm probes, a rod goes in each hole. For the larger probes, a rod is placed in every other hole.

Fig. G.



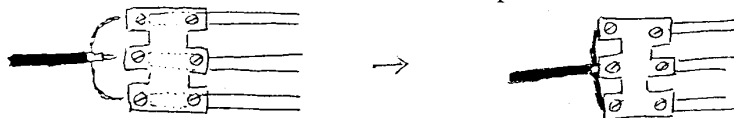
2. Use the small screwdriver to raise the screws on one side of the barrier strip. Leave the screws down on the other side. Insert the steel rods into each hole until they contact the second screw on the other side. Tighten the rods in place by tightening the screws you raised (Fig. H).

Fig. H.



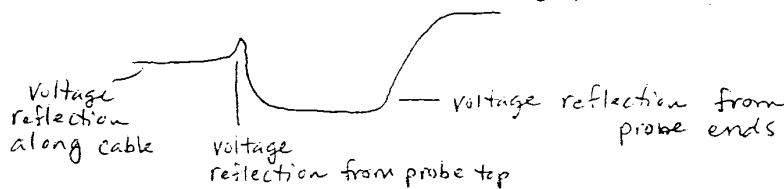
3. Raise the screws on the opposite side of the barrier strip. Insert the three pieces of wire on the coaxial cable into these holes. Make sure the wire pieces actually contact the metal rods and that they lie as flat as possible across the top of the barrier strip. It will take a little careful trimming and measuring of the wires to make them the right length (Fig. I). Once you have the wires positioned, tighten the screws to hold them in place.

Fig. I.



4. Test the probe at this stage by placing the steel rods in a bucket of water (fully submerge the rods, but do not get the barrier strip and exposed wire wet), and take a TDR reading. See the instructions for hooking up the laptop computer and using the Tectronix cable tester. You should see the typical TDR waveform shown below (Fig. J).

Fig. J.



5. To finish the probe, use Goop to seal and hold everything in place. Using a stick or other tool, apply Goop thickly to the exposed wire, to the holes in the barrier strip where the wires and rods are inserted, and to the screws. The idea is to make the electronic connections as strong and water tight as possible. Try to avoid getting Goop on the probe rods by wiping them regularly as you apply the Goop. Allow the Goop to dry for 24 hours.

TDR instructions by me

Probe end

1. Cut coaxial cable to 1 m
 - a. Can vary for needs of experiment
2. Strip off 2" insulation (yellow strippers, #8)
3. Unbraid outer wire layer
4. Twist together into two wires
 - a. Make sure they aren't touching each other
5. Strip of foil (leave 1 cm) at base
 - a. Use small hole with blue strippers
6. Break off three white adapters
 - a. Can use knife
7. Thread wires thru holes
 - a. Make sure they do not touch each other
8. Clamp down wires with screws
 - a. Just tighten screw closest to main wire
 - b. Make sure they actually clamp the wire
9. Cut off extra wire right at white adapter
 - a. Use scissors
10. Use 1/16" wire to cut probes
 - a. May keep 5 cm from pot edge
 - b. Account for 2 cm for the length inside the adapter
11. Place probe in adapter to the back screw; tighten front screw
 - a. Make sure they're the same length when you're done
12. Use epoxy to seal back wires, front spaces and screws
 - a. Don't let it run on probes
13. Hang to dry
 - a. Add more epoxy if air bubbles form or if things aren't covered

End to monitor

1. Strip 1 cm down to core and then 2 cm of outer wires
2. Trim down braided wire a bit
3. Put barrel (curved side on 1st) and slip down into insulated part
4. Slip solid gold barrel on core
 - a. Make sure core isn't exposed
5. Put adapter on
 - a. Over inner insulation and braided outside
6. Slide barrel up and crimp (red handled) multiple times
 - a. Make sure barrel covers up to adapter and back to outer insulation