Rogowski Coil Construction

Supplies needed:

1. 10 inch piece of RG-60 (or equivalent) coaxial cable
2. 30 gauge enameled magnet wire (best if already "spooled")
3. Plastic "T" from 1/4" irrigation system
4. 2 inch piece of 1/4" irrigation system tubing
5. 10K Ω 1/4 or 1/8 watt resistor
6. 1.5 inch strip of vector-board (to mount termination resistor)
7. 24 to 36 inch length of "audio" cable with RCA plug
8. 24 inches of ¼" diameter heat-shrink tubing
9. Needle-nose pliers
10. Micro-sheer cutters
11. Ohm meter
12. Masking tape (or the like)
13. Soldering iron and solder

Instructions:

1. Strip the outer insulation off the RG-60 cable.
2. Remove the braided shield from the RG-60 cable.
3. Remove the foil shield from the RG-60 cable, leaving just the inner conductor and it's foam insulator. *Note: I chose RG-60 coax cable because it the internal foil was easily removed, others (RG-59 or RG-58) were melted or glued to the inner conductor's foam insulator and difficult (impossible) to remove.*
4. Strip off ¼" of the foam insulation from one end, 2" of the foam insulation from the other end, leaving the center conductor exposed on both ends.
5. Using a hobby knife or the like, scape the enamel insulation off the end of the magnet wire.
6. Using the hobby knife, cut a diagonal slit in the foam insulation on the end with the ¼" of exposed center conductor. This is to act as a groove to guide the the magnet wire from the center conductor to the foam insulation.
7. Wrap a few turns of the freshly exposed magnet wire around the ¼" of exposed center conductor and solder. Clip off the excess magnet wire (not the length you will use to wind the coil) and the excess center conductor leaving just the solder formed at the junction of the two wires.

Winding the coil:

I developed a method to wind the magnet wire around the foam insulation. I am right-handed, so I held the RG-60 in my right hand with the soldered end on the left side. I was able to twist the RG-60 cable between the fingers on my right hand while using my left thumb and index finger to "guide" the magnet wire to lay side-by-side with each twist. I was not concerned that the wires were not perfectly next to each other without space in between as there is a remedy for this.

After about ten (10) twists, I pushed the newly formed loops up against the end of the foam insulation. With every subsequent ten twists, I pushed the newly formed loops up against the prior loops. This method allowed me to quickly wind the coils and insure the loops had no space in between. When the end is reached, cut off the magnet wire leaving about 6 inches of excess to work with later. You may want to keep track of the number of turns on the coil.

At this point, use a piece of masking tape to wrap and secure the last few loops from becoming unraveled while the remaining steps are performed.

Terminating the coil into the "T":

1. The plastic irrigation tubing "T" typically has flanges on each of the three (3) ends. I used the hobby knife to remove them so that the ¼" irrigation tubing slipped easily but snuggly over the

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ends.

2. Using the needle-nose pliers, work the excess magnet wire through the "T" so it exits the "T" at a 90º angle from its entry point.
3. Using the needle-nose pliers, form the 2 inch exposed center conductor and work it through the "T" so it exits the "T" at a 90º angle from its entry point, same as the magnet wire.
4. Pull the "T" so it is snug against the insulating foam. If you can, try to work the insulating foam partly into the "T".
5. Slip a piece of heat-shrink tubing (cut to the proper length) over the entire RG-60 length so that it covers the "T".
6. Apply heat to shrink the heat-shrink tubing snuggly over the entire coil.
7. Cut a 1 inch piece of the ¼" irrigation tubing and slip it over the other end of the RG-60 length, securing it in place using another piece of heat-shrink tubing cut to proper length and heat-shrunk.
8. At this point, the RG-60 coil length can be formed into a loop and the end with the tubing slipped over the "free" end of the "T". This will complete the loop and hold it in place.

Terminating the coil:

1. Trim the vector-board on one end so it will fit into the end of the plastic "T".
2. Form the 10K Ω resistor leads and insert them through the vector-board.
3. Solder the center-conductor wire to the 10K Ω resistor lead closest to it.
4. Solder the magnet wire to the other lead of the 10K Ω resistor.
5. Cut off the vector-board about 0.5" from the end of the resistor lead the magnet wire is soldered to.

At this point, a test should be performed on the coil.

1. Using the ohm meter, short the test leads to each other and not the reading.
2. Connected the test leads across the 10K Ω resistor and insure the connection is not open. The reading from the coil should be sub-ohm (slightly higher than the reading taken in step 1).

Final construction steps:

1. Cut a length of heat-shrink tubing that will cover the vector-board, the "T" and about 2 inches of the audio cable.
2. Strip off the end of the audio cable opposite the end terminated with the RCA plug exposing the braid and center conductor wires. Strip the insulation off the center-conductor of the audio cable.
3. Slip the heat-shrink tubing over the audio cable but do not shrink it yet.
4. Solder the center-conductor of the audio cable to the junction of the 10K Ω resistor and the magnet wire of the coil.
5. Solder the braid of the audio cable to the junction of the 10K Ω resistor and the center conductor wire of the coil.
6. Slide the heat-shrink tubing over the audio cable, vector-board and "T" and apply heat to shrink the tubing. This should form a snug fit and secure the audio cable to the "T" junction.
7. Use the ohm-meter to check for no open connection.

This completes the construction steps for the Rogowski Coil.