

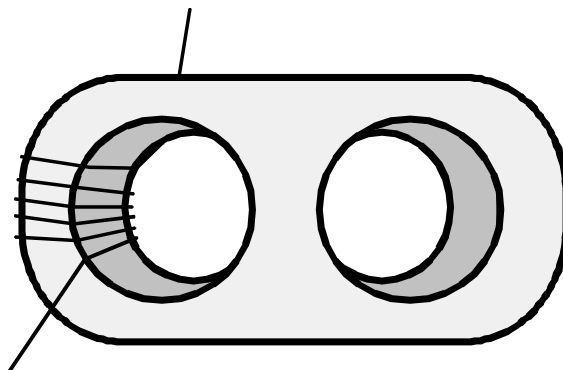
ASSEMBLY (DIRECTIONAL COUPLER)

We are now going to build the directional coupler transformer. This is the part that does all of the work for us. The binocular core is made of a special magnetic material which is good up to very high frequencies and can handle a fairly strong magnetic field without saturating.

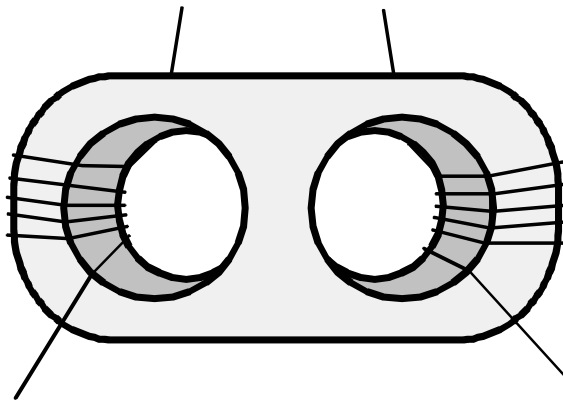
The key to building this part for best performance is patience and accuracy. For best directivity the part should be built in a complete mirror image on either side of the binocular core. This is quite difficult and performance relies on how well you put this together. We provide enough wire to make two of these, just in case you mess up. Just follow our steps and you shouldn't have any problems. Bless your luck and buy a lotto ticket if you get it right the first time around!



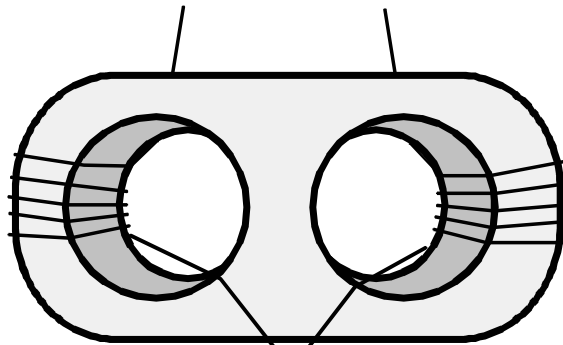
- ❑ 1. Cut two 1 1/8" pieces from the #16 bus wire.
- ❑ 2. Using small needle nose pliers, bend each wire using the pattern above. Try to get the bend dimensions as close as possible, and keep bends nice and square (as possible), and the wires nice and straight. Use the pattern above for actual size. Hold your wires up against this to verify dimensions.



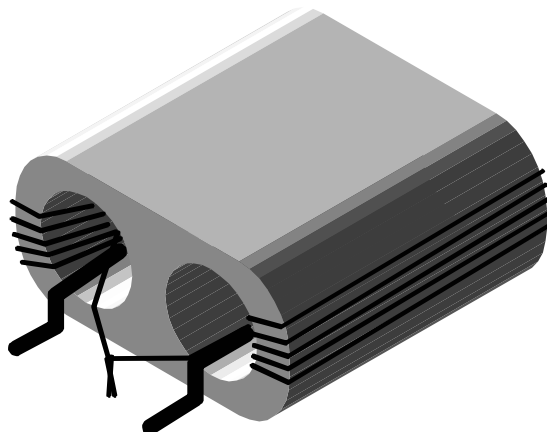
- ❑ 3. Cut off a 12" section of the thin magnet wire. We will wind 6 turns of this wire through one outside section of the binocular core as shown. Turns in binocular cores are defined by how many times the wire passes through the hole, not complete turns. Leave 1 1/2" of extra wire on each end. Try to keep the windings side-by-side, and not crossed over each other. This prevents strange coupling effects at higher frequencies. Ideally we want the windings to be as close to each other as possible, and all to one side of the core.
- ❑ 4. To make it easier to wind the second half without messing up the first half, use a small piece of scotch tape to hold the windings in place, making sure to tape down the ends so they don't dangle and get in the way.



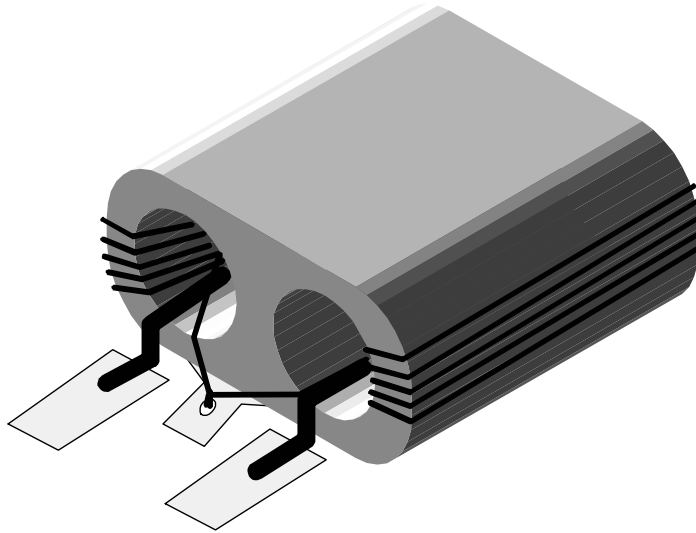
- ❑ 5. Wind 6 windings on the other side of the core, going in the opposite direction. See the drawing to see how we do this. If we went in the hole starting from the bottom, and then worked our way to the top, we will repeat that on the other side. Ideally we want a mirror image of the first set of windings. An absolute perfect mirror will give us the best possible performance.
- ❑ 6. You can tape down the other side's windings now if you wish. It may look sloppy, but it sure helps!



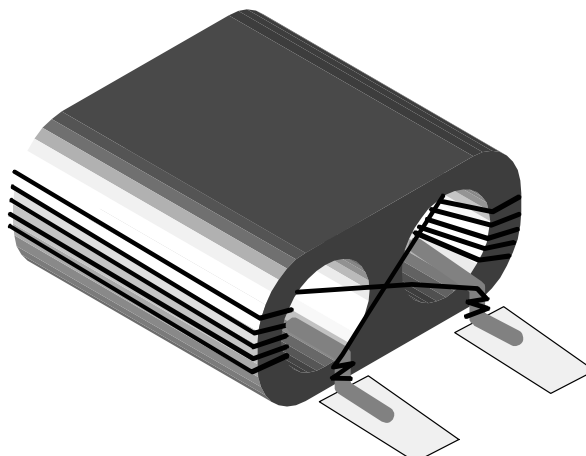
- ❑ 7. Take the wires on one end of the binocular core, and twist them together tightly. We want this twist to apply some tension to the wires to hold windings in place. Solder these two wires together. You will find that if given enough heat, the insulation will melt from the wires allowing for the solder to flow.
- ❑ 8. Place one of the bus wires you bent in the first step into each hole, and then hold down to the position on the main board into which this will be installed. Verify that the bus wires will solder OK to the main board without



further bending. You may need to unbend the bus wire a bit to get it to go through the hole, but re-bend it when through. You may need to weave the bus wires around the last winding to allow it to mount lower inside of the binocular core holes.



- 9. The two wires you have twisted together and soldered will go into the hole that is centered between the two surface-mount pads on the side of the board facing J4. Insert this wire into that hole, and then pull it down from the back side of the board to pin the core down flat. Solder the wires to hold the core in place.
- 10. Solder the bus wires on the same end of the core as well.
- 11. Bend the entire core up in the air on the end away from where you just soldered about 1/4". It makes the winding of the wires much easier.



- 12. Tin the two remaining ends of the magnet wire back about 1". Remember that we told you to leave 1 1/2" of spare wire on each end so this means you should have 1/2" of un-tinned wire before entering the core. This is to prevent the wires from shorting when we cross them over in the next steps.
- 11. Take the magnet wire exiting one side of the core, and cross it over to

wrap around the opposite bus wire exiting the other side. Use small pliers or tweezers to help thread the wire around the bend in the bus wire.

- 12. Use ample heat to solder the magnet wire to the buss wire.
- 13. Do the same with the magnet wire exiting the other side. Cross it over to its opposite side and solder with ample heat.
- 14. Bend the core back down. It will probably want to spring back up again but you will have to press down and solder at the same time to make sure the wire is tight to the board.
- 15. Solder the bus wires down to the main board's provided pads using your tweezers or needle nose pliers to press down on the bus wire while soldering to keep it from springing up.