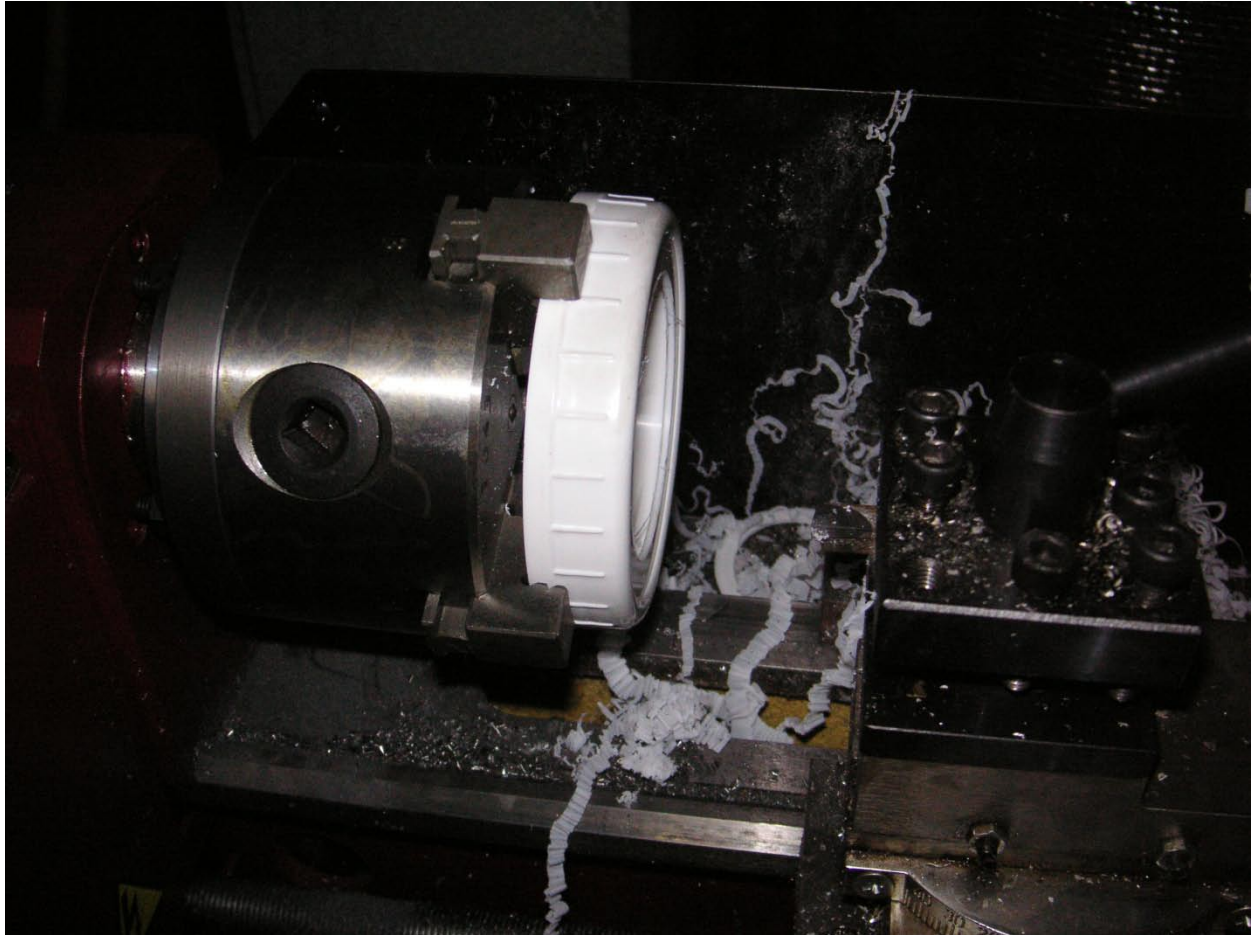


You will need to make two sensor coils for your magnetometer. Each sensor coil is wound on a short length of 2" PVC pipe. You will need two 2" slip X 2" thread fittings for the ends of each coil. You will also need to make some flanges to contain the sides of the coils. The pipe section will be about 4-7/8" long to provide 2" of length between the flanges. You will also need a 2" threaded cleanout plug to hold the sensor bottle in place within the coil. All of the coil form parts are made of plastic to avoid magnetic disturbances or currents induced by the AC field in the coils.

Here are shown the plastic parts for one coil.



I used Ball wide mouth plastic storage caps to make the coil flanges. These lids are 3-1/2" in diameter and are made to fit the glass "mason" jars used for home canning. The outside diameter of the 2" pipe is 2.375" I used a small lathe to cut 2.375" holes in each plastic lid.



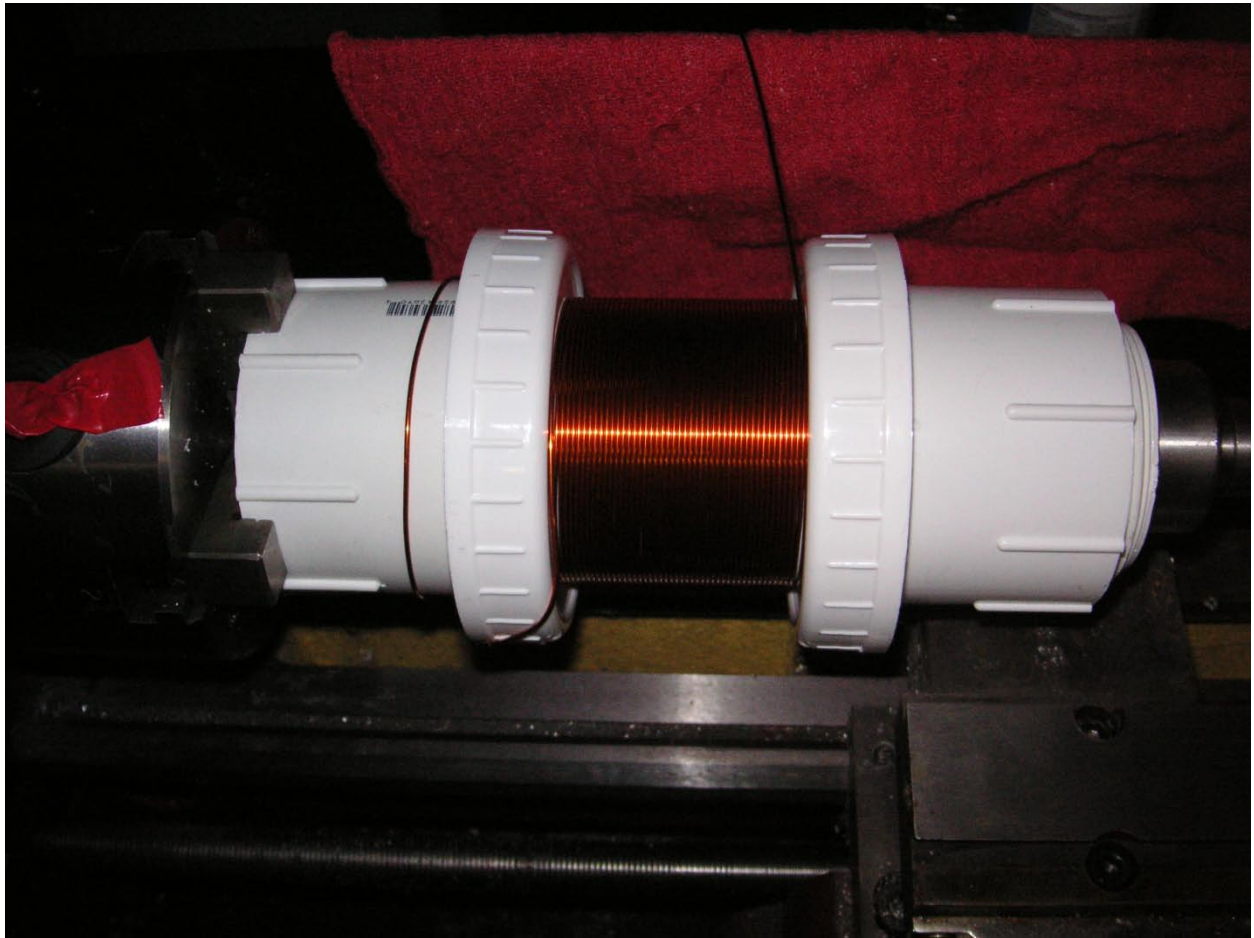
I assembled the plastic parts by tapping them together using wood blocks. When assembling the coil form be sure that the flanges for the coil ends are oriented correctly. Here are shown the assembled plastic parts for one coil form. The space between the coil flanges should be 2" long.



I held the coil forms in the chuck of the small lathe and used a “live center” to hold the far end of the form in place for winding. Unfortunately, the slowest speed on the lathe was too fast for me to keep up with, so I wound the coils by turning the lathe chuck by hand while guiding the wire with my other hand.



You will need to wind 600 turns of #18 (18AWG) enameled magnet wire on each coil form. It will require about 400 feet of wire for each coil. You will want to wind one coil clockwise and the other with the wire wound counter-clockwise. I ended up with 14.5 layers of 44 turns in each layer. Carefully count the number of turns in each layer. Keep the windings tight and even as you go. I found that the key to keeping the windings even was to keep tension on the wire to prevent previous windings from becoming loose. Pay particular attention to the windings at the end of each layer to be sure that each layer is completely filled with tightly spaced windings before starting a new layer.



Here are the two completed coils. I used colored electrical tape to keep the windings in place. The red coil was wound clockwise and the blue coil was wound counter-clockwise. If you have a bridge or meter for measuring the inductance, you can match the inductance of the coils by removing a few windings from the coil with the greater inductance. Keep in mind that inductance is proportional to the number of turns squared, so removing just a few windings will make a relatively large change in the inductance. My coils pictured here have an inductance of 18.0mH and a DC resistance of 2.9 ohms each. The 2" cleanout plug is screwed into the lower end of each coil with the square stub inside the coil to support the bottle of proton rich fluid. In the coil that contains the sample bottle, You will need a spacer about 3/4" thick between the cleanout plug and the bottle to center the bottle within the coil winding.

