# The NVARC “Ugly” Filter Project

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# Winding and Mounting Coils

Drill the mounting hole (where required) and the adjacent Wire Start Feedthrough Hole (WSFH). Mark the form for drilling. The mounting hole is 3/16 and the WSFH is 9/16 of an inch from the end of the form. Use the same drill for both. The mounting hole is on the opposite side of the pipe from the WSFH’s but if you drill the mounting hole through both sides of the pipe and the WSFH’s through just the top side you can do all the marking and drilling without rotating the pipe.

Wind the coils in the direction indicated in the pictures for the corresponding filter. In some cases the coils are identical except for the direction of winding. This is necessary for the coil terminals to come out in the appropriate location. Try not to bend or kink the wire as you wrap it. With #14 wire you will not be able to pull out these artifacts by pulling the wire tight from the end so they will remain as spaces between the windings which is undesirable. Remove the damaged wire and start over.

Insert one end of the wire through the WSFH and out the nearest end of the form leaving three inches free. Bend the wire sharply against the inside of the form so it will not pull out of the hole. Wrap the wire around the form towards the other end as tightly as possible. See comment above about the proper direction. When the required number of turns have been applied mark the spot where the wire should be entering the form. Make sure the coil is as tight as you can and pressed toward the starting end. Drill the Wire End Feedthrough Hole (WEFH) at the marked spot. This should be on the same axis as the starting point WSFH if the specification calls for a whole number of turns. Alternatively if the wire is 0.1 inches in diameter you can calculate where the end hole should be and drill all the holes at the same time. It is important that the coil windings end up tight in any case. Not only is it important that the turns are tight on the form diameter but

they should be tight to the adjacent coil turns. If the forms are pre-drilled the measuring and drilling parts is already done. In any case if the wire ends up other than tightly wound, it should be rewound. Start with a fresh form if it is unlikely you can drill a good second hole. Save the form as it may be usable elsewhere if you are building other filters.

Trim the wire so there is approximately three inches of wire past the WEFH. Strip the insulation on the loose end from approximately one half inch before the WEFH to allow tightening. It is much easier to pull the portion of the wire that is stripped into the form than the insulated part. Feed the wire through the WEFH and out the end of the form while keeping the wire on the form from loosening. Using a pair of heavy (but pointed) pliers pull the wire tight from inside the form by leveraging against the end of the form. If you run out of bare wire on the outside of the form it is better to remove the end and strip the insulation back further. Holding the form in a vise can help. Wrap your hand around the coil and twist the wrapped wire in the direction of the winding toward the stripped end. This will tighten the turns. Pull the slack from the inside at the same time to get the tightest winding. Make a sharp bend in the wire against the inside of the coil form to secure the turns on the coil. Run the wire out the near end and cut off leaving about three inches for now.

The two coils that connect to the SO-239 connectors should have approximately 3 inches of wire stripped on the mounting hole end. The other end should be brought out the opposite end and stripped. It should be formed up and trimmed to be a terminal post where the capacitors can be attached. The center large coil should have the leads brought out on both ends and formed as terminal posts.

When building and tightening the coils you may break off the end of the wire at one end. All might not be lost. Typically most coils use the end opposite the mounting hole only as a terminal so only a half inch of wire is needed there. The center coils typically use both ends as mounting terminals so both ends only need the short length.

When you form a coil end up as a terminal leave approximately ½ inch. After soldering the components trim the excess length.

Some of the filters have a vertically mounted coil. Once you have all the coils prepared mount the small vertical coil first using a 4-40 x ¼ inch screw, flat washer, and nut. A notch is cut or filed in the ground end of the vertical coil form to pass the coil lead under the form and keep the form flat on the base. See photos.

Mount the center horizontal coil next so you can rotate it to get the hardware installed. Note the 20 and 15 meter filters do not have vertical coils so start with the center coil.

When mounting the coils on the long machine screws first install the screw through the case and secure it in place with a nut. Then install another nut and turn it down about one half inch. Place a washer on the screw. Install the coil on the screw working it down to the lower nut and washer. Put only a nut on the screw inside the core. Turn the nut down until approximately one complete thread is showing through the nut. Using a small wrench tighten the coil in place by tightening the nut below the coil forcing it up against the inside nut. Also be sure to add the solder lug for the shunt (to ground) capacitors to the coil mounting bolt where required. Study the photographs before starting assembly.

Notice that for coils with whole numbers of turns the wire starting and ending holes and mounting holes are in the same plane. If the holes are drilled through both sides of the form then it also accommodates the ½ turn possibility. For the coils with ¼ or ¾ turns the WEFH is at 90 degrees from the mounting/wire starting holes. Again study the photographs before winding the coils. Although the number of turns may be the same the coil winding geometry may not be. Be sure you understand what you are doing before you do it and you will be successful.

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