The NVARC “Ugly” Filter Project

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Case Preparation

The assembly instructions refer to the “base” or the “bottom” of the case meaning the section that was configured to mount the printed circuit board and where the coils will be mounted when building the filter.

With the case assembled drill four holes in the bottom lip (two on each side) where the top slips inside the bottom to secure the top and bottom together.

It is necessary that this lap joint make good electrical contact. If these surfaces are free to move or make poor connection arcing can take place at this surface. This arcing is from the current induced in the case by the middle coil in the filter. This is a bad situation and why the four screws are necessary to hold these joints together.

Assemble the top and bottom making sure the top is seated all the way down. Drill the four holes using a # 43 drill which is correct for tapping the inside portion. Remove the top. Re-drill the four outside holes as clearance holes for the 4-40 machine screws using a #35 drill.

Some cases have insufficient overlap between the two sections to get the two holes without breaking through the edge of either the inside or outside section. In that situation, with the case assembled, drill the clearance holes in the outside lip so that they do not break the edge. The holes in the inside edge will be notches in the edge of the lip. The notches in the inside edge should be enlarged to allow the case to fully close. You can then make a Nut Plate to sit inside with tapped holes aligned with the clearance holes in the outside case lip. A nut plate is a small piece of metal that has a hole drilled and tapped in it. When mounted the nut plate needs to be large enough to touch the bottom of the case so it can not rotate when the screw is

tightened since you do not have access to hold it. When the two halves of the case are put together the notch in the inside case edge slips around the screw between the outside lip and the nut plate. While two small nut plates can be used on each edge they are more difficult to work with than a single nut plate for both screws which can not rotate and is recommended. To make the nut plate use a scrap piece of aluminum approximately one half inch wide and five inches long that is thick enough to tap. See Nut Plate drawing. Place the nut plate inside the case against the lip with the two clearance holes that were already drilled. Mark the nut plate at the two locations then drill and tap it for the 4-40 screws. Using a small drill press and vise is the preferred method though a hand drill and pliers can be used with care. The nut plate is placed inside the case and the two screws threaded loosely into it to hold it in place. Assemble the case with the top (inside) edges between the outside edge and the nut plate. The notches in the inside edge should be deep enough to allow the case to close as much as possible. When the screws are tightened the nut plate pulls the inside case against the outside case. When removing the cover remember to only loosen (not remove) the nut plate screws.

Depending on the case you may or may not have to create holes for the RF connectors. Orient the base of the case to take advantage of the available holes. Sometimes this means only the connector screw mounting holes will need to be drilled. In some cases you will only be able to rotate the connector to allow two mounting holes but you may be able to install the other two mounting screws to pinch the edge of the opening. The goal is to have the two connectors on opposite sides of the box approximately one inch from the side edge and near the top. By using existing openings you will be plugging openings rather than having to make them which is a plus.

Drill the base of the case per the dimension drawing for the coil mounting hardware. The base is the part of the case that the connectors (and coils) are mounted in.

Lightly steel wool or sand the mating surfaces of the case and the areas where a lug or coil will be attached to the case. Also, prepare the surface where the internal shield attaches to both halves of the case. The shield should run down the center of the case. It is attached to the cover because that allows it to be mounted permanently on two sides. The third side is secured through the bottom of the case by drilling clearance holes in the case and tapping holes in the shield.

Mount the connectors using the 4-40 x ¼ hardware. Position them so the solder cups face up for easier assembly.

Depending on the exact positioning of the components you may need to trim the shield to give sufficient clearance to the coil. There should be approximately 3/16 or more clearance.

You should mark the cases so that you know which pieces go together. During construction we had many filters in process at once and the holes will not line up if you mix case sections. We also used the finished filters as models for others to use when they built their filters. This means the cases will be taken apart several times. Some of the hardware does not need to be removed to take apart the case such as the permanent hardware for the shields. Mark that hardware on the outside as “do not remove” or something similar.

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