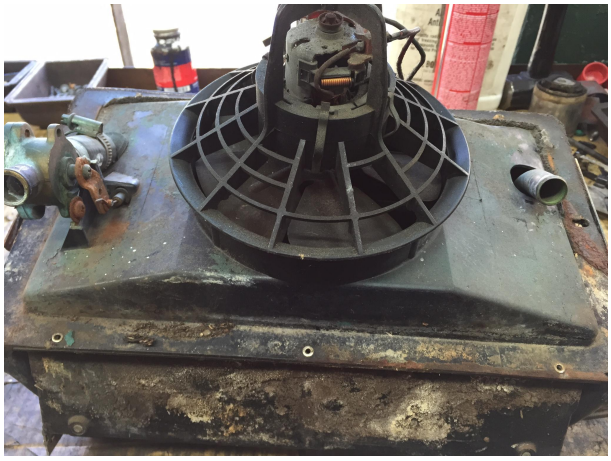
BMW 2002 Heater Box Rebuilding

Note: This is the directed page from: https://tinyurl.com/02HVACguide

40+ Years of Service

After 40+ years of service inside the car, we all agree that the heater box inside our 2002s have done their job really well and deserve some refreshing. Here, I'll be showing you the process of how I refresh the heater boxes and make them better. The first photos here show how tired a box can look (Note the amount of debris inside and weathering that this box endured).



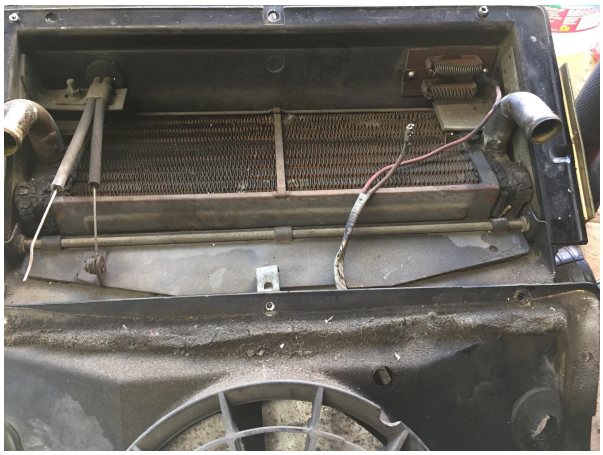
Removal / Disassembly

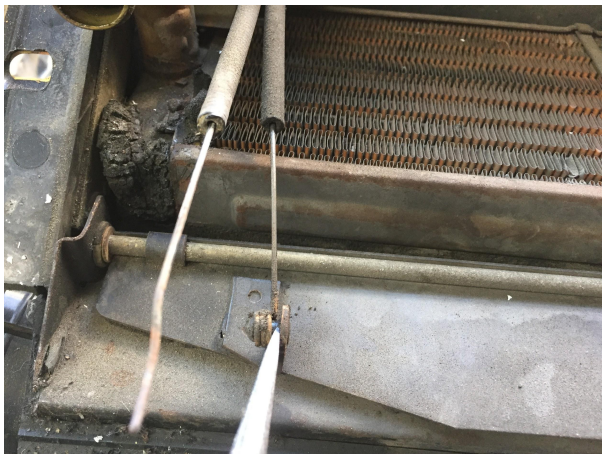
To open up the box, I had to remove the rivets and clips that held the box together. I carefully drilled off the rivets, making sure that I don't drill into the plastic of the housing. To do so, I used a ⅛" size drill bit and drilled into the lip side of the rivet until it separates from the rest of the rivet. You will then have to remove the three "C" clips off of the other side of the box; an easy way to remove the clips is to get a small hammer or something flat and slowly knock the "C" clips off.

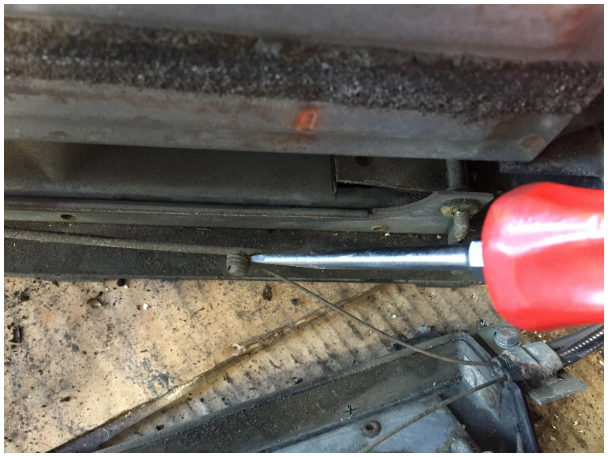
One thing to note is that after cracking the box open, I carefully opened it so that I could disconnect the plugs from the fan and the control board. Make sure that you do not break the spades off of the control board or the wiring when opening up the box. For the bowden cables that connect to the heater valve and the flaps, they should be easy enough to pry off with a flathead screwdriver.

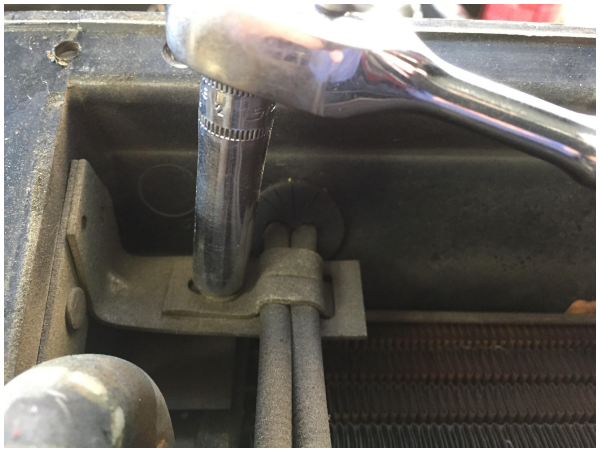
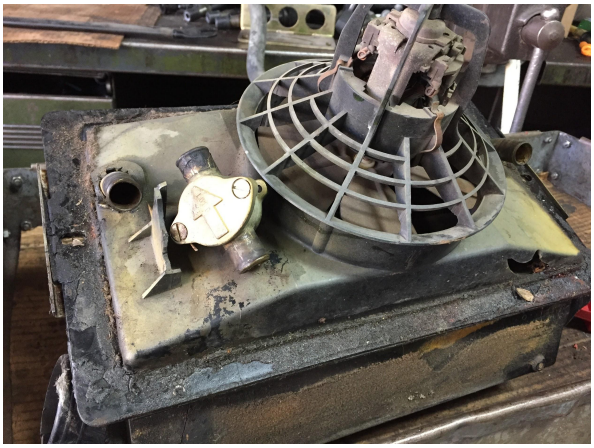
I continued to take apart the box, by then removing the four (4) spring clips that hold the fan to the housing. If your fan is in poor condition, now is the time to replace the fan with a new motor and install a new fan (you are able to purchase a brand new motor with the fan installed). I then removed the heater core - This is the perfect time to remove the core and to pressure test it to make sure that it is not leaking. This is also when you can replace the rotted foam.

The heater valve must also be removed from the housing. Most heater valve brackets are snapped/broken from the ones that I've seen, and luckily for you I have created a bracket kit that will put your heater valve back in place and make sure that it will work properly for years to come.





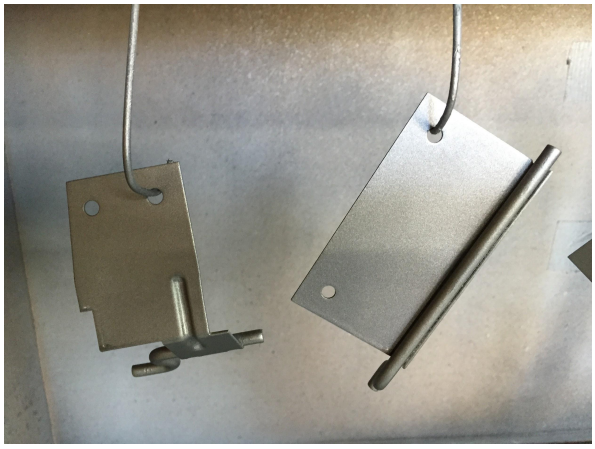


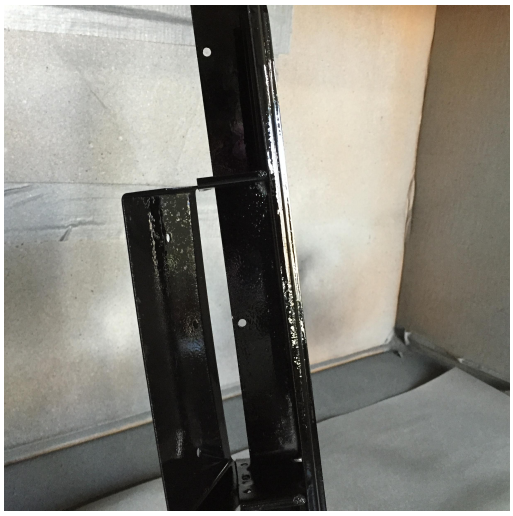



Cleaning

Time to clean up and refurbish all the components. I started off by taking all the metal pieces and sandblasted them to clean off all the surface rust. You may also used

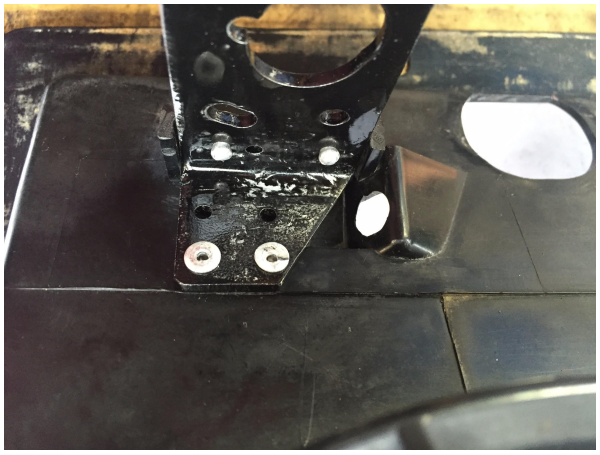
a wire wheel or sandpaper as well. I then wiped them down with acetone/degreaser **(do not use on plastic parts)** in order to prepare them for the painting process. Prime the pieces first, and then after 2 coats of primer, you let it dry and then apply the final paint coats - usually 2 coats should be sufficient. I used epoxy paint for all of the metal pieces. If you really want to make them look more factory-like, you can send the flaps out to be zinc plated and then get the fresh air flap mount powder coated. I paint mine with the same metallic silver paint I use for the flaps. For the plastic components, clean them with a cleaning solution (such as Simple Green), soap and water. For harder to reach areas, a toothbrush can be used. Wipe them clean and air dry.

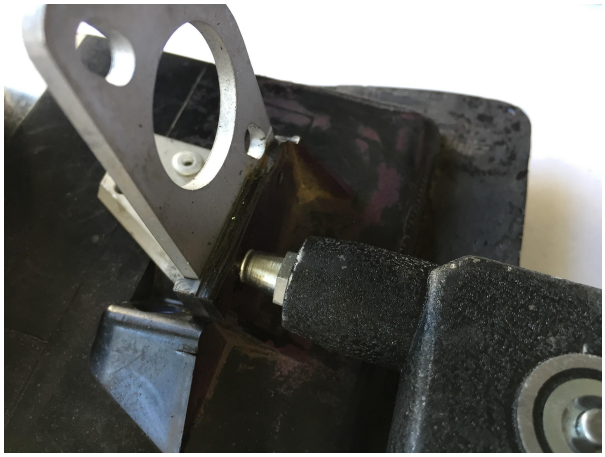




Repairing

The biggest repair job to do here is to get the heater valve bracket fixed. With the kit that I've created, this should not be too difficult. Mock-mount the heater bracket where it needs to be, making sure that it sits flush with its mating surfaces. In order to figure out where to drill the holes, use a hole puncher/90º pick, heated up so that it melts the plastic and goes through it. You then drill into the housing using a ⅛" drill bit (**Note: When drilling into the housing, make sure that it's being drilled perpendicular to the housing. Otherwise, you will have a hard time inserting the rivets)**. The bracket then gets put into place, and then ⅛"-(.188-.250) ¼" rivets are used to firmly mount it in place (Note: For the rivets that mount to the housing and not where the existing bracket is, I used washers to reinforce it).





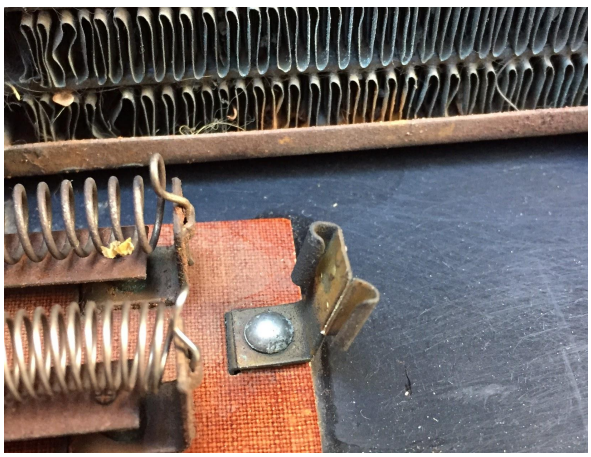
During this step, pressure test the heater core to make sure that it isn't leaking. If it leaks, then the core will have to be rebuilt. I did this by capping off one side of the core and then putting a hose and a pressure tester with an adaptor to test it. Fill it up with water, and then test it to 16 -17PSI for about 5 minutes.

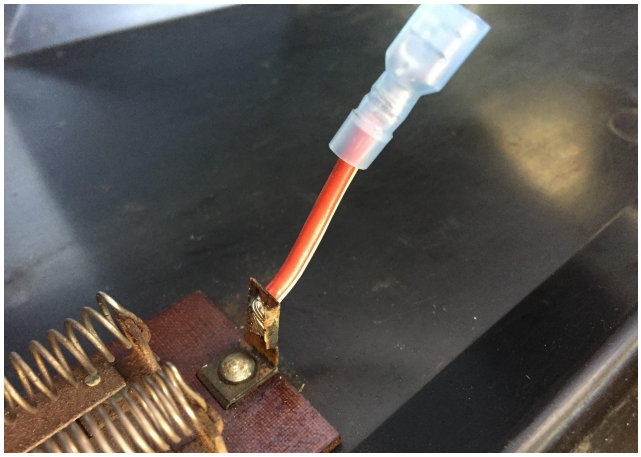
Another thing I take care of is the cable that goes from the circuit board /resistor to the fan motor. The female connector that connects to the board usually breaks. They are made of brass, so this is a good time to cut off the old plug and splice in a new one. There are two methods that you can use to repair this:

(A) For the first method, cut the curved part of the connector completely and grind it to become a male spade connector, or solder a short pigtail with a female connector crimped at the end of the wire. I made a small hole in the connector and fed the pig tail through it before soldering it. After that, it should be a secure contact.

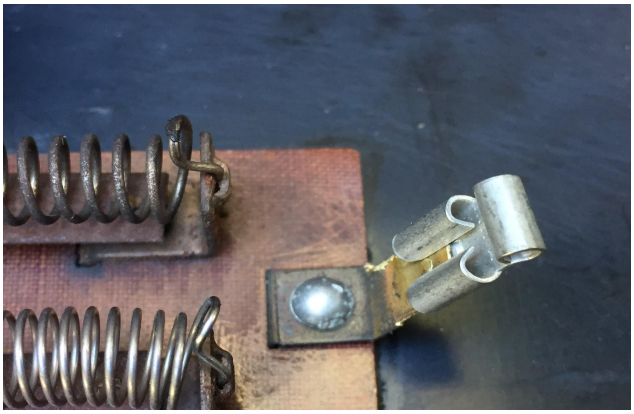
(B) The other method is to break the curved part of the connector and convert it into a male connector. This way, the blower harness male connector at the resistor end, need to be converted to female. Check both inner and outer female spade of the blower resistor. Don't forget to check and make sure the resistors are good.

Method A





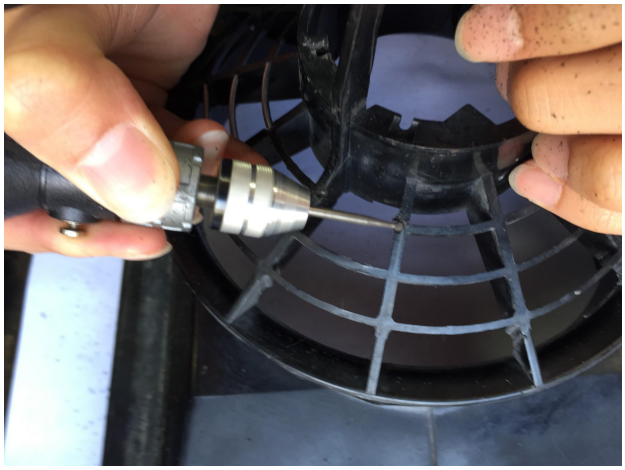
Method B

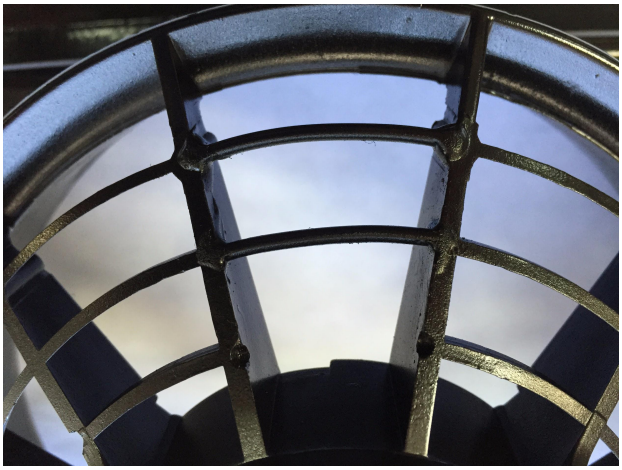


This is also a good time to repair all the cracks. Some have minor cracks, while some are more severe. I used a plastic welder reinforcer with metal screen. A fiberglass repair kit nor epoxy glue will not do any good. They will peel and not stick to the plastic box materials. Repair any cracks and then sand down until almost level with the rest of the box. Apply wax & grease removal, blow dry and then prepare for paint.

Repairing Fan Cage Ribs (Optional)

Here's something that you could do to further touch up on the details of your heater box: The fan motor's cover ribs. You can see in the first image (below) that there are a few sections that are missing the plastic rib (Note: The sections where the motor mounting clips are are intentionally left blank). The way to fix them is to use a metal wire coat hanger and bend them into shape and then paint them accordingly. Using a pair of wire cutters, cut out an appropriate length of wire and then grabbed a pair of pliers to bend it into the curvature it needs it to be. Use a dremel/drilling bit to cut some divots into the housing so that the wire can sit snugly. After making sure that the wire sections fit, apply epoxy to the pieces, let the glue cure, and then paint them afterwards with touch-up paint (If you have not painted your heater box yet, you can paint everything at once).

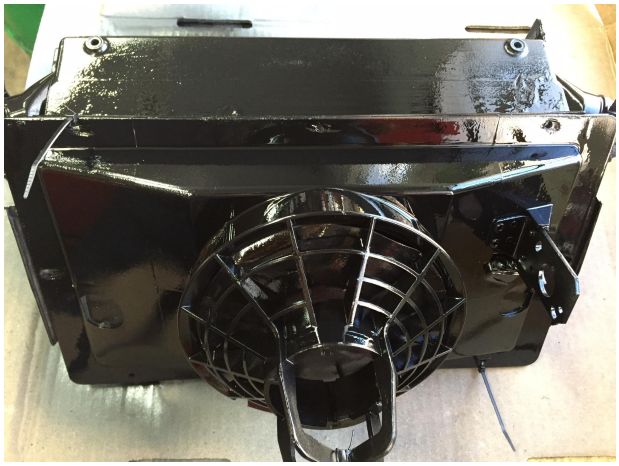




Painting and preparation

Now that all the metal components are painted and plastic box cleaned & repaired, it's time to prepare for assembly. Use plastic paint to paint the plastic portion box. Check that all materials to rebuild the heater box is complete.

Start by gluing the foam pieces to all the flaps and installing the grommets. Clean and lubricate the bowden cables or you can replace them using our cables. The mounting aluminum bracket can be painted black before mounting it (optional). Prepare the heater core inlet/ outlet grommets by trimming and grinding the inside diameter for easy access to the heater core outlets. **These grommets only for late model (Mid '72-76) fan housing with the 1-¼" D shape opening. Only chamfered when the core has 18mm inlet/outlet. We have grommets available for the early fan housing with the 1" D shape opening as well.** Make sure you have enough rivets along with the rivet gun if you do not want to use screws. Use ⅛" (.188 -.250") x ¼" for the bracket and 5/32" (.188 -.250") rivets for the rest of the box. The box outer perimeter rivets are slightly longer 5/32" (.251 - .375"). I prefer use aluminum rivets and rivet washers whenever the bottom end of the rivet is against plastic materials. If you have smaller heater core outlets (16mm) and a newer heater valve (18mm), you may need an adapter hose, since they have differing diameters.




3M
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WEATHERSTRIP
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ADHESIVE
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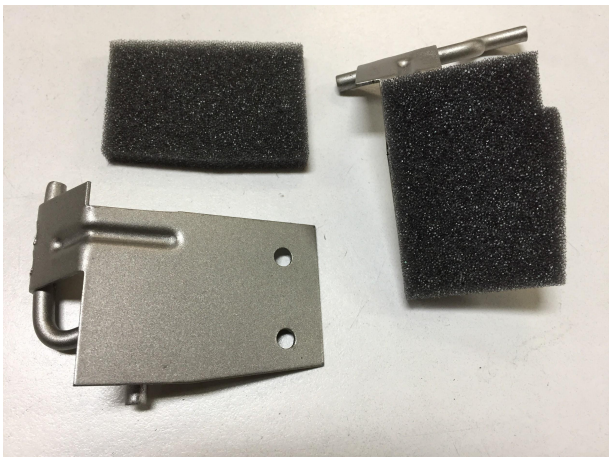
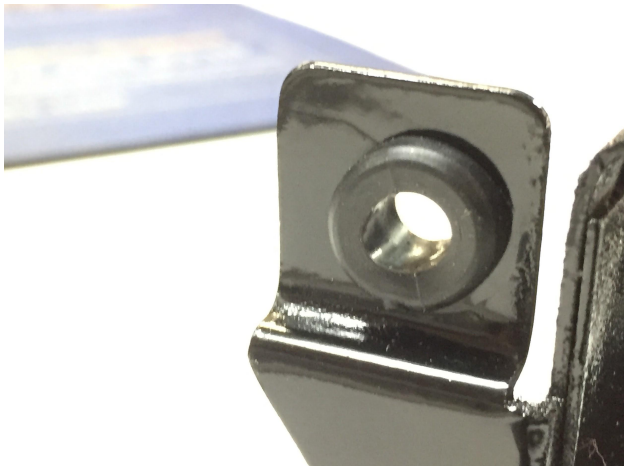
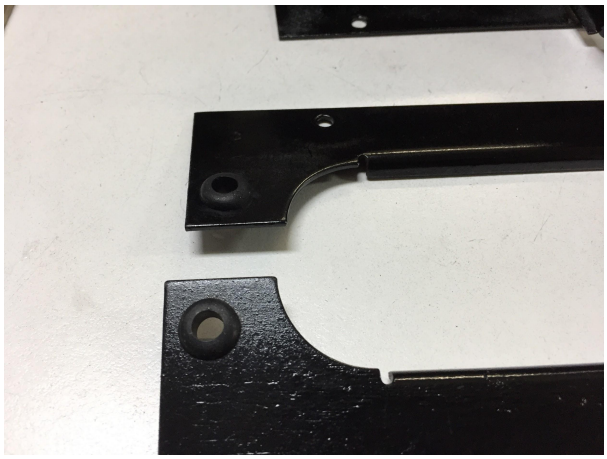
Exceptional bond strength
Permanently bonds gaskets



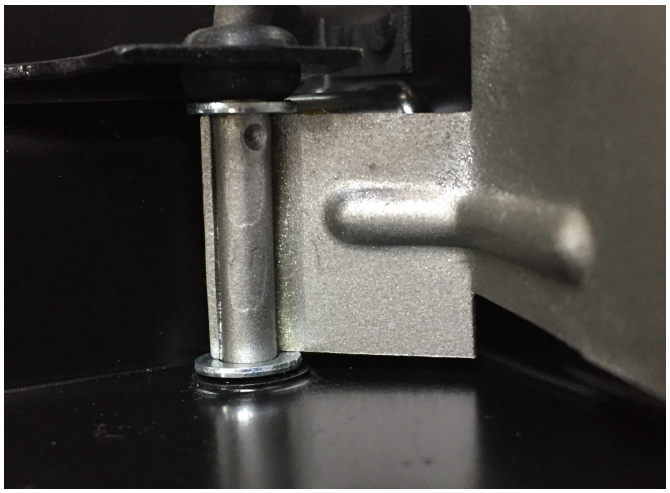


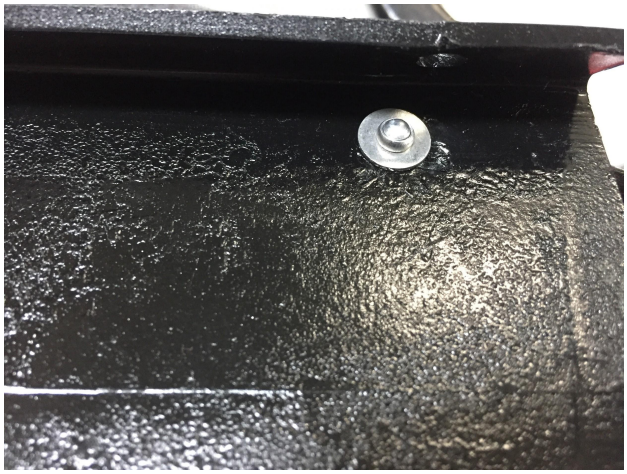


Assembly

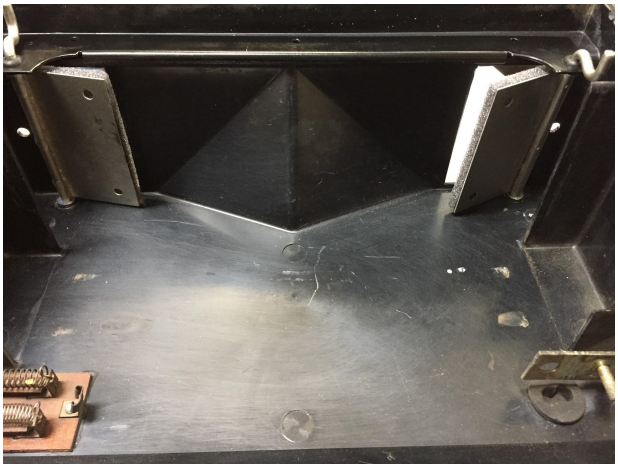
I started to assemble the defroster flaps first, then the fresh air flaps. Make sure that the metal bracket that secures the flaps in place has the tab facing upward/away from the housing.

Note: It’s important that you don't forget the shaft washers (Note washers on both top and bottom).

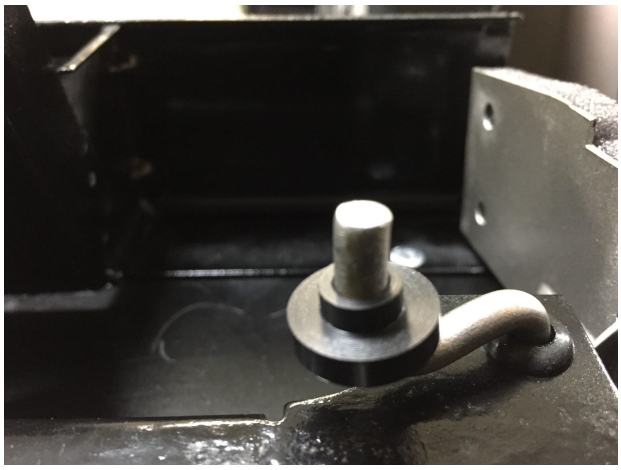


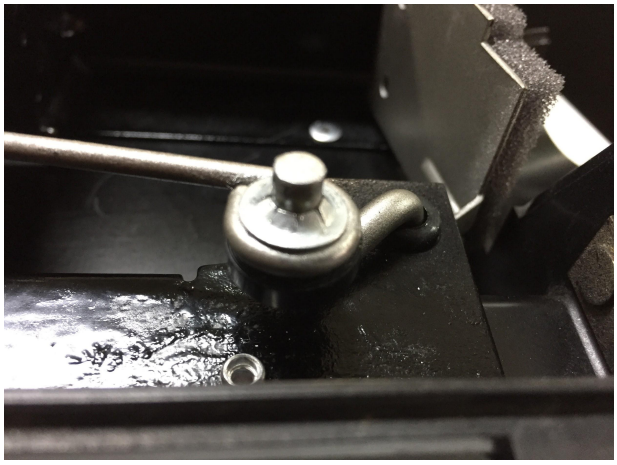
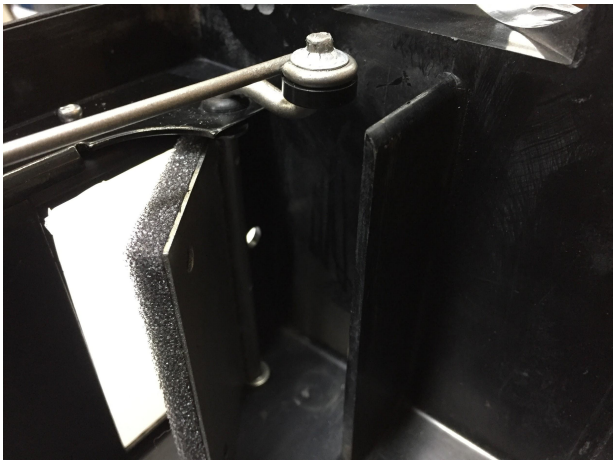


Next, goes in the heat flaps, making sure that all the flaps are free. The same procedure is done with how the defrost flaps were installed.



I then installed the custom designed delrin bushings and attached the relay rods. Please take note that rods are different lengths - if the rods were swapped, the flaps will not operate synchronized. The rods are mounted with the knob facing up and closer to where the bowden cables are secured. I then secured the rods with the spring clips then checked the operation of the flaps, making sure they are free.



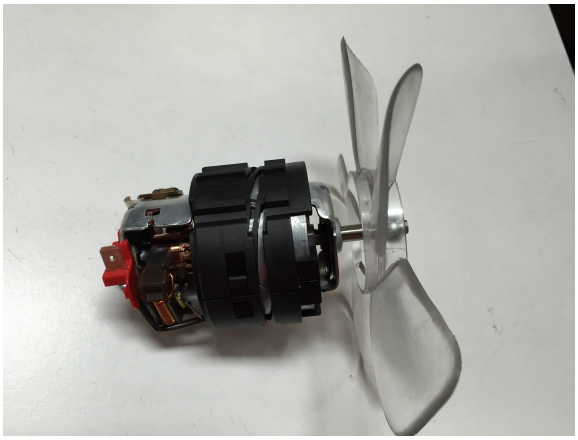



The tested heater core can then be installed, but don’t forget to apply the perimeter seal.

Attach the bowden control cables that control the defroster and heat flaps. Be careful not to mix up the cables: The upper lever is to control the defroster and the lower lever is to control the the heat. The control lever screw tab faces upward. Adjustment is done from the bowden cable holder at the outer edge of the box and at the lever.

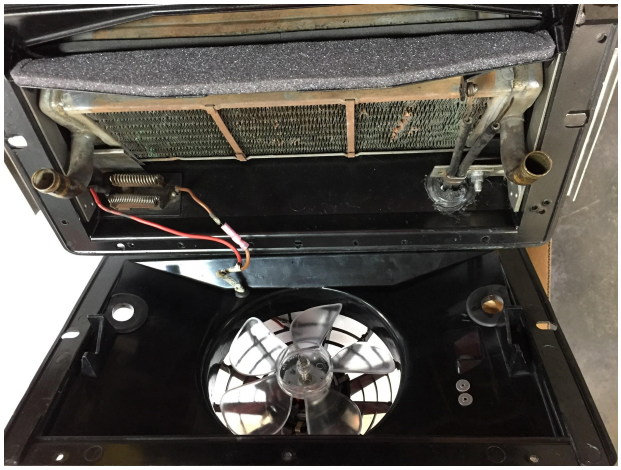
Check the flap operation from the full open to full closed positions before tightening the bowden cable holder and then do the same thing with the bowden control cable for the fresh air flap/heater valve. I temporarily mounted the heater valve at this point. Install the fan housing to check heater valve adjustment from fully closed to full open. When the fresh air flap is in the closed position, the heater valve should be in the full open/heat position. If somehow, the heater valve cable is broken (normally at the pinch bolt), the cable is still usable. Make a slight compromise by adjusting the valve to full closed and not full hot (better for summer driving). The valve will still deliver plenty of heat. Don't forget to lubricate the cables if you are using existing cables.

Once the adjustment and operation is satisfied, then I start to work on the upper cover and fan housing. Prepare the fan- the blades are counter clockwise (The plastic fan blade shaft clip is facing away from the motor), and so are the ones on the replacement fan motor. Because of this, the polarity has to be reversed. The female is negative and the male is positive. Mount the fan motor using the four clips and install the harness through the fan housing with the new supplied grommet. Check and make sure the airflow is correct.



Install the modified heater outlet grommets, applying plenty of lubricant. Next went in the fan housing by sliding it through the core outlets, and at the same time guide the heater control cable through the opening with the new supplied grommet. (the heater valve is not mounted). Temporarily secure the top with a couple of screws.

Don't forget to install the three spring "C" clamps (last) at the bottom of the box. Next, apply a thin layer of 3M glue to secure the box perimeter seal and foam on the outer square section of the box. For perimeter box "**one piece strip seal"**, it need to be cut into four pieces, cut the strip at 45º at each end and apply sealer between the joints. For the **"one piece square seal"**, just apply glue and mount it.



Testing

This is the time to check for fan operation, control cables and flaps - Everything. For the late model, check the fan operation by applying power and ground to the harness. Test all the fan speeds and air distribution. For the early model, apply ground and power through the male connector directly to the resistor for varying fan speed. Make sure that all flaps open and close smoothly and ensure that there is a good seal and little to no air is blowing past the flaps. Once you are satisfied with all operations, the box can be secured with screws or rivets. Install the heater valve first and then the lever. Feed the bowden cable through the lever pinch bolt, before securing it onto the valve (It's easier). Once it's mounted, then you can adjust the cable and secured the pinch bolt (Don't over tightened it). The box is now ready to be mounted into the car.

Ready for service!