

A (Relatively) Economical R107 Blower Unit Rebuild

A Step-by-Step Tutorial by GlueckAuf

Few major components on the Mercedes-Benz R107-series roadsters are as needlessly expensive to replace rather than repair as the climate control system's heater blower motor assembly. The only part that's subject to wear and tear is the electric motor that turns two fans, which in turn drive air from the cars external vents into the climate control system.

The motor itself is relatively inexpensive—as Mercedes parts go, anyway—at less than \$150 from several sources. But as many owners have discovered, it's removing the two centrifugal fans from the old motor and reinstalling them on the new motor that has proven to be the most challenging—and *expensive* when it went wrong—step in the process.

Because of their press fit and spokeless, puller-defeating design, breaking one or both of these fans is all-too-easy to do. Unavailable individually as a spare part, the fans are very rare and thus very costly on the used parts market. Breaking one can nearly quadruple this job's cost as usually the entire heater blower unit must then be purchased.

This guide will show you the technique I successfully used to recently rebuild my own, original heater blower assembly on my 1987 560 SL, the center point of which is the *easy* and *safe* transfer of your original fans from the old motor to the new.

To perform this job you'll need the following:

1. **Replacement Bosch blower motor** (ADSITCO.com's part # 083-0714, \$134.10 with online discount, less shipping, as of this writing. The original German Bosch motor's part # is 0 130 063 021, while the Brazilian-made Bosch replacement motor's last three digits are ~013.)
2. **Phillips #2 bit screwdriver.**
3. **Socket wrench, 10mm socket, an approximately 10" extension, and a deep-well 13/16" (spark plug) socket** (the latter two are to be used together as a mandrel to press the first, leftmost fan onto its new motor shaft).
4. **Needle nose pliers**
5. **Workbench** with good lighting.
6. **Cooking pot and range**, large, at least 6" deep.
7. **Permanent marker** that can withstand boiling water.
8. **Ruler** with fine graduations (millimeters preferred).
9. **Kitchen sink, parts cleaning brush, and detergent.**
10. **Snap ring pliers** (preferred, but not essential if you have the needle nose already)
11. **Wire coat hanger**
12. **Wire cutters** capable of cutting a wire coat hanger
13. **Vise Grip** locking pliers, medium-size

Cautions:

- *This repair procedure involves immersing parts in boiling water and installing those parts by hand while they're heated to over 200 F. Use appropriate means, like temperature-resistant gloves, a thick rag, or the wife's potholders to avoid painful burns.*
- *Take the common-sense precautions to avoid causing a fire, like keeping flammable items well clear of the burner of your stove while working this step. Don't leave a hot stove unattended.*

Blower Motor Unit Removal

1. Remove air cleaner assembly and set aside. Cover the engine air intake to prevent foreign objects from falling into it.
2. Remove eight Phillips screws securing the blower motor access cover plate to the firewall. Carefully remove the cover plate and its rubber gasket, inspect them for damage, and set aside. **If either the cover plate or its gasket are cracked or torn, consider replacing them. This lid must provide a water-tight seal for the blower motor well or rain will enter, causing unseen, expensive, and difficult-to-repair rust.**



Figure 1. After removing the air cleaner and sealing the engine air intake, remove the eight Phillips screws that hold the heater blower motor well cover plate in place. Remove the cover and gasket. Unplug the blower motor cable.

3. Pull off the blower motor power cable from its receptacle. Remove two Phillips screws from the resistor block receptacle where it mounts to the firewall. Pull the resistor block receptacle from its mounting position and move it and its cable to expose one of the four blower housing mounting nuts beneath it.

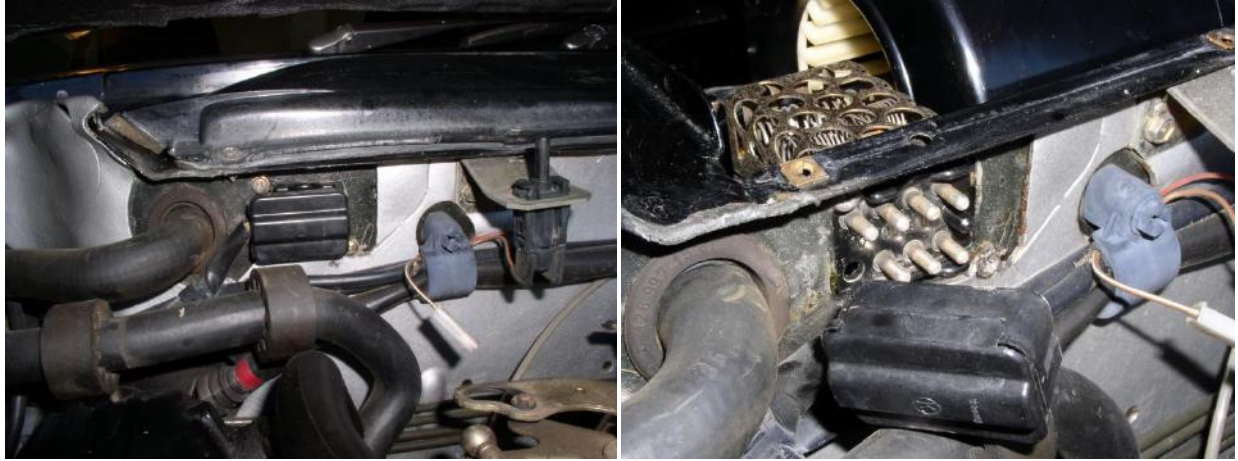


Figure 2. Unplugging the heater blower cable exposes the two Philips screws that mount its receptacle to the firewall. Unscrew these, pull the resistor block receptacle rearward from the firewall, and drape the cable out of the way.

4. Remove four flared base 10mm nuts securing each corner of the heater blower motor assembly from their mounting studs. If any of the nuts is rusted or stubborn, use penetrating oil to loosen them.



Figure 3. Four M6 studs hold the heater blower housing in the well. After blower unit is removed, inspect the condition of the rubber gasket. Look for and remedy any rust issues you discover, and give the well a good cleaning.

5. Lift the heater blower assembly, power cord, and resistor block receptacle out of the well. Tilt the back of the housing slightly upward to clear the well and the hood. Bring the assembly to the workbench.



Figure 4. Untouched for the twenty-three years after it left the factory, my '87 560 SL's heater blower unit was long overdue for a refresh. Noisy and arthritic in operation, one motor bearing was stiff and the other worn out with about $\frac{1}{4}$ " (6mm) of radial play at the fan.

6. Clean out any dirt, leaves, or other debris from the heater blower unit well and vacuum it out with a shop vac or household vacuum cleaner and soft brush attachment. Clean the AC evaporator fins if dirty, oily, or covered with debris with a small amount of odorless general purpose spray cleaner and a soft brush. Check the condition of the lower gasket and replace if torn, dried out, or cracked. Remedy any rust you find inside the well.

Blower Motor Unit Disassembly and Marking

1. Using needle nose pliers remove 8 small housing clips and set them safely aside. Using snap ring pliers (preferred) or by two-handed spreading your needle nose pliers, remove the large housing clips on the front center and rear center of the housing. *(Caution: The two large center housing clips are very strong, and simply prying them off risks cracking the plastic housing. It's safest to spread them with a tool first to relieve their considerable tension before removing them from the housing and likewise, when reinstalling them back on the housing. Wear eye protection.)*



Figure 5. Remove the eight small and two large clips that hold the clamshell halves of the unit together.

2. Position the housing so its front is facing you. Use the permanent marker to mark both halves FRONT. Mark the left and right outer air intake guides OUTER-LEFT and OUTER-RIGHT. (Note that the flat edge of both goes against the *bottom* of the lower housing.)
3. Carefully raise the top half of the housing clear of the lower half. Be aware that all or parts of four guides—two, one-piece circular ones on the outsides; and two, split polygonal ones on the insides—may come off with the top of the housing.

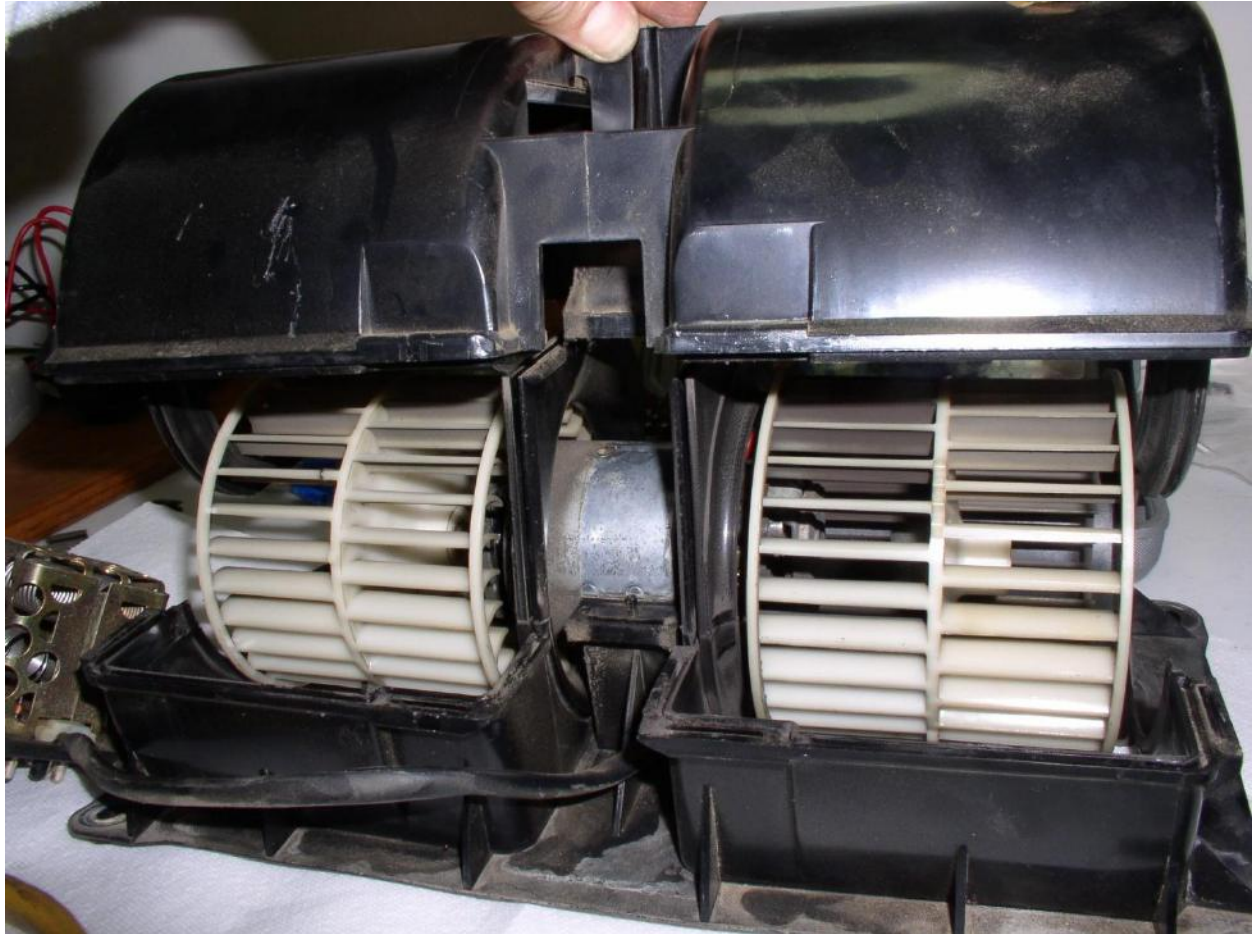


Figure 6. Separating the halves of the heater blower unit. Air intake guides (4) will either stick to the top or bottom half.

4. Mark the two inner guides' four parts INNER-LEFT-TOP, INNER-LEFT-BOTTOM, INNER-RIGHT-TOP, and INNER-RIGHT-BOTTOM with the permanent marker.
5. Inspect both fans' full 360-degree circumference for damage. **If there are any cracks, broken fins, or stripped hubs, the fans are unserviceable and must unfortunately be replaced.** Check e-bay or Mercedes parts providers for replacement parts or a new heater blower unit.
6. If serviceable, mark the fans with the permanent marker as follows to ensure a balanced reassembly:
 - 6.1. Mark the left fan LEFT and the right fan RIGHT.
 - 6.2. Mark OUTER on the outer halves of each fan.

- 6.3. Mark both fans with a single alignment arrow so that you can reinstall them in exactly the same rotational position on the shaft relative to one another (to retain factory balance).
- 6.4. Mark the position of each factory-installed balancing clip (in case one or more fall off while removing, cleaning, or reinstalling the fans.)
- 6.5. If needed, mark the left and right motor shafts at the place they enter the inside fans' hubs. (Twenty-three years of fossilized dirt build-up sufficed for me.)

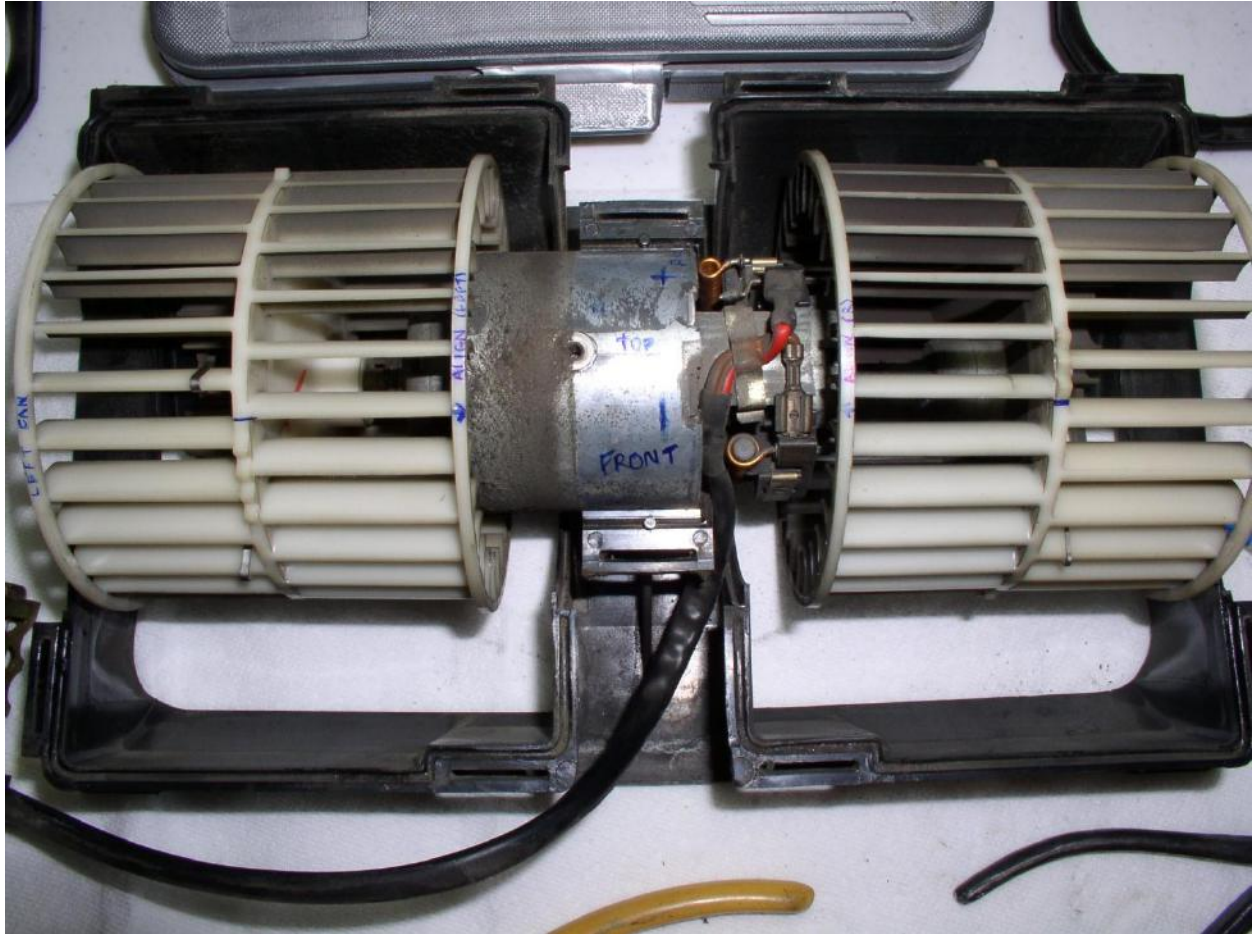


Figure 7. Mark everything to aid a proper and balanced reassembly. (Air intake guides removed for clarity)

TIP: A digital camera is a great aid to capturing the important details of the original fan alignment and balance and the housing's proper assembly. Take lots of shots of the housing, the fans, and the guides for reference when assembling.

7. Set the upper housing half and the guide pieces safely aside.
8. If not already removed, take off the pinned, upper halves of the inner guides and set them aside.
9. Lift the fans and motor and attached power cable/resistor block receptacle from the lower housing and set it aside.
10. Remove the spring clip from the motor that holds down the power cable. Carefully remove the male and female spade connectors from the old motor. (Per the pictures, I left my motor's power

cable and resistor block receptacle in place, but it made fan removal a little more difficult than it had to be.)

Clean up all parts

1. Wash up all housing parts in hot soapy water, rinse, and allow to dry. A parts cleaning brush will help get the decades of dirt out of the nooks and crannies.



Figure 8. Wash all parts gently, but thoroughly. They accumulate a lot of crud in twenty plus years.

2. Clean up the 10 housing clips and account for all of them before you drain the sink.
3. Do NOT immerse or wash the resistor block receptacle. Only wipe off its outer surface and its cable with a damp cloth.
4. Renew your fan markings if the washing faded them.

Fan Removal and Reinstallation on the New Motor

1. Moving to the kitchen, bring a large pot of tap water to a full boil in an old pot the wife won't crown you with if you ruin it with car crud.
2. Immerse one fan into the boiling water up to the top of its hub, allowing it to heat up for about two minutes, holding the opposite fan securely by its reinforced center section.

Cautions:

- ***Avoid applying pressure to the fragile fins or either end of the fan! Hold fans by center only.***
- ***Do NOT allow the fan to rest on the bottom of the pot where the much higher temperature of the metal, vice the boiling water, may melt or distort the plastic fan.***

3. Withdraw the fan from the water, quickly wrap its center with a rag or pot holder to protect your hands from the heated plastic and drips of boiling water, and, holding against the reinforced center section of both fans, counter-rotate the two fans against one another while gently pulling the

heated fan toward the end of the shaft as you turn it, as if unscrewing it from the shaft. The heated fan should turn relatively easily at first, but will become more resistant as it cools. Work quickly, but don't use excessive force to twist or pull on the fan, lest you risk breaking it. If the fan gets too difficult to turn easily, heat it again for a few minutes in the boiling water and resume turning it off of the shaft until it's free.



Figure 9. Boiling water expands the plastic fans at a safe, controlled temperature, 212 F (100C), allowing them to be removed from the motor shaft without the excessive, ill-applied force that often breaks them--and your wallet!

4. Clamp Vise Grip pliers very tightly to the now-vacant shaft, immerse the opposite fan into the boiling water, and repeat the previous Step 3 on the second fan. **NOTE: This may leave burrs on the motor shaft—okay if you're discarding the old motor, but you may want to use an alternate method such as a soft-jawed vise, if you're reusing, rebuilding, or exchanging the old motor.**
5. Once removed, clean up the fans using a soft brush and a soft touch. Each fan has some number of small metal balancing clips that were installed at the factory. Be careful not to push them off while cleaning. Do not drain the sink until you account for all of the clips. If one or more has fallen off, determine its location by the marks you applied earlier and return it to the correct fin.
6. Return to the workbench with the old motor
7. Lay the old and new motors side by side on the workbench and measure the depth the fans were originally mounted on the old motor as evidenced by the residual dirt or your previously-made mark. Mark the *new* motor's shaft at this same depth with the permanent marker. Double-check the marks' accuracy, and then return to the kitchen with the new motor and a 13/16" spark plug socket inserted into a long extension.

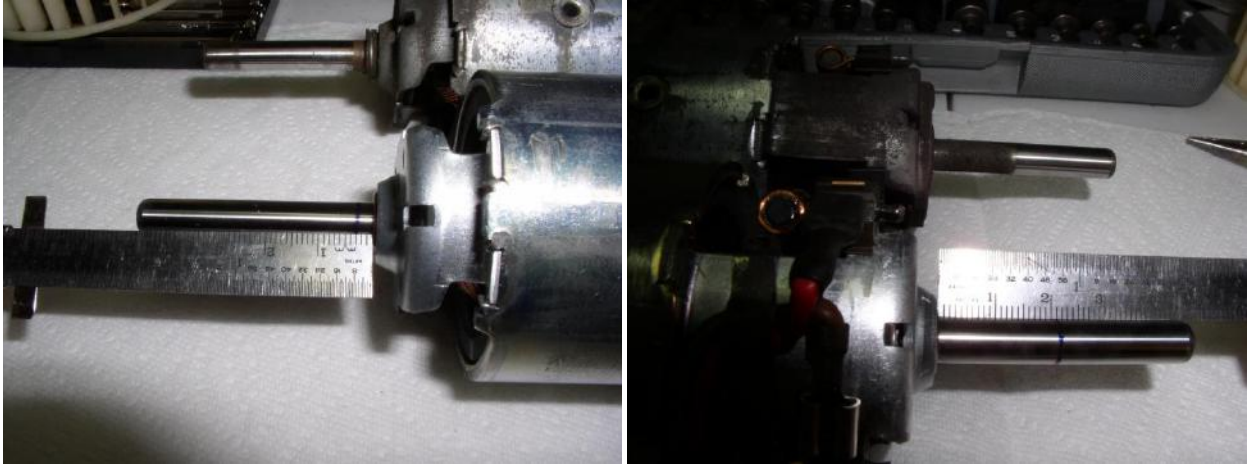


Figure 10. Careful measuring of the fans' installation depth is crucial to centering them in their housings and preventing interference with the intake guides.

8. Fashion a wire coat hanger into a holder for the fans. Place the left fan on the holder and immerse it up to the top of the hub in the boiling water.



Figure 11. Boiling the fans before pressing them on their shafts makes installation easy...and precludes the expensive breakage that can quadruple the cost of this repair!

9. Carefully stand the new motor on its right shaft, its left shaft upright. (I recommend you have an assistant hold the motor to prevent its falling over.) Have your spark plug socket/extension ready. After the fan has heated for about two minutes, quickly remove it from the boiling water, start the fan's inboard hub opening onto the shaft, and then press it down on the shaft to the marked depth using the spark plug socket and extension as a mandrel. If the fan cools too quickly and gets stuck on the shaft beyond what applying reasonable force can press it fully down, simply return that fan, on the shaft, to the boiling water, heat it again for about two minutes, and then press it fully down to its mark again using the mandrel. **NOTE: If you install the first fan too *deeply* on the shaft past the mark, wait until AFTER the second fan is installed and has fully cooled. Then heat up the first fan again and use the counter-rotation technique to unscrew it back to the required depth.**



Figure 12. An improvised mandrel presses the left fan onto its shaft without putting pressure on the motor's bearings.

10. Heat the second fan in the same manner as the first, but use the counter-rotation technique to screw the second fan onto the shaft to the installation depth mark. Do NOT use the mandrel to install the second fan. If you did, you'd be pressing down onto the fragile end of the opposite fan rather than against the stout motor shaft as you did with the *first* fan. As the important final step, bring the rotational alignment marks together to ensure the original factory balance is retained.

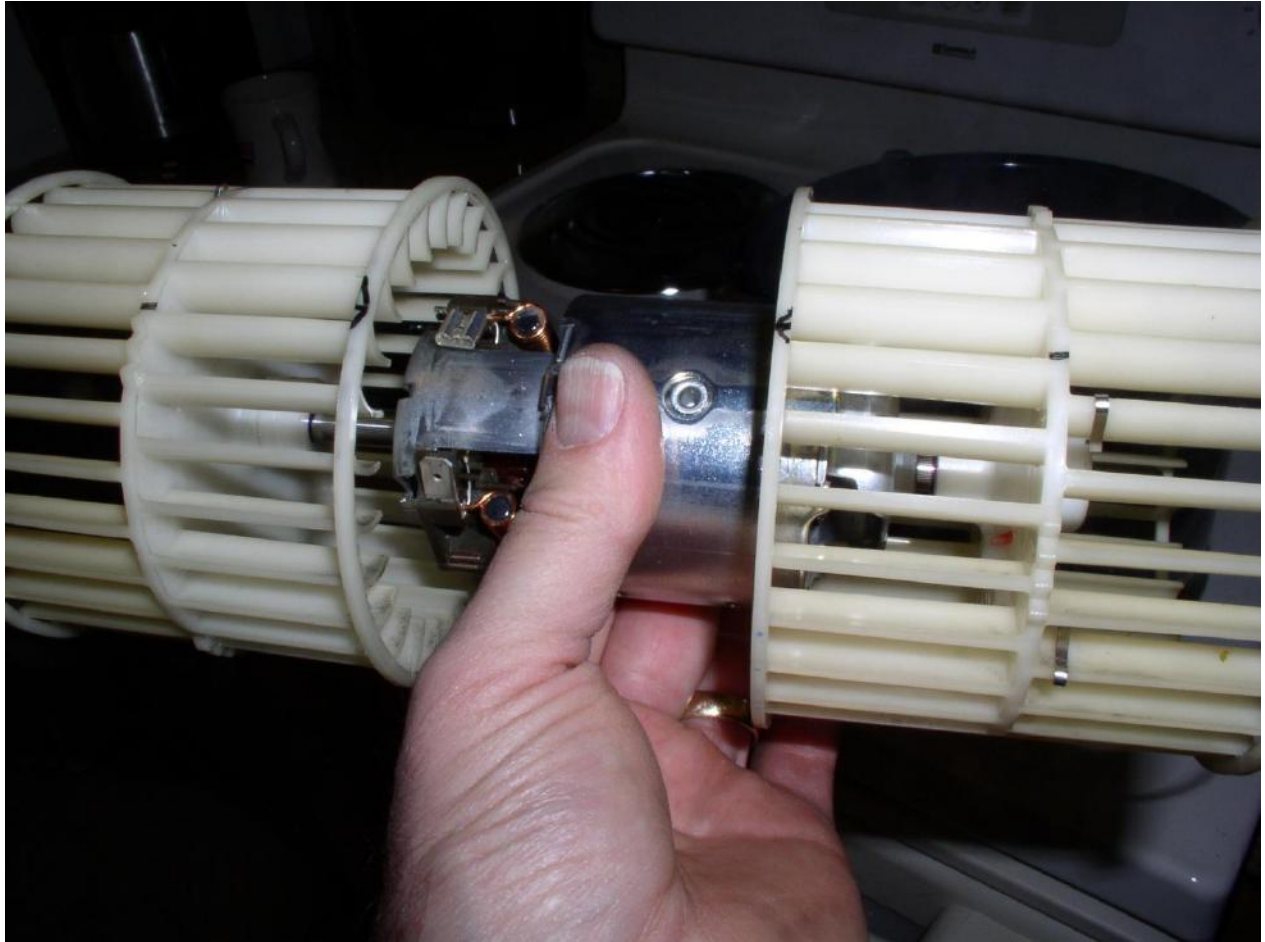


Figure 13. When the second fan is counter-rotated onto its shaft, the important final step is to realign the two fans as you marked them during disassembly. This ensures the factory balance is restored.

11. Inspect both fans to ensure they're both installed properly—both to correct depth, left fan on left shaft, ends installed outward, realigned, etc., just as you marked them in the first phase. Move all the clean housing parts, mounting clips, and the new motor with fans attached back to the work bench.

Reassembly of the Heater Blower Unit

1. Place the bottom housing on the work bench with its front facing you.
2. Reinstall the inner guides' lower sections. (The inner lowers are half-round crescents, while the inner uppers are squared off. The airfoils on *all* guides are offset *toward* their respective fans.)

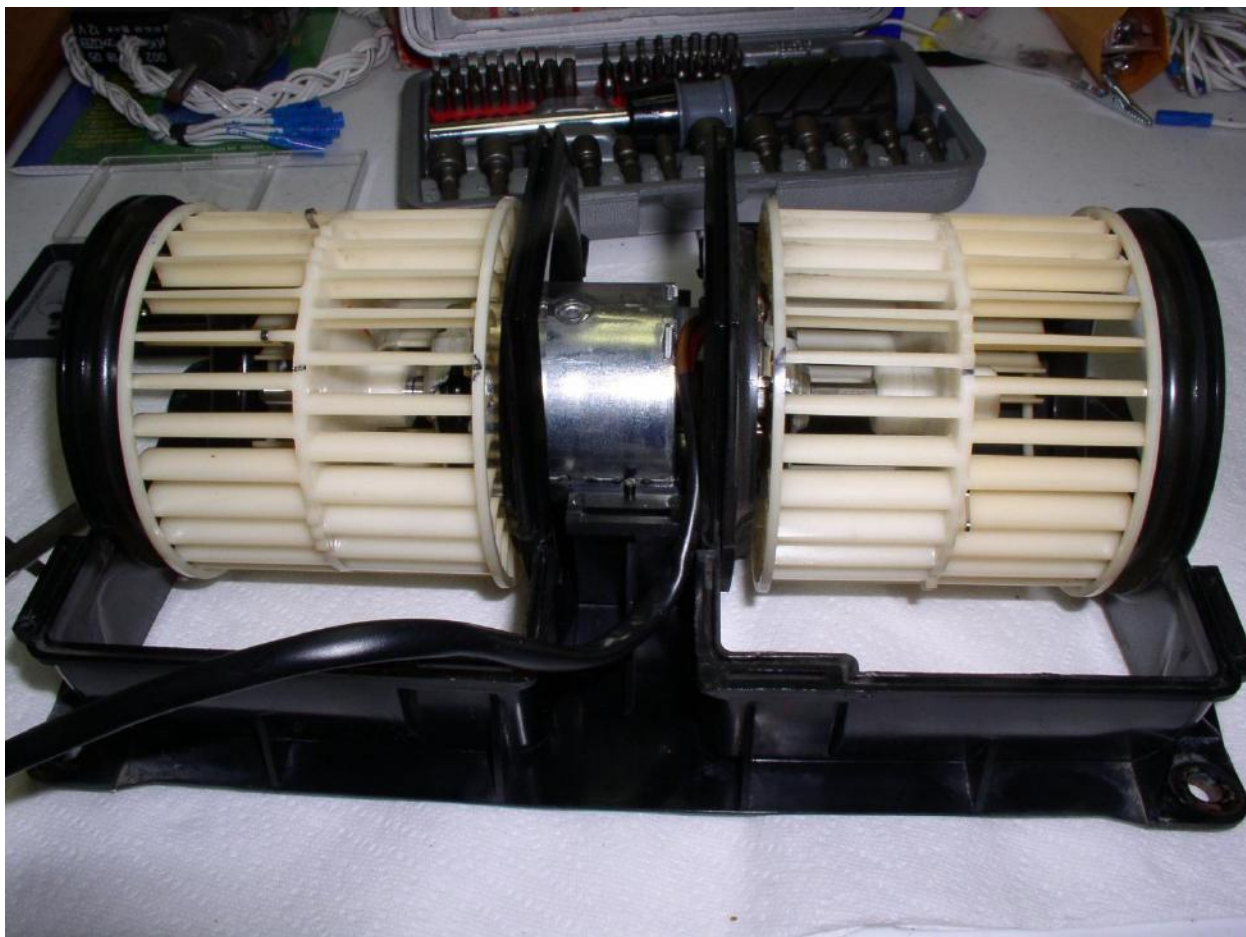


Figure 14. New motor nestled into its pinned saddle; the four air intake guides are reassembled and ready to receive the upper housing. (I actually found it easier to install the outer guides and the top halves of the inner guides in the *upper* housing first before joining the halves, but either approach works.)

3. Place the motor and fans into the lower housing. The center grommet on the bottom of the motor engages with a pin at the bottom left of the housing. Carefully seat it.
4. Connect the power cables to their respective spade connectors on the new motor. Secure the cable to the motor with its spring clip and route the cable out of the lower center of the housing as it was originally.
5. Install the center upper guides. Above photo notwithstanding, I actually found it easiest to do this by pre-installing them into their plates in the *upper* housing rather than trying to blindly engage them when lowering the upper housing onto the lower housing.
6. With both sets of lower guides in place, **check the clearance of the inboard and outboard edges of both fans with the edges of their lower guides. *THIS IS CRITICAL!*** The axial (side-to-side) clearance of each fan's edge to each guide should be fairly equal to allow for future axial play when the motor bearings wear. By NO means should any fan's edge touch—or even *nearly* touch—a guide. If either or both fans are too close for comfort, adjust their position on the shaft by returning to the kitchen one more time, heating up the offending fan in the boiling water again, and using the counter-

rotation method to move the fan in the desired direction to the optimum position—*about 1/8" (3mm) clearance from the edge of each fan to its respective air intake guide.*



Figure 15. It's IMPORTANT to ensure each fan edge has at least about 1/8" (3mm) clearance from its guide. Despite careful measuring and marking, I had to readjust one of my fans slightly outward on its shaft to better clear its inside guide.

7. If/when all fan-to-guide clearances are in order, replace the top of the housing onto the lower housing. Spin the fans to ensure nothing is binding, and visually check to see both inner guides' pins have mated and that the outer guides' flat sides are seated in the bottom housing.

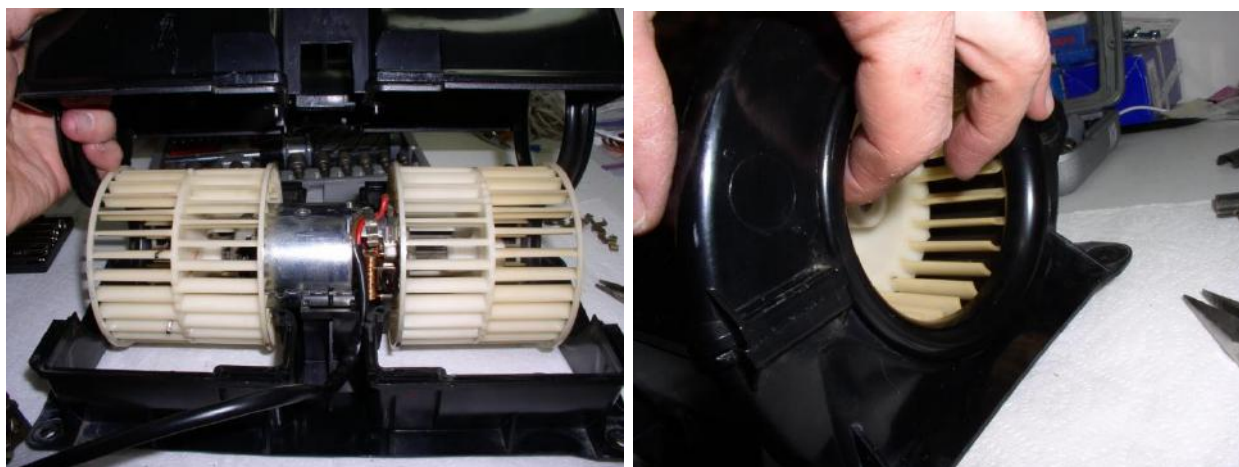


Figure 16. Lower the upper housing, carefully seat it, and check for binding by spinning the fan. Note both outer air guides and the upper halves of the two inner air guides are pre-installed in the upper housing.

8. Reinstall 8 small clips to their positions on the joined housings. Use snap ring pliers (or needle nose pliers as before) to reinstall the two large center housing clips.



Figure 17. Install eight small and two large housing clips. The large clips should be spread by a pair of snap ring pliers to make installing them easier and avoid stressing the plastic housing.

9. The heater blower unit now has a fresh, new motor, it's been cleaned, its balance has been restored, it's been properly reassembled, and it's ready to install back into your SL.



Figure 18. With a fresh new Bosch motor, the blower unit is ready for installation.

Test, Reinstallation of Heater Blower Unit

1. Return the newly rebuilt heater blower unit to the car and insert it into the well. Don't fasten it down yet, though, test it first.
2. With ignition OFF, Fan OFF, Climate Control push button "O" depressed, and the heater unit back in the well, reconnect the heater blower unit's resistor block receptacle to the car's heater blower cable plug.
3. Turn ignition key to Position II. **Caution: DO NOT START CAR, as air cleaner is not installed and air intake is covered.**
4. Press fan speed button to HIGH.
5. Depress DEFROSTER button on push button unit. Ensure fan begins to run, that it pushes air, that there are no abnormal sounds, and that its speed is high.
6. If unit successfully checks out, complete reinstalling the unit using the reverse of removal instructions. Tighten the blower housing flared nuts very judiciously to avoid cracking the plastic housing, and use blue Loctite on the threads to prevent them from coming loose. Note that the top cover rubber gasket has several nubs that fit into holes along the front of the cover mounting surface.



Figure 19. The top cover gasket must be installed only one way for these nubs to line up with their holes. When the cover is screwed down, remove the engine air intake covering and reinstall the air cleaner.

7. You're done! Head back to the kitchen and pop open your favorite beverage of choice, rightfully proud of retaining the considerable amount of money you would have blown (pun intended) for exchange fans, or worse, on a new or even used heater blower unit. (Might ought to rinse out that sink and wipe off the stovetop between brews, too, to remove any evidence of what you've been up to in her kitchen from the frau.)

Good road,

GlueckAuf

Sterling Heights, MI

1987 Mercedes-Benz 560SL *Benzedrine*

2002 Volvo S80 T6

2004 Litespeed Vortex/Campagnolo Record