Elise / Exige "How to Change the Coolant": A Do-It-Yourself Adventure!

By Marc Caden and Gary Davis

In the stellar pantheon of Lotus cars, the Elise and Exige models are perhaps the optimum blend of high performance coupled with reliability and low cost of maintenance. While some owners understandably only entrust their cars to professionals for service, others prefer to perform their own routine maintenance, such as oil changes and brake pad replacement.

One such item that Lotus advises should be done on a 4-year basis, regardless of mileage, is replacing the coolant. While coolant replacement is straightforward and relatively simple on most vehicles, the mid-engine layout and radiator location does present some intriguing challenges to be overcome. For those willing to possibly drip some errant coolant on their driveway or garage floor, we present a "Do It Yourself Adventure" with all the tips and tricks we have gleaned from various sources and added a few twists of our own.

Before we begin the step-by-step process, it is necessary to thank those who guided us. We truly stand on the shoulders of giants, and they are:

- Rick MacGregor, who kindly let us use his warm and spacious garage.
- Michael Sands, of The Sands Mechanical Museum, which has an excellent how-to that we used for guidance, as well as a lot of other useful reference information on the Elise: http://www.sandsmuseum.com/cars/elise/experience/maintenance/coolantdrain/coolantdrain.html
- Thomas Waszak, Field Service Engineer at Lotus NA, who gave us a nice checklist of steps to perform, and some real in-person tips and advice at LOG-41. Thanks TJ!

OVERVIEW of the process:

0: Typical safety disclaimer goes here: Do this at your own risk, "coolant" is "hot" when the car has been running, know how to safely lift the Elise/Exige, use jack stands, wear safety glasses, etc.
1: Read this entire article and decide if this is something you really want to tackle. It is not complex or difficult, but it does help to have the proper tools, a friend to help, and plenty of time so you are not rushed.
2: Assemble the tools and materials you need.
3: Drain the old coolant.
4: Fill with new coolant and bleed out any trapped air.
5: Clean up and properly dispose of old coolant.

Sounds easy, right? Now let us delve into the details of each step. Chances are that if you can do an oil change, you can do a coolant change, so here we go . . . .

TOOLS & MATERIALS:

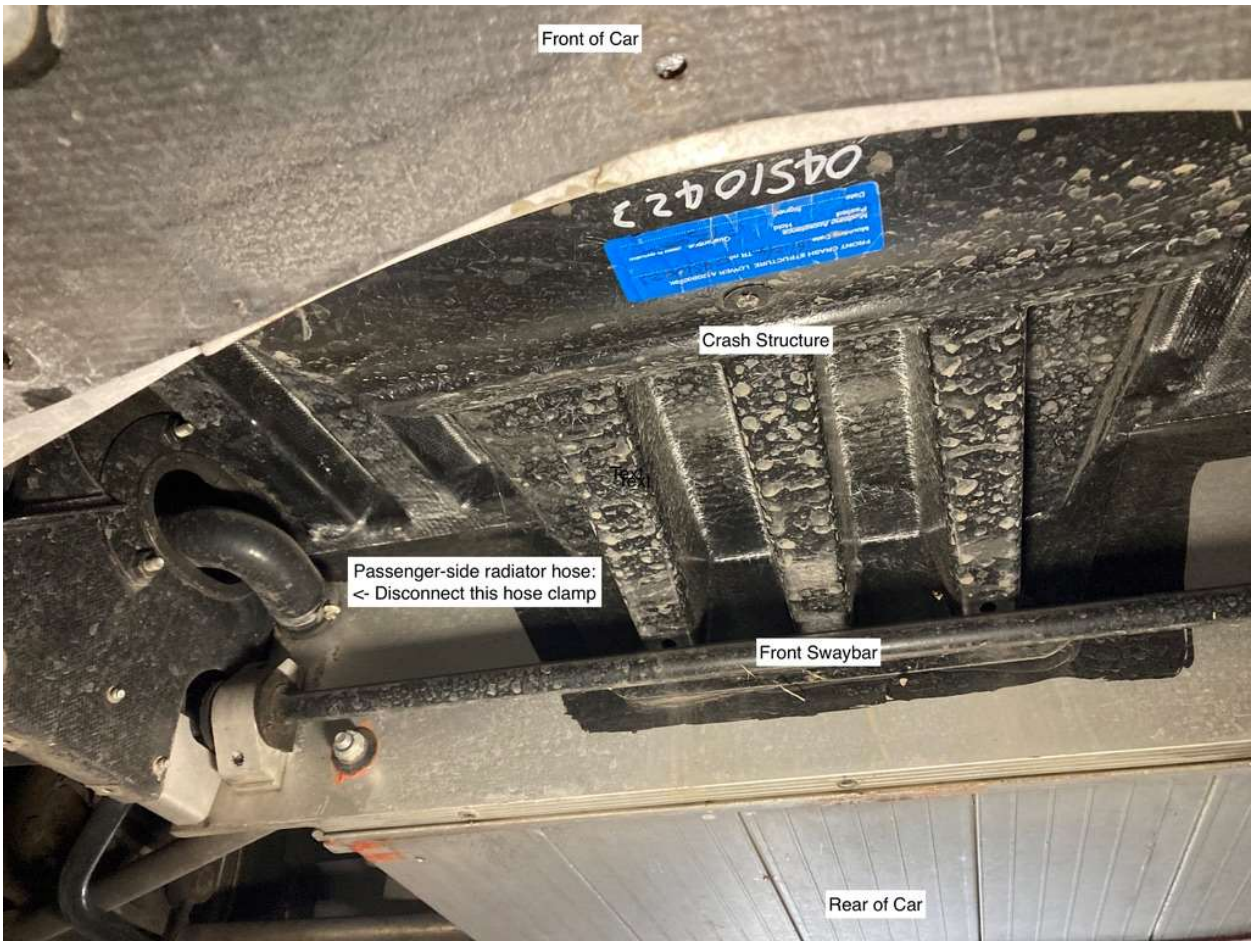
• Coolant: The first thing you need to consider is type of coolant. There are debates all over the Elise online community over which type is either the right or best coolant; we will not go into that debate here. Based on our research, we chose Toyota Super Long Life Coolant (and as also suggested by TJ, a bonafide Lotus Field Engineer). It is pink, tastes like lemonade, and has Organic Acid Technology (OAT) (note: we joke, do NOT ingest coolant or allow access to children or pets, it is highly toxic). Not to be confused with Toyota Long Life Coolant, which is red. The Super Long Life Coolant is pre-mixed 50/50 with distilled water, so no mixing is needed. The coolant can be sourced directly from Toyota or many other online vendors: https://parts.toyota.com/p/Toyota-5050-Pre-Diluted-Super-Long-LifeAntifreezeCoolant/69276658/00272SLLC2.html
The total coolant capacity is 12 liters, but you will not be able to get 100% of it out unless you drain the heater circuit. Each gallon container has about 3.75 liters, so we bought 4 containers just to be sure. We ended up filling up with about 2.75 containers' worth of coolant (10 liters) and we felt pretty good about that.
• Ramps, lift, or jack, and jackstands. We used a single floor jack and placed ramps and/or jackstands for safety. You can do this outside in the driveway, or in a garage, or on a car lift if you lift the Elise properly by the designated lift points. We will not get into the proper methods to lift an Elise since that information is widely available online and in the Elise owners manual.
• Metric sockets and/or wrenches.
• Metric hex (Allen) tools.
•Radiator hose removal tool (optional)
• A "no-spill" funnel is almost indispensable. These are fairly inexpensive and can be procured online. We paid $24 for one with good reviews on Amazon.
• A vacuum fill tool designed for evacuating a coolant system is very useful. We used a tool from "OEM tools" that worked very well (note: we paid $79). Note that you will need a compressed air supply to power the venturi to create the vacuum.
• Rubber vacuum hose plugs and caps of various sizes.
• Containers to catch the draining coolant, and a large container to bring the used coolant to a recycling center.
• A three foot length of ¼" rubber or tygon or similar flexible tubing.
• General shop supplies & tools such as a water supply, rags, funnels, step ladder, good flashlights, snacks, surgical gloves, and music.

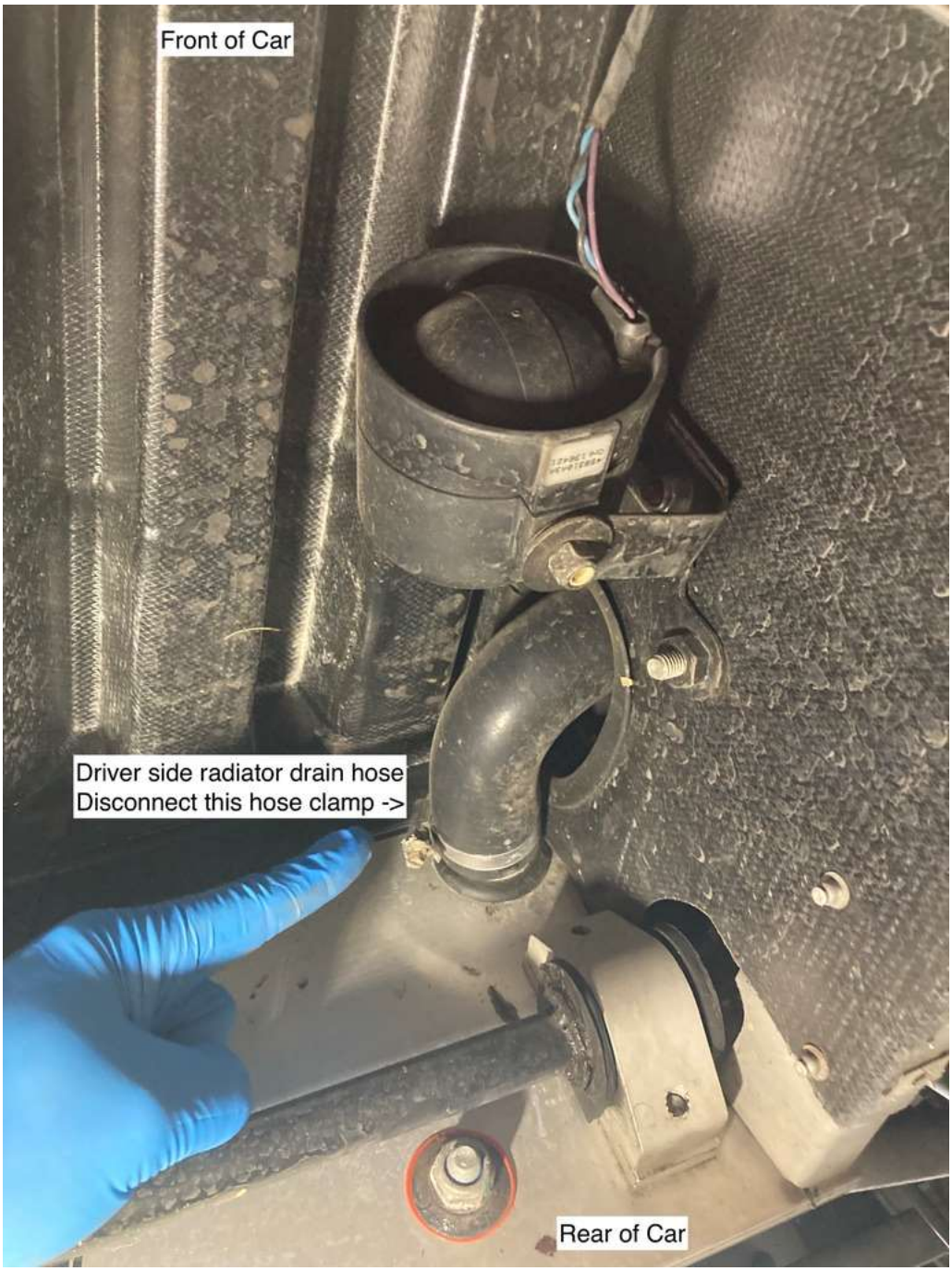
DRAIN THE OLD COOLANT:

A: Lift the front of the car (one side is okay), and use jackstands for safety (last reminder – ALWAYS use jackstands or other supports like ramps – NEVER rely on a hydraulic jack for your safety).

B: Remove the front undertray. There are several 8 mm bolts that need to be removed. Do not lose their washers! Once all fasteners are removed, the front undertray slides toward the front of the car slightly and can be removed to reveal the underside of the front crash structure, the front sway bar, and two hoses. Each hose connects that side of the radiator to the frame rail leading back to the engine.

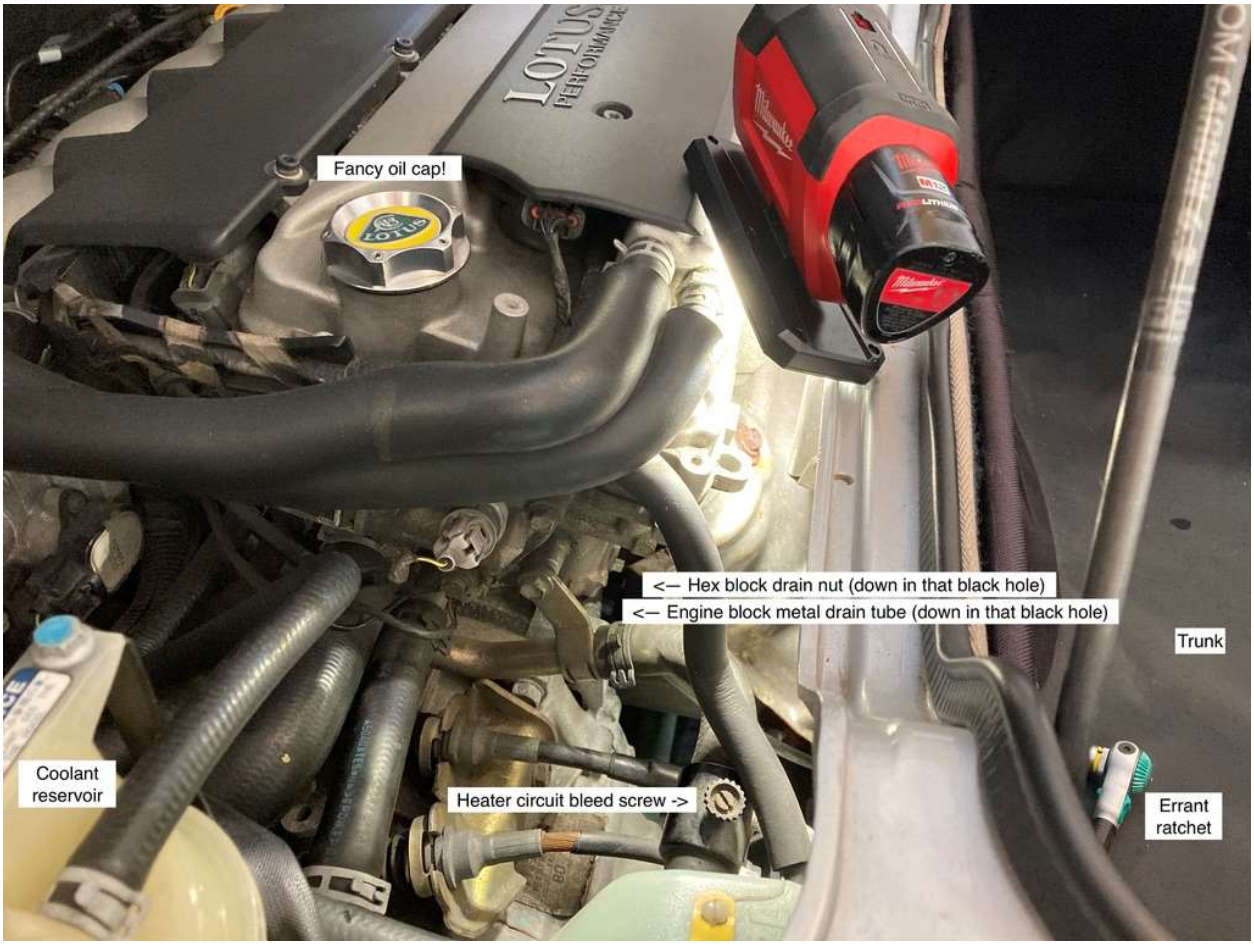
C: Prepare buckets or trays or even a bedpan to catch the coolant. One at a time, loosen the hose clamp (remove using either a flathead screwdriver or a 6 mm/7 mm nutdriver) on each hose and pull off the hose. Coolant will eagerly flow out because of gravity. If the car has recently been running, the coolant will be hot, so watch out.


Front of Car
Crash Structure
Passenger-side radiator hose:
<- Disconnect this hose clamp
Front Swaybar
Rear of Car



D: While the front of the car is lifted, find the engine block drain plug. It is a (8 mm? 10 mm?) hexagonal bolt on the rear of the engine block in roughly the center of the car. To the left (toward the driver side) of this hex bolt is a short metal drain tube. Conventional wisdom is to remove the rear undertray of the car (the same panel used to perform an oil change – the one with the three NACA ducts) to get to the coolant drain plug. However, in our tiny-handed cleverness, we were able to find the drain plug, easily put a socket on it, and fish a Tygon tube through the diffuser where the exhaust exits and reach the metal drain tube and slip it on so we could drain into a container and not all over the engine bay. A few turns of the plug and we

saw coolant draining out of the block. Note to learn from our mistake: We forgot to remove this hose when we fired up the engine, and the exhaust promptly melted right through the hose; now you know.



E: Once the coolant gushers have subsided to a gentle drip, replace your buckets with shallow drip pans. In the engine bay, remove the coolant reservoir cap. This will help the system drain a little better. Also, lower the front of the car (be sure your shallow drip pans will not be crushed) to allow better drainage.

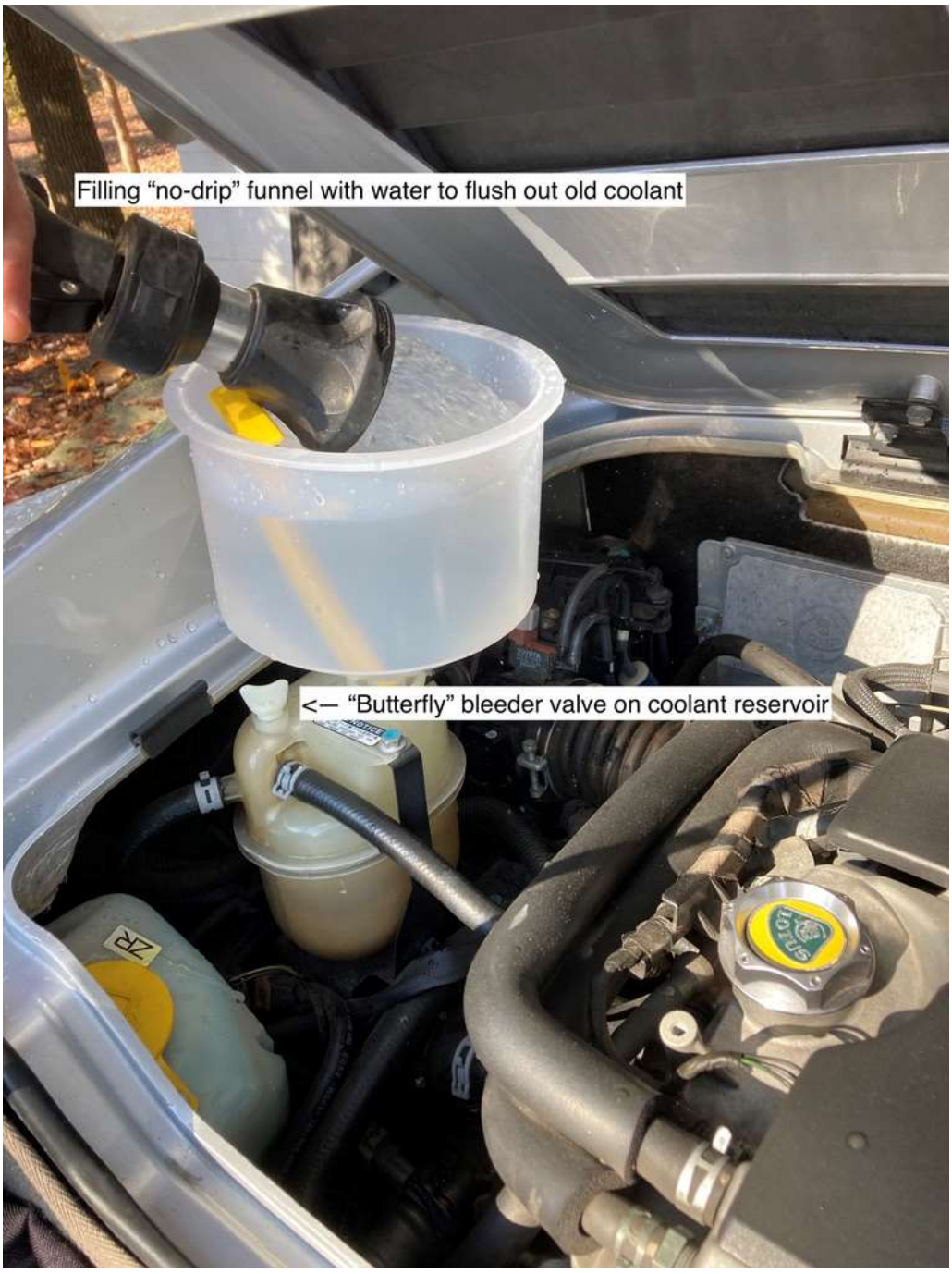
F: If you want to drain your coolant even more thoroughly, you can lift the rear of the car to drain a little more. Be patient, because it is a long run from the engine through the side rocker panels and the tubes make lots of twists and turns, creating places for bubbles to form and coolant to stay trapped.

G: At some point, the drips will stop, noting that you are draining from three locations, the two radiator hoses at the front, and the engine block drain at the rear. Due to the ironic cleanliness of our drain bedpan, we noticed an interesting fact – Gary's Elise (which was also Marc's former Elise) had been filled with two different types of coolant, green AND orange. Since the car had been running perfectly and the coolant wasn't gloopy or anything,this was no huge cause for concern, although it did prompt us to perform an additional step that may not be needed if the drained coolant is the same type (hopefully pink) as the new coolant you will soon employ.

CONTINGENCY FLUSH:

H: Because of the multicolored old coolant, we felt it was wise to flush the system with water. First step was to reconnect only the driver-side radiator hose (just hand tight, no need to tighten the clamp) so when we flushed with water it would flow through the radiator and flush it out as well.

I: Attach the no-drip funnel and fill with water. Catch the drips from the (single) front radiator hose and from the rear engine block drain until they are both clear.



J: Let the system drip more until it is dry. A (GENTLE) blast of compressed air can be helpful by wrapping a rag around the air nozzle and giving a few short bursts into the coolant reservoir until you get all the water out, knowing that "all" means "most".

FILL WITH NEW COOLANT:

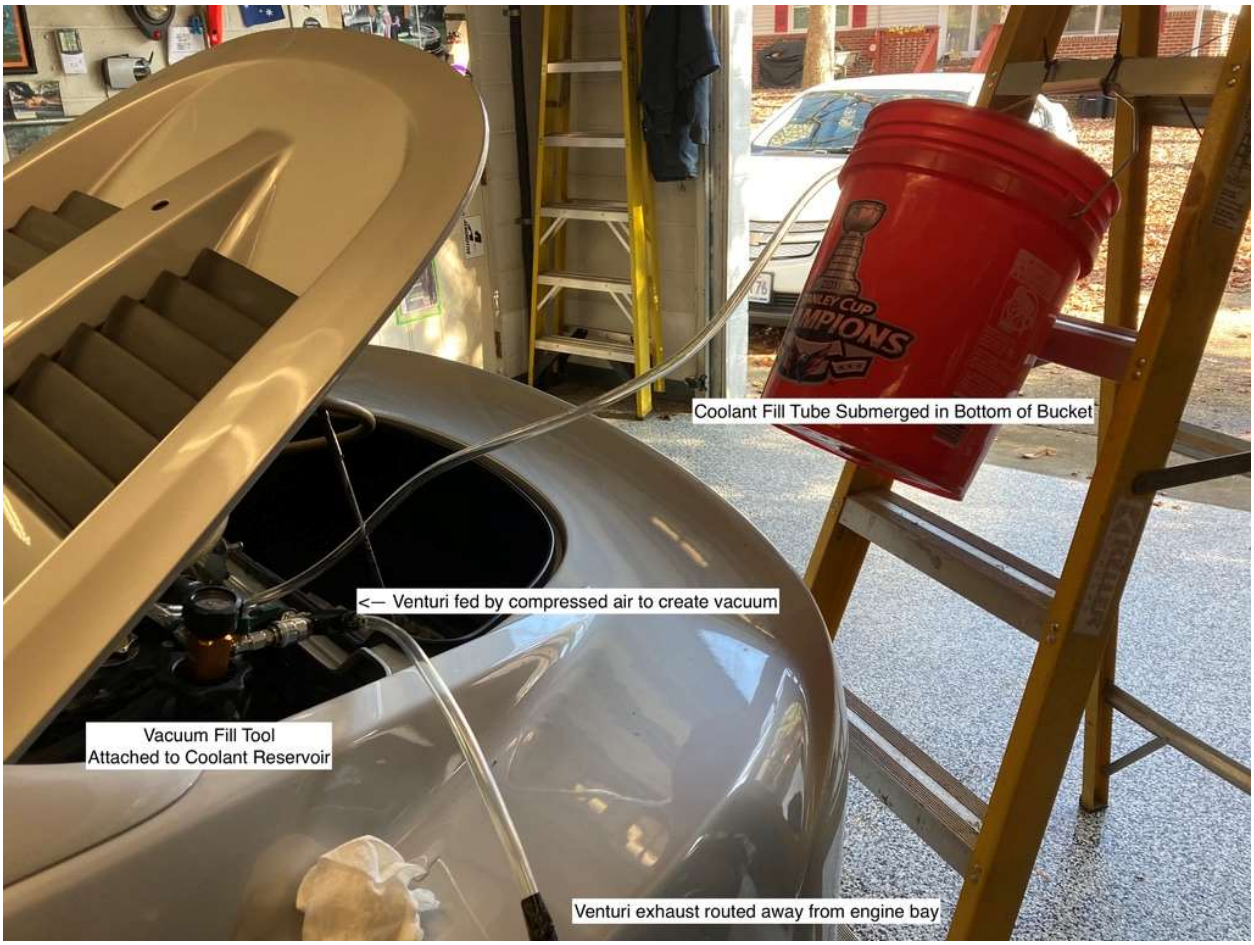
K: Reattach both front radiator hoses and secure their clamps securely. Orient the hose clamps such that in four more years, you thank yourself for making them easier to access. Tighten the block drain plug and remove your fancy drain hose so it doesn't melt against any hot exhaust parts.

L: Remove the short overflow hose on the front side of the coolant reservoir. Seal the nipple with an appropriately sized plug or cap so you can pull a vacuum on the system.

M: At this point of the adventure, we used a snazzy tool from OEMTOOLS called a "Coolant System Refiller Kit" although there are many such tools online. Our kit worked well enough, but again using this type of tool (while advised) is purely optional. What the tool does is attach to the coolant expansion tank and pull a partial vacuum created by a venturi powered by compressed air. Connect the tool, connect the compressed air, and draw down the system to a partial vacuum. We were able to get 23 inches of water as read by the tool's vacuum gauge. Note that some of the larger coolant hoses in the car may flatten out – this is normal and proof that you have good suction on the system. The reason to evacuate the system is to remove as much air as possible from the system, thus having fewer air pockets and bubbles to deal with during the bleed process. You will never get 100% of the air out, and that's okay. This is an overall adventure of "most".

N: Now for the filling and some tips based on this part. Using the vacuum system there are three little hacks to make it easier:

- First, take two of your containers of new coolant and pour them into a clean 5 gallon bucket or something similar. The reason is that once the vacuum flow of coolant starts, you do not want to stop and interrupt the process.
- Second, lift the container above the level of the reservoir container so gravity can "help" transfer the coolant. We used a stepladder and secured the bucket at an angle so the suction hose would be able to get all of the coolant in the bucket.
- Third, before you suck coolant into the system, prime the hose by filling it with coolant by hand using a small funnel. Once it is filled with fluid, submerge it into the 5 gallon bucket. The reason is to minimize the air that gets sucked into the system.



O: This is the big moment. By now your vacuum tool has sucked the inside of the coolant system to a decent vacuum, and your coolant hose is all full of fresh new coolant and its free end is at the bottom of a big container with a fresh mixture of 50/50 coolant and distilled water. At this point, double check everything and reconfigure the valves on your vacuum tool to shut off the venturi and open the valve to the coolant. You will see two magical things happen – the vacuum gauge will start to move from your previous vacuum level towards zero, and the coolant will be sucked from the bucket into the car. Be sure to keep the hose submerged in the bottom of the bucket so you do not suck air into the system! Hopefully you just sucked in two or more gallons of coolant. If not, no worries.

P: Once you reach zero on your vacuum gauge, the suction has stopped and you need to fill the rest of the coolant using the suggested no-drip funnel. At this point, carefully remove the vacuum tool, remove the overflow plug you used and replace the overflow tube, etc. and install the no drip funnel.

BLEEDING THE SYSTEM

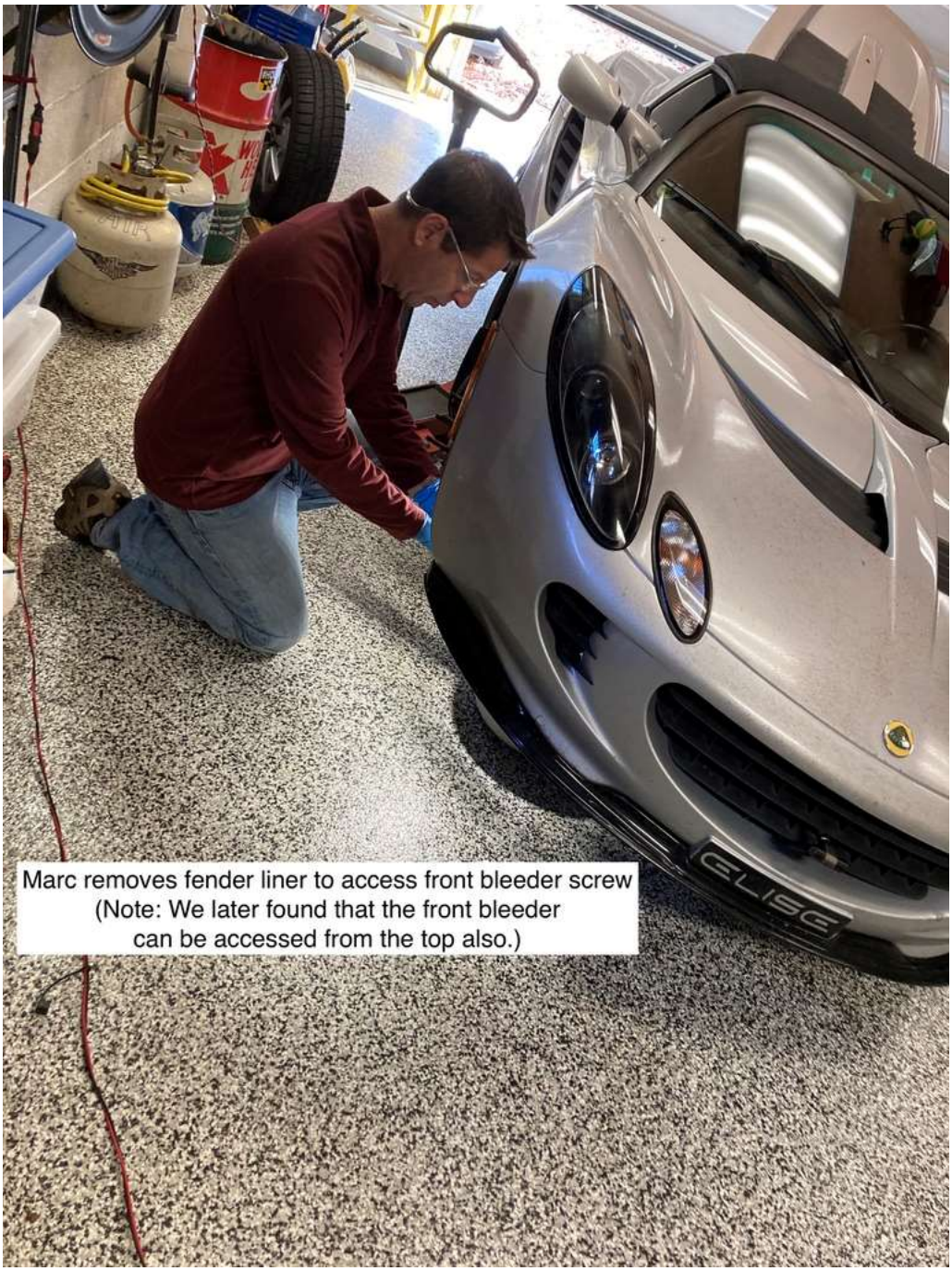
Q: With the car off, attach and fill up the no-drip funnel with coolant. As you bleed the system, the air pockets at the topmost parts of the system will vent out, allowing liquid coolant from

the no-drip funnel to take their place. This is easy if you are patient, because there are no fewer than THREE bleed locations, and they need to be bled multiple times.

R: The first air bleeder is the white butterfly-shaped valve at the top of the coolant reservoir tank. Open and close this bleeder until only liquid comes out. Note: as you bleed things, the level in the funnel may drop, so make sure you keep refilling it; this is where a friend comes in handy to keep an eye on things.

S: At this point, we jacked up the front passenger corner of the car for two reasons. First, that's where the front bleed screw is, and we figured that raising that section will help trapped air to rise since it wants to go to the highest point. Second, to access that bleeder you *might need to remove the front passenger side wheel and remove the fender liner to get to the bleed screw.

*Actually, we found out later that the front bleed screw can also be accessed from above by removing the passenger side clam top access panel and passenger side of the plastic radiator grille.



Marc removes fender liner to access front bleeder screw
(Note: We later found that the front bleeder
can be accessed from the top also.)


<— Note: If you remove passenger side top clam access panel and plastic grill over radiator, this is where you can access bleed screw from the top.
Electrical junction box
(Note: bottom of this box slides into metal bracket on the top of fender liner - use care removing fender liner.)
V
Front Radiator Bleed Screw
V
Front of car
Rear of car
Inside of passenger-side wheel well

T: Whether you access the front bleeder from the fender side or from the top, now is the time to start the car and turn on the heat on high on defrost. Monitor the temps and run the car. Note that the radiator coolant circuit only flows once the thermostat opens whereas the separate heater circuit is always running. Keep watching the funnel, as it will burp out air and suck in more coolant (also sometimes squeezing the radiator hoses themselves with your hands can help induce some more air burps). Use the front bleeder screw on the passenger side of the radiator to bleed out air until coolant comes out. Keep watching the engine coolant temperature to make sure nothing goes amiss. Revving the engine A LITTLE (perhaps around

2000 rpm) during this process seems to help get the water pump spinning at different speeds, warms the car, and pushes the bubbles around to the bleeder locations.

U: While car is running, after bleeding the coolant reservoir and front bleeder, use the bleeder valve in the engine bay. It is located on the heater coolant circuit and is easy to find. Note that the front and rear bleeder screws are plastic, and have small O-rings to accomplish sealing when they are tightened. One of my O-rings was broken; we discovered this when we opened the bleeder too far and the screw dropped out. Lucky this happened because only then did we notice the broken O-ring so we could replace it.

V: Go back and bleed the reservoir butterfly valve again, and the front bleeder screw again, and the rear bleeder screw again, all while keeping an eye on the engine coolant temperature and watching the no-drip funnel to make sure it is always full. Repeat as necessary.

W: To remove the funnel with literally no drips, the secret is to grab a big coolant hose (with gloves if it is hot) and squeeze it. This will raise the level in the funnel a bit. Then plug the

funnel with the handy plug that comes with it. Carefully unsqueeze the hose and remove the funnel and viola -there will be no drips at all!

X: Replace the cap on the coolant reservoir and go for a test drive, carefully watching the engine coolant temperature. Some people say that it is good to drive up and down steep hills, so if you live in mountains, have at it.

Y: When you drive back to home base, check for leaks, then jack up the front of the car, replace the front body undertray, fill the coolant reservoir to the proper level, and you are *almost* done.

Z: Finally, put your tools away and responsibly dispose of your old coolant and coolant-contaminated water you may have flushed out. Set your calendar for 4 years from now to do it all again. Drink your beverage of choice to celebrate.

We hope you find this guide useful. As we said at the beginning, we have merely consolidated a lot of wisdom generated by others, so we thank them. Our guess is that a shop would charge about $500 to perform this service. Even procuring specialty tools for this job, it cost less than $200 for the tools and coolant, so we consider it a “win.” Also, examining and working on various parts of the car is an excellent way to inspect your car. A full-day adventure with “cool” results.