

## Flushing the Cooling System

Republished from <http://www.bullittarchive.com/>

The Ford Shop Manual calls for coolant that meets **ESE-M97B44-A** specifications. A quick check shows Prestone and Zerex both make antifreeze/coolant that meets that specification.



Prestone recommends changing their Coolant annually and the Zerex guarantees theirs for 5 years or 100,000 miles.

They are both about the same price so for the first time I decided to buy something other than the Prestone. Stopped by the parts store and picked up two gallons of Zerex in the white container. Also picked up 4 gallons of distilled water.

A lot of people use the Prestone backflush kit and the Ford Shop manual shows this exact setup as a tool to use to backflush the system. But because of the shape of our heater hose I did not want to cut it and insert the T-fitting.

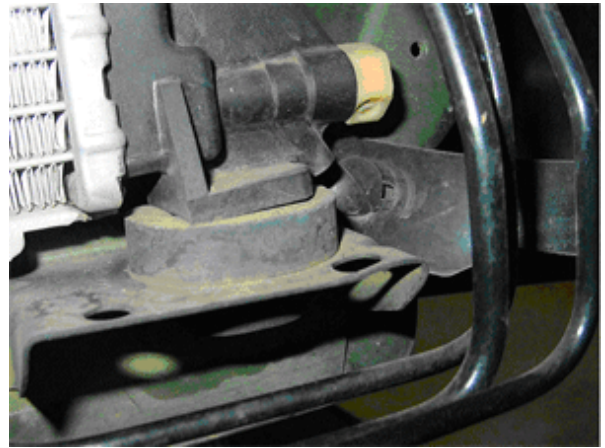
This is the way I drained and filled mine.

The desired mixture is a low of 40% antifreeze and 60% water to a max of 60% antifreeze and 40% water.

The coolant system holds 14.1 quarts so we need at least 5.6 quarts for the 40% and a max of 8.5 quarts for the 60% mix. Naturally 7 quarts would put us right in the middle at a 50% mix. This 50-50 mix protects us from freezing down to -34 degrees and protects us from boiling over at 265 degrees.

When I learned where the radiator drain plug was located and that it required a socket to open/close it I was thinking to myself this may be a pain. However it is very nicely laid out and easy to get to. It is located on the bottom of the radiator on the passenger side and a 3/8" ratchet and socket fits easily.

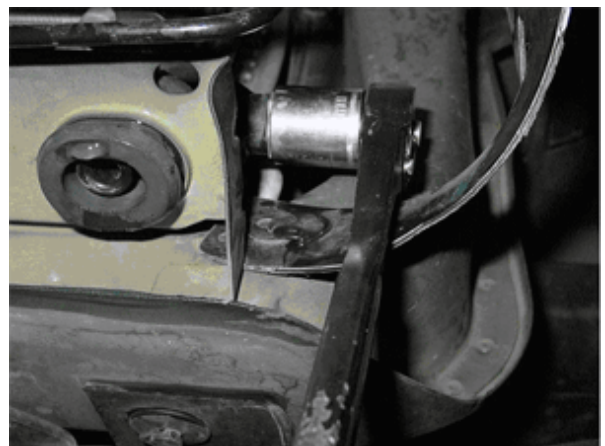
The drain valve as viewed from the engine side.



Ratchet in place viewed from the front.



Viewed from the engine side.



Use a 19mm socket to loosen the drain valve. Place a container underneath to catch the antifreeze. Typical warning here, don't leave the antifreeze where animals can get to it. They will eat it and probably die.

**Note:** the manual says that you will drain less than 20% of the systems capacity by simply opening up the drain valve. However I was able to drain 8 quarts before it stopped flowing. OK Another typical environment warning here, dispose of antifreeze in accordance with your local ordinances. Basically you want to throw it down the drain instead of leaving it just set around. The water treatment plant can break it down.

After I drained the 8 quarts off and emptied the drain pan, a quick look in the expansion tank revealed the old familiar reddish brown deposits.



I filled the expansion tank back up with the garden hose and started the engine. I left the water running at a slow rate and kept emptying the drain pan until the water was clear. It took a few minutes before the temperature gauge moved but would eventually get to the half way mark and stayed there the entire time.

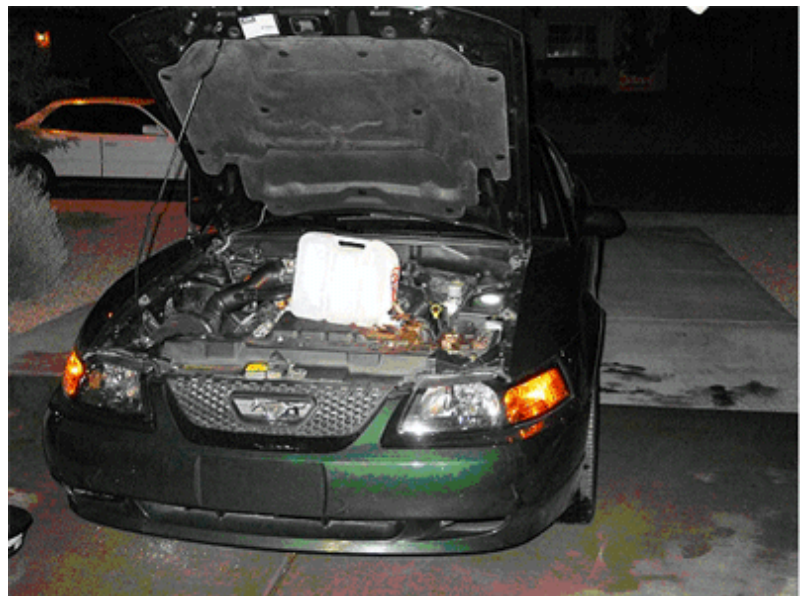
**Note:** By this time the neighbor Vern has probably noticed you working on the car and has arrived to see what work is being done. DO NOT let Vern dump the water. The water is going to get to around 200 degrees while doing this so be careful when emptying the pan. And don't trust him to set in the car and keep an eye on the temp gauge either. Odds are he will keep looking at the fuel gauge and keep yelling that it is too hot or too cold.

Now that looks better



Even though the coolant is designed to work with hard water I wanted to put distilled water in. So I turned the engine off and let it drain again.

Started the engine and poured in 4 gallons of distilled water in with the drain still open.



After I had put in the 4 gallons I stopped the engine and let it drain again to make room for the antifreeze. After the water had completely stopped draining I closed the drain valve and then added about 6 quarts of antifreeze and started the engine to let it reach temperature. Checked the expansion tank and topped it off with just about another quart of antifreeze. This should put me right at the desired 50-50 mix.



Took the car for a drive it the coolant level at the expansion tank still looked good. Let it cool some and then tested the percentage of antifreeze. Looks right on the money to me.



In theory we had 6 quarts of water and about 7 quarts of antifreeze for a total of 13 quarts. The system is supposed to hold 14 quarts. This would mean that I was somehow missing 1 quart of water if I wanted to keep the mix at the 50-50 percentage. Over the next couple of days I topped off the expansion tank with water. I am guessing that the cooling system had tons of small air bubbles that eventually worked their way out.

Ok time for another typical warning. I was pretty sure of how much water I was taking out when it drained and we know how much we poured in so I am pretty sure the system is full. HOWEVER if you have to be careful of getting a huge air pocket in the water pump and creating cavitation. What happens is the pump is designed to move water. If you get a big enough pocket of air around it it just sets there and spins without pumping any water. The car can set at idle and the water temperature may be fine. But take it out for a spin and within a few hundred yards the water temperature gauge is going to peg. First stop the car immediately and check the water level. It will probably be seriously low. Adding water should cure the problem. Some systems provide a place to bleed air off on the engine side to help prevent this.

Just an observation, you normally see a hose coming off next to the radiator cap. This allows the venting coolant a place to vent through. Usually it would just go to line that would vent the overflow down towards the ground or to another tank. We do not have one, instead the cap just opens and the overflow now leaks down the back of the expansion tank. Some people have noticed this before and thought that there was a problem. It is normal. Lots of time the pressure will build above the 16lbs, right after you shut the car off because the radiator has stopped being cooled. You may see some white deposits around the cap and the back of the expansion tank.

What is the small hose on top of the expansion tank for then? The small hose next to the radiator cap goes from the top of the radiator tank on the right side to the top of the expansion tank. This provides a path for air at the top of the radiator tank to travel to the expansion tank. It is kind of deceptive but the expansion tank connects to the lower radiator hose. I believe they refer to our expansion tank as a degas/expansion tank.

### **Water Wetter**

If you are looking for some extra cooling there is a product made by Red Line Oil called Water Wetter you can use. You can use Water Wetter along with your antifreeze. It also provides corrosion protection. (Except for Magnesium)

If you ever watched a pot of water start to boil you can see bubbles form on the bottom of the pot. This is where the water is turning to steam. Same thing happens inside your engine at local hot spots, in the water jackets around the cylinders. Water Wetter reduces the surface tension of the water and produces smaller bubbles. This in turn allows the water to transfer heat more efficiently. This can lower your Cylinder Head Temperatures compared to just using a 50-50 mix of antifreeze. A side benefit of the lower cylinder head temperatures is that it will allow you to use a lower octane gas. If you have a knock sensor which helps to maximize your timing depending on the octane gas you are using, you may see more power due to the cooler head temperatures.