

This write up covers removing and replacing the engine oil cooler lines on a '97 855 GLT wagon with light pressure turbo and automatic transmission. This car has 163K miles. The oil cooler lines were original.

The lower cooler line (lower = the one that goes to the lower inlet on the radiator) had developed a very slow leak at the crimp nearest the radiator. It was leaking just enough to start to wet the hose above the crimp. Many other people have reported finding leaks here and replacing these lines so I wasn't surprised to find a leak starting on my hose. I decided to replace both upper and lower hoses at the same time to avoid having to repeat parts of the work later if the upper hose developed a leak too.



There are already several excellent guides on this job that have been written up, so many in fact that I wondered if it would be worthwhile to offer my own contribution. In the end I decided to go for it because I generally take photos anyway as I'm taking things apart to make sure I put them back together the right way.

I'm grateful in particular to rspi, cn90, kickin_it, holler1, aahmes57 for having written up repair and replacement descriptions:

rspi's write up is here:

http://www.atthetipwebs.com/technologyinstructions/volvo_S70_GLT_oil_line.htm

Good thread on repairing the lines:

<http://www.matthewsvolvo.com/forums/viewtopic.php?t=48061&p=252160>

Replacing the lines (aahmes57):

<http://www.matthewsvolvosite.com/forums/viewtopic.php?f=1&t=36007>

Another write-up on vspeed:

http://volvospeed.com/vs_forum/topic/146852-oil-cooler-lines-write-up/

Neither the Haynes nor Chilton manuals for the 850 describe the procedure.

I also consulted the VADIS parts list, which was great for supplying a diagram and identifying the numbers for all the parts in the system. I used the parts list to order the right parts from the dealer. I've found that the online dealer parts websites like Waltrip and Tasca won't show all of the parts for the car when you select your year/model/options etc. You have to look up the parts numbers on VADIS (or get them somewhere else, like from MVS posts, FCP, eEuro, IPD, or the old parts themselves) and then you can type those part numbers into Waltrip or Tasca to get a price.

Overall, this job took me about 4 hours. It was more difficult in some ways from what I was expecting and easier in other ways. The bracket bolt that holds the oil lines to the engine was not as hard to remove as I expected. I found that I could slide a 10mm open end wrench up over the bolt and break it loose. Then fingertips were sufficient to turn it out and remove it. On the other hand, re-attaching the thermostat to the engine while keeping the rectangular gasket from slipping out of its groove was tricky – applying some RTV to hold the gasket in place turned out to be helpful.

New parts:

The photo below shows the new oil lines (Volvo part # 3528201 and 3528207). Others have had success using aftermarket lines, repairing the old lines or using rebuilt or refurbished lines and saving some money on parts. I decided to go for OEM replacement lines for several reasons: the original lines lasted about 17 years, which is an acceptable lifetime. I also wanted to save time during the job by not having to repair or modify the old lines. I've also found that from time to time my improvised solutions have failed later in unexpected (to me) ways, causing me to have to go back into an area or system and re-repair it – you may be more skilled or have a better track record than me in this regard. In the case of these oil lines, failure has the potential to allow the engine oil to leak out rapidly, potentially leading to engine damage due to insufficient lubrication. For these reasons I usually go for new OEM replacement parts even though the upfront cost is almost always higher than aftermarket or repair / refurbishment / rebuild options. It's a judgment call based on the car, situation, available time and funds, and other factors. I know some people won't agree with my decision to buy brand new OEM when there are less expensive options available.



The other parts that I bought included replacement screws, a flange, rectangular gasket, and extra o-rings in case I damaged the new ones that come with the new lines. I also changed the oil, oil filter and oil drain plug gasket while doing this job. I got all the parts from Waltrip Volvo in TN. The bulk of the parts cost (~80%) is for the two oil lines themselves.



QUANTITY		PART NUMBER / DESCRIPTION
SHIP	B. O.	
2	0	986226-9 SIX POINT SOCKE
		SHIPPED 0 SPECIAL ORDERED 2
1	0	3528201-1 OIL LINE
1	0	3528207-8 OIL LINE
1	0	3528200-3 FLANGE
		SHIPPED 0 SPECIAL ORDERED 1
1	0	986212-9 SIX POINT SOCKE
		SHIPPED 0 SPECIAL ORDERED 1
1	0	982775-9 FLANGE SCREW
		SHIPPED 0 SPECIAL ORDERED 1
1	0	1366791-0 SEALING RING
		SHIPPED 0 SPECIAL ORDERED 1
2	0	968757-5 O-RING
2	0	656456-1 RUBBER CAP
		SHIPPED 0 SPECIAL ORDERED 2

Left: VADIS print out of the parts in the oil cooler system, with some of the parts from Waltrip. Right: photo of packing list from Waltrip with all the part numbers. Note: the rubber caps on the last line of the packing list are for the brake calipers – I found a cracked brake caliper bleed screw cap that I wanted to replace – it's not part of this repair procedure.

Useful tools / supplies:

- 10mm open end wrench (useful for removing the 10mm bracket bolt)
- 10mm socket 1/4" drive (1/4" drive is more compact and gives better clearance)
- 1/4" 6pt socket for holding T30 and T40 bits
- T30 (thermostat flange bolt) and T40 bits (thermostat housing bolts)



1/4" drive extensions (6" and 3")

1/4" drive ratchet

17mm socket for oil drain plug

Oil filter removal wrench

Jack, jackstands, wheel chocks

19mm socket and breaker bar for removing wheel lug nuts

Torque wrenches for tightening oil drain plug and the wheel lug nuts

Nylon tie wraps (to wrap around the oil line clips for added assurance the clips won't work loose or pop off)

Circlip pliers or needle nose pliers to pry open cooling line clips

Note: I did not install a new thermostat. I tried to order a new one but found out from Waltrip and Tasca (the two dealers I contacted) that the part is discontinued by Volvo and is no longer available. When I got the old thermostat off I saw that it was marked "Wahler Made In Germany" and "07 36 VOLVO 958 35 28 199". To the left was stamped "96" with six raised dots which must be the year and month (June) it was produced (my car is a 1997 model year).

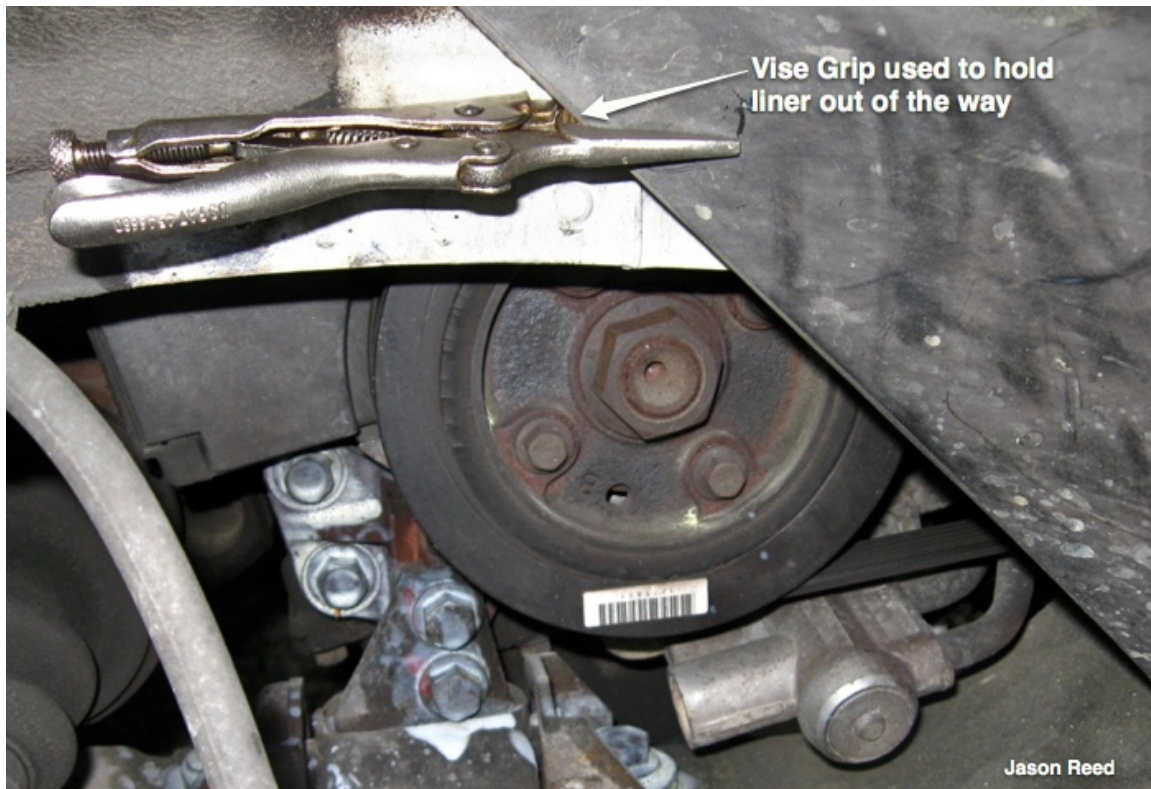
I wanted to install a new thermostat because the old one makes a "moaning" sound on startup in colder weather when the throttle is applied. It lasts for a few minutes and then the sound goes away as the engine oil heats up, presumably allowing the thermostat to open. The thermostat mechanism has a plunger and internal spring that I cleaned with brake cleaner fluid. Hopefully this will help quiet the mechanism down – it has been warm here since I did the job so I'm not sure if the cleaning has made any difference. Other than the noise, there didn't seem to be anything wrong with the thermostat.



Procedure

Preparations:

- 1) Remove hubcap and partly loosen the nuts on front passenger's wheel (~1/2 turn to break torque)
- 2) Chock rear driver's side wheel
- 3) Raise front passenger's corner of car to lift wheel. Install jack stands.
- 4) Remove the nuts and wheel.
- 5) Remove the two 10mm nuts holding the splash guard in place and remove the splash guard. This allows access to the lower oil cooler line connection at the radiator.
- 6) Loosen the plastic nut holding the wheel liner down
- 7) Fold back the wheel liner and hold it up with a vise grip, other clamp or a cord

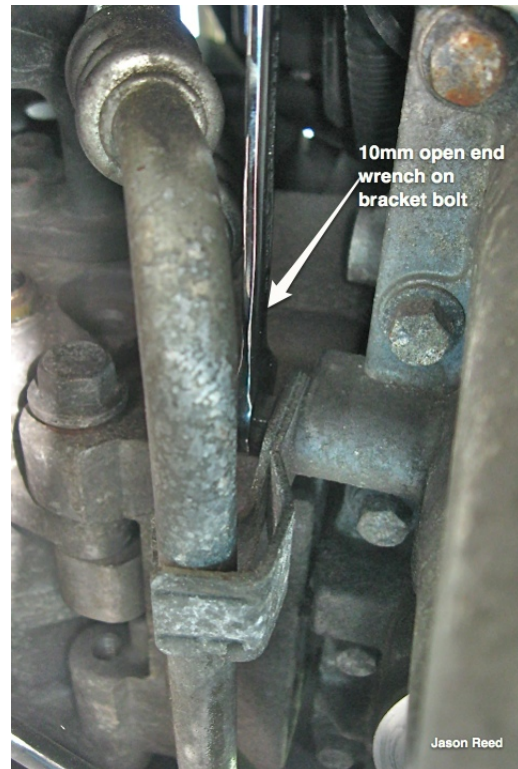


- 8) (Optional) Drain the engine oil and remove the oil filter. Having the oil filter out of the way make snaking the lines and thermostat into position much easier.

Removing the lines:

- 9) Under the car, loosen the 10mm bolt on the brackets holding the oil lines. I used a 10mm open end wrench for this job, one partial turn at a time. Once the bolt is loose I could turn it out relatively easily with my finger tips. This only took about 5 minutes – not as bad as I was expecting. I have read how others used a flexible joint and socket to remove the bolt. I tried that but couldn't get a good angle on the bolt due to interference from the AC compressor bolt. Depending on the car, you may have to try different approaches to loosening the bolt.

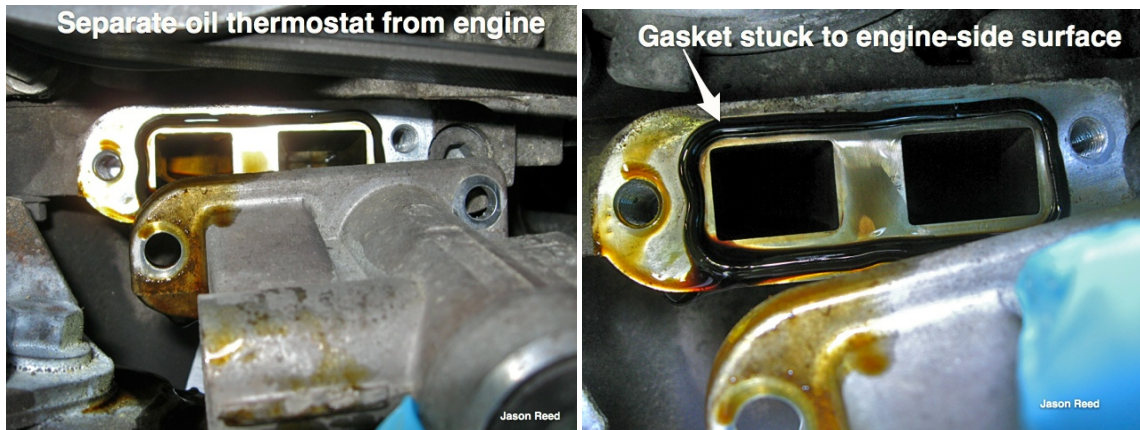
Since others have mentioned that this part of the job was extremely difficult or impossible, it's probably worth taking a look for yourself and giving it a try before you start in on the job. If you can't get the bolt loose, then you'll have the opportunity to go out and get a better tool, or even make the call to take the car to a repair shop. Loosening the bolt up in advance won't hurt anything – just tighten it back up again afterwards until you're ready to start the job.



- 10) Loosen the thermostat housing screws with a T40 bit on a 1/4" drive with long extension, or else a long T40 bit.



- 11) Pull thermostat away from engine slightly. Remove gasket if stuck to engine. Be prepared with a catch pan to catch the engine oil (~1/3 L) that will drain out of the thermostat and lines.



- 12) Disconnect the upper and lower oil cooler lines at the radiator. I used a pair of circlip pliers to prise open the clamp far enough to allow the line to be pulled off the radiator. This was a bit of a change in procedure for me – I used to pry the clamp open wide enough to pull it off of the line entirely before trying to pull the line out of the radiator. But I found it's easier to just pry it open enough to slide the clip and line out. On the lower cooler hose I could slide the clamp backwards away from the end of the line.



Left: Upper line disconnected. Right: Lower line clamp being spread with pliers.

- 13) Make a note of the positions and pathway of the upper and lower oil cooler lines so you can snake the new ones in the same way.

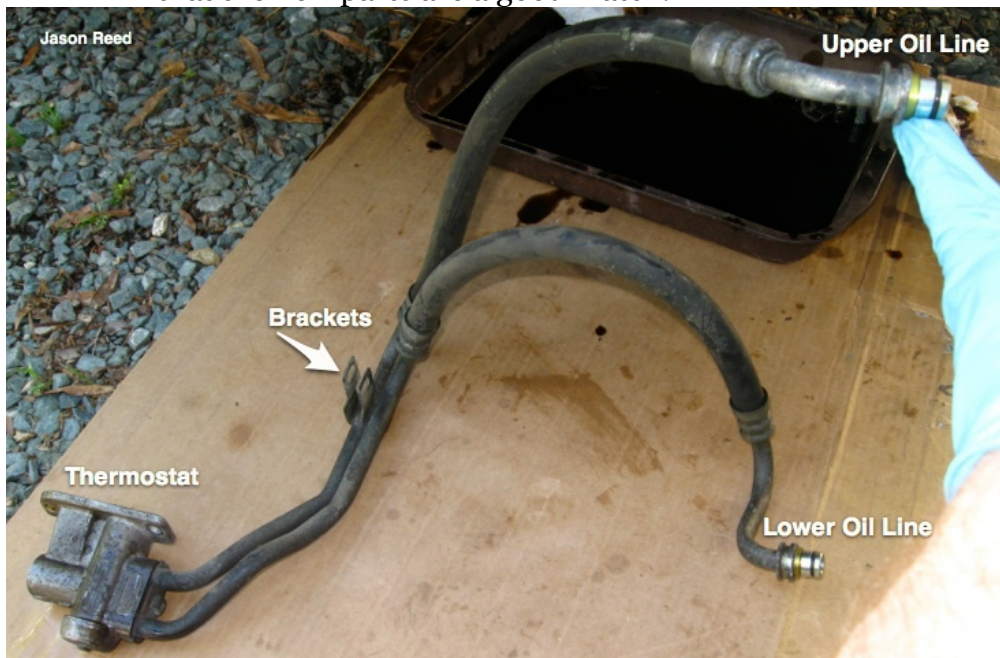


General routing pathway for the upper and lower oil lines.

- 14) Push the thermostat back towards the oil filter area and pull it down from the engine. The lines will come along but will likely hang up on components above. I had to go back and forth a couple times from below and above to lower the lines, free them from obstructions, and then lower the thermostat and lines all the way out.



- 15) Make a note of the relationship between the lines and the thermostat so you can install the new lines in the correct holes and with the correct orientation. The lower oil line bracket is smaller than the upper and nestles on top of it. This is a good time to compare the new parts with the old parts to make sure that the new parts are a good match.



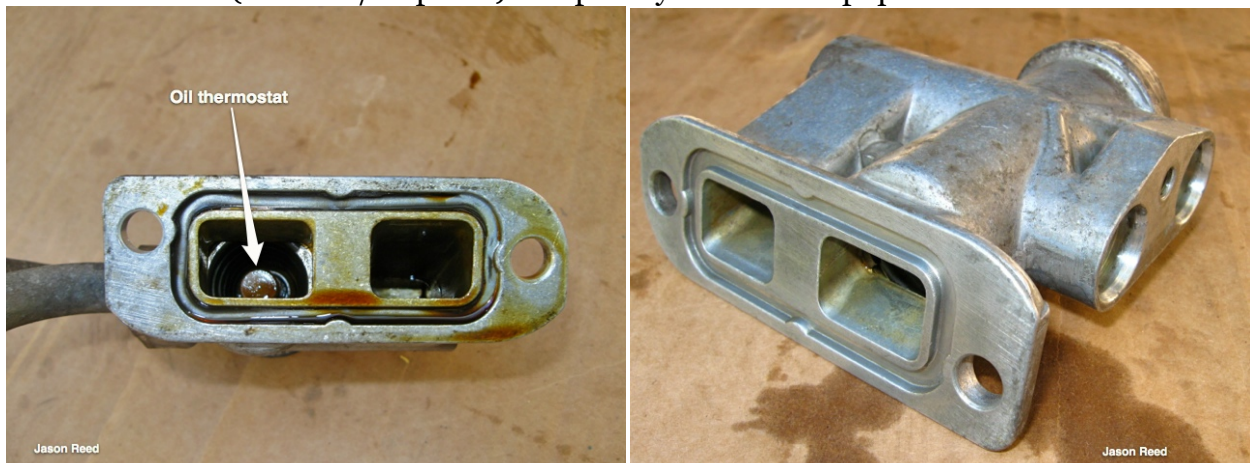
- 16) Disconnect the T30 screw holding the flange to the side of the thermostat. This flange holds the two oil lines in place.



- 17) Pull out the lines and remove the old o-rings from the thermostat if stuck inside.

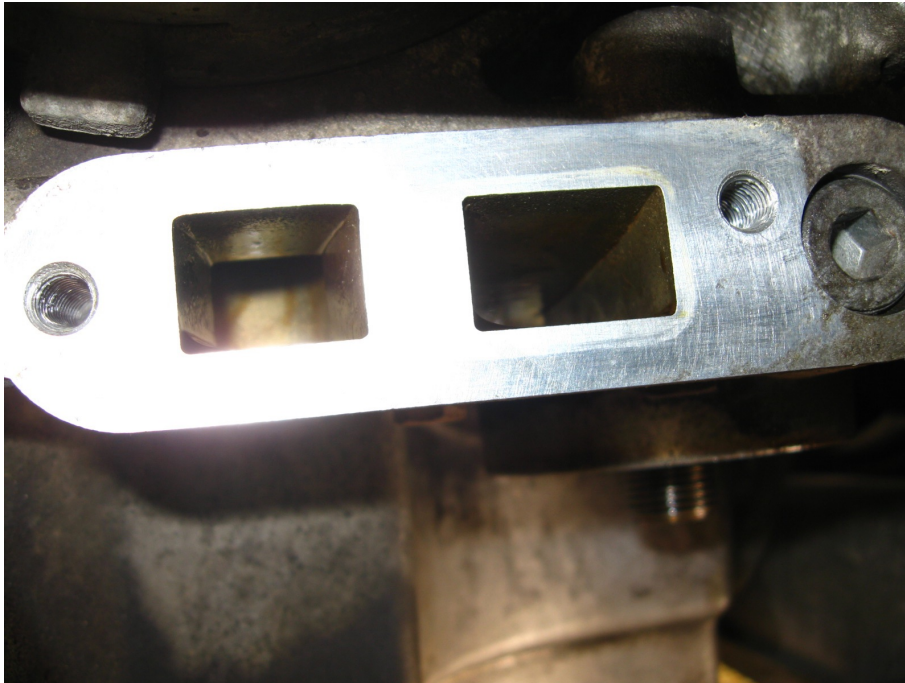


- 18) Clean up the old thermostat. My old thermostat makes the “moan” sound on startup in colder weather, whenever there is some throttle applied. It lasts for about 2 – 4 minutes and then the sound dies down. The thermostat mechanism has a plunger and internal spring that I cleaned with brake cleaner fluid (acetone / heptane). Hopefully this will help quiet the mechanism down.



Left: internal plunger and spring mechanism. Right: after cleaning with solvent.

- 19) Clean up the thermostat mating surface on the engine block.



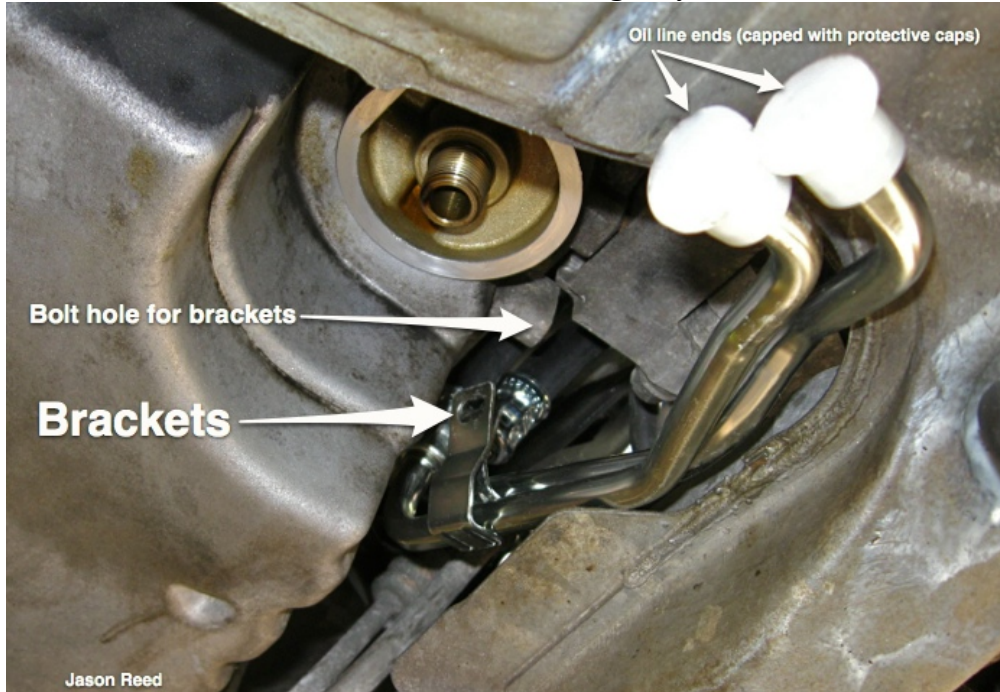
Mating surface on engine after cleaning.

Installing the New Lines:

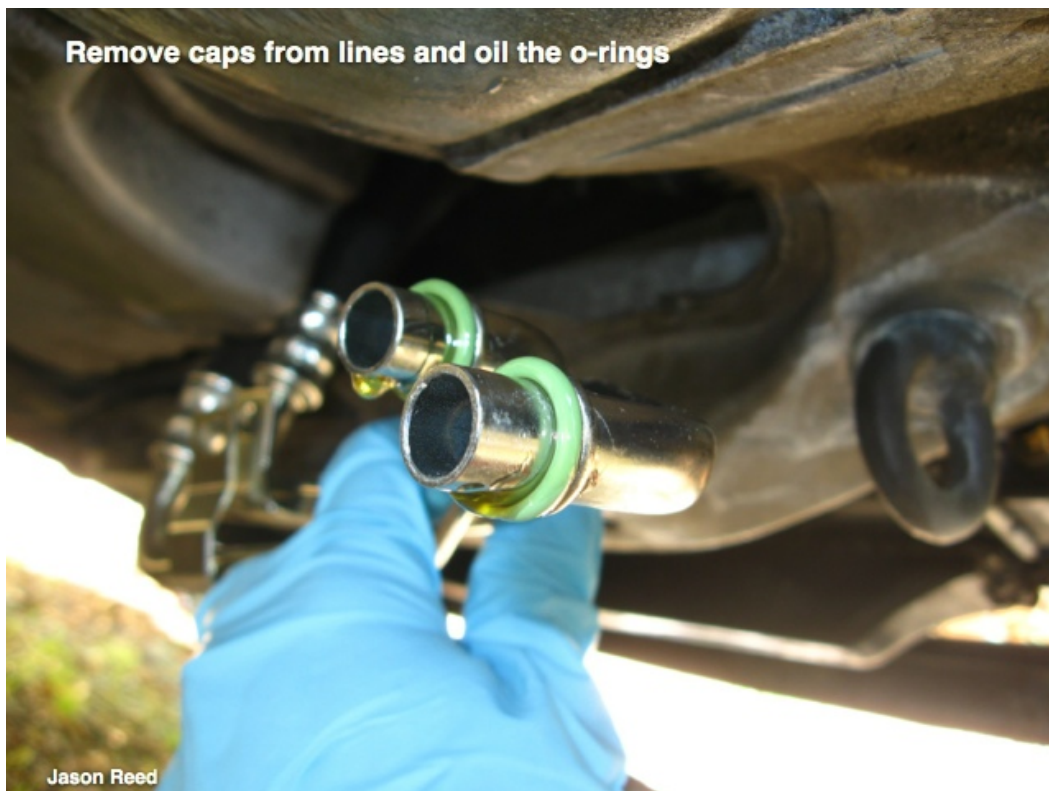
- 20) Position the new lines together with the brackets aligned. The lower line has a shorter bracket that lies on top of the upper line. The new lower line will be straight instead of curved. This is normal and the fitting will be in the right orientation when you bend the line over later for making the connection to the radiator.



- 21) Snake the new lines up into the engine following the same path as the old lines. Don't bolt the brackets to the engine yet.



- 22) Remove the plastic caps and apply a little oil to the green o-rings.



- 23) Oil the sockets in the thermostat (may be overkill – even after cleaning the thermostat I observed some corrosion and roughness on the line sockets, so I wanted to add extra oil there to protect the o-rings from cuts during insertion)



- 24) Connect the lines to the thermostat.



- 25) Install flange. Tighten T30 screw to hold flange in place.



- 26) Snake the new lines farther up into the engine bay. Make sure the new lines follow the right pathway up into the engine. Align the brackets near the bracket bolt hole.





Up above in the engine bay you can position the upper and lower oil lines as shown.

- 27) Lift the thermostat up past the oil filter area and position it near the mating surface.





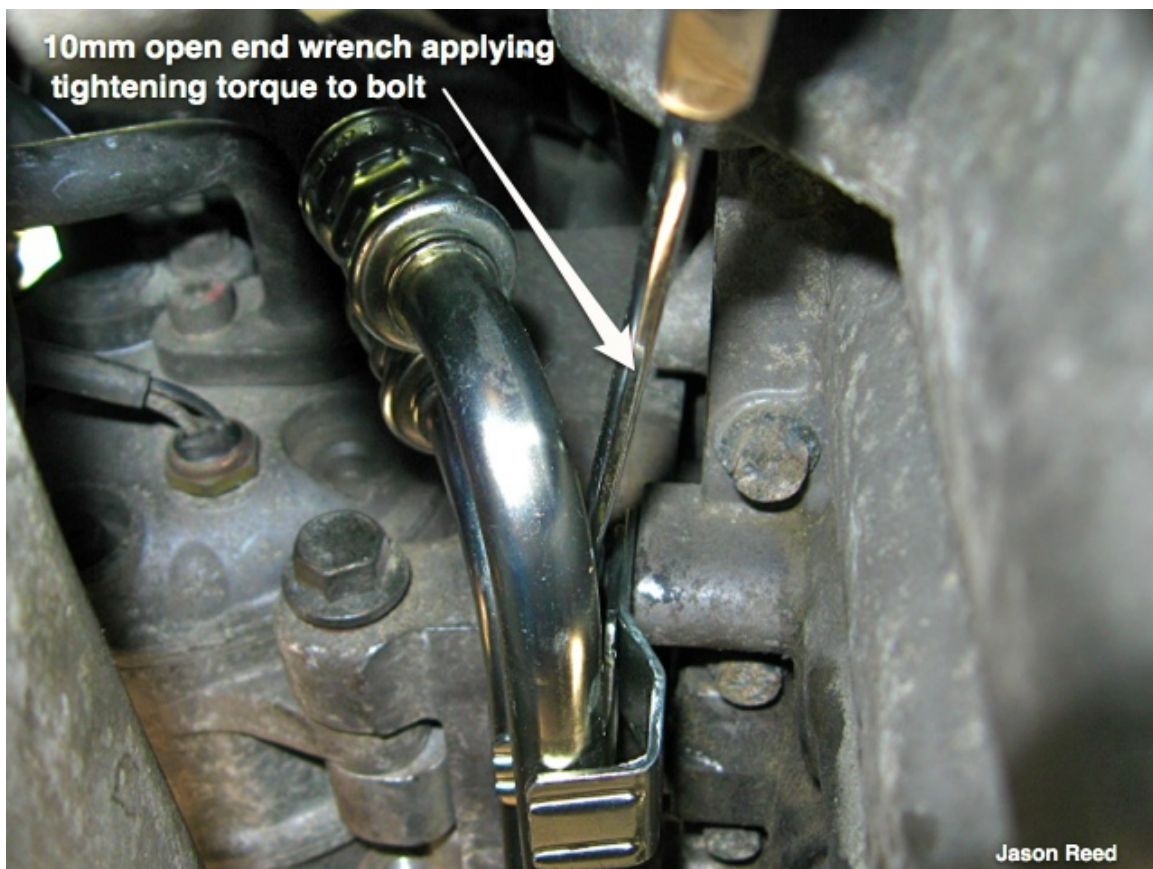
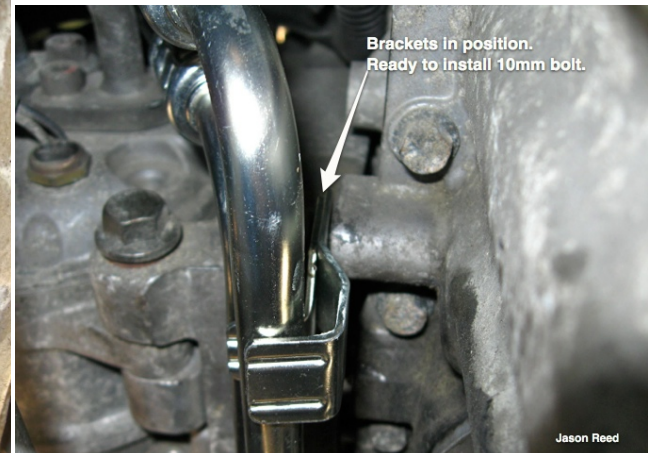
- 28) Apply RTV (I used black oil-resistant RTV) to the gasket to hold it in place in the groove in the thermostat.



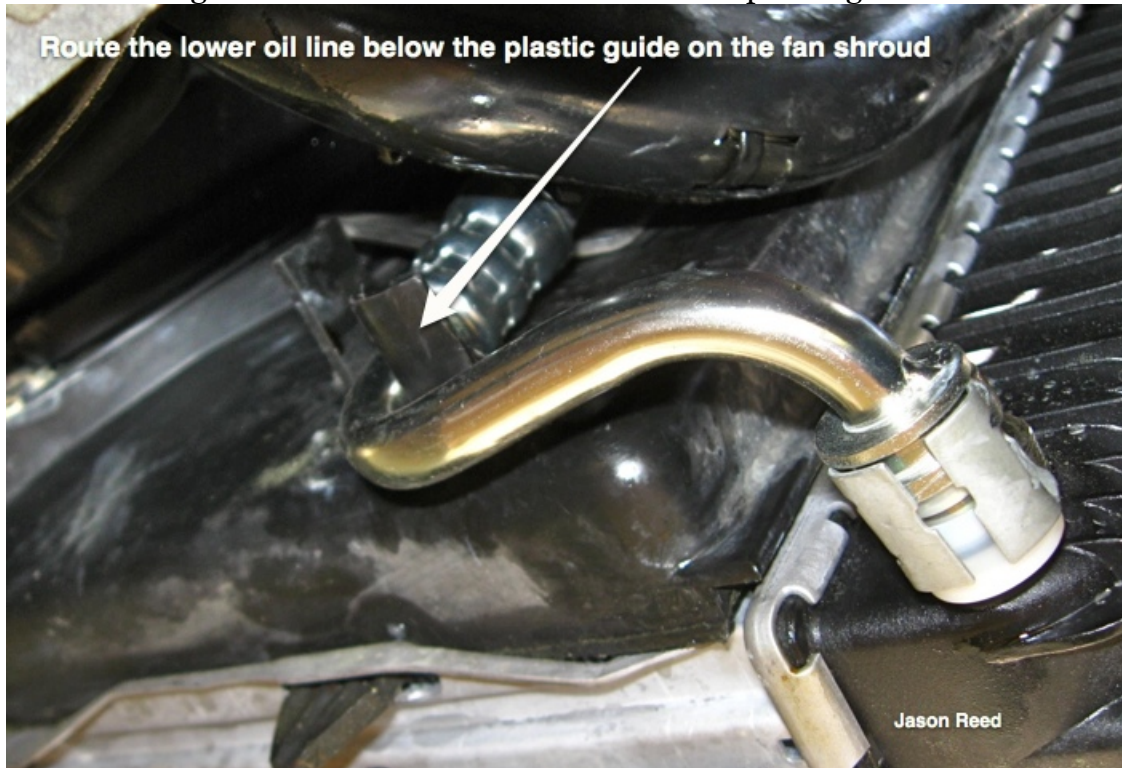
- 29) Position thermostat and align the screw holes. Hold the thermostat against the mating surface to hold the gasket in place in the groove. Insert the two T40 screws and tighten them up, making sure that the gasket doesn't slip out of

place and get pinched during tightening. This was a tricky step for me. The first and second time I tried this the gasket slipped out. The third time I used more RTV, quickly pressed the thermostat against the flange and kept pressure on it until I could get both bolts tightened up finger tight. That worked well.

- 30) Position the oil line brackets over the bolt hole. Insert the 10mm bolt and tighten. Getting the bolt started was tricky. The access is so restricted that I had to use my finger tips to position and turn the bolt head. This took a few tries. Once the threads engaged it was much easier to tighten it up. For final torquing I used the open end 10mm wrench again. I tightened it up 'snug' – not too tight.



- 31) Check the pathway of the new lines up into the engine bay. Route the upper and lower line ends to the radiator. The lower line must be bent about 180 degrees downward and under the bottom plastic guide on the fan shroud.



- 32) Remove the plastic caps from the ends of the oil lines. Apply a small amount of fresh engine oil to lube the o-rings. Connect the oil lines to the radiator. I used a circlip plier again to spread the clamps just enough to slip over the connectors. If you have removed the clamps make note that they are not symmetric. Be sure the wider part of the clamp is towards the radiator.
- 33) Apply nylon tie wraps over the clamps for extra security.

Finishing Up:

- 34) Install new oil filter (if removed) and drain plug. I used a new aluminum crush washer, though they can be reused. Tightening torque on drain plug: 26 ft-lbs.
- 35) Refill with oil if you drained the oil (about 6 quarts).
- 36) Start and run car. Check for leaks at thermostat, lines and connections at radiator. Stop car. Check and top up oil level if needed.
- 37) Reinstall splash guard and tighten the two 10mm splash guard bolts.
- 38) Reinstall wheel. Hand tighten lug nuts. Remove jack stands. Lower car. Use criss-cross pattern to tighten lug nuts evenly. Final tightening torque on lug nuts: 81 ft-lbs.
- 39) Remove wheel chocks.

That's it. Good luck!