

Here are some pictures to show what's required when replacing the A/C compressor, expansion valve and receiver/drier on a 2001 Volvo V70. Even if you don't replace these A/C parts these pictures can help with headlight assembly replacement, bumper cover removal, radiator fan assembly removal, etc.

Working on the A/C components is not for everyone, the A/C system is under pressure and nothing should be tampered with prior to refrigerant recovery. By law the refrigerant has to be recovered and not many I know have this type of equipment. When recharging the system a vacuum pump and gauge set is required. I have a friend that did the refrigerant removal and I have the vacuum pump and gauge to recharge the system so I was able to replace the compressor and change the expansion valve and receiver/drier, which is recommended when replacing the compressor.

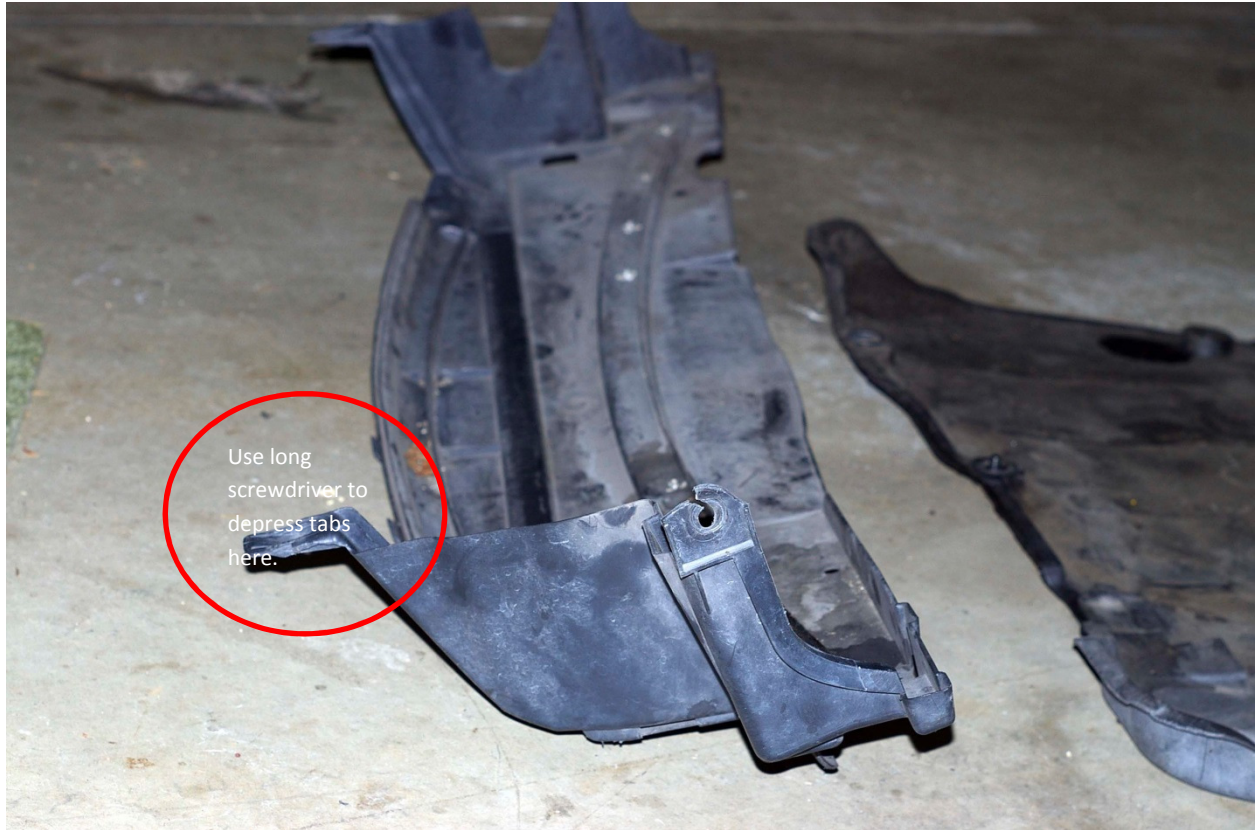


**Figure 1** Here's what needs to be removed for access to the A/C compressor, expansion valve and receiver/drier. Front bumper cover/grill and passenger side headlight to gain access to the receiver/drier, strut brace and turbo to intercooler tube for better access to the expansion valve, serpentine belt and fan/shroud (not shown ) for access and removal of a/c compressor.



Figure 2 The fan and shroud also needs to be removed for access to the four a/c compressor bolts and removal of the compressor from the top. A/C compressor needs to come out from the top with just enough room between the intake manifold and radiator.





**Figure 3** From under the car, the front air dam and engine belly pan also need to be removed. The front air dam is held on by two bolts, one on each side and two locking tabs up front. A long screwdriver and good lighting is needed to depress the tab fingers up front. While under the car disconnect the fog lights in preparation for the front bumper cover removal.

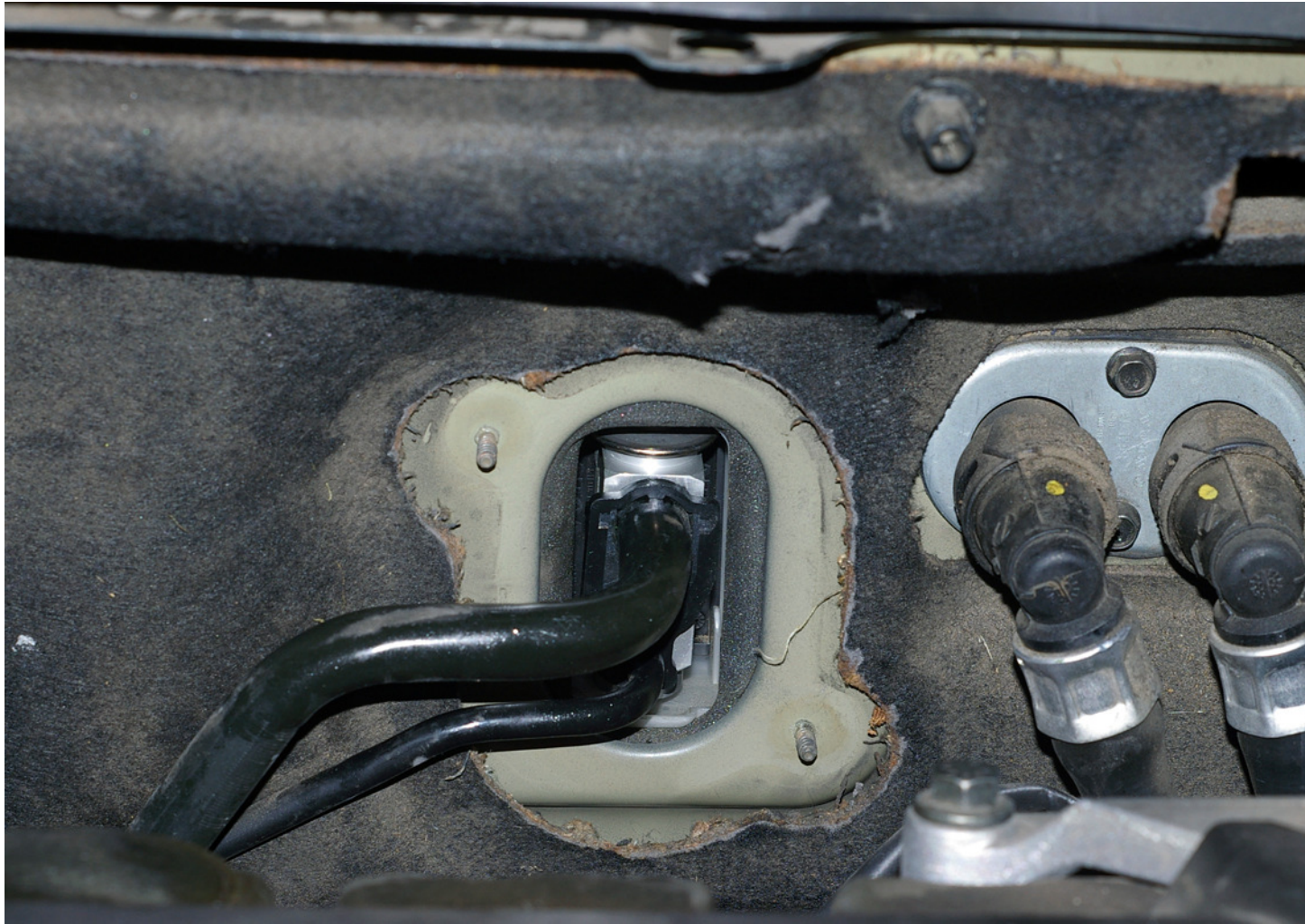


Figure 4 Here's the expansion valve located on the firewall and with the access plate removed. Two stamped metal nuts need to be removed to take off the plate. These nuts are not on tight; just use pliers to grab one of the flat edges and twist.





Figure 5 Here's the location of the receiver/drier behind the passenger side headlamp and with the front bumper cover/grill and headlamp removed. The new receiver/drier has been installed in this picture. The receiver/drier removes moisture from the system and provides some filtering.

Any time the A/C compressor is replaced or the system has been open for any length of time it is recommended the receiver/drier be replaced. There is a desiccant bag in the receiver/drier to absorb moisture in the system and once saturated it needs to be replaced. Replace this component last to minimize the time it's exposed to air and moisture. Front bumper fascia and passenger side headlight must be removed for access.

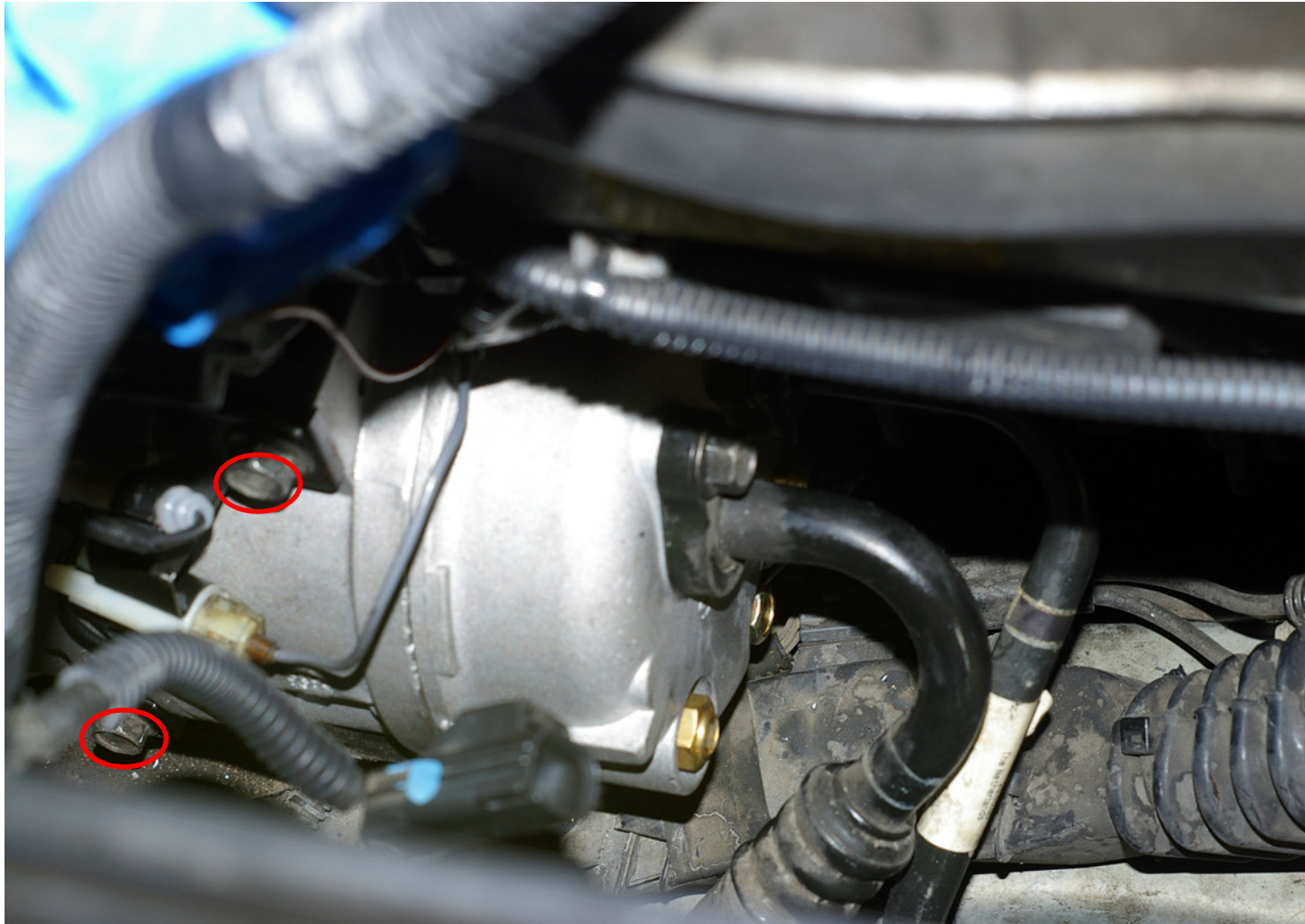


Figure 6 A/C compressor location is below the alternator and attached with four bolts. Once the radiator fan and shroud assembly is removed there's good access to the four bolts and the compressor comes out from the top. Two of the bolts are visible in this picture.





Figure 7 To begin removal of the front bumper cover the plastic push pins on top must come out. The plastic pins on my car all needed to be replaced due to deterioration over the years.

Removal of the front bumper grill cover provides access to the receiver/drier.

If you ever need to replace a headlight assembly you'll now know how to remove the front bumper/grill for access to the headlight bolts. It doesn't take long to remove. The plastic pins on top need to be removed, two bolts under the bumper trim pieces need to be removed, the fog lights need to be disconnected and two torx screws in the fender wells need to be loosened, then it slides off.



Figure 8 Remove plastic trim pieces on both sides to gain access to two mounting bolts. Don't forget to unplug the fog light connectors prior to sliding the bumper cover off.





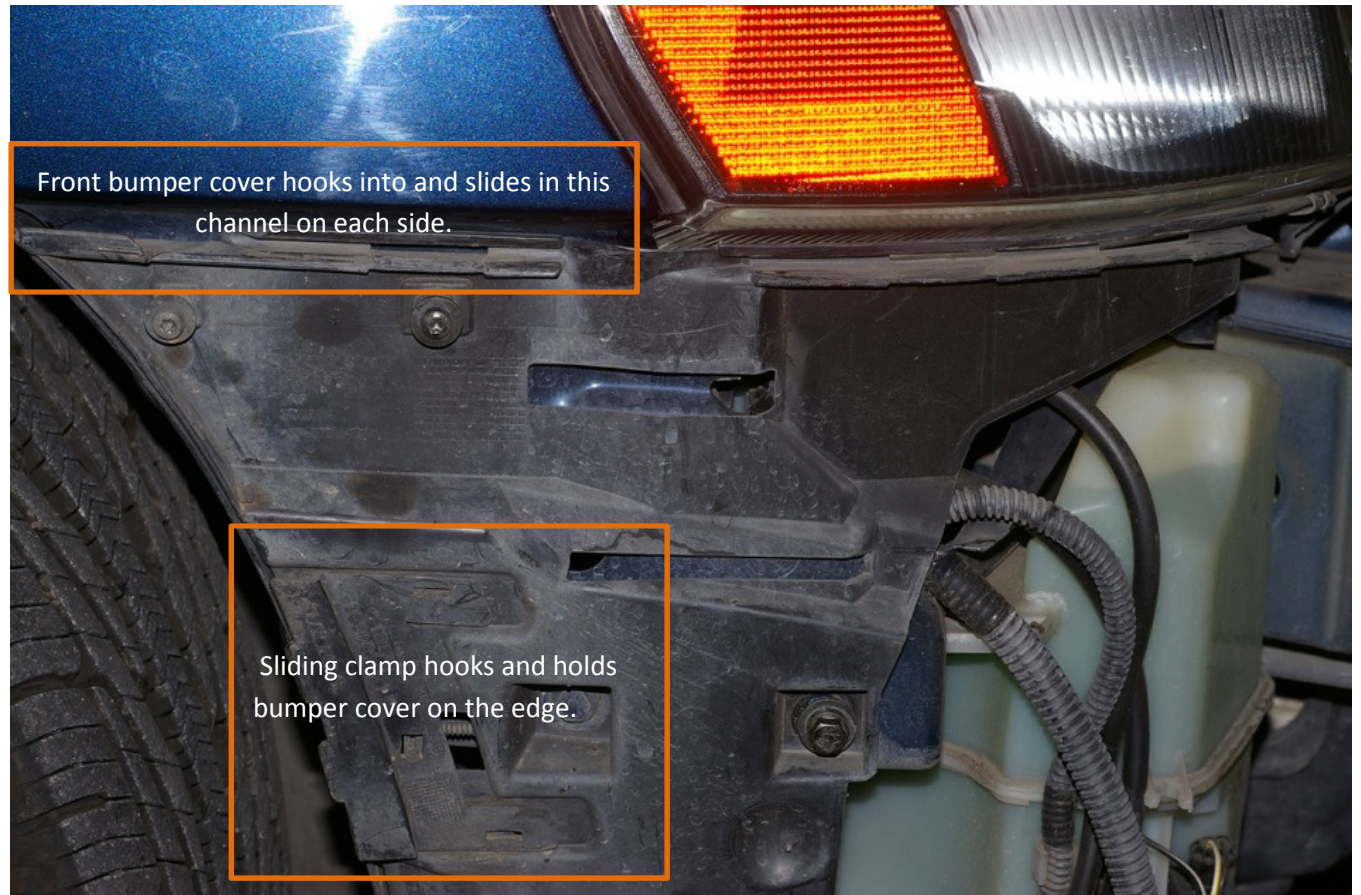
Figure 9 Underneath the bumper trim pieces are two bolts one on each side in the front. Remove these two bolts and take care to prevent the bolt threads from contacting the edge of the metal inserts in the bumper fascia. When I installed one of the bolts the metal insert pieces was not lined up well over the bolt holes in the bumper area and I damaged the threads on the bolts, which damaged the threads in the bumper sheet metal. Just make sure when reinstalling the bolts the holes in the bumper fascia lined up well over the bolt hole threads, push on the bumper if necessary to line things up.



Loosen single torx screw in each front fender well and push in on screw to release the clamp holding the bumper cover. Pull bumper cover out and slide towards the front of the car.

Figure 10 In addition to the plastic push pins on top and the two front bolts these torx screws in the fender wells need to be loosened to remove the front bumper fascia. There are clamps that hold the fascia in place on the sides and these screws (one on each side) loosen the clamps. Once the side torx screws are loosened, push on the torx screws to move the clamp edge back and then the front bumper cover can be pulled out on the side inside the wheel well to clear the clamp. The fascia can then be pulled away from the car.





Front bumper cover hooks into and slides in this channel on each side.

Sliding clamp hooks and holds bumper cover on the edge.

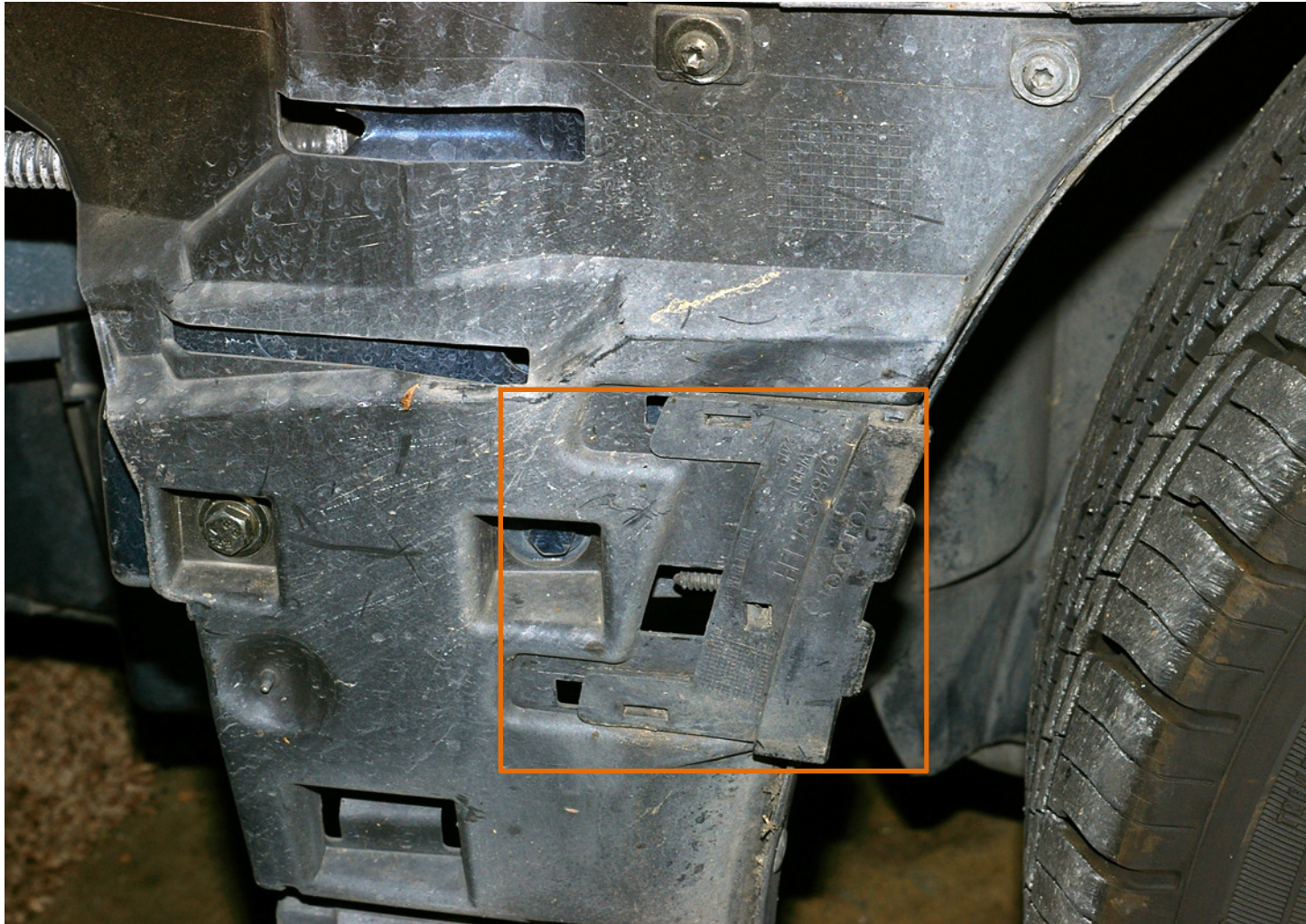


Figure 11 Another view of the sliding clamp that holds the front bumper cover on. When the torx screw is loosened the screw can be pushed in, which moves the clamp and unhooks it from the edge of the front bumper cover.





Figure 12 Be sure to unplug fog light connectors prior to sliding front cover off instead of ripping the light sockets apart like I did.



Figure 13 To gain access to one of the headlight bolts these two torx screws and one bolt need to be removed from the side here. Note the sliding clamp that holds the front fascia in place.





Figure 14 After the two torx screws and one bolt is removed the side plastic piece this piece can be pulled back to remove the headlight assembly bolt. Four bolts attach the headlight assembly, one on the side here two on top and one on the front. The headlight needs to be removed to gain access to the receiver/drier.



Figure 15 One of the four bolts that needs to come out for headlight removal



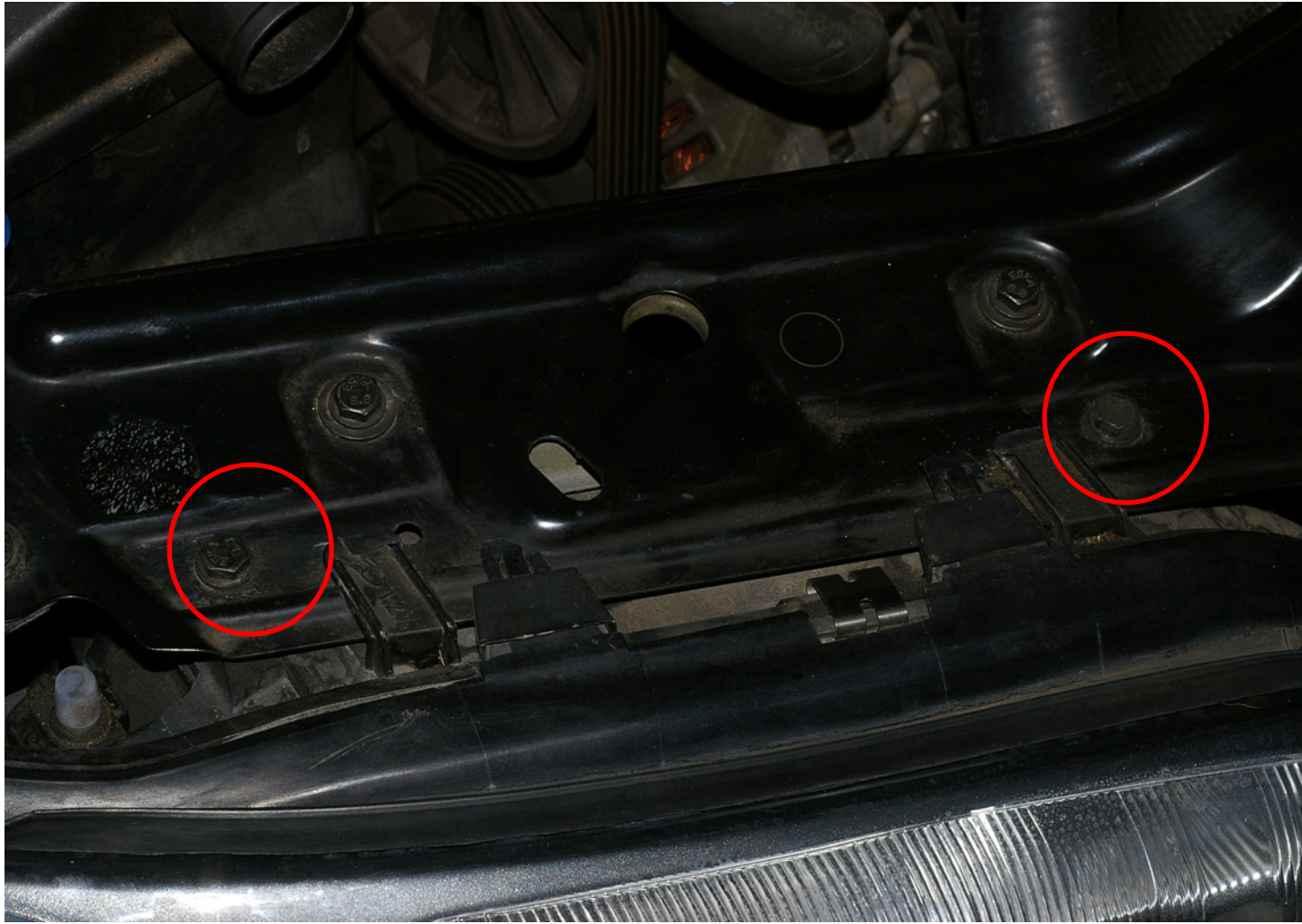


Figure 16 Remove top two bolts of headlight assembly

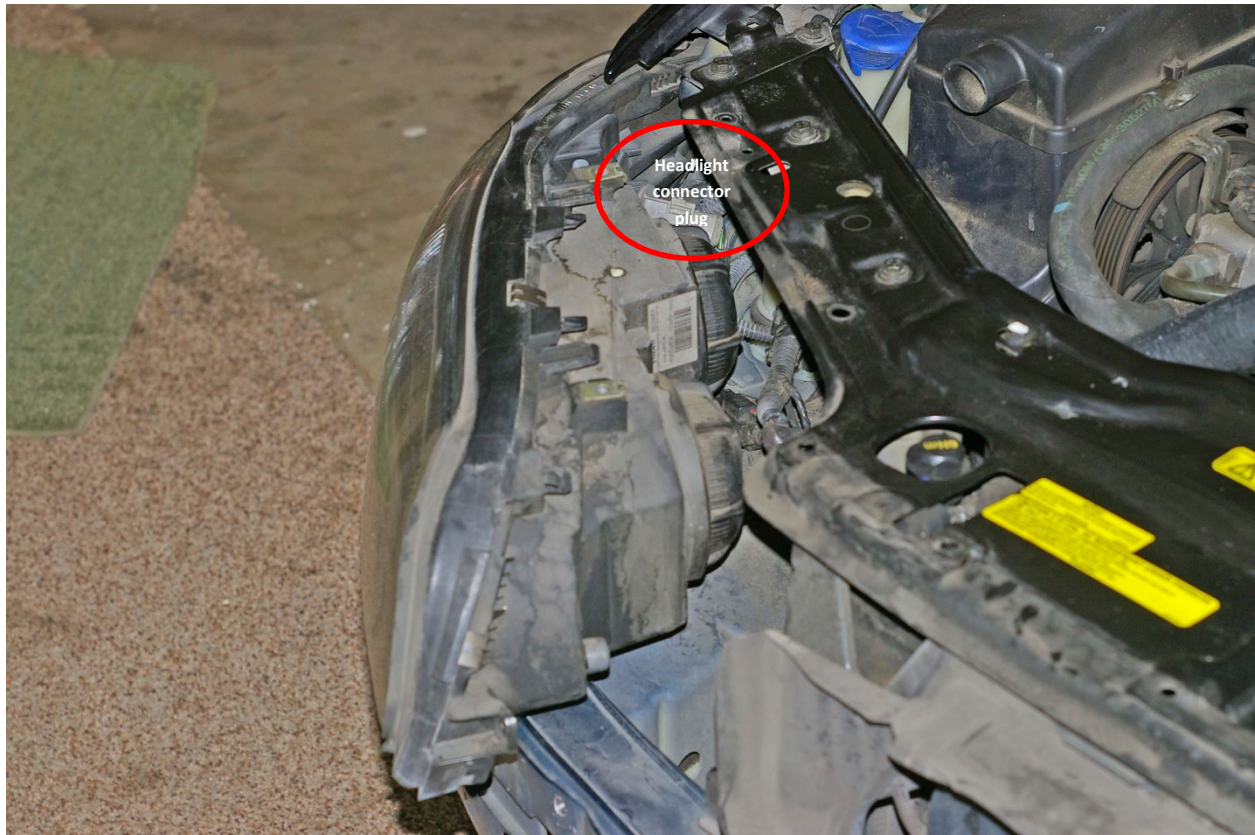


Figure 17 After removal of the four bolts and unplugging the connector the headlight assembly comes out.



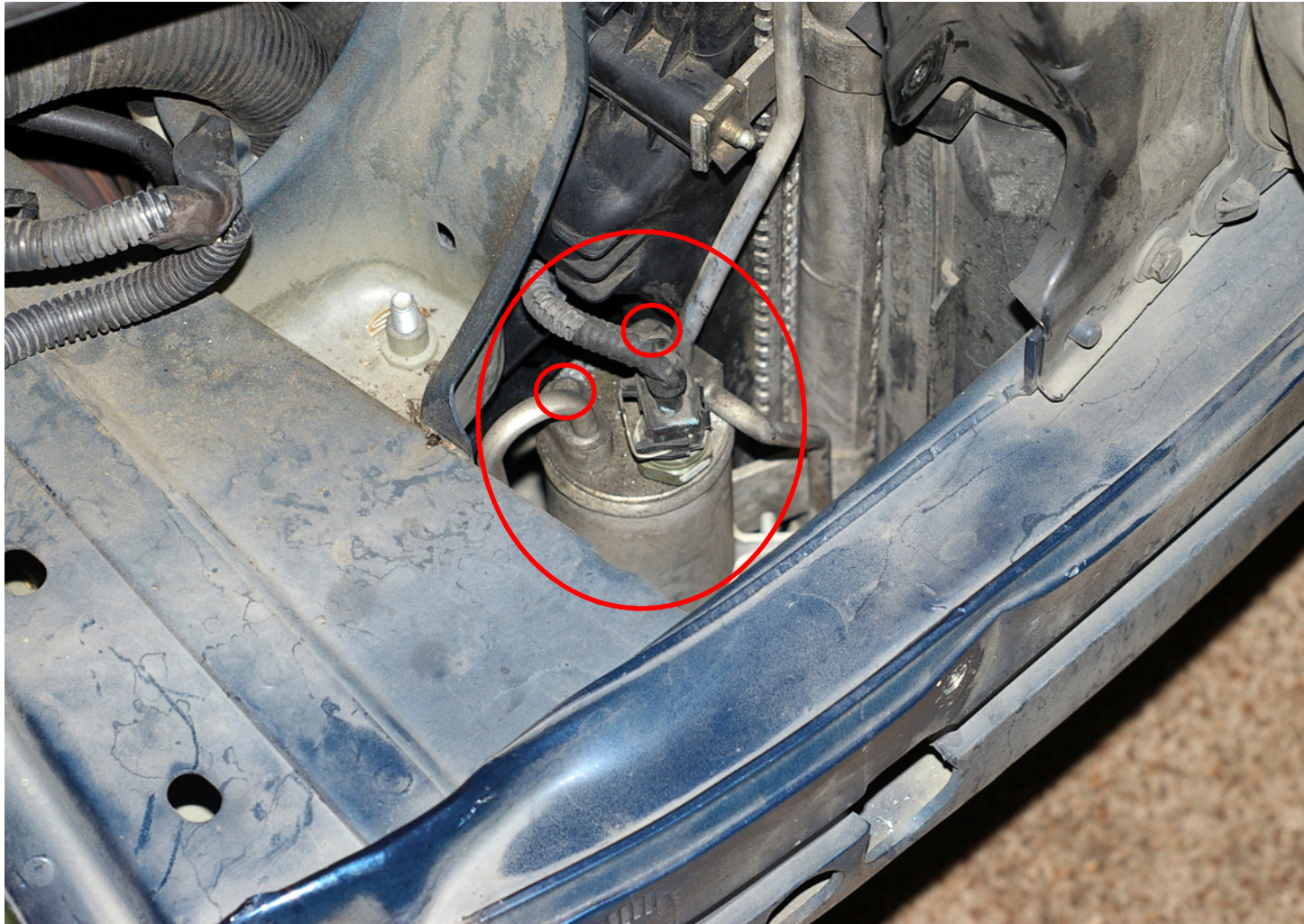


Figure 18 With front bumper cover and headlight removed there's now access to the receiver/drier. There are a couple of 10mm bolts attaching the tubes and a pressure switch to remove.



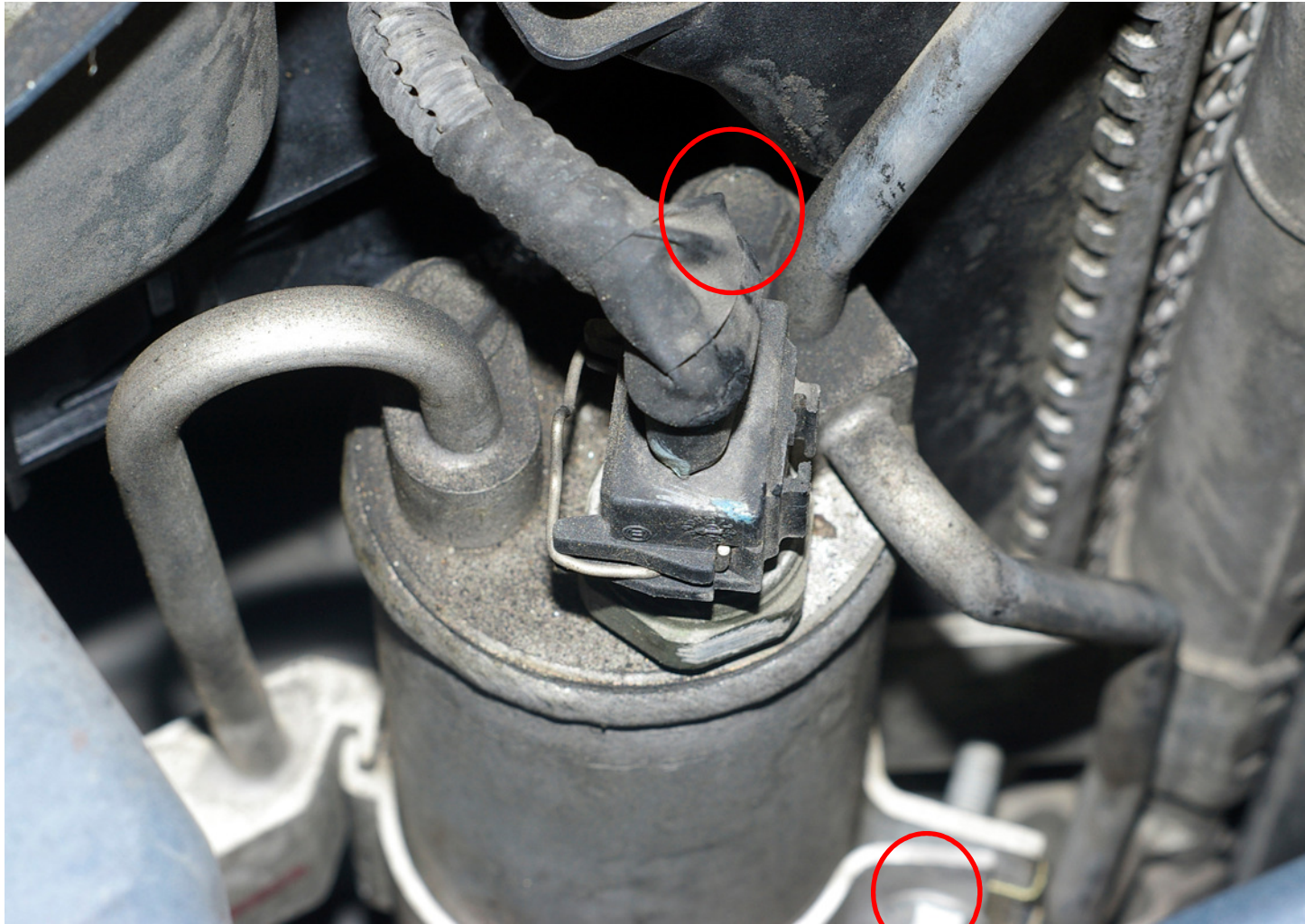


Figure 19 To get a 10mm socket on the bolt to the right I had to carefully pull the receiver/drier out some, which means bending the tubing some. I loosened the receiver/drier clamp bolt (lower right) and the pulled/bent the tubing just enough to get a socket on the top right condenser tube bolt. Disconnect the pressure switch connect for now and remove the switch after the receiver drier is removed. You can get an open end on the pressure switch nut with the receiver/drier installed but the wrench is at a bad angle. After the top two bolts are removed there's still one more below.





Figure 20 Top bolts and pressure switch removed. For the bolt on the right I had carefully pull out and bend the tubing some to get a socket on this bolt. I removed the pressure switch with the receiver/drier still in the car but it's easier to remove once the receiver/drier it out of the car.



Figure 21 From below, there's one more bolt and to disconnect from the receiver/drier. The receiver/drier clamp bolt (not shown, to the right) also needs to be removed.





Figure 22 New receiver/drier installed, this should be the last item replaced to minimize the time the receiver drier is exposed to air and moisture.

## A/C Expansion valve replacement



Figure 23 For access to the A/C expansion valve and the A/C compressor the top side turbo to inter cooler pipe needs to be removed. From the back side of the engine the hose clamp right above the turbo needs to be loosened up.





Figure 24 From the front side of the engine; loosen the turbo pipe to intercooler hose clamp. Also a good idea to take out dipstick to prevent breaking the plastic handle off, which I've done. Save \$25 replacement cost.

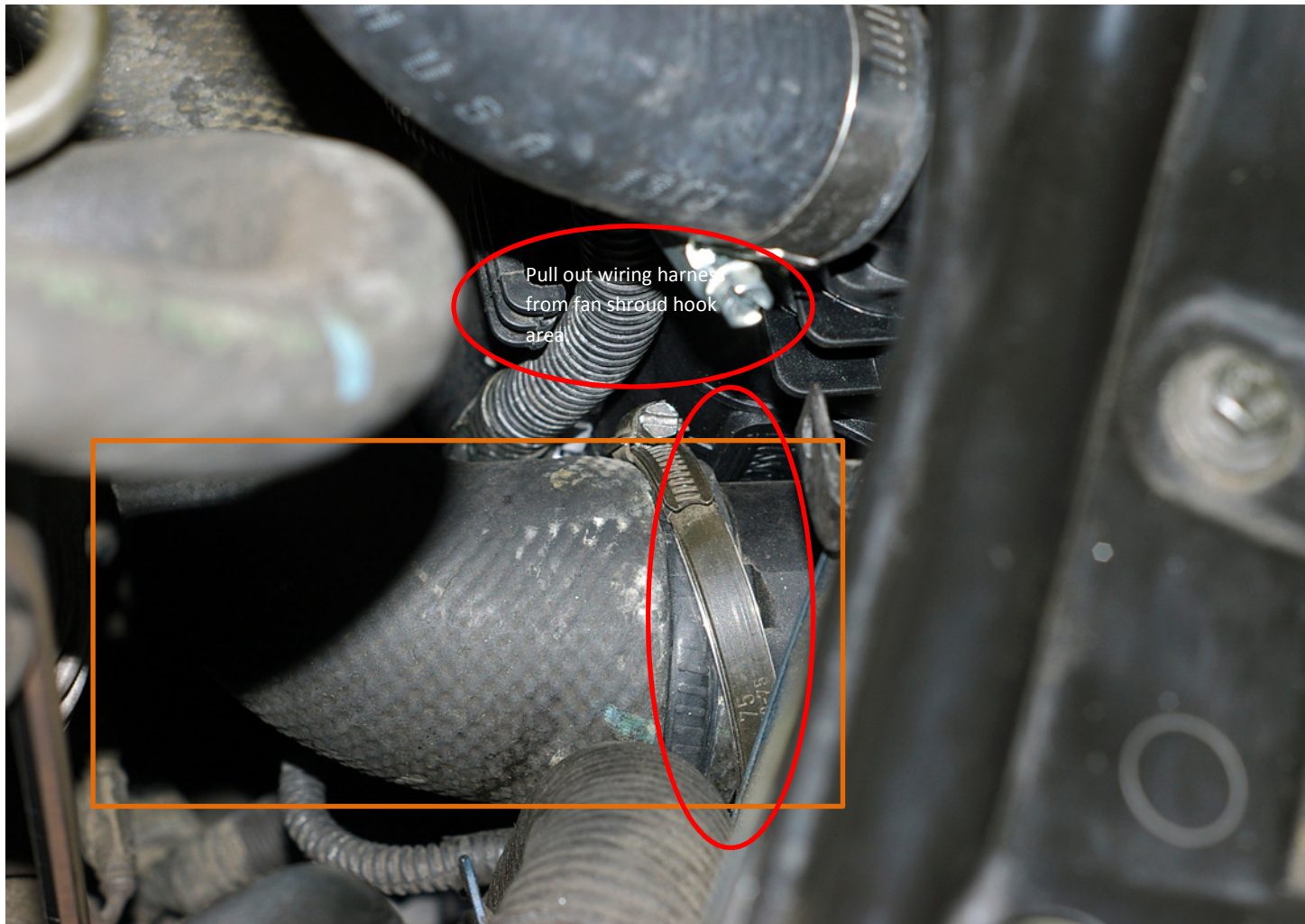


Figure 25 Also, at the intercooler, loosen the hose to inter cooler clamp and remove this short hose piece for better access to the A/C compressor and easier fan shroud removal. Remove dip stick before removing this hose, this is when I broke the dip stick.





Figure 26 Here's the expansion valve location on the firewall. To get access to the expansion valve there are two stamped metal nuts, the metal plate shown and a rubber insulator behind the plate, remove all. Strut brace and the over the engine turbo charge tube are removed for better access.



Figure 27 Expansion valve cover plate, rubber insulator and two stamp metal nuts. To remove the nuts I just grabbed the flat bent edge of the nut and twisted, these nuts are not on tight.





Figure 28 One center bolt (not shown) is removed to take off the high and lower pressure lines to the expansion valve. Two 3mm Allen screws hold the expansion valve to the evaporator. Remove these screws and pull out the expansion valve. Replace all four O-rings behind and in front of the expansion valve. Be careful with the O-ring sizes as the front larger tube is a different size than the larger hole on the other side. I bought a Volvo A/C O-ring kit that had most (but not all) the O-rings needed. I ended up having to re-use a couple of O-rings, one on the receiver/drier pressure switch and one on the compressor hose.



Figure 29 Another view of the expansion valve with high/lower pressure tubes detached.



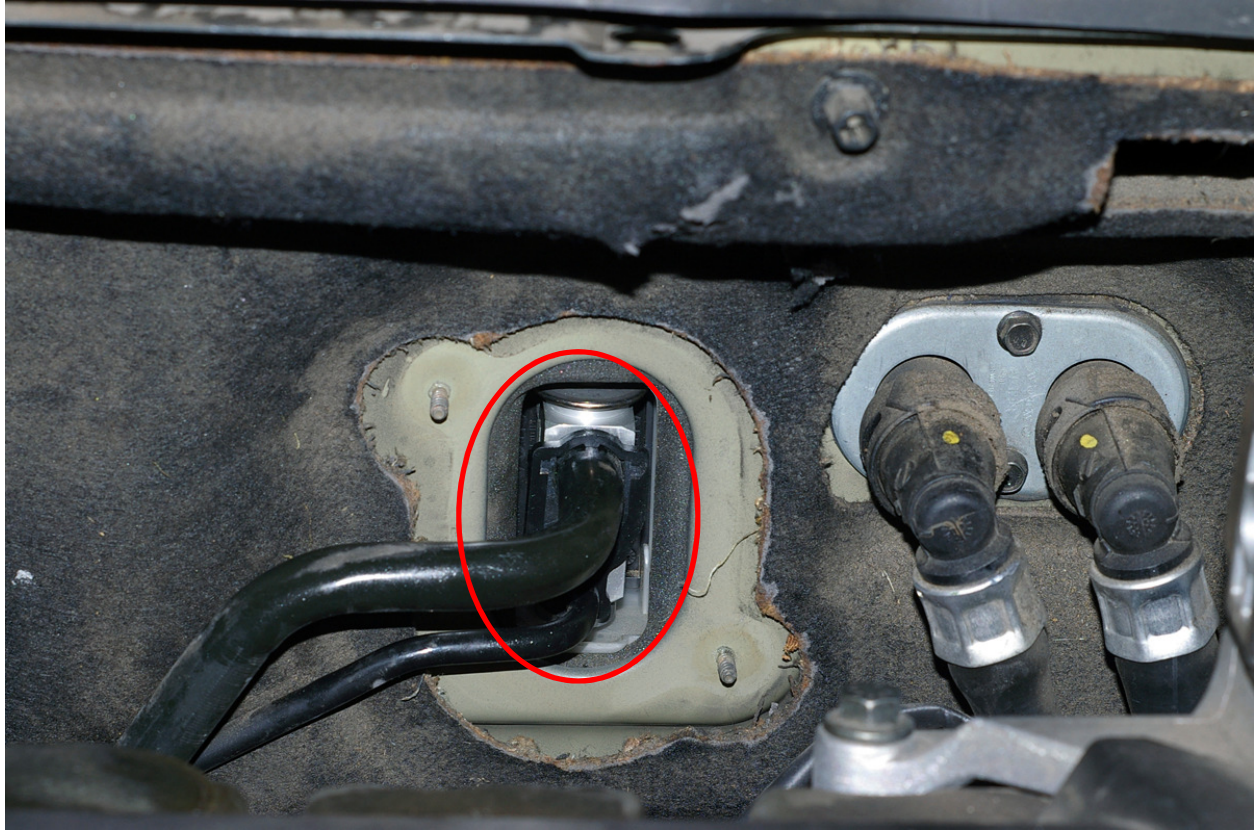


Figure 30 New expansion valve installed, still need to install cover place. I never did a good view of the single center bolt attaching the tubes to the valve.

## A/C Compressor Replacement

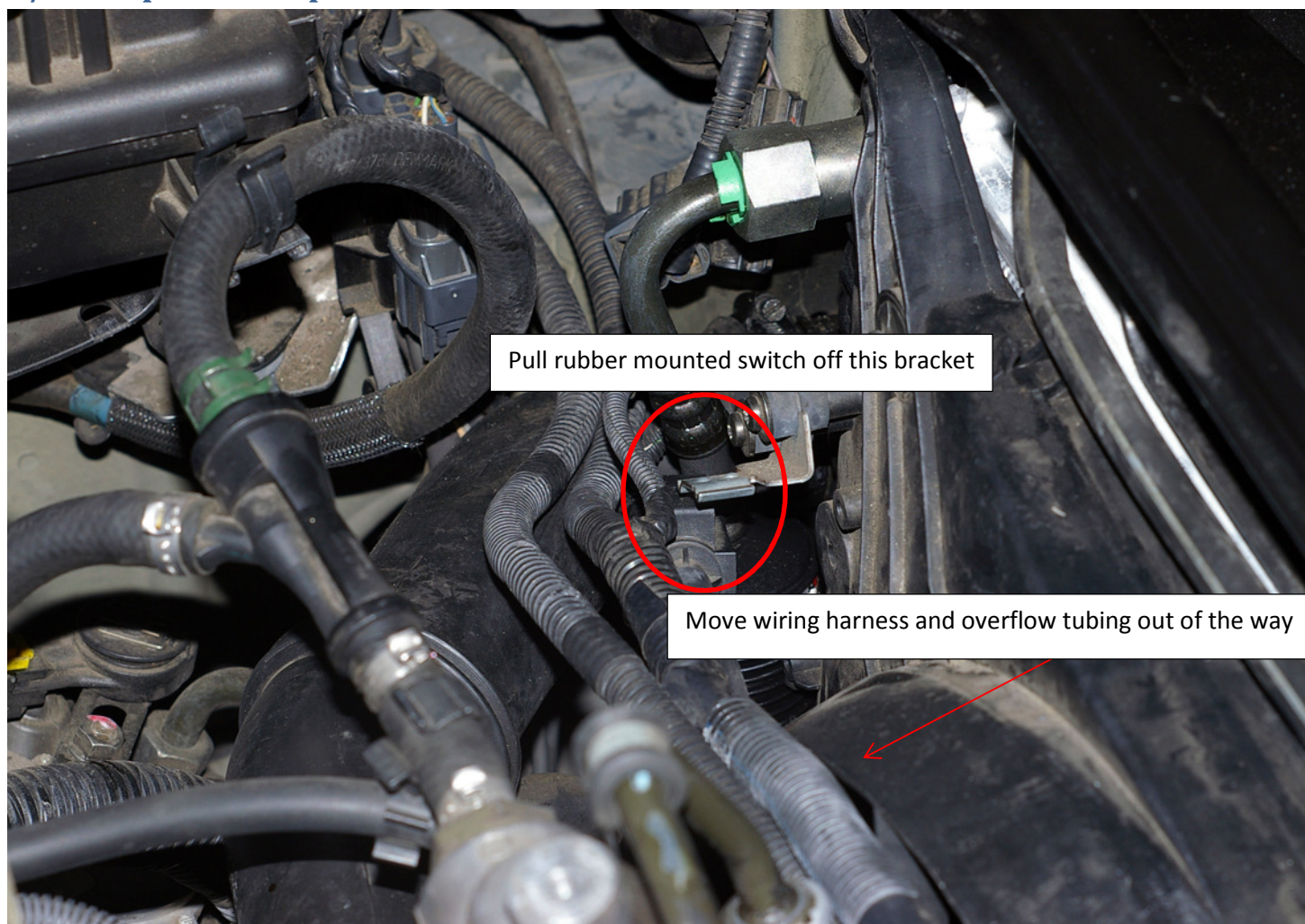


Figure 31 For A/C compressor removal and replacement the radiator fan/shroud must be removed. On top the shroud detach and move the wiring harness and overflow tube back towards the engine. There's also an EVAP switch that needs to be pulled off and shown above, it's rubber mounted and can be just be pulled back off the bracket.



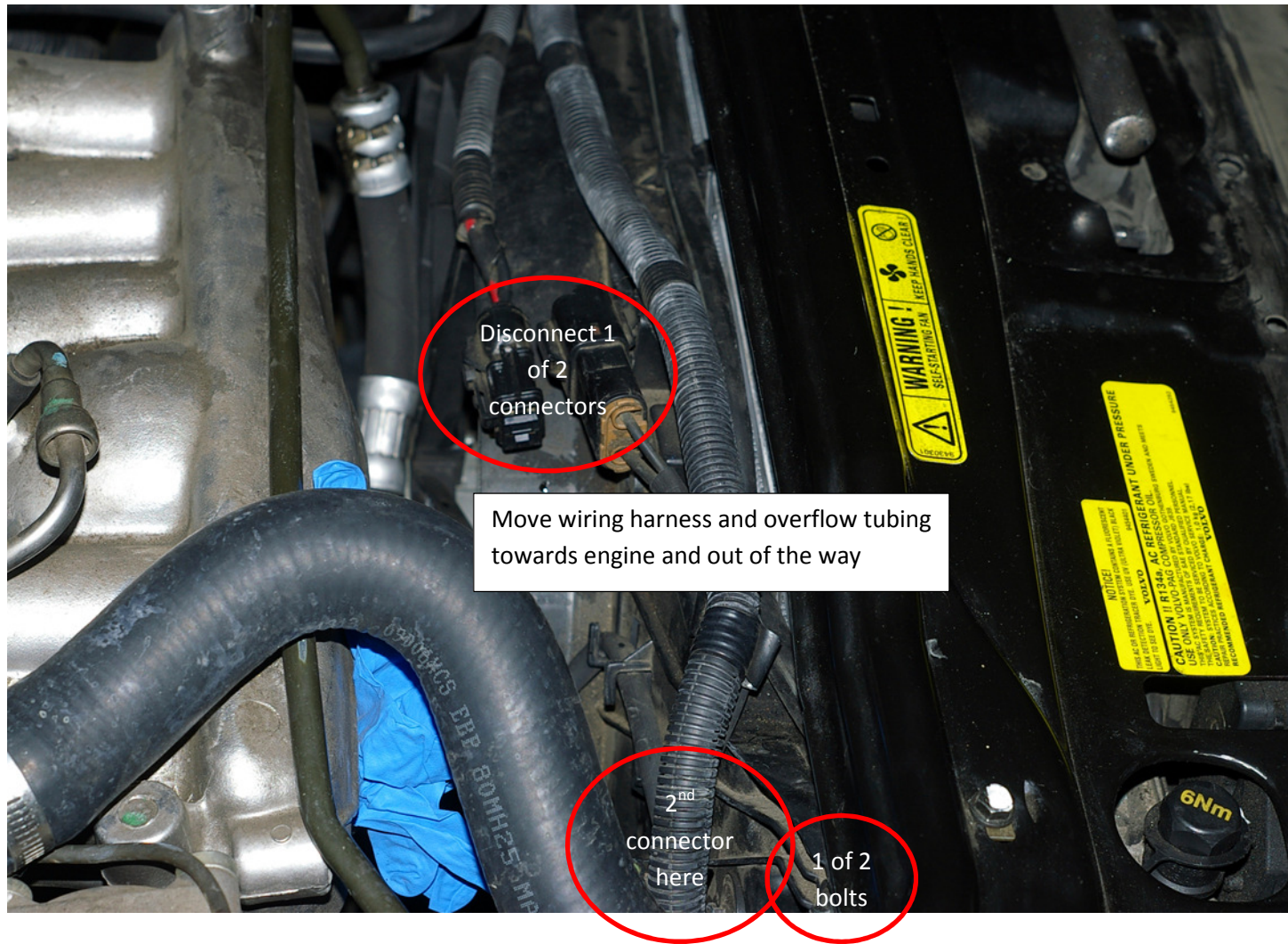


Figure 32 Disconnect two connectors prior to fan shroud removal. One connector not shown in this picture. Remove the two bolts at the top of the fan shroud and pull the fan/shroud assembly up and out. Make sure the wiring harness is not still under the shroud clip area on the passenger side of the shroud. Note, top turbo to intercooler pipe and hose to intercooler are already removed. Pull shroud up slowly, it's a tight fit and the shroud can snag in different places.

Reassembly-- At the bottom of the shroud are two tabs the just slip into slots at the radiator bottom area so make sure these tabs enter the slots when replacing the fan/shroud assembly.

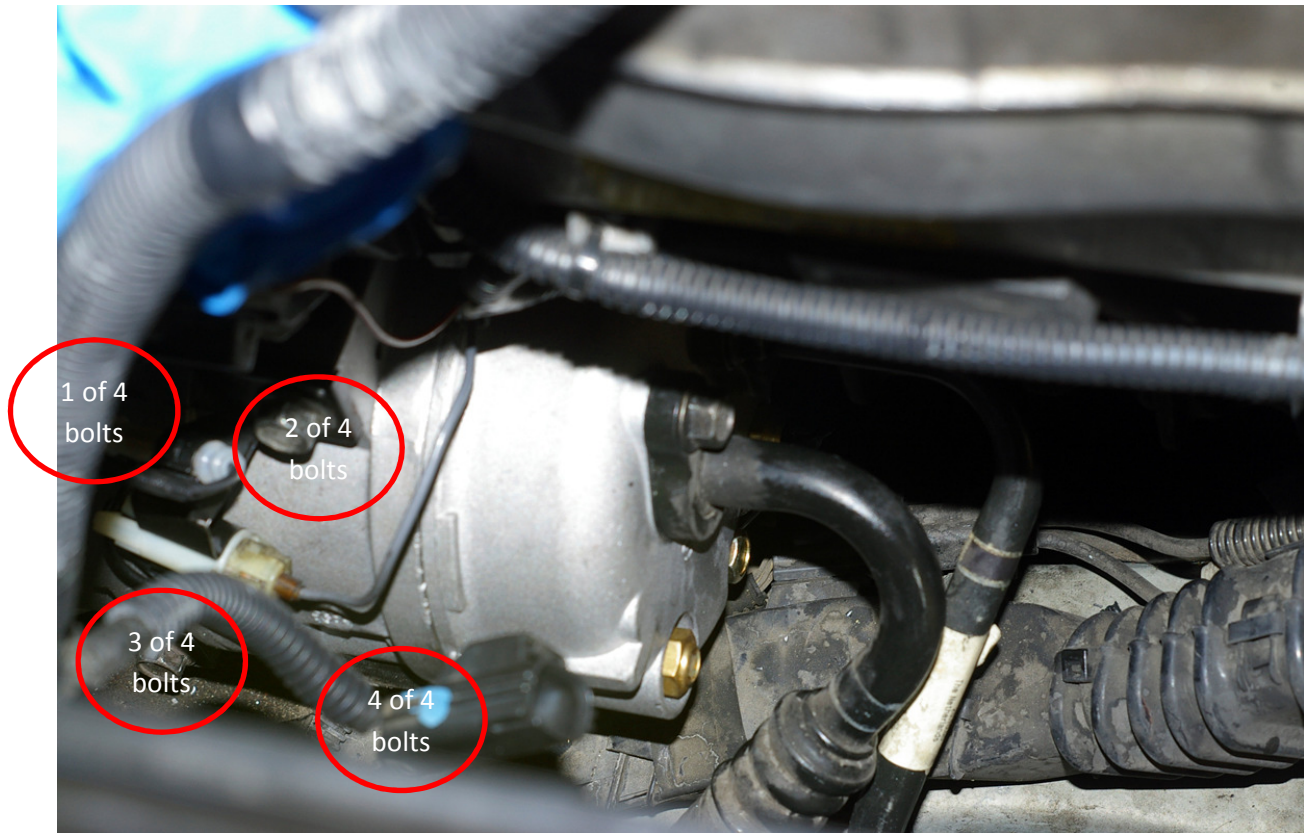


Figure 33 Once the fan and shroud are removed there's pretty good access to the four side mounting bolts on the A/C compressor and the hoses on the rear of the compressor. With the hoses removed, the connector disconnected, the serpentine belt removed and the four side bolts removed the compressor can be pulled out through the top between the intake manifold and radiator.



## A/C System Oil Charge

Replacement amount for A/C oil lost when replacing parts is in the table below. The oil in the original compressor needs to be drained and measured as it will vary. I've found that 2 ounces is generally lost when discharging the system plus the amount below when replacing individual components. The new compressor oil must be drained and the total replacement amount needed can then be added back to the new compressor and the components replaced.

Compressor oil replacement: If less than 68ml (2.3oz) is measured from the original compressor then add 2.3 oz. to the new compressor, if more than 2.3oz then add same amount drained from the original compressor. This is for a 2001 V70.

	oz.	cm3
Evaporator	1.69	50
Condenser	1.01	30
Receiver Drier	1.01	30
Hose	0.34	10
Hose	0.34	10
Sum minus		
Compress	4.4	130
Compressor	2.37	70
Total Oil Charge	6.77	200

Refrigerant charge for the 2001 V70 is 2.2 lbs.

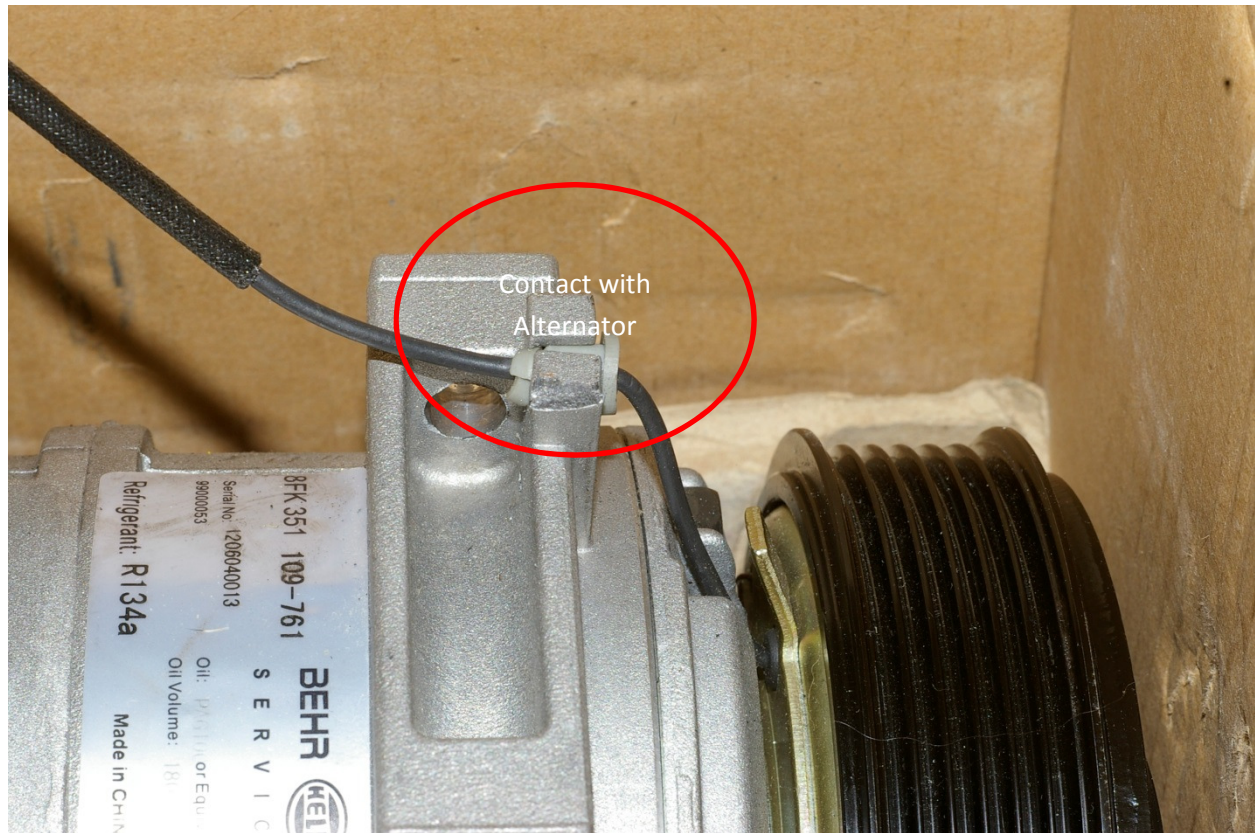


Figure 34 Here is a problem with some of the A/C compressor replacement parts. This Behr A/C compressor has a wire guide tab cast into the upper mounting area and it contacts the bottom of the alternator when tightening down the compressor. I didn't realize this as I was installing the compression since it's so difficult to see and it put a lot of stress on the A/C housing, not to mention what it did to the guide tab. If you have an A/C compressor replacement part like this, I would recommend cutting off this guide tab as the interference with the alternator stresses the A/C compressor housing when tightening the bolts and you just don't want this contact between the alternator and compressor. Or get a replacement compressor without this cast-in tab.