

**Vacuum and air hose replacement** -- replacing all the old, crusty air and vacuum hoses under and around the intake manifold. Requires removing the intake manifold. While you've got the intake manifold off, it would be good to do the PCV valve and the knock sensors. Both are much more difficult to replace when the intake manifold is installed.

### **Throttle body and intake manifold removal**

I suggest first removing the throttle body. The intake manifold+throttle body are pretty heavy, so I removed the throttle body first. The FSM says to remove the alternator, but I don't recall having to do that. Keep track of where all the hoses and bolts go as you remove parts.

- 1) Drain fuel from fuel rail as described in the FSM (see next page).
- 2) Remove throttle cable and cruise control cable.
- 3) Remove air intake pipe and place some protection over the MAF inlet so nothing damages the MAF.
- 4) Disconnect all hoses attaching to the throttle body. There are several air hoses and two water hoses. The hoses are usually stuck pretty good. I found that in almost all cases, I was able to unstuck the hoses by gently twisting the hoses on the pipe with a pair of regular pliers.
- 5) Disconnect TPS electrical plug.
- 4) Remove the bolts securing the throttle body to the intake manifold.
- 6) As you pull the throttle body away, disconnect the IAC electrical plug from the bottom of the throttle body.
- 7) Disconnect the electrical plugs on the fuel injectors, the plug on the sensor going to the PS pump, and the plug for the EGR sensor at the back left (as you face the motor) of the intake manifold.
- 8) Remove the fpr. The screws can be difficult to loosen. Be careful not to strip the screws.
- 9) Disconnect the EGR tube from the passenger side rear of the intake manifold.
- 10) Disconnect the hose going to the PCV valve. You can disconnect it at the crank case.
- 11) Pull the vacuum line going to the brake booster. Pull it at the intake manifold.
- 12) Disconnect the electrical plug that goes to the aux air controller on the driver side of the engine under the intake manifold.
- 13) Remove all the bolts holding the metal fuel lines to the fuel rails. There are three sets of two bolts.
- 14) Disconnect the fuel lines and vapor line attaching to the intake manifold on the driver side of the intake manifold.
- 15) Disconnect the vapor lines going to the charcoal canister. Disconnect the lines at the intake manifold.
- 16) Disconnect the plugs between the fuel injector harness and the main wiring harness. There are two plugs. These are at the back of the engine on the passenger side.
- 17) Disconnect the two vacuum hoses that go from the EGR system to the metal vacuum lines at the passenger side rear of the intake manifold.
- 18) Remove a bolt at the passenger side rear of the engine that secures the metal fuel lines to the cylinder head.
- 19) Remove the bolt securing the thick metal bracket to the driver side front of the intake manifold. The bracket links the intake manifold and the AC compressor.
- 20) Remove the bolts securing the intake manifold to the risers. The intake manifold bolt at the driver side front of the intake manifold will be difficult to reach. If you like, you can do as the FSM suggests and move the AC compressor forward.

The intake manifold + metal fuel/air lines + injector wiring harness will all come off as one piece. You'll have to slightly bend the metal fuel line to clear the air conditioner pipe at the driver side front of the intake manifold. You'll probably have to reposition the injector wiring harness as you lift off the intake manifold. **Take care not to get any dirt/debris into the fuel rails on the engine or into the fuel pipes on the manifold! Any small amount of debris can clog fuel injectors.**

Here are the FSM instructions (2 pages) for removing the intake manifold.

## 7. Fuel Injector

### A: REMOVAL

- 1) Fuel pressure elimination
  - (1) Disconnect fuel pump connector.
  - (2) Start engine.
  - (3) Run engine until it stalls.
  - (4) After it stalls, crank starter for approximately 5 seconds and turn ignition switch to "OFF".
- 2) Disconnect connector from fuel injector.
- 3) Remove fuel injector cover.

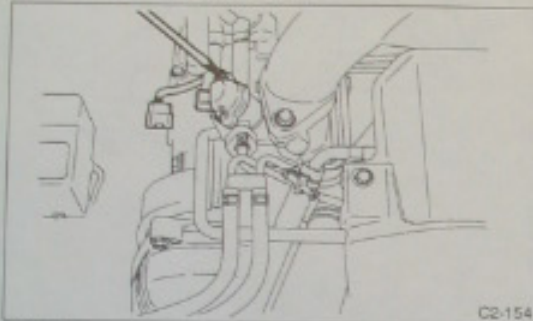


Fig. 5

- 4) Extract while turning fuel injectors.
  - a. Do not attempt to pry injectors with a screwdriver or similar tool. Do not pinch injector pin with pliers.
  - b. Be careful not to damage O-ring.
  - c. If injector is difficult to remove with your hand, remove injector and fuel pipe as a unit, and push injector out from the back side.
- 5) To install, reverse order of removal procedures.

## 8. Collector and Intake Manifold ASSY

### A: REMOVAL

- 1) Fuel pressure elimination
  - (1) Disconnect fuel pump connector.
  - (2) Start engine.
  - (3) Run engine until it stalls.
  - (4) After it stalls, crank starter for approximately 5 seconds and turn ignition switch to "OFF".
- 2) Remove corrector cover.
- 3) Disconnect throttle cable and cruise control cable from throttle lever.
- 4) Remove air intake boots.
- 5) Disconnect engine harness connectors.
- 6) Disconnect female connectors of engine harness from bracket.



Fig. 6

- 7) Disconnect connector from auxiliary air control valve.
- 8) Disconnect two coolant hoses from throttle body. (They are located under the throttle body.)
- 9) Disconnect auxiliary air control valve hose from throttle body.
- 10) Disconnect PCV hose from connector PCV.
- 11) Remove blow-by hose from cylinder head cover RH.
- 12) Disconnect EGR control hoses from intake manifold.
- 13) Remove EGR pipe and cover.
- 14) Disconnect power steering pump SW connector.
- 15) Disconnect brake booster hose from intake manifold.
- 16) Disconnect fuel hoses (delivery, return and evaporation lines) from fuel pipes.  
**Place a container to catch fuel from fuel hose.**



Fig. 7

- 17) Remove drive belt cover and drive belts. (Refer to 1-5 "Drive Belts [01A0]" )
- 18) Disconnect alternator B terminal and connector.
- 19) Remove bolt securing the alternator harness cover.
- 20) Remove alternator.
- 21) Remove A/C belt idler pulley ASSY.
- 22) Remove all bolts securing the A/C compressor bracket. Move the A/C compressor and bracket forward as a unit to facilitate removal of intake manifold mounting bolts.

When moving the compressor and bracket, take care not to over-stretch the pipes and hoses.



Fig. 8

- 23) Remove collector and intake manifold ASSY.

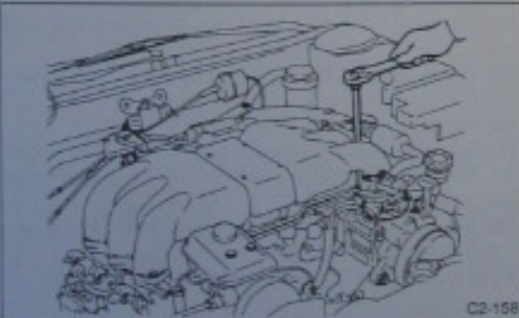


Fig. 9

## B: INSTALLATION



Fig. 10

Installation is in the reverse order of removal procedure. Observe the following.

- 1) Remove traces of gasket from the mating surfaces of the intake manifold and cylinder head before installation.
- 2) Be sure to use new gaskets.
- 3) Be careful not to catch hoses or harnesses between intake manifold and cylinder head.
- 4) Before installing A/C compressor bracket, apply fluid packing to thread portion of bolt which indicating arrow mark in Figure.

### Fluid packing

Three bond 1344 or equivalent

### **Replacing the hoses**

The hoses are usually stuck pretty good to the metal and plastic piping. I found that in almost all cases, I was able to unstick the hoses by gently twisting the hoses on the pipe with a pair of regular pliers. Gently grip the hose where it attaches to a pipe, and try gently twisting the hose. Spraying a little silicone lube would probably help too. Be very careful when removing hose from the solenoids with plastic nipples. That plastic can and will break if too much force is applied. It may be necessary to slice the hose lengthwise and peel it off the nipple. Below are two pictures showing all the vacuum lines that I replaced under the manifold and on top of the engine.

If you want, you can use non-Subaru hose to replace the 3 mm vacuum lines. It will save you quite a bit of money. I went with viton rubber tubing which is rated to much higher operating temperatures (400F) than standard nitrile rubber tubing (250F) sold at auto parts stores. I have listed a viton hose supplier in the table at the end of the document.

As the end of this document, there is a list of hoses and other replaceable items with their part numbers.

### **Replacing other items**

This would also be a good time to replace the PCV valve and the knock sensors. Both are very easy to access while the intake manifold is off, while almost impossible to reach when the intake manifold is on. Knock sensors and PCV valve are shown in the pictures below. Use teflon pipe tape when installing the new PCV valve.

Knock sensor torque value: 31 ft-lbs

The PCV valve has pipe threads.

It would also be good to replace the fuel rail o-rings. I have listed the part number for these in the table at the end of the document.

### **Obtaining parts**

I recommend buying your OEM Subaru parts from [1stsubaruparts.com](http://1stsubaruparts.com). They are located in the Seattle area. They have the best prices of any Subaru dealer. Their shipping prices are also the best. **1-866-528-5282. Ask for Jason in Parts.**

### **Installation of intake manifold**

Installation is pretty much in the reverse order. Use new intake manifold and throttle body gaskets. The intake manifold gaskets have little tabs that can be bent down to hold the gasket to the intake risers. Be sure that you've installed all the hoses correctly and that all the electrical plugs have been reinstalled. After getting the manifold reinstalled and everything buttoned up, flush the fuel rails with gasoline by turning the ignition to "on" but not starting the car. Leave it at "on" for a few minutes.

Top of engine



Bottom of intake manifold.



item	quantity	Subaru PN	figure	metric ID	metric OD	SAE ID	SAE OD	length
throttle body water hose #1 (OEM is cheaper than viton)	1	807607992	063A-1	8 mm	14 mm	5/16"	9/16"	1 ft
throttle body water hose #2 (OEM is cheaper than viton)	1	807907202	063A-1	8 mm	14 mm	5/16"	9/16"	1 ft
aux air hose #1 (OEM is cheaper than viton)	1	807412152	036A-1	12 mm	17 mm	1/2"	3/4"	1.25 ft
aux air hose #2 (OEM is cheaper than viton)	1	807412162	036A-1	12 mm	17 mm	1/2"	3/4"	1.25 ft
hose clamp for hose (not in stock at Subaru USA)	2	805919070	036A-1					
pcv hose to PCV valve (OEM is cheaper than viton)	1	807415082	082A-1					
pcv hose to intake box (OEM is cheaper than viton)	1	807412172	082A-1					
fuel pipe o-ring	3	17595AA000	061A-1					
small vacuum hose upper rear throttle body #1	2	807503900	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.75 ft
small vacuum hose upper rear throttle body #2	1	807403130	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.75 ft
fpr vacuum hose	1	807503982	061A-1	3 mm	7.5 mm	1/8"	5/16"	1 ft
fpr fuel hose	1	807707130	061A-1					
vacuum hose into small black box	1	807504442	061A-1	3.5 mm	9 mm	1/8"	3/8"	0.5 ft
small air hose from small black box to top of throttle body	1	807204221	061A-1	3.5 mm	9 mm	1/8"	3/8"	1.25 ft
IRIS check valve (not a hose)	1	16195AA030						
vacuum line from manifold to IRIS check valve	1	807503112	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.25 ft
vacuum line from IRIS check valve to IRIS box	1	807503360	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.25 ft
vacuum line from IRIS vacuum box to metal pipe	1	807503211	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.25 ft
vacuum line to IRIS vacuum diaphragm	1	807503440	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.5 ft
vacuum line to IRIS controller (same PN as into IRIS box)	1	807503211	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.25 ft
short fuel vent hose under right side of intake manifold	1	807505212	061A-1					
vacuum hose to solenoid under left side of intake manifold	2	807503431	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.25 ft x2
egr vacuum diaphragm hose behind left side of motor	1	807503952	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.5 ft
egr vacuum diaphragm hose behind left side of motor	1	807503962	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.5 ft
egr vacuum diaphragm hose behind left side of motor	1	807503972	061A-1	3 mm	7.5 mm	1/8"	5/16"	0.5 ft
idle air control hose (OEM hose is cheaper than viton)	1	807520162	050A-1	19 mm				2 ft
<b>total length of 3 mm ID x 7.5 OD mm tubing</b>				<b>3 mm</b>	<b>7.5 mm</b>	<b>1/8"</b>	<b>5/16"</b>	<b>8.25 ft</b>
1/8" x 5/16" viton hose supplier: McMaster-Carr								
Be sure to order the "60" durometer (aka "firm") tubing!								
<a href="http://www.mcmaster.com/">http://www.mcmaster.com/</a>								
bell housing plug (replace it while your in the area)	1	11413AA040	005-1					
PCV valve	1	11810AA000	050A-1					
knock sensors	2	22060AA031						
intake manifold gaskets	2	14075AA021	050A-1					
throttle body gasket	1	16175AA091						