OPT B Kit

INSTRUCTIONS

2-Pass Intercooler Endplate Features and Instructions

Kit Contains: 88958721 – End Plate
12584355 – Seal

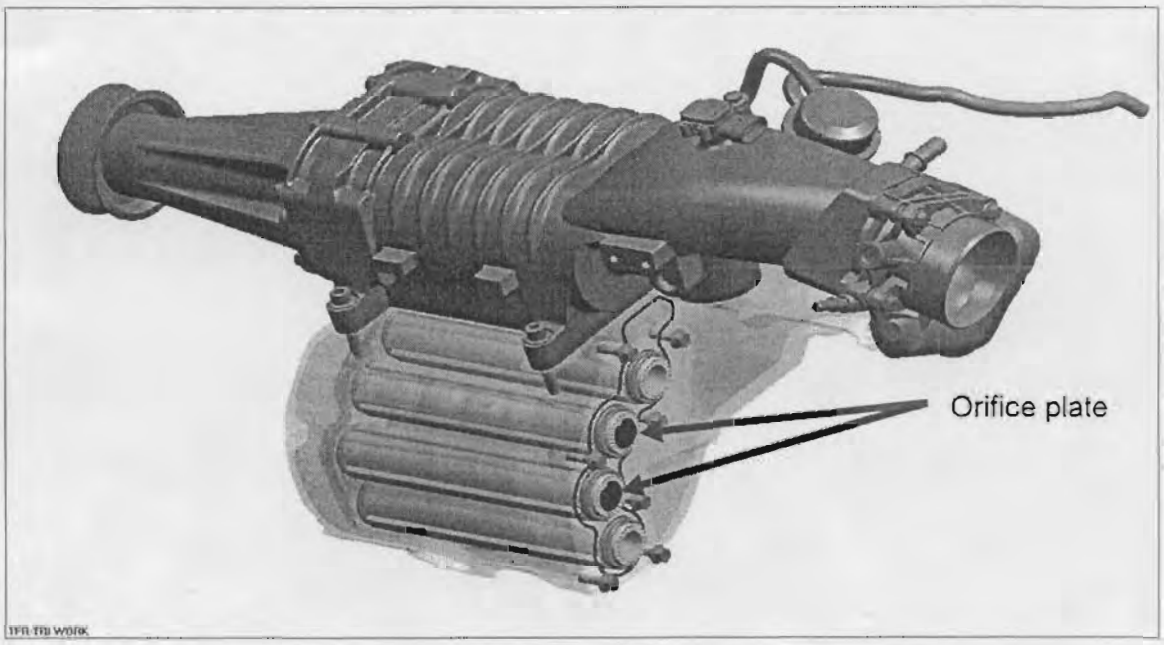
Background info
The production Supercharged Ecotec liquid to air intercooler system is set up for optimal production performance and ease of production assembly. The following modifications can greatly improve intercooler efficiency for higher horsepower applications as found with the Stage 2 and Stage 3 kits.

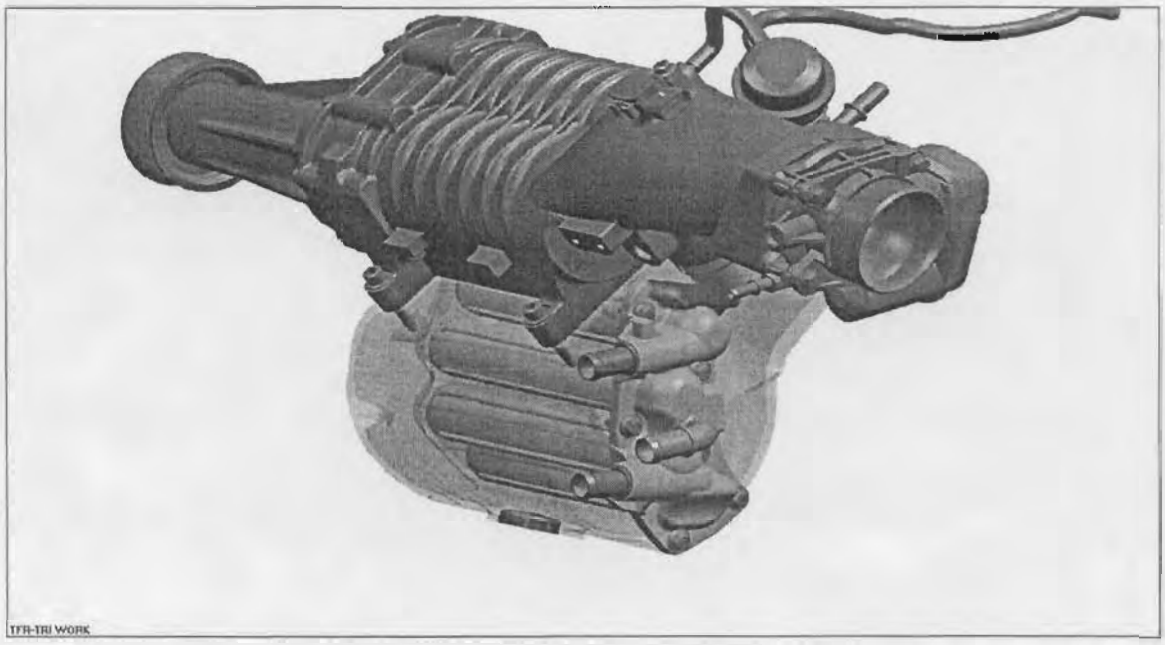
Installation

A. Gain access to the manifold end plate:
    a. Remove fuel rail - (see additional info provided)
    b. Remove supercharger assembly – (see additional info provided)
    c. Remove manifold from head – (see additional info provided)
B. Remove 7 manifold end plate fasteners; remove end plate with care to not damage perimeter seal or o-rings on laminova tubes
C. Remove lower 2 laminova tube (HANDLE WITH CARE!) Take care to not damage the o-ring lands (do not use hard face gripping tools). Also be careful to not damage the fins on the laminova tubes.
D. Re-install the tubes with the small orifice openings at the center locations and the upper and lower with the big end opening showing (see diagram); use a light coating of assembly lube to o-rings prior to re-installation of removed laminova tubes and for all end plate end o-rings.
E. Install GMPP PN 88958721 2-Pass end plate
F. Re-torque fasteners to 10 Nm (89 lb.in.)
G. Install intake manifold to head and lower support bracket (see attached procedures)
H. Modify Plumbing as shown in ***Option A - Production fill cap*** to use production fill cap assembly, or in ***Option B – High Performance Option*** to use high performance system (add second production coolant reservoir).
I. Install supercharger to intake manifold (see attached procedures)
J. Verify all stock connections are re-established

Note: With Option A, it is very difficult to purge the air from the system. Option B insures a fully purged system with no trapped air for optimum performance out of the intercooler system.

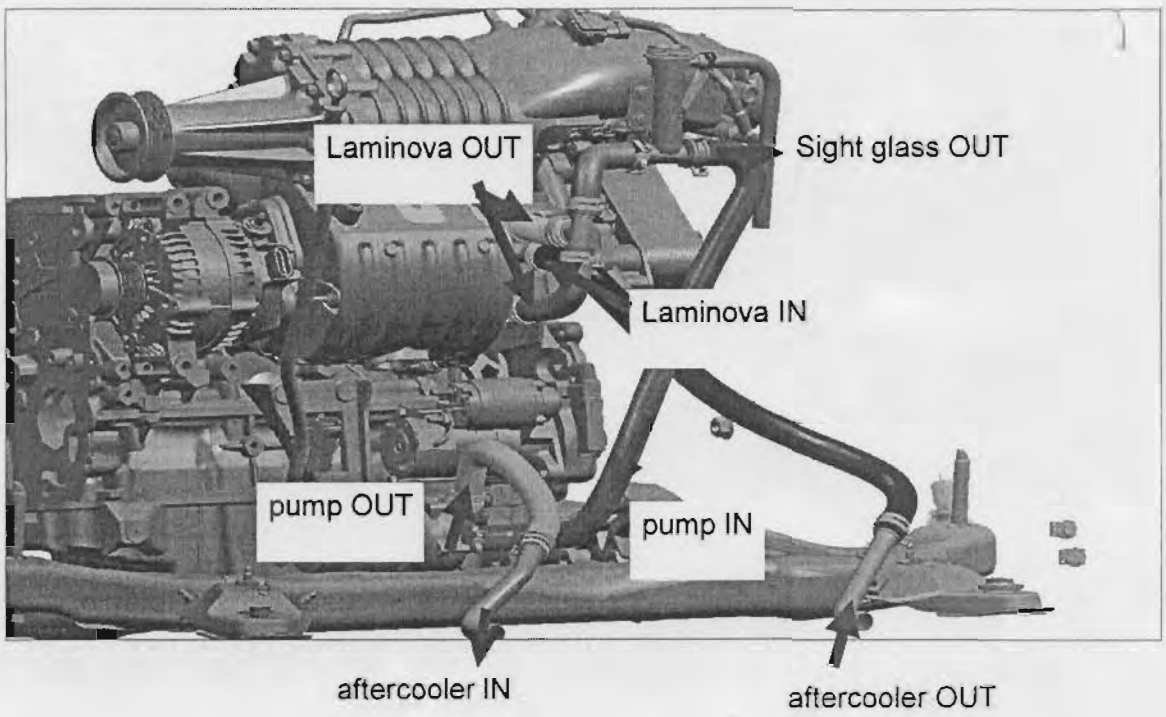
DRIVER SIDE VIEW





Option A – Production fill cap (5 lb)

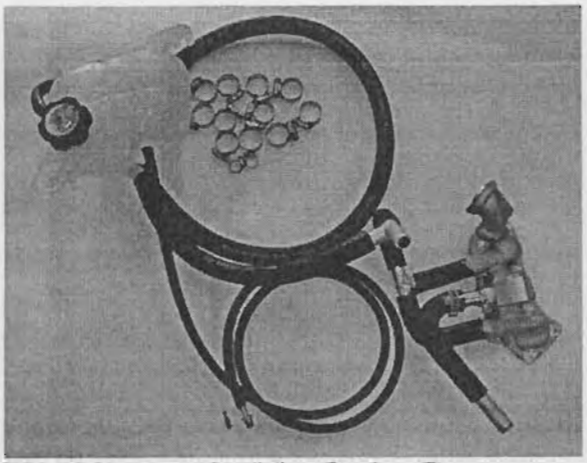
Plumbing of the 2-pass intercooler endplate will require additional ¾" water hose (about 1ft or less), hose clamps and one T-fitting, as shown in the diagram below. These parts are available from hardware or automotive parts stores.



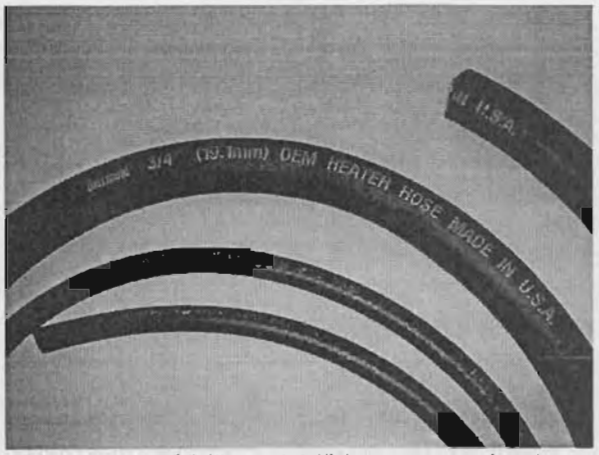
Option B – High Performance Option (15 lb cap)

This option requires parts not included in the Stage 3 kit. It adds a charge air cooler "Expansion / make-up tank" and requires these parts:
P/N 22630381 Saturn Red Line surge tank; cap included, from a GM parts dealer
Fabricated mounting brackets for the surge tank, see photo below
Hoses, clamps, and fittings available from an automotive parts or hardware store:

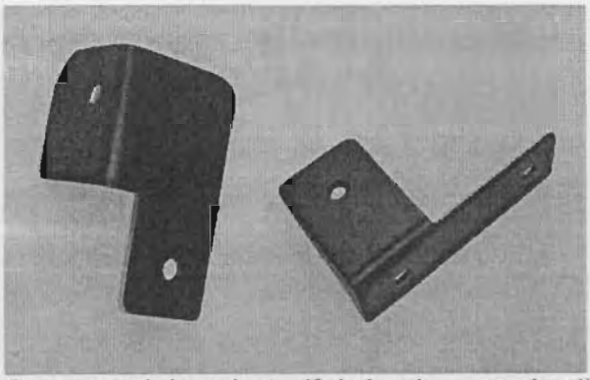
- Two "T" fittings (purchased or fabricated)
- ¾" and ¼" water hose and clamps
- Air bleed fitting NPT to hose (press-in machined .040 orifice), see photo



Plumbing required for Option B

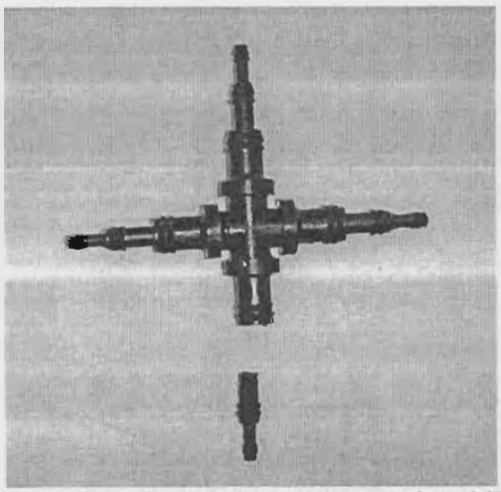


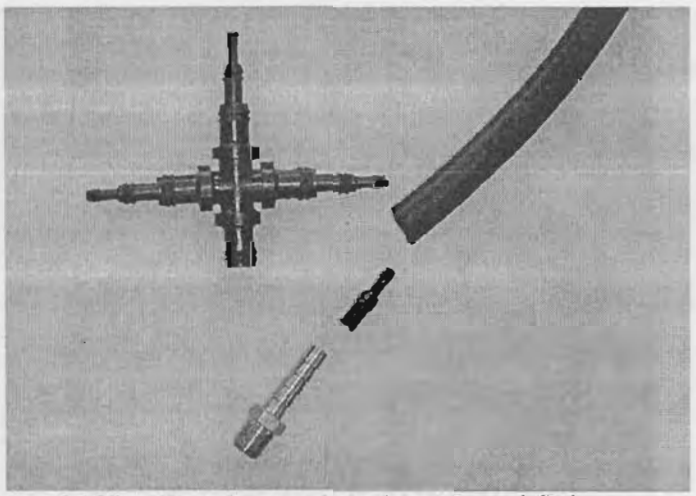
Close-up of ¾" and ¼" hose required



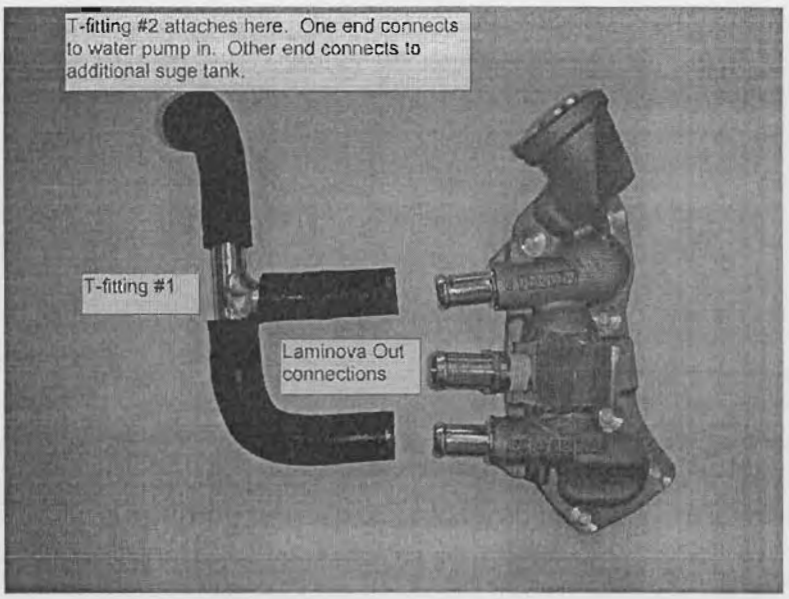
Surge tank brackets (fabrication required)

Close-up of 'T' fitting (need 2)

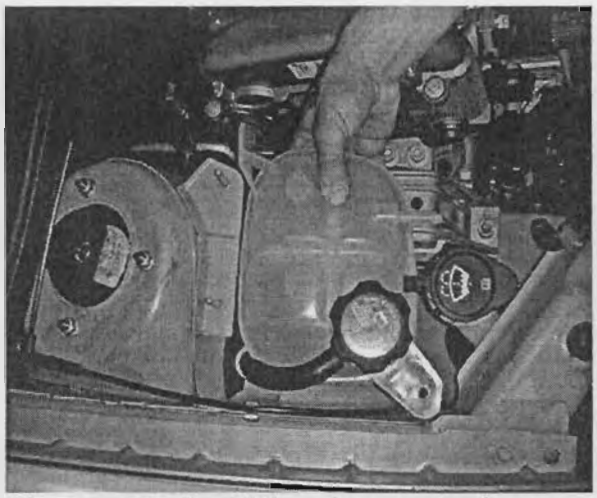




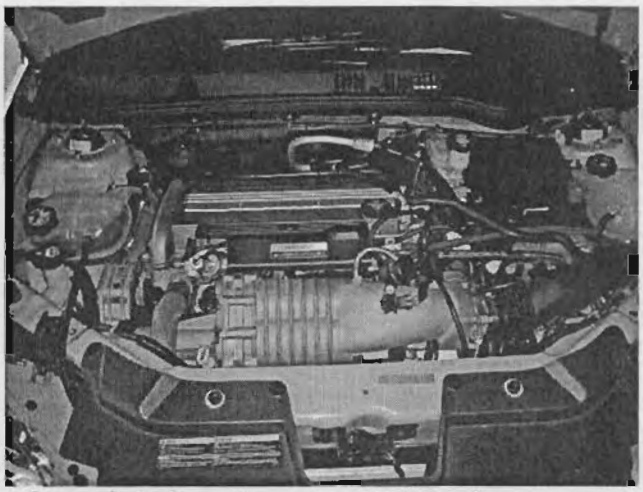
Creating the air bleed line using ¼" hose, .040" orifice (press into hose) and fitting.



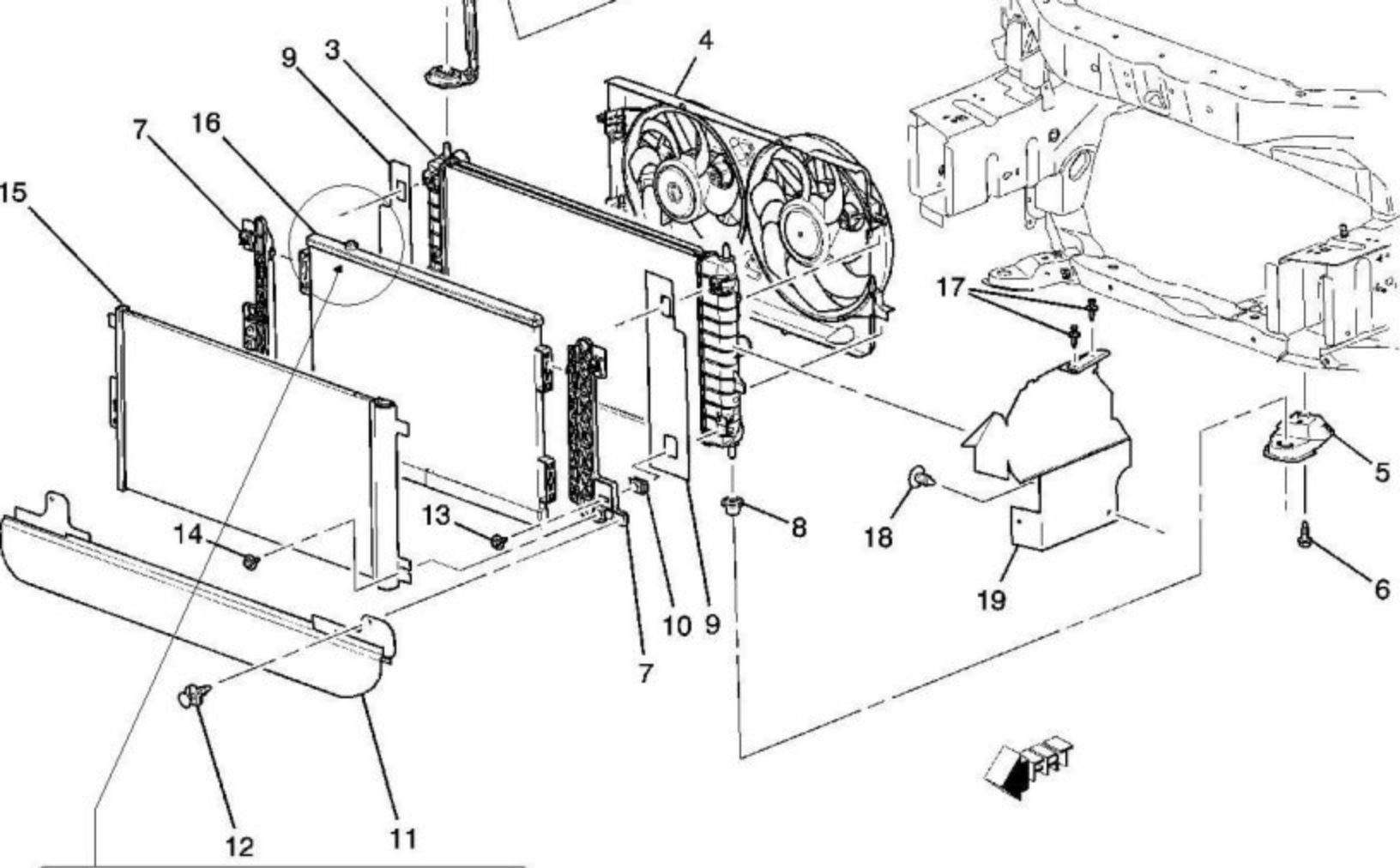
Attaching hoses to 2-pass endplate



Placement of additional surge tank.



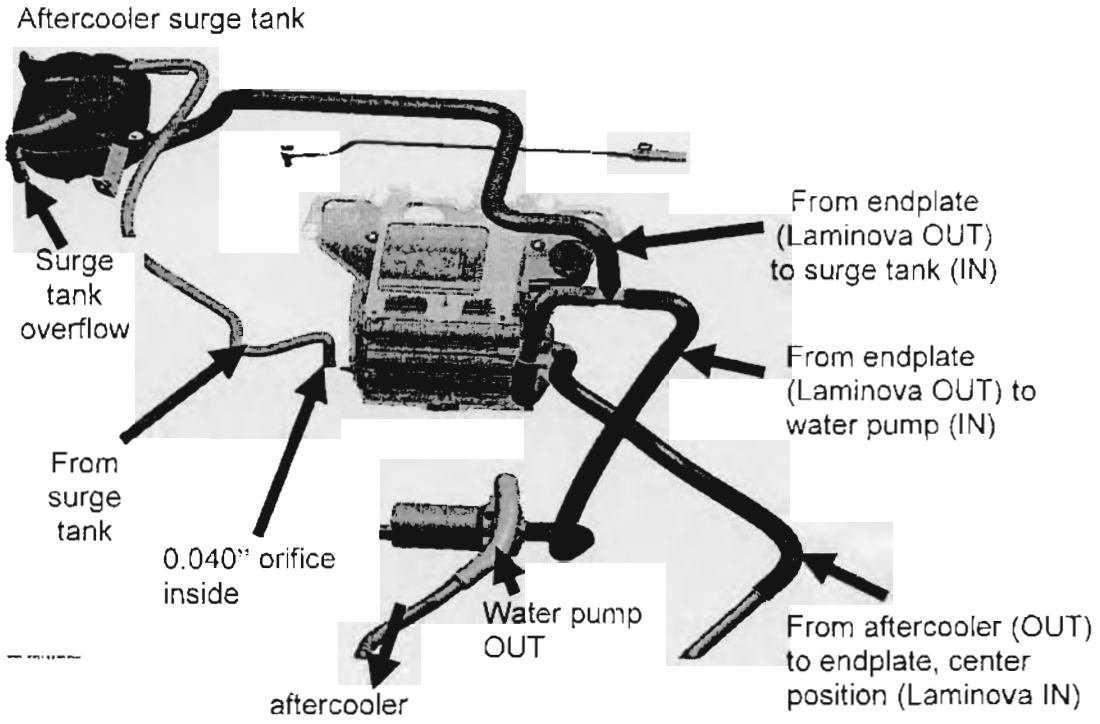
Completed engine compartment.



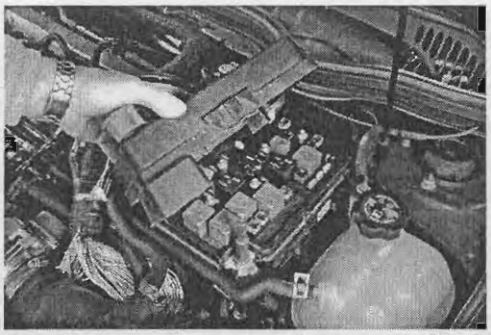
-- Brass barbed fitting will be screwed into top of intercooler. Route the 1/4 inch hose behind headlamp, this usually the easiest and cleanest way.

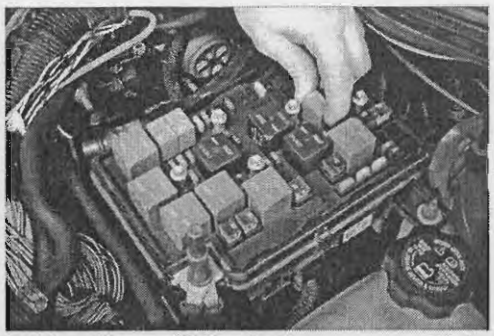
-- Slide the air bleed fitting into hose before clamping on the brass fitting.

Option B Plumbing Skematic



Fuel Rail Removal





The first step in removing the fuel rail is bleeding off the fuel pressure. This is accomplished by removing the relay controlling the fuel pump from the fuse block. On the Cobalt, the fuse block is on the driver side of the engine compartment. Pull the cover off the top of the fuse block by grabbing the two sides of the cover and slightly peel the tangs back while lifting the cover off. The fuel pump relay on the Cobalt is located towards the rear of the fuse block (fingers on it in inset photo). Pull it out at this time.

Note, on the Saturn Red Line Ion, the fuse block is located under the center stack of the dashboard. Start accessing this panel by removing a standard screw from the driver side of the center stack. Pull panel toward the rear of the vehicle to remove it from the center stack. The fuel pump relay has a yellow stripe on it and is located in the upper left corner of the fuse block.

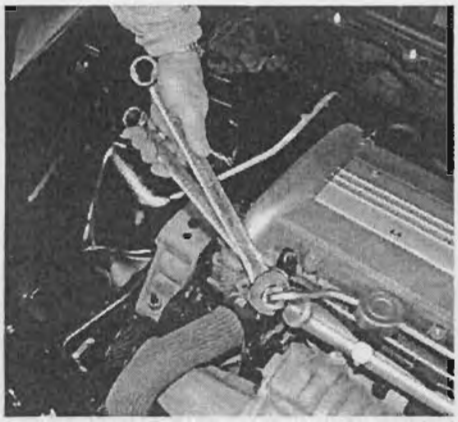
With the fuel pump relay removed, start the engine and let it run until it starts to stumble, then shut the engine off.

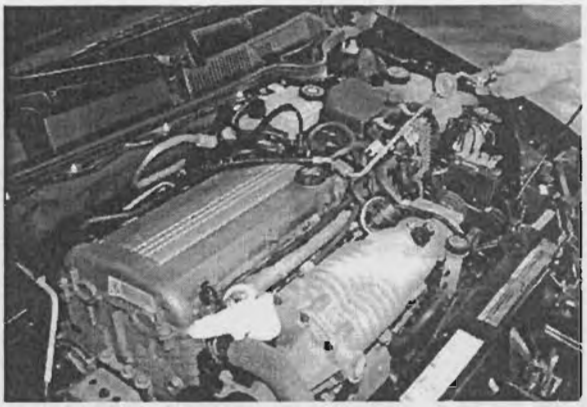
Reinstall the fuel relay in the fuse block. You will not need at access it in the future, so reinstall the closeout panels.

Move to the trunk to disconnect the negative battery cable from the battery. Start by lifting the carpet liner off the battery. Then loosen the nut on the battery cable and wiggle cable off battery stud.

Unbolt the engine cover that is held in place with two T30 Torx screws. We suggest you place all component sets in Ziplock bags and mark them with a Sharpie pen to ease the reassembly process.

Remove the 10 mm bolt holding the fuel line onto the engine.



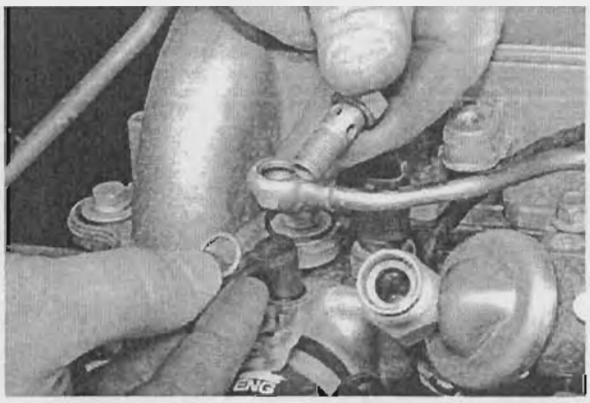


Loosen the 24 mm fuel line nut by pulling against a 21 mm open end wrench situated on the fuel rail anchor nut. This is to avoid twist and possibly damaging the fuel rail as you apply torque to the fuel line nut.

Place a rag under the fuel line fitting to absorb any excess fuel coming out of the rail. Running the engine with the fuel pump relay out of the fuse block should have bled off most of the fuel pressure, but there will still be some fuel in this line that the rag will be needed to absorb.

Pivot the fuel rail off the front of the engine and lay it on the driver side of the engine bay. This is required to access the fuel rail and fuel injectors and remove them.
As a tip, it is a good idea to blow off and/or vacuum the top of the engine to remove any debris that could fall into any of the engine orifices that will be exposed during this process.

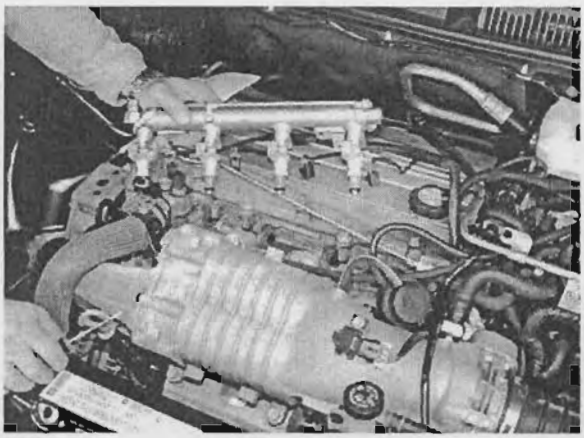
Loosen the pressure cap on the coolant system reservoir (located on the driver side of the engine bay) to make sure the system is not under pressure. ONLY PERFORM THIS STEP ON A 'COLD' ENGINE.

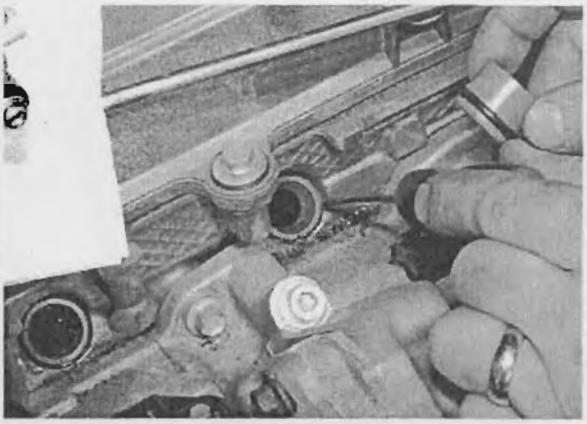


Unplug the coolant temperature sender electrical connector from the front of the engine by pushing on the black plastic tang with your thumb while cautiously pulling up on the connector.

Remove coolant steam pipe with 14 mm socket on front of engine. Make sure to save the copper washer under the 14 mm fitting and once removed, it is a good idea to plug this hole with ¼ inch rubber stopper to minimize coolant flowing out of the hole.

Remove the two 10 mm bolts holding the fuel rail in place on the engine.



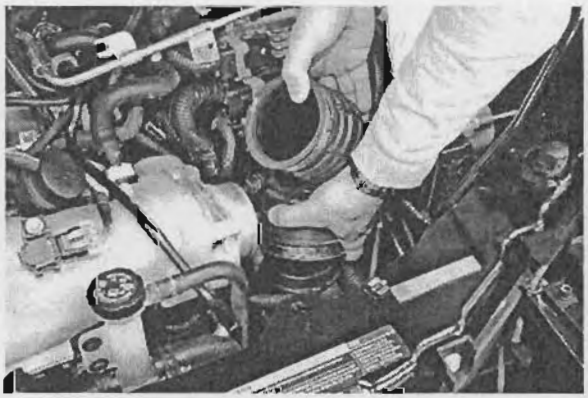


Pull the fuel rail and fuel injector assembly out of the cylinder head. This should require minimal force. Be very careful to pull up in line with the fuel injectors to avoid causing any damage to the injectors. Set the fuel rail on the cylinder head with a rag near the fuel rail opening to absorb any remaining fuel that draining from the rail

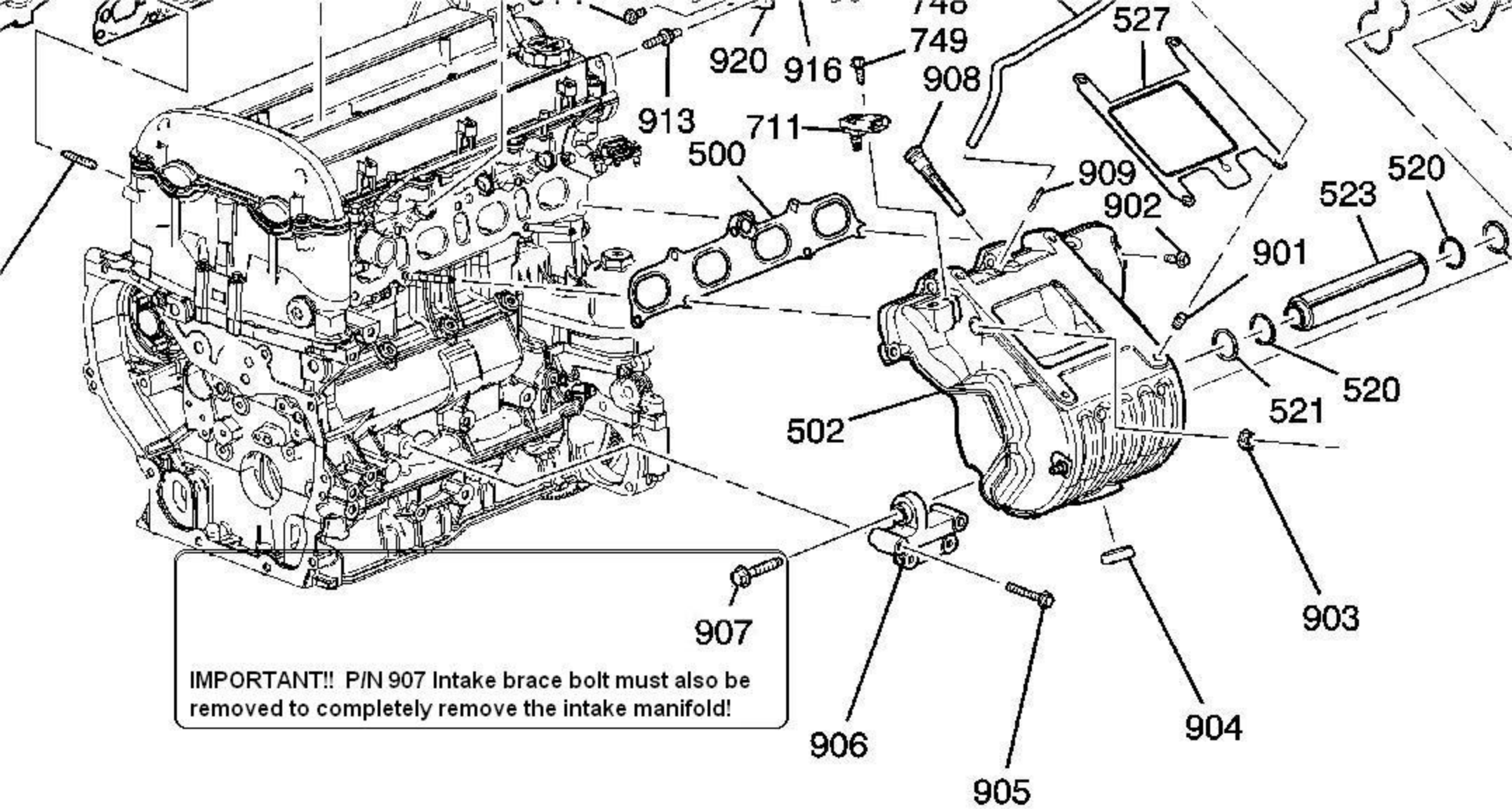
The fuel injectors seat into plastic 'inserts' in the cylinder head—these inserts should remain in the head but sometimes stick to the fuel injectors when they are removed. If the inserts come out, reinstall them into the head after wiping a light coat of Vaseline on the o-ring seal.

Inspect the fuel line fitting to make sure the green plastic washer and blue O-ring are seated in the fuel rail (these usually are nested into this position and will not come out, but it's a good idea to make sure they are there before proceeding).

Supercharger Removal

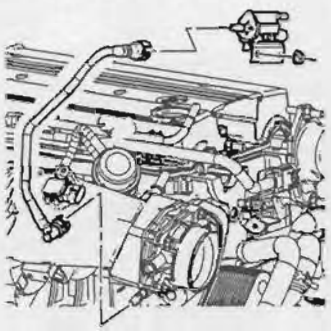


Remove the air inlet tube attached to the throttle body on the blower by loosening 8 mm hose clamp bolts and sliding it off.

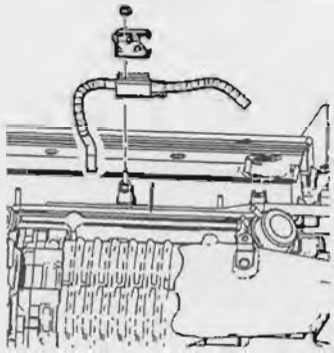


IMPORTANT!! P/N 907 Intake brace bolt must also be removed to completely remove the intake manifold!

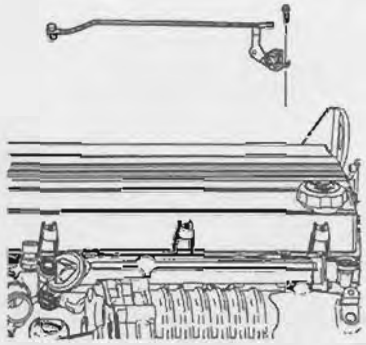
Now, remove the many electrical and hose connections on the blower. These will all need to be hooked up after the blower is reinstalled. Connections include the MAP sensor (shown above), as well as the following the brake booster hose, evaporative emission (EVAP) tube and EVAP valve, boost control vacuum hose, barometric pressure sensor, coolant return line bolt, and intercooler reservoir bracket.



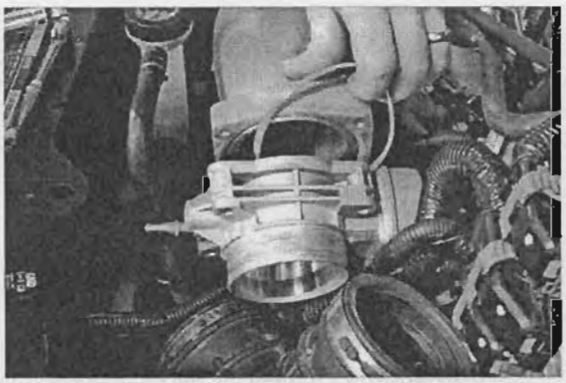
EVAP tube and EVAP valve



Boost solenoid and bracket



barometric pressure sensor and coolant return line

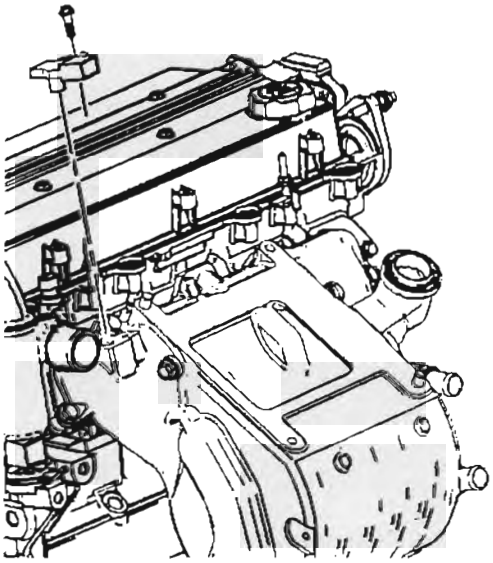


Remove the four 10 mm bolts holding the throttle body and gasket on the blower. Pivot the throttle body away from the blower to allow blower removal.

Relax the blower belt tensioner with a 15 mm wrench and remove front drive belt by hand.

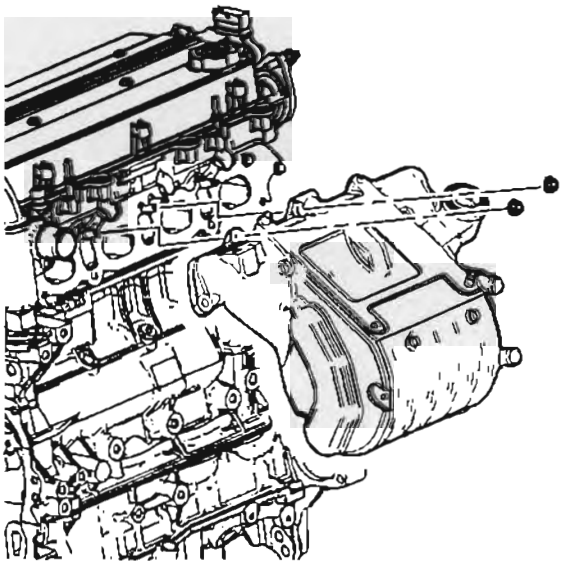
Unbolt the four 6 mm bolts holding the blower onto the intake manifold and remove blower.

Intake Manifold Removal



Notice: Never attempt to remove the intake manifold from a hot engine, allow the engine to cool to ambient temperature.

Remove the manifold absolute pressure (MAP) sensor.

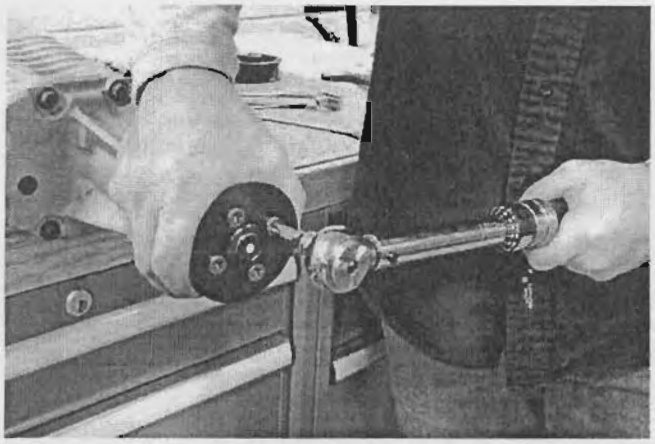


Remove the intake manifold retaining nuts and bolts.

Remove the intake manifold.

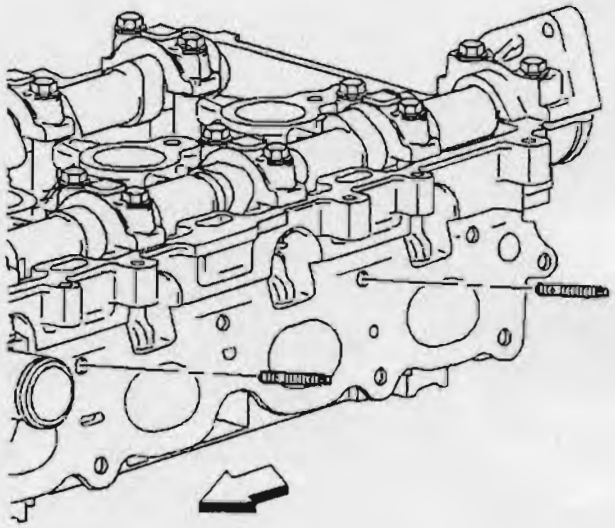
Remove the intake manifold gasket. Discard the gasket if damaged.

Stage 3 Pulley Installation



Removed the blue Stage 2 pulley bolts using the tool provided with the Stage 2 kit. Removed the Stage 2 pulley. Install the smaller Stage 3 blower pulley on the Stage 2 hub using the blue Stage 2 bolts and the provided tool. Torque to 16 lb-ft in a radial pattern.

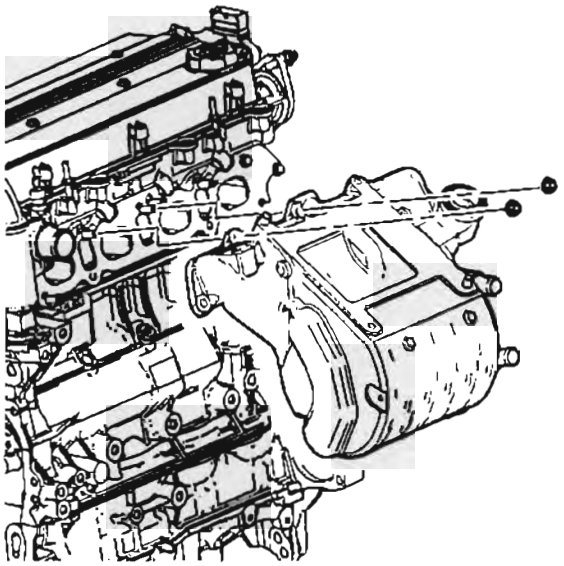
Intake Manifold Installation



Notice: Use the correct fastener in the correct location. Do not use paints, lubricants, or corrosion inhibitors on fasteners or fastener joint surfaces unless specified. These coatings affect fastener torque and joint clamping force and may damage the fastener. Use the correct tightening sequence and specifications when installing fasteners in order to avoid damage to parts and systems.

Install the intake manifold studs in the manifold face.

Tighten the intake manifold studs to 5 N·m (44 lb in).



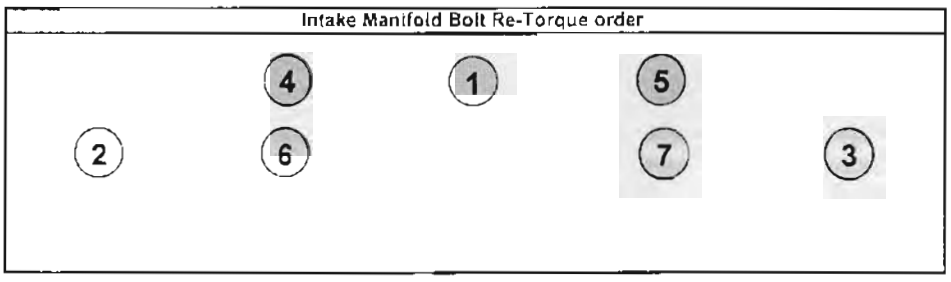
Install a new intake manifold gasket (12584359) on the intake manifold if orginal is damaged.

Install the intake manifold.

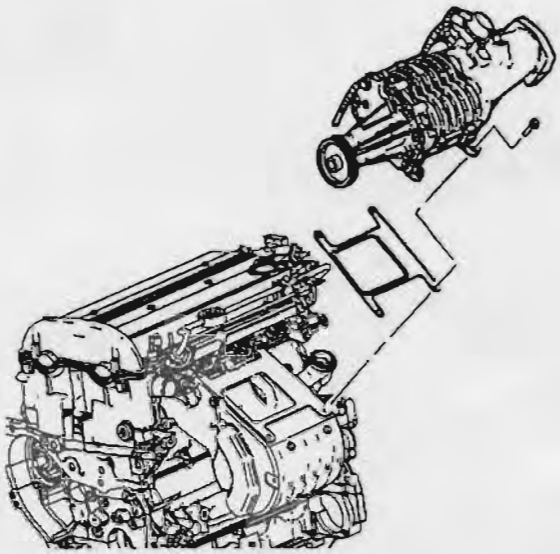
Install the intake manifold bolts and nuts.

Tighten the bolts and nuts to 22 N·m (16 lb ft).

Intake manifold fastener torque pattern:



Supercharger Installation

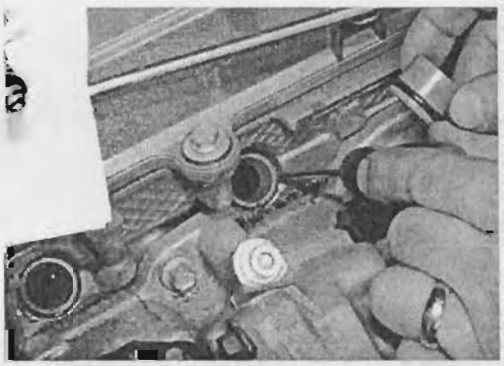


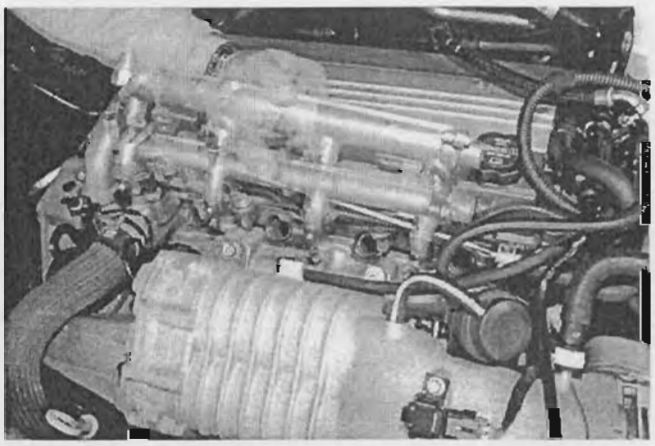
Reinstall the now-Stage 3 upgraded blower on the engine intake manifold. Make sure the blower aligning pins are seated in the intake manifold and that the intake-to-blower gasket is in place. Thread the new blower belt over pulley. Torque the 6 mm supercharger bolts to 18 lb-ft (25 Nm).

Install throttle body and gasket, torquing the four bolts to 89 lb-in (10 Nm).

Install other components removed in previous removal steps. The boost solenoid bracket nut should be torqued to 89lb-in (10 Nm)

Fuel Rail Installation





Before reinstalling the fuel injectors, check to make sure the plastic injector spacers in the cylinder head are fully seated by pushing down on them.

Flip the fuel rail over and point fuel injectors toward cylinder head in preparation for reinstallation. As one final check, make sure the green washer and blue O-ring still are seated in fuel rail fitting.

Position fuel injector wiring harness so it does not get wedged under mounting boss—as this will prevent the fuel rail from 'fully seating' down onto the boss and the fuel injectors being fully installed.

Push the injectors (which are loaded on the fuel rail) into the cylinder head until there is no space between mounting boss and fuel rail boss.

Install the two fuel rail holddown bolts and torque them to 89 in-lbs (10 N-m).

Reinstall the coolant steam pipe into the cylinder head and torque to 89 in-lbs (10 N-m).

Lube up the fuel line fitting end with a light coat of petroleum jelly before reinstalling.

Reinstall the 24 mm fuel line fitting onto fuel rail and torque the fitting to 89 in-lbs (10 N-m).

Install the hold down bolt on the fuel line and torque it to 89 in-lbs (10 N-m).

Reconnect the negative battery cable and torque the fastener to 89 in-lbs (10 N-m).

Key on for initial pressure check---look for leaks in fuel rail. Repeat key up (wait 10 seconds between key on and key off to make sure system is fully pressurized)

If there are no leaks, crank the engine it starts and let it run for a few minutes. Check the fuel rail again for leaks once everything has come up to operating temperature.

With no leaks, shut the engine off and install engine cover with two T30 Torx. Torque these to 89 in-lbs (10 N-m)