

sequence shown.

Intake Manifold Attaching Bolts : 12-18Nm

- 6. Install the fuel rail and injectors and top intake manifold.
 - (a) Install a new "O" ring into each injector position of the manifold.
 - (b) Install the spacers onto the bolts which support the fuel rail.
 - (c) If the injectors have been removed from the fuel rail. Install the injectors into the fuel rail, make sure that the injector turn freely in the fuel rail.
 - (d) Install the top intake manifold chamber, 5 bolts.
 - (e) Tighten the fuel rail and top intake manifold bolt to specification.

Fuel Rail and Top Intake Manifold bolts: 10-14Nm

7. Install new "O" rings and the air intake chamber, tighten to specification.

Air Intake Chamber Bolts: 10-14Nm

- 8. Replace the top air intake chamber cover and gasket.
- 9. Install fuel and fuel return lines at the quick release connections, on the firewall.
- 10. Install the engine wiring loom and connectors, attach the 6 fuel injector wiring connectors, water temperature sensor at the front of the engine, water temperature gauge sender unit, TPS and IAC connectors to the throttle body. 3 vacuum hoses for brake booster, fuel pressure regulator and heater control hose.

Connect the hoses to the throttle body if removed, crankcase vent hose and emission control hose, if removed.

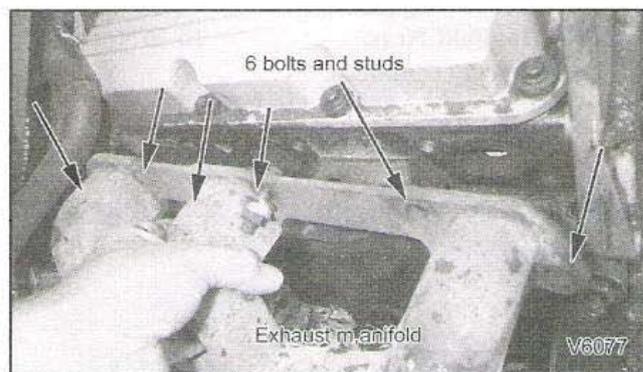
- 11. Connect the accelerator cable and bracket, 3 nuts.
- 12. Install air duct tube between air cleaner and throttle body.

- 13. Connect radiator hoses, fill and bleed the cooling system.
- 14. Replace air cleaner to intake chamber tube with MAF sensor, connect MAF wiring connector.
- 15. Replace alternator and wiring connections.
- 16. Replace drive belt tensioner.
- 17. Replace fuse 14, reconnect earth to battery.
- 18. Install top engine cover, 4 nuts.

EXHAUST MANIFOLDS

Remove

- 1. Remove the bolts attaching the exhaust pipe to the exhaust manifolds.
- 2. Unplug spark plug leads and position them out of the way.
- 3. [Left side manifold] Remove the air cleaner to intake chamber tube with MAF sensor, disconnect MAF wiring connector.
- 4. Remove the lock washers, 6 nuts, studs and bolts each side as required attaching each manifold to the cylinder head, remove manifolds. (left side the oil dip stick and bracket is attached to the manifold)



Install

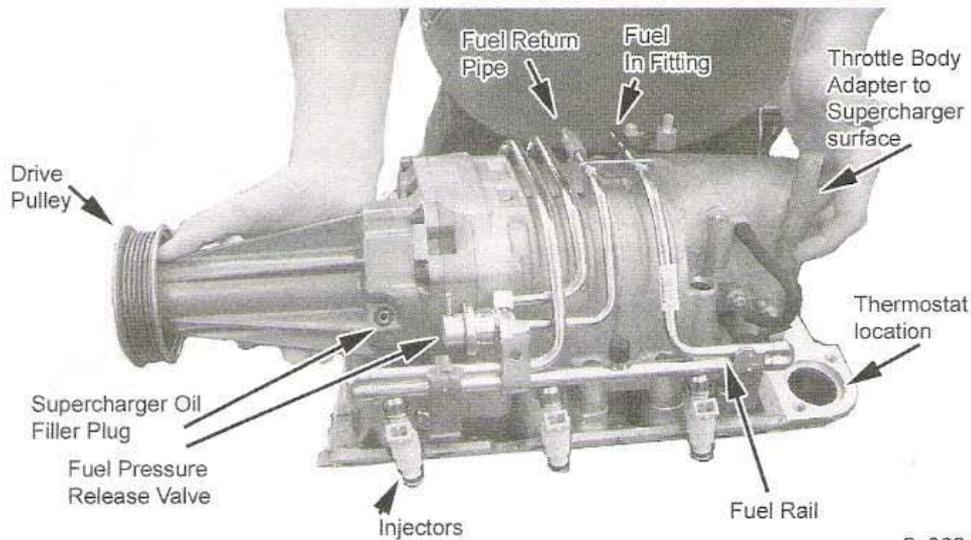
1. Install gasket to cylinder heads, to align the gasket, install four guide studs in the cylinder head. Place the gasket on the studs. Place the manifold on the studs. Install the bolts on the lower holes, remove the guide studs, install the upper bolts. Gradually tighten the bolts to specification. Install lock washers. Apply Kopr-Kote or similar anti-seize to threads of bolt and studs.

Exhaust Manifold Studs, 1 Bolt: 25-35Nm

Exhaust Manifold Nuts: 20-27Nm

2. Tighten the manifold flange to exhaust pipe nuts to specification. Apply Kopr-Kote or similar anti-seize to threads

SUPERCHARGER V6



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cut down) before checking supercharger oil level, otherwise oil loss will occur and possible hot oil spray from plug hole could burn you.

- a) Remove oil plug, oil level should be at the lower threads of the plug. (use a 3/16 allen key)
- b) Top oil level by using specified oil.

Supercharger Oil:

GM Part No 12345982 Synthetic Oil

- c) Replace oil plug and tighten.

Supercharger Oil Plug: 10Nm

3. Excessive oil leak at front seal, behind drive pulley.

Tip: It is acceptable for a small weep at this seal, but not excessive weeping.

General Information

The V6 supercharged engine uses a positive displacement, two counter rotating rotors in a housing mounted on the top of the engine. The supercharger develops maximum boost from 50-70kPa, the boosted air pressure is available at all of the rpm range, when not required the boosted air is recirculated by the bypass valve through the bypass passage between the lower intake manifold and inlet of supercharger.

The bypass valve has a spring keeping it closed and a vacuum actuator valve that opens it with increased vacuum. The closed valve allows boost air pressure to be used by the engine, the open valve allows boost air pressure to recirculate. The rotors are driven by the front drive belt, rotors are supported by ball bearings at the front and sealed roller bearings at the rear.

On Vehicle Tests

1. The drive belt tensioner indicator must be within the tension range as per the marks on the belt tensioner.
2. Oil level should be checked at regular maintenance service checks.

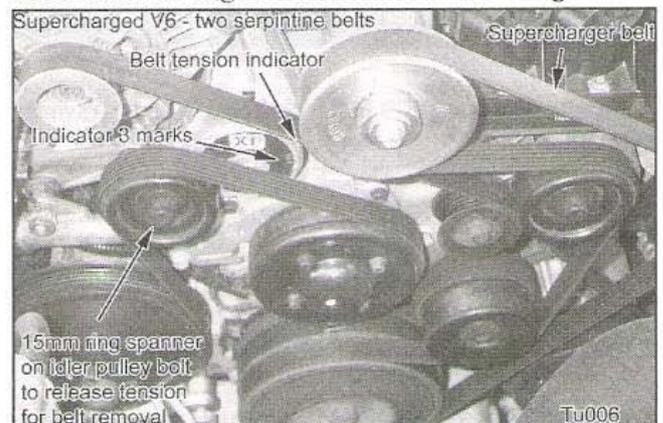
Note: The engine must be cool (2 1/2-3 hours after engine

Maintenance

Supercharger

Remove

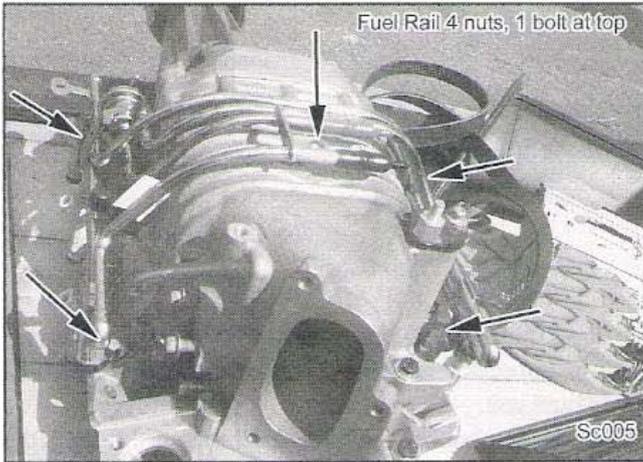
1. Remove engine cover, 4 nuts.
2. Disconnect wiring loom connectors, for MAF - air flow meter, IAT - air flow meter, TP - throttle body, IAC throttle body.
3. Remove the drive belt from the supercharger pulley.
4. Disconnect accelerator cable and cruise control if applicable.
5. Remove duct between air cleaner and throttle body.
6. Remove attaching bolts for boost solenoid wiring and rear



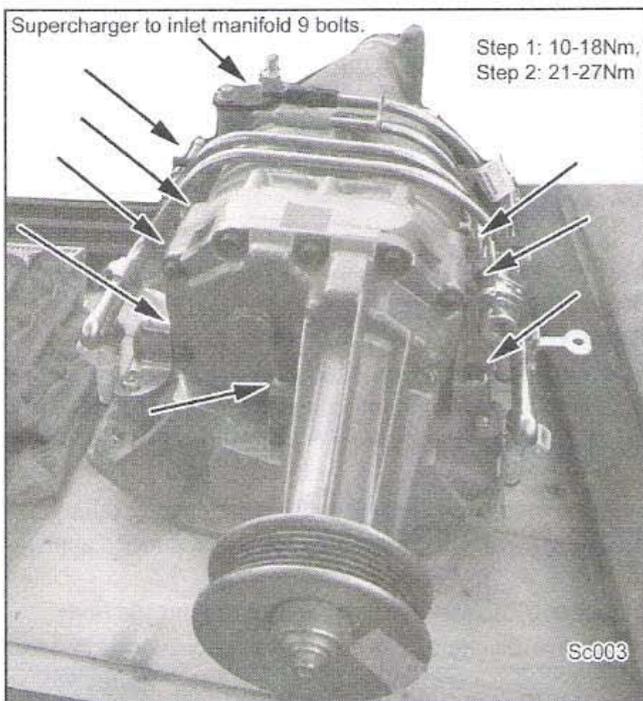
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cover, disconnect wiring harness.

7. Depressurise fuel system as described in EFI chapter.
8. Disconnect and label for assembly vacuum hoses to throttle body, boost solenoid, heater, fuel pressure regulator and engine vent.
9. Remove alternator bracket.
10. Remove fuel rail, disconnect injector connectors.



11. Remove supercharger, 9 bolts, discard gasket and "O" rings.



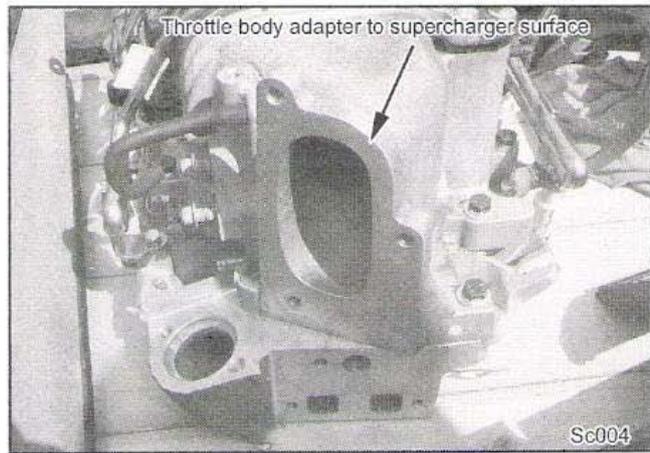
Install

1. Install supercharger, 9 bolts, new gasket and "O" rings, tighten bolts.

Supercharger bolts:

Step 1: 10-18Nm, Step 2: 21-27Nm

2. Install fuel rail, 4 nuts 1 bolt. Connect injector connectors.
3. Connect the vacuum hoses for the boost control solenoid, and the engine cover back bracket.
4. Connect vacuum hoses to fuel pressure regulator, engine vent.
5. Install throttle body and duct between throttle body and air



cleaner.

6. Install the acellerator cable and cruise control.
7. Install the drive belt from the supercharger pulley.
8. Reconnect wiring loom connectors, for MAF - air flow meter, IAT - air flow meter, TP - throttle body, IAC throttle body.
9. Install engine cover, 4 nuts.
10. Connect the battery, turn ignition key ON and check for leaks as fuel system repressurises.

Supercharged Model Modifications

Front drive belt and pulleys.

Supercharged models have two drive belts, one standard belt plus a belt for the supercharger.

Front drive belt tensioner and Idler pulleys.

Supercharged models have an extra tensioner fitted, and two additional idler pulleys are required. A wider crankshaft balancer pulley with different specifications is also required.

Balance shaft.

The supercharged models have a balance shaft without grooves in the balancer weights and also the end of the balance shaft has 4 oil holes instead of 3.

Camshaft sprocket.

Camshaft sprocket has triangular holes while the standard camshaft sprocket has round holes.

Piston Pin.

The piston pin is alarger diemeter (23mm) and therefore the piston and connectind rod is also different.

Piston.

The piston pin is alarger diemeter (23mm) and therefore the piston and connectind rod is also different.

Connecting rods.

The piston pin is alarger diemeter (23mm) and therefore the piston and connectind rod is also different. Also the centers of the piston pin and bigend are at a different distance.

Cylinder Heads.

The cylinder heads have been altered due to the injectors in the cylinder heads.

Cylinder head gaskets.

Supercharged models have special head gaskets due the revised heads, also the gaskets are made of a different composition.

Camshaft Sprocket

A modified camshaft sprocket is used, this can be identified by the triangular holes in the sprocket.

Fuel Injectors

Higher volume fuel injectors are fitted to supercharged models.

Fuel Rail

A different fuel rail is used for the supercharged models.

Inlet manifold



The lower inlet manifold is different due to the supercharger fitted to the inlet manifold and the injectors fitted into the heads.

Rocker covers.

The supercharged models need different rocker covers due to the extra clearnace needed by the injectors.

Throttle Body Adapter

A special throttle body adapter is used between the throttle body and the supercharger.

Coolant Outlet and Thermostat Housing.

Coolant outlet to the radiator is located at the rear of the inlet manifold, therefore a different coolant outlet and thermostata housing is used.

Flexiplate

The supercharged models have an extra counter weight on the flexiplate.

Crankshaft Balancer

A different crankshaft balancer is necessary because of the extra drive belt fitted, also the balancer is specifically designed for the supercharged engine.

Coil Pack Bracket and Spark Plug leads.

Supercharged models have a different coil pack bracket, therefore the spark plug leads are also different and in a different position.

Spark Plugs

The spark plugs are a different heat catagory.

Engine Management - PROM

The engine management PROM is different.

Problem Solving

Roughtlding

* Check and clean engine breather (crankcase ventilation

valve.

* Throttle body or adapter bolts loose.

* Supercharger bolts loose.

* See other problem solving diagnosis systptoms under EFI and Ignition.

Noisy Supercharger

* Low oil level of supercharger.

* Worn internal gears

* Worn bearings.

* Drive belt stretched.

* Loose pulleys.

* Worn or frayed drive belt.

Excessive Oil Leak

* Front seal of supercharger.

* Worn supercharger shaft at front seal.

* Cracked supercharger housing.

Specifications

* Engine Capacity:	3791cc
Engine Compression Ratio:	8.5:1
* Bore:	96.5 mm
* Stroke:	86.3 mm
* Taxable H.P.RAC OR SAE:	34.6
Power DIN:	171 kw @ 5200rpm
Torque DIN:	375 Nm @ 3000rpm
* Same as standard V6 engine	

Torque Specifications Nm

Drive belt tensioner bolt:	40 - 50
Drive belt tensioner pulley bolt:	40 - 50
Drive belt idler pulley bolt:	40 - 60
Drive belt idler pulley bracket bolt:	25 - 35
Supercharger bolts:	
Step 1:	10-18
Step2:	21-27
Supercharger oil filler plug:	10
Engine dress cover attaching nut:	4.0 - 6.0
Engine top cover bracket bolt,nut:	15 - 20
Coil pack bolts:	40 - 50
Throttle body adaptor bolts:	20 - 28
Throttle body nuts:	15 - 20
Crankshaft balancer bolt:	270 - 325
Bypass valve actuator bolts:	26
Bypass harness bolt:	15 - 20
Boostreduction solenoid bolt:	30 - 40
Fuel rail bolt:	20 - 30
Fuel rail nuts:	8.0 - 12
Radiator inlet pipe attaching bolt:	20 - 27
Bypass actuator solenoid valve bolts:	30 - 40