

N - REMOVE/INSTALL/OVERHAUL

1998 Pontiac Bonneville

1998 ENGINE PERFORMANCE

General Motors Corp. - Removal, Overhaul & Installation
3.8L

Buick; Le Sabre
Oldsmobile; LSS, Eighty Eight & Regency
Pontiac; Bonneville

CAUTION: When battery and SOME PCM input devices are disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION section before disconnecting battery.

INTRODUCTION

This article covers removal, overhaul and installation procedures (when given by manufacturer). If component removal and installation is primarily an unbolt and bolt-on procedure, only a torque specification may be supplied.

COMPUTERIZED ENGINE CONTROLS

POWERTRAIN CONTROL MODULE (PCM)

CAUTION: Electronic components used in control systems are designed to carry very low voltages. As little as a 30-volt charge created by static electricity can cause a total or degrading failure in PCM or other electronic components containing integrated circuits. Before servicing PCM, technician must ground himself and the work area to discharge static electricity.

CAUTION: DO NOT remove part from packaging until ready to install. Ground any static-proof package before opening. DO NOT touch electrical terminals of components unless properly grounded. DO NOT lay electrical components on car seat, carpeting or dashboard. Use electrostatic protection mat and ground strap whenever possible.

NOTE: Before replacing PCM, carefully inspect all wiring and control components. Failure to test for short circuits may result in repeated PCM failure due to shorts. To prevent internal damage to PCM, ensure ignition switch is in OFF position when connecting or disconnecting PCM connectors or any electrical components.

Removal & Installation

Turn ignition off. Disconnect negative battery cable. Locate PCM. See PCM LOCATION table. Remove any necessary components to gain access to PCM. Disconnect electrical connectors from PCM. Remove PCM mounting bolts (if equipped). Remove PCM. To install, reverse removal procedure. Transfer any necessary components (i.e., knock module, EEPROM, etc.) to new PCM before installation. Program replacement PCM using appropriate equipment and latest software.

PCM LOCATION TABLE

Application	Location
3.8L	In Right Front Corner Of Engine Compartment

ELECTRICALLY ERASABLE PROGRAMMABLE READ-ONLY MEMORY (EEPROM)

EEPROM is a permanent memory that is part of PCM. EEPROM cannot be replaced. EEPROM contains program and calibration information that PCM uses to control powertrain. If PCM is replaced, ensure NEW PCM software/calibration is correct and most recent version for vehicle. EEPROM must be programmed when NEW PCM is installed. Program EEPROM using latest software for that specific vehicle.

IGNITION SYSTEM

IGNITION CONTROL MODULE (C(3)I)

Removal & Installation

1) Disconnect negative battery cable. Disconnect 14-way connector at ignition control module. Disconnect spark plug wires from coil pack. Remove 6 screws retaining coils to ignition control module. Remove ignition coils from module.

2) Remove screws and washers securing ignition control module to bracket. Remove ignition control module. To install, reverse removal procedure. Tighten retaining screws to specification. See TORQUE SPECIFICATIONS.

CAMSHAFT POSITION SENSOR

Removal & Installation

Disconnect negative battery cable. Disconnect electrical connector from camshaft position sensor. Remove camshaft position sensor mounting bolt and remove camshaft position sensor. To install, reverse removal procedure. Tighten camshaft position sensor bolt to specification. See TORQUE SPECIFICATIONS.

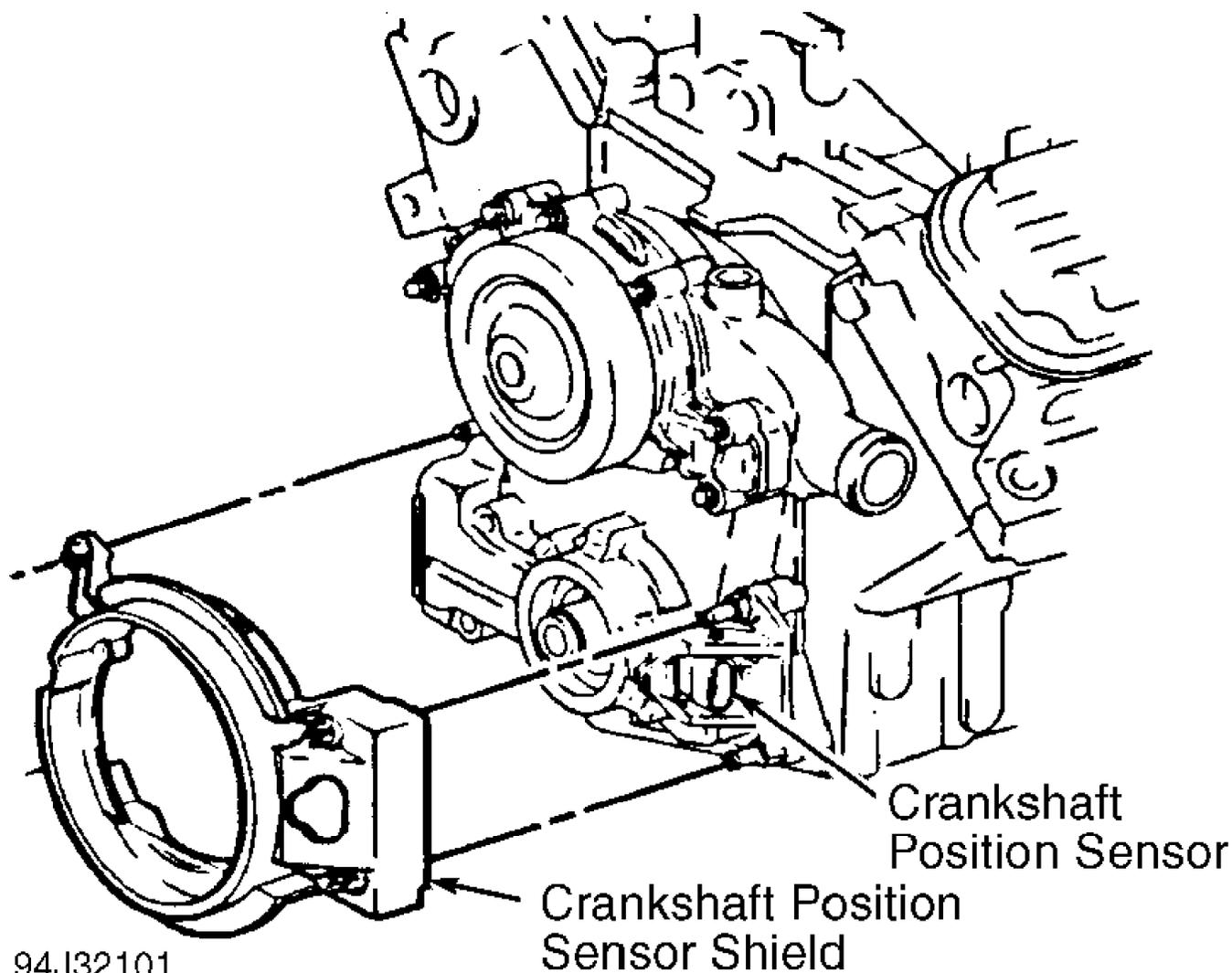
CRANKSHAFT POSITION SENSOR (C(3)I)

Removal & Installation

1) Disconnect negative battery cable. Remove serpentine belt from crankshaft pulley. Raise vehicle on hoist. Remove right front tire and wheel assembly. Remove right inner fender access cover.

2) Using 28-mm socket, remove crankshaft harmonic balancer bolt. Using Balancer Remover (J-38197), remove harmonic balancer. Remove crankshaft position sensor shield (DO NOT use pry bar). See Fig. 1. Disconnect crankshaft position sensor harness connector. Remove crankshaft position sensor from engine block.

3) To install, reverse removal procedure. Apply Thread Sealer (GM 1052080) to threads of harmonic balancer bolt. Tighten sensor and harmonic balancer bolts to specification. See TORQUE SPECIFICATIONS. Perform CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION section.



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Fig. 1: Removing Crankshaft Position Sensor Shield (C(3)I)
 Courtesy of General Motors Corp.

IGNITION COIL (C(3)I)

Removal & Installation

Disconnect negative battery cable. Disconnect spark plug wires from coil pack. Remove 6 screws retaining coils to ignition control module. Remove ignition coils from module. To install, reverse removal procedure. Tighten retaining screws to specification. See TORQUE SPECIFICATIONS.

FUEL SYSTEM

FUEL PRESSURE RELIEF

WARNING: Always relieve fuel pressure before disconnecting any fuel injection-related component. DO NOT allow fuel to contact engine or electrical components.

Fuel system is under pressure. Pressure must be relieved prior to servicing fuel system. Fuel pressure may be relieved by using

one of the following methods.

- * Disconnect negative battery terminal. Loosen fuel filler cap. Install Fuel Pressure Gauge (J-34730-1A) on fuel pressure connector of fuel rail. Wrap shop towel around pressure connection when installing fuel pressure gauge to absorb fuel leakage. Install gauge bleed hose in container. Open bleed valve to bleed fuel pressure.

THROTTLE BODY (SFI)

WARNING: Ensure residual fuel pressure is relieved before working on throttle body.

Removal

- 1) Relieve fuel pressure. See FUEL PRESSURE RELIEF.

Disconnect negative battery cable. Remove air intake ducts. Disconnect and mark electrical connections and vacuum hoses from throttle body. Disconnect control cables from throttle body.

- 2) Drain cooling system and remove coolant hoses to throttle body (if applicable). Remove throttle body retaining bolts. Remove throttle body and gasket.

NOTE: Identification number is stamped on throttle body. Use identification number to order replacement components.

Installation

- 1) To install, reverse removal procedure using NEW gasket.

Tighten throttle body retaining bolts to specification. See TORQUE SPECIFICATIONS. Refill cooling system (if drained).

- 2) If installing NEW Idle Air Control (IAC) valve, ensure IAC pintle length setting is adjusted before installation (if applicable). See IDLE AIR CONTROL (IAC) VALVE. Adjust idle speed and TP sensor (if removed, and if adjustable). See D - ADJUSTMENTS article.

FUEL PRESSURE REGULATOR

Removal

Relieve fuel pressure. See FUEL PRESSURE RELIEF. Disconnect negative battery cable. Disconnect pressure regulator vacuum hose. Remove pressure regulator snap ring. Lift and twist pressure regulator from pressure regulator housing attached to fuel rail. Remove backup "O" ring, large "O" ring, filter screen and small "O" ring from pressure regulator housing.

Installation

To install, reverse removal procedure. DO NOT reuse "O" rings. Lubricate NEW "O" rings with oil and install in regulator housing. Install snap ring.

FUEL RAIL & INJECTORS

NOTE: If injector is replaced, ensure replacement injector has the same part number as injector removed.

Removal

- 1) Relieve fuel pressure. See FUEL PRESSURE RELIEF.

Disconnect negative battery cable. Remove air intake duct (if necessary). Remove vacuum line from throttle body. Remove ignition coil wires.

- 2) Disconnect vacuum hose at fuel pressure regulator.

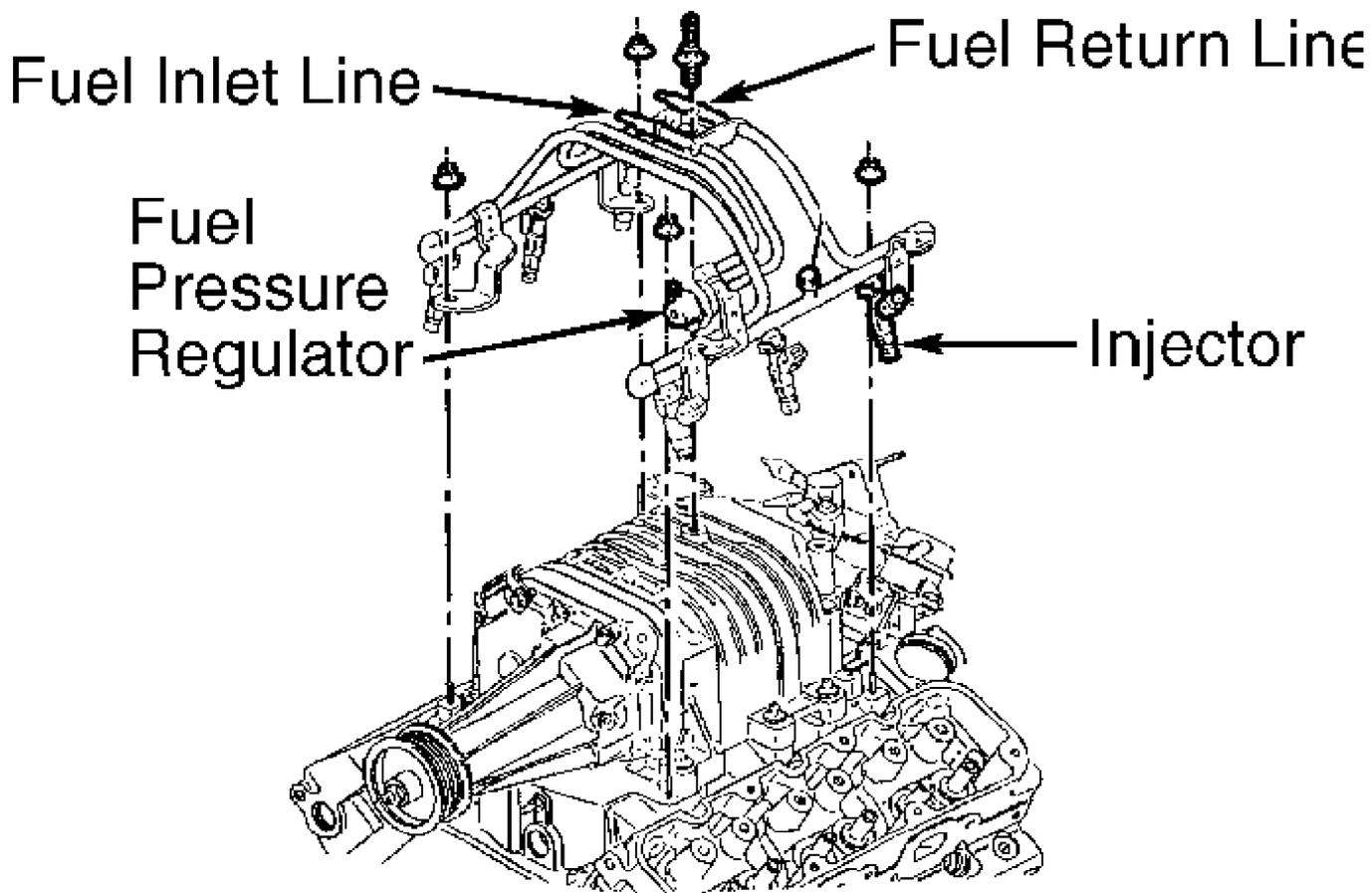
Disconnect and plug fuel return line at pressure regulator. Disconnect and plug fuel inlet line at fuel rail. Disconnect electrical

connectors from injectors.

3) Remove fuel rail retaining bolts. Remove fuel rail from intake manifold using equal force on both sides of fuel rail. See Fig. 2 or 3. Remove injector-to-fuel rail retaining clip (if equipped). Remove injectors from fuel rail. Remove injector "O" rings and discard.

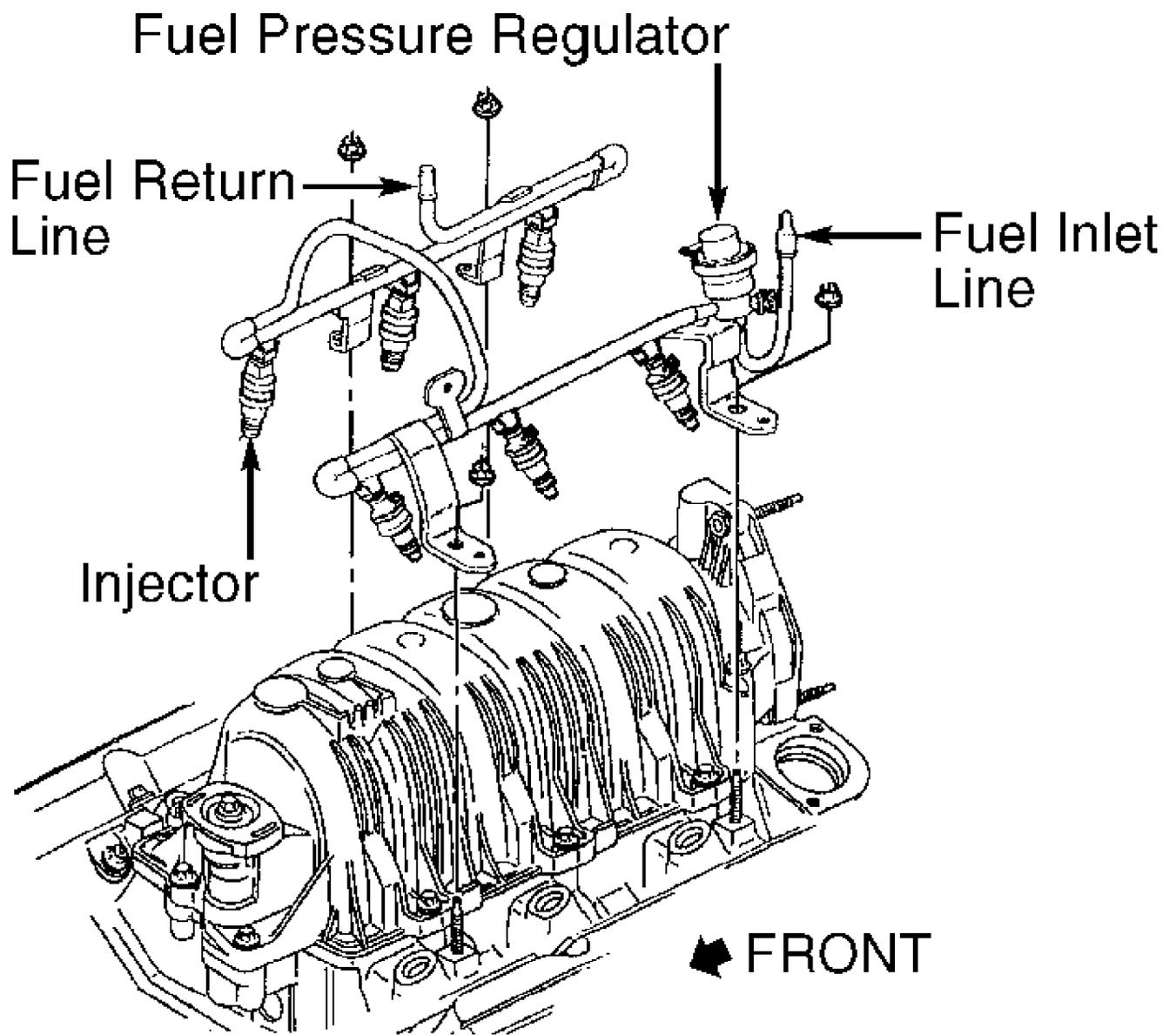
Installation

To install, reverse removal procedure. Coat NEW injector "O" rings with clean engine oil. Install injector-to-fuel rail retaining clip with open end facing injector electrical connection. Position fuel rail on intake manifold. Push down on rail to seat injectors in manifold. Tighten fuel rail retaining bolts. See TORQUE SPECIFICATIONS . To complete installation, reverse removal procedure.



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Fig. 2: Locating Fuel Rail Assembly Components (VIN 1)
Courtesy of General Motors Corp.



95J35005

Fig. 3: Locating Fuel Rail Assembly Components (VIN K)
 Courtesy of General Motors Corp.

IDLE AIR CONTROL (IAC) VALVE

Removal

Disconnect electrical connector from IAC valve. Remove IAC valve, gasket and "O" ring from throttle body assembly.

CAUTION: DO NOT extend or retract pintle if IAC valve has been in service, or damage to worm gear will result.

Installation

1) Inspect gasket or "O" ring for damage. Replace as necessary. Check extended distance of IAC pintle before installing. Damage will occur if measurement is incorrect. Distance must not

exceed 1.100" (28 mm). Measurement should be taken from valve housing flange to end of pintle cone.

2) To retract NEW IAC valve pintle, slowly exert finger pressure on valve. Install NEW "O" ring or gasket on valve. Coat "O" ring with clean engine oil. Install IAC valve. Tighten IAC valve to specification. See TORQUE SPECIFICATIONS. Reconnect electrical connector to IAC valve. To reset IAC valve, refer to D - ADJUSTMENTS article.

FUEL PUMP

Removal & Installation

1) Relieve fuel pressure. See FUEL PRESSURE RELIEF. Disconnect negative battery cable. Remove filler neck. Lower fuel tank. Disconnect fuel lines and electrical connection.

2) Remove fuel level sending unit and fuel pump retaining bolts or cam lock ring. Lift assembly from fuel tank and remove fuel pump from sending unit.

3) Pull fuel pump upward while pulling away from bottom support. DO NOT damage rubber insulator and strainer. To install, reverse removal procedure using NEW "O" ring and gasket.

THROTTLE POSITION (TP) SENSOR

Removal & Installation

Turn ignition off. Disconnect electrical connector from TP sensor. Remove TP sensor retaining screws. Remove TP sensor from throttle body. With throttle valve in closed position, install TP sensor on throttle body. Ensure TP sensor lever engages with drive lever on throttle shaft. Install retaining screws and electrical connector. TP sensor is self-zeroing and is not adjustable.

OXYGEN SENSOR

Oxygen sensor is mounted in exhaust pipe, below exhaust manifold. It is equipped with a permanent pigtail which must remain intact when removing sensor.

Removal

1) Ensure oxygen sensor is free of contaminants. DO NOT use cleaning solvents of any type. Oxygen sensor may be difficult to remove when engine temperature is less than 120°F (48°C). Excessive removal force may damage threads in exhaust manifold or pipe.

2) Disconnect negative battery cable. Disconnect electrical connector from oxygen sensor. Carefully remove oxygen sensor from exhaust pipe.

CAUTION: Correct torque of oxygen sensor is critical to prevent crushing glass beads in graphite anti-seize compound. Crushing glass beads will cause sensor to seize in exhaust manifold. This may necessitate replacement of exhaust manifold at the next removal.

Installation

1) Whenever an oxygen sensor is removed, coat threads with anti-seize compound before installation. New oxygen sensors already have this compound applied to threads.

2) Install oxygen sensor in exhaust pipe. Tighten oxygen sensor to 30 ft. lbs. (41 N.m). Reconnect electrical connector to oxygen sensor. Reconnect negative battery cable.

SUPERCHARGER

NOTE: Servicing of supercharger unit is limited to replacement only.

Removal (VIN 1)

1) Relieve fuel pressure. See FUEL PRESSURE RELIEF.

Disconnect negative battery cable. Remove accessory drive belt from supercharger pulley.

2) Remove fuel injector sight shield. Disconnect fuel lines from fuel rail. Disconnect vacuum hoses. Disconnect injector electrical connectors. Disconnect electrical connectors from front of supercharger. Remove fuel rail bolts. Remove fuel rail and injectors as an assembly. See FUEL RAIL & INJECTORS.

3) Disconnect electrical connectors from IAC valve, TP sensor, MAP sensor, MAF sensor, EGR valve, boost control solenoid, and engine coolant temperature sensor. Remove air intake duct from throttle body. Remove EGR pipe from supercharger. Disconnect throttle and cruise control cables. Remove boost pressure manifold and vacuum block. Remove cable bracket and tensioner bracket to supercharger mounting stud.

NOTE: Tensioner bracket-to-supercharger stud must be removed, or supercharger cannot be lifted high enough to clear lower intake manifold locator pins.

4) Remove throttle body from supercharger. Remove supercharger-to-intake manifold bolts and remove supercharger. Remove supercharger gasket and coolant passage "O" rings.

Installation

Ensure locator pins are in their proper location on intake manifold. Replace gaskets and "O" rings. DO NOT use any type of sealant on gasket. To complete installation, reverse removal procedure. Tighten supercharger-to-intake manifold bolts to 17 ft. lbs. (23 N.m). Tighten fuel rail retaining bolts to 89 INCH lbs. (10 N.m).

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
Harmonic Balancer Bolt (1)	110 (149)
Ignition System	
Crankshaft Position Sensor Bolt	15-30 (20-41)
Oxygen Sensor	30 (41)
Supercharger-To-Intake Manifold Bolt	17 (23)
	INCH Lbs. (N.m)
Fuel System	
Fuel Rail Retaining Bolt	89 (10)
Idle Air Control (IAC) Valve Screw	27 (3.0)
Throttle Body Retaining Bolt	89 (10)
Ignition System	
Camshaft Position Sensor Bolt	89 (10)
Ignition Coil-To-Module Screw	40 (4.5)
Ignition Control Module/Coil Pack-To-Bracket Screw	71 (8.0)

(1) - Plus an additional 76 degrees.
