1. Disconnect and isolate the negative battery cable.

2. Remove the engine cover (1).

3. Drain the engine cooling system. Refer to STANDARD PROCEDURE.
4. Disengage the upper radiator hose retainer (1) from the upper intake manifold.

5. Remove the engine cooling fan and shroud assembly. Refer to FAN, COOLING, REMOVAL.

6. Remove the intake resonator. Refer to RESONATOR, AIR CLEANER, REMOVAL.
7. Disconnect the electrical connectors from the Manifold Absolute Pressure (MAP) sensor (1) and the Electronic Throttle Control (ETC) (7).

8. Disengage the ETC harness from the clip (8) on the throttle body. Disengage the wire harness retainers (4 and 5) from the upper intake manifold near the MAP sensor and reposition the wire harness.

9. Disconnect the following hoses from the upper intake manifold:
   1. Positive Crankcase Ventilation (PCV) (3)
   2. vapor purge (6)
   3. brake booster (2)
10. Disengage the wire harness retainer (4) from the upper intake manifold support bracket (5).

11. Disengage the wire harness retainer (3) from the studbolt (2).

12. Remove two nuts (1), loosen the studbolt (2) and reposition the upper intake manifold support bracket (5).
13. Remove the nut (2) from the support bracket of the heater core return tube (1).
14. Remove two nuts (1), loosen two studbolts (3) and reposition the two upper intake manifold support brackets (2).
NOTE:

The upper intake manifold attaching bolts are captured in the upper intake manifold. Once loosened, the bolts will have to be lifted out of the lower intake manifold and held while removing the upper intake manifold.

NOTE:

Exercise care not to inadvertently loosen the two fuel rail attachment bolts that are in close proximity of the upper intake manifold attaching bolts.

15. Remove seven manifold attaching bolts (1) and remove the upper intake manifold (2).
16. Remove and discard the six upper to lower intake manifold seals (1).

17. Cover the open intake ports to prevent debris from entering the engine.

18. If required, remove the insulator (2) from the LH cylinder head cover.

MANIFOLDS > MANIFOLD, INTAKE > REMOVAL > LOWER
WARNING:

The fuel system is under constant pressure even with engine off. Before servicing the fuel rail, fuel system pressure must be released.

1. Release fuel system pressure. Refer to FUEL SYSTEM PRESSURE RELEASE PROCEDURE.

2. Disconnect and isolate the negative battery cable.

3. Remove the resonator and upper intake manifold (2). Refer to MANIFOLD, INTAKE, REMOVAL.
4. Remove the insulator (2) from the LH cylinder head cover.
5. Disconnect the fuel supply hose (2) from the fuel rail inlet. Refer to FITTING, QUICK CONNECT.

6. Disconnect the fuel injector electrical connectors (1).
7. Disengage the injection/ignition harness retainer (1) from the rear of the lower intake manifold.

8. Disengage the main wire harness retainer (2) from the rear of the lower intake manifold.
9. Remove the eight lower intake manifold attaching bolts (1).

10. Remove the lower intake manifold (2) with the fuel injectors and fuel rail.
11. Remove and discard the six lower intake manifold to cylinder head seals (1).
12. If required, remove the fuel rail (2) and fuel injectors from the lower intake manifold. Refer to RAIL, FUEL, REMOVAL.

MANIFOLDS > MANIFOLD, INTAKE > INSTALLATION > UPPER INTAKE MANIFOLD
NOTE:

Prior to installing the upper intake manifold, verify that the four fuel rail bolts were not inadvertently loosened. The bolts must tightened in the sequence shown in illustration to 7 N.m (62 in. lbs.). Refer to RAIL, FUEL, INSTALLATION.
1. Clean and inspect the sealing surfaces. Install new upper to lower intake manifold seals (1).

   
   
   NOTE:
   
   Make sure the fuel injectors and wiring harnesses are in the correct position so that they don't interfere with the upper intake manifold installation.

2. If removed, install the insulator (2) to the two alignment posts (3) on top of the LH cylinder head cover.
3. Lift and hold the seven upper intake attaching bolts (1) clear of the mating surface. Back the bolts out slightly or if required, use an elastic band to hold the bolts clear of the mating surface.

4. Position the upper intake manifold (1) onto the lower intake manifold so that the two locating posts (2) on the upper intake manifold align with corresponding holes (3) in the lower intake manifold.
5. Install the seven upper intake manifold attaching bolts. Tighten the bolts in the sequence shown in illustration to 8 N.m (71 in. lbs.).
6. Install two nuts (1) to the upper intake manifold support bracket (5). Tighten the nuts (1) to 10 N.m (89 in. lbs.) and tighten the studbolt (2) to 20 N.m (177 in. lbs.)

7. Engage the wire harness retainer (3) to the studbolt (2).

8. Engage the wire harness retainer (4) to the upper intake manifold support bracket (5).
9. Install two upper intake manifold support brackets (2) with two studbolts (3) and two nuts (1). Tighten the studbolts (3) to 20 N.m (177 in. lbs.) and tighten the nuts (1) to 10 N.m (89 in. lbs.).
10. Install the nut (2) to the support bracket of the heater core return tube (1) and tighten to 12 N.m (106 in. lbs.).
11. Connect the following hoses to the upper intake manifold:

   1. Positive Crankcase Ventilation (PCV) (3)
   2. vapor purge (6)
   3. brake booster (2)

12. Connect the electrical connectors to the Manifold Absolute Pressure (MAP) sensor (1) and the Electronic Throttle Control (ETC) (7).

13. Secure the ETC harness to the clip (7) on the throttle body and engage the wire harness retainers (4 and 5) to the upper intake manifold near the MAP sensor.
14. Install the engine cooling fan and shroud assembly. Refer to FAN, COOLING, INSTALLATION.

15. Engage the upper radiator hose retainer (1) to the upper intake manifold.

16. Install the intake resonator. Refer to RESONATOR, AIR CLEANER, INSTALLATION.
17. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

18. Fill the cooling system. Refer to STANDARD PROCEDURE.

19. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to STANDARD PROCEDURE.

20. Install the engine cover (1).

MANIFOLDS > MANIFOLD, INTAKE > INSTALLATION > LOWER
1. Clean and inspect the sealing surfaces. Install new lower intake manifold to cylinder head seals (1).
2. If removed, install the fuel injectors and the fuel rail (1) to the lower intake manifold. Tighten the four bolts in the sequence shown in illustration to 7 N.m (62 in. lbs.). Refer to RAIL, FUEL, INSTALLATION.
3. Position the lower intake manifold (1) on the cylinder head surfaces.

4. Install the manifold attaching bolts and tighten in the sequence shown in illustration to 8 N.m (71 in. lbs.).
5. Engage the main wire harness retainer (2) to the rear of the lower intake manifold.

6. Engage the injection/ignition harness retainer (1) to the rear of the lower intake manifold.

7. Connect the fuel injector electrical connectors.
8. Connect the fuel injector electrical connectors (1).

9. Connect the fuel supply hose (2) to the fuel rail. Refer to FITTING, QUICK CONNECT.
10. Install the insulator (2) to the two alignment posts (3) on top of the LH cylinder head cover.
11. Install the upper intake manifold (1), support brackets and resonator. Refer to MANIFOLD, INTAKE, INSTALLATION.

12. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

13. Start the engine and check for leaks.