

## Ford 4.6L & 5.4L F150 & Expedition 1997-2002 model years



We encourage you to read this manual thoroughly before you begin work, and perform the following:

1. A quick parts check to make certain your kit is complete. If you discover shipping damage or shortage, please call our office immediately.
2. Take a look at exactly what you are going to need in terms of tools, time, and experience

## Tools and Materials Required

You're going to need a few basic tools and supplies as follows:

- \* #3 Phillips screwdriver
- \* Flat head screwdriver
- \* Metric wrench set
- \* 1/4" & 3/8" Ratchet and Metric socket set (deep and standard)
- \* 3", 6", and 9" extensions (1/4" and 3/8" drive)
- \* Universal joint for sockets (1/4" and 3/8" drive)
- \* 1-1/4" open-end wrench
- \* Metric Allen wrench set
- \* Drill, 3/16" and 3/8" drill bits
- \* Hose-cutting tool
  
- \* Tubing cutter
- \* Belt tensioner tool or 1/2" drive breaker bar
- \* Tools for removal of fuel rail spring fittings (Lisle P/N 3700 or Snap On P/N ACT1370)
- \* 1-gallon of antifreeze/coolant.
- \* Shop Vac
- \* Compressed air blowgun
- \* Anti-seize compound
- \* Thread lube

### A few very important items you should know:

1. Our Allen Engine Development Inc. kits are designed for engines in good mechanical condition only. Installation on worn or damaged engines is not recommended and may result in engine failure. Allen Engine Development Inc. is not responsible for engine damage or consequential damages.
2. Aftermarket engine recalibration devices such as chips and programmers are not compatible with this kit and may cause engine damage. Our kits are designed to work best with factory stock vehicles. Headers/exhaust systems, air boxes, and thermostats may conflict with our calibration. If you have any questions, call us!
3. Use only premium fuel, 91 octane or better).

### IMPORTANT WARNING:

Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited, resulting in possible personal injury. Fuel in the fuel system remains under high pressure even when the engine is not running. Before servicing or disconnecting any of the fuel lines or fuel system components, the fuel system pressure must be relieved to prevent accidental spraying of fuel, causing personal injury or a fire hazard.

So... let's get started! Any questions? Call first! We're here Mon-Fri, 8:00 a.m. to 5:00 p.m. Pacific time or e-mail [allen@allengine.com](mailto:allen@allengine.com)

Ford 4.6L & 5.4L

### Installation Instructions:

1. Disconnect the negative (-) battery cable.
2. Remove the plastic cover with "TRITON" logo on it, using a 10mm and 8mm socket.



Figure 2.

3. Remove the air inlet assembly by disconnecting the mass air meter plug, inlet air temperature sensor, two plastic tubes in front of the throttle body, loosening the hose clamp at the throttle body and unlatching the clamp at the air filter housing.



Figures 3 & 4

4. Remove the air filter housing by lifting up on the air filter housing to dislodge it from the two rubber grommets on the inner fender.



Figure 4 & 6a.

5. Drain the engine coolant into a container from the radiator petcock valve located on the lower passenger side of the radiator. (remove radiator cap to speed drainage rate)

6. Disconnect the throttle and cruise control cable from the throttle body, the cable mounting bracket and power steering reservoir bracket. Remove throttle/cruise control cable bracket from intake manifold, using 10mm socket. Set bracket and mounting hardware to be re-installed in a later step.



Figure 6b.

7. Disconnect the Throttle Position Sensor (TPS), Exhaust Gas Recirculation (EGR), exhaust gas sensor (EGS) and on 4.6 equipped vehicles, the Idle Air Control (IAC) plugs.



Figure 7.

8. Using an 8mm socket, remove the three bolts retaining the power steering reservoir support bracket.



Figure 8.

9. Remove the vacuum line assembly by removing it from passenger side of the throttle body, the EGR solenoid, EGR valve, fuel pressure regulator and EVAP solenoid (located on the driver's side firewall). Set toward the passenger side, out of the way. Be sure to note location of each vacuum line.

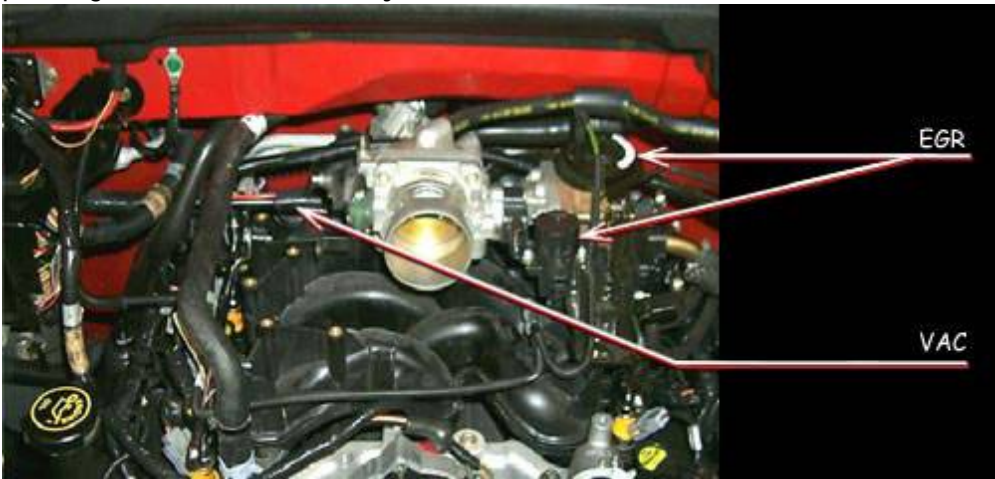


Figure 9

10. Remove the large vacuum line from the backside of the throttle body that runs over to the EVAP solenoid, located on the driver's side firewall, and swing it out of the way. Remove the brake booster vacuum line from the intake manifold and swing it out of the way.



Figure 10.

11. Unplug the two hoses going to the bottom of the exhaust gas sensor. Using a 10mm socket, remove the nut and bolt that retains the EGR solenoid and exhaust gas sensor mounting bracket. Set aside to be reinstalled in a later step.



Figure 11 &amp; 12.

12. Using a 1-1/4" wrench disconnect the EGR tube from the EGR valve and loosen the other end to swing it out of the way to allow removal of the intake manifold.

13. Depending on model and year, if your vehicle is so equipped, disconnect the 1/4" coolant hose on the passenger side of the throttle body.

14. Depending on year: 97-98: Remove spark plug wires from spark plugs and the alternator support bracket. Unplug all fuel injectors, sensors on intake, and on the 5.4, the IAC motor at the back of the intake. Remove the ground strap from intake if equipped. Push all wires over valve cover out of the way. 99-present: Unplug all injectors, ignition coils, sensors on the intake, and on the 5.4, the IAC motor at the back of the intake. Remove the ground strap from the intake if so equipped. Using a 7mm socket, remove all of the ignition coils. Push all wires over valve cover out of the way.



Figures 14a &amp; 14b.

15. Using the appropriate fuel line quick disconnect tool, disconnect the two fuel lines located at the rear of the driver's side intake. Use shop towel to absorb excess fuel from the fuel lines.

The fuel system is under high pressure, relieve the fuel pressure before disconnecting the fuel lines. Clean up any spilled fuel to prevent any fire hazard.



Figure 15.

16. Drain coolant from radiator and remove the upper radiator hose. Using a 13mm wrench, remove the radiator hose support bracket and ground strap on the front of the side passenger head. Discard the bracket and lay the ground strap to the side.



Figure 16.



Figure 17 &amp; 17a.

17. This step may not be required depending on your specific truck. Remove the serpentine belt by rotating the tensioner clockwise using a 1/2" breaker bar. Using a 10mm socket, remove the three tensioner mounting bolts. **5.4 liter only!** Using a small file or grinder, remove the small boss, to allow a greater range of travel. Re-install the tensioner using stock hardware. Again, this is **not** required on 4.6l engines, and most 5.4l engines will not require this modification.

18. Remove the alternator using a 10mm socket leaving the wires connected and set on the passenger inner fender. Using the two lower alternator mounting bolts, bolt the supercharger drive housing support bracket to the lower alternator mounting points on the engine, positioning the snout saddle on the passenger side.



Figure 18.

19. Depending on the year of the vehicle: disconnect the temperature sensor and remove it from the coolant crossover pipe, and install sensor in the water crossover where the 3/8" pipe plug is. If the sensor is located in the valley on the driver's side cylinder head, simply unplug.
- 19½. Remove the PCV hose assembly from the passenger side valve cover, leaving the PCV valve in the valve cover.
20. Disconnect the large (5/8") heater hose from the intake manifold. (Depending on year, will be at the front or rear on the passenger side).
21. Using a 10mm socket, remove the thermostat housing, thermostat and O-ring seal noting the order of assembly (as in photo). Set aside to be re-installed in a later step.
22. If shop air is available, blow debris away from intake manifold. Using a 10mm socket, remove the intake bolts. Note: there are five on the passenger side and four on the driver's side. Remove the intake manifold assembly. If a shop vac is available, vacuum any dirt or debris away from intake flange.



Figures 21 & 22.

\*Tip - keep injectors connected to fuel rail in order to avoid spilling gas on gasket.

23. Remove intake gaskets. Inspect gasket o-rings for damage. (I.E. wear, rips, or swollen). Carefully clean gaskets using a soft rag. Use a vacuum cleaner to remove dirt or debris from in and around intake ports.
24. Remove the fuel rails, injectors, and throttle body adapter from the stock intake manifold using an 8mm socket. Retain all stock hardware.

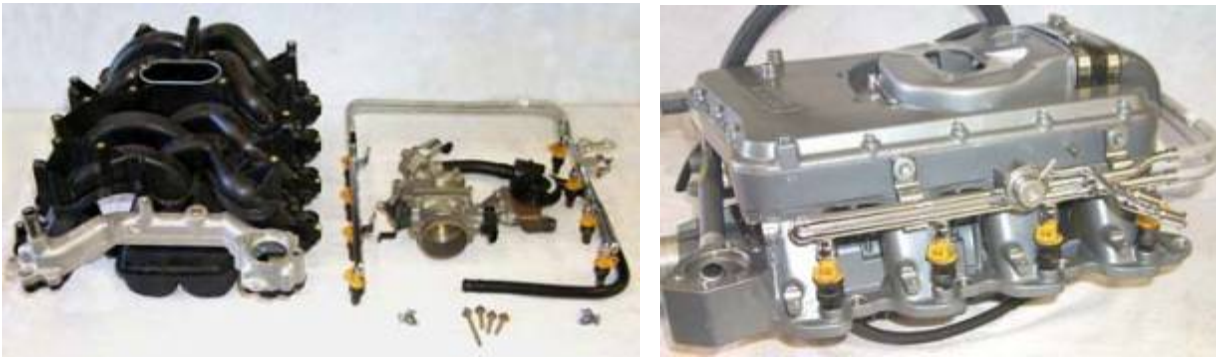


Figure 24 & 25.

25. Depending on year: 97-98 Install the stock fuel rails on the supercharger assembly by routing the rubber fuel lines at the back of the fuel rails, around the back of the supercharger and the air tube. Lubricate the injectors, o-rings and install assembly using stock mounting hardware.

2000-Present: Install the supplied fuel rails on the supercharger assembly by routing the rubber fuel lines at the back of the fuel rails, around the back of the supercharger and the air tube. Lubricate the injector o-rings, and install the assembly using stock mounting hardware. (See Fig 25)

Note: Check positioning of fuel rail with mounting holes to ensure there is no stress or tension pulling injectors to the side. The Injectors should be in straight/ vertical alignment in order for o-rings to seal correctly.

26. Test fit the throttle body adapter to the Allen Engine manifold. The Ford throttle body adapter casting is quite rough and in some cases may need slight grinding for a proper fit.



Figure 26 & 27.

27. Remove the protective tape from the manifold and cylinder heads. Install the intake gaskets. The manifold and supercharger assembly is heavy and should only be installed by two people. Carefully install the intake manifold into position onto the engine. Be careful not to damage the gaskets when positioning the manifold assembly. Also be sure all hose and wire connections that will need to be reconnected are not pinched or trapped under or behind the manifold.

28. Install the supplied intake manifold bolts and torque to 17-22 ft-lbs. It is advisable to initially start all of the bolts finger tight, and then torque them once all bolts are threaded in place. It may help if you move the intake manifold around slightly during this process. Re-install the stock thermostat (or supplied 180° thermostat; 9 psi kit only), o-ring and housing, sandwiching the two supplied .050" thick washers (PN 77-00-070) between the thermostat housing and intake manifold.





Figures 28 & 29.

29. Loosen drive housing mount bolts. Gently pull upward until drive mount contacts nose drive in proper position. Tighten the drive housing mount to the engine block at 17-22 ft-lbs.

30. Re-install spark plug wires or coils (depending on the vehicle). Connect all fuel injector and coil electrical connections. Connect the temperature sensor connection. Red and yellow wires are included to extend temp sensor wires if needed. Solder them and insulate with heat shrink tube. Cover with black convoluted split loom supplied.



Figures 30 & 31a.

31. Re-install the throttle body assembly using the stock hardware. If the vehicle was equipped with an aluminum intake re-use the original gasket only if it is in good condition. If the vehicle was equipped with a plastic intake, apply a small bead of Loctite gasket eliminator (PN 71231) around the flange or use the stock gasket if supplied. Torque bolts to 9-11 ft-lbs.



Figure 31b.

32. Re-attach the power brake hose, EVAP hose and the IAC electrical connection. Connect throttle body coolant hose, if so equipped, and install the supplied 90 degree fitting in the front of coolant crossover pipe. If your

vehicle does not have a coolant hose that runs up to the throttle body, install the supplied pipe plug into the coolant crossover pipe.



Figure 32.

33. Connect coolant hose at passenger side rear of engine compartment (removed in step 20) to hose fitting at rear of Allen manifold. Trim the hose coming from the supercharger to achieve best fit. Route the hose carefully as not to kink or cause abrasion of the hose.



Figure 33.

34. Attach the Supplemental Fuel Pressure Regulator (SFPR) to the stock fuel pressure regulator.

35. The EGR tube on most 5.4L vehicles will not fit properly without this modification. This can be remedied by cutting the tube in a location where it is vertical. A tubing cutter should be used for this procedure to eliminate chips or debris from getting into the transducer. A brass compression fitting can now be installed between the two halves of the tube, and tightened after end connections are tight.

36. Re-install the EGR solenoid assembly using stock nut and one of the allen head bolts from the plenum cover. Re-connect the electrical connection and two hoses previously removed in step #11.



Figure 36.

37. Re-install the vacuum line assembly removed in step #8 to all vacuum ports, with the exception of the fuel pressure regulator. Plug the stock fuel pressure regulator line (Note, red plastic vacuum line) with the supplied rivet.

37a. On 4.6L equipped vehicles there is a flapper valve located in the manifold plenum. It has an electrical connector which plugs into it. Remove this valve and break off the plastic flapper with a pair of diagonal cutting pliers. The unit can now be plugged in to its proper connector and zip tied in a out of view area, such as the power steering reservoir bracket. Failure to do this may cause the computer to throw a check engine light code.



Figure 37.

38. Depending on the vehicle, there are two different PCV hose assemblies. If the vehicle is equipped with the PCV assembly (below),

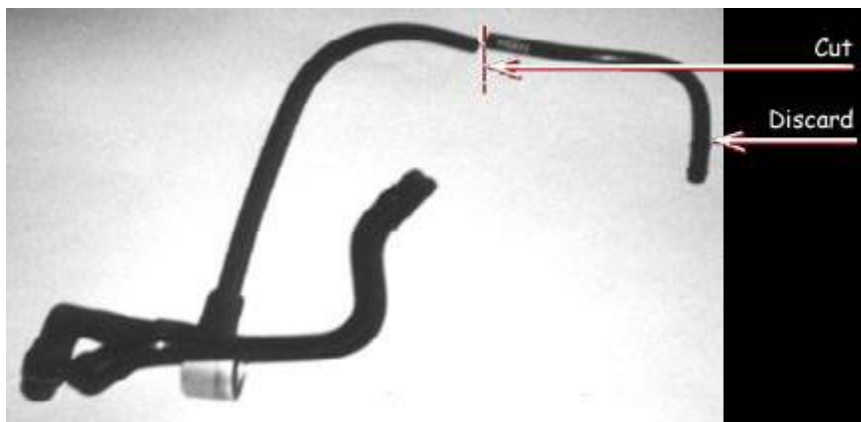


Figure 38.

cut accordingly and attach the 3/8" hose from the rear passenger side of the supercharger assembly. If the vehicle does not have this assembly, simply attach the 3/8" hose from the supercharger assembly to the PCV valve on the passenger side valve cover. (See Fig 38) If the vehicle was equipped with a plastic manifold on a 5.4L, run the supplied 3/8" hose from the bottom of the supercharger to the PCV valve on the passenger side valve cover.

39. Remove nut on indicated stud. Install the alternator as shown in its new location. Use supplied bolt to attach alternator to boss on front of Allen intake manifold. A bolt and bracket are supplied for the other leg of the alternator; the upper bolt is installed from the rear, and threads into the bracket. Reinstall the nut removed from the lower stud. Torque fasteners to 17-22 ft/lbs.



Figure 39a &amp; 39b

Install the alternator rear support bracket and tighten bolts.

40. Re-install the stock throttle and cruise control cable bracket using stock hardware. Slight modification (cutting/grinding) may be necessary to allow bracket to clear alternator.

41. Re-install the power steering reservoir support bracket to the thermostat housing and power steering reservoir using the stock hardware.

42. Using a 22mm deep socket, remove the bolt/stud located between the power steering pulley and the crankshaft pulley. Replace it with the supplied bolt using a 17mm socket. Install the accessory drive belt in accordance with the new belt diagram.

Note; it may be necessary to grind off a small portion of the middle tensioner retaining bolt if the tensioner is hitting it during belt installation and limiting the travel of the tensioner.

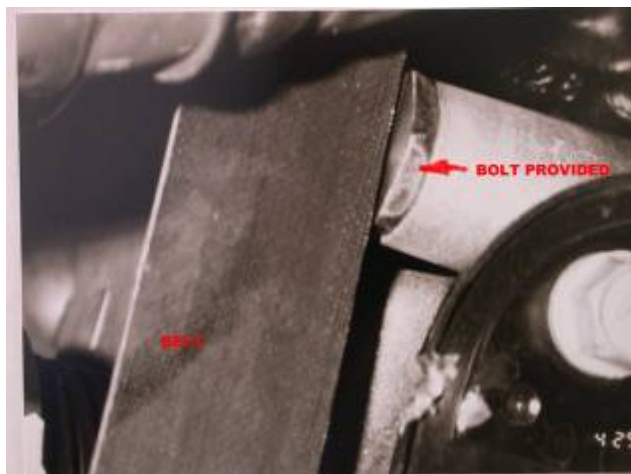
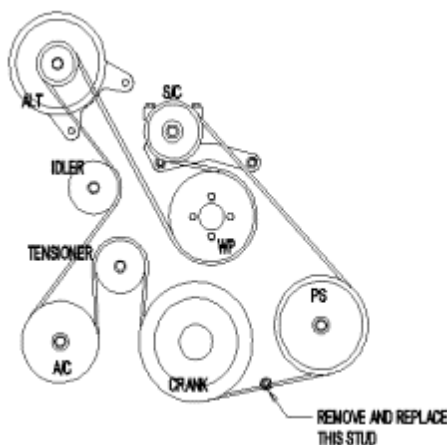


Figure 42a &amp; 42b.



43. Remove the plastic core support to grill cover. Using the two, three inch padded clamps and self-tapping screws, mount the intercooler tank on the front driver's side of the core support. Note, make sure there is

enough clearance between the hood and the intercooler tank cap.



Figure 43a. & 44

Note: It may be necessary to relocate outside air temperature sensor to install the tank.



Figure 43b.

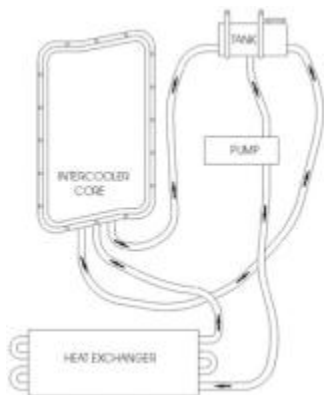
44. Install the heat exchanger to vehicle using the supplied mounting kit. Note: It may be easier to remove the grill assembly to complete this process.

45. Attach the pump and mounting bracket assembly to the driver's side of frame rail, using the three self-tapping screws, as shown in the photo below.



Figures 45

46. Connect the hose following the diagram below.



Figures 46a & 46b.

Run the three hoses that go up to the intercooler, under the core support, between the frame and the core support, up the driver's side of the fan shroud, across the top of the fan shroud and to the intercooler. Attach with supplied hose clamps. Drill 2 3/16" dia. holes in the fan shroud on both sides of the intercooler hoses. Use the supplied tie wraps to secure the hoses to the top of the fan shroud.

47. Re-install the upper radiator hose, shortening the radiator side of the hose (approx. 2") to allow the hose to closely contoured to the fan shroud (insure the hose will not come in contact with the drive belt) Drill a 3/16" hole in fan shroud on each side of the radiator hose and secure it to the fan shroud using a tie wrap, as done for the intercooler hoses.



Figure 47 & 48a.

48. Mark and cut a 3" hole in the plastic cover previously removed in step #43, to allow access to the intercooler reservoir tank cap. Re-install the plastic cover.

49. Re-install the throttle and cruise control cable onto the stock bracket and throttle body. Verify its proper operation, free from any binding. Install the supplied new belt/vacuum diagram sticker over the stock belt routing sticker located on the plastic cover.

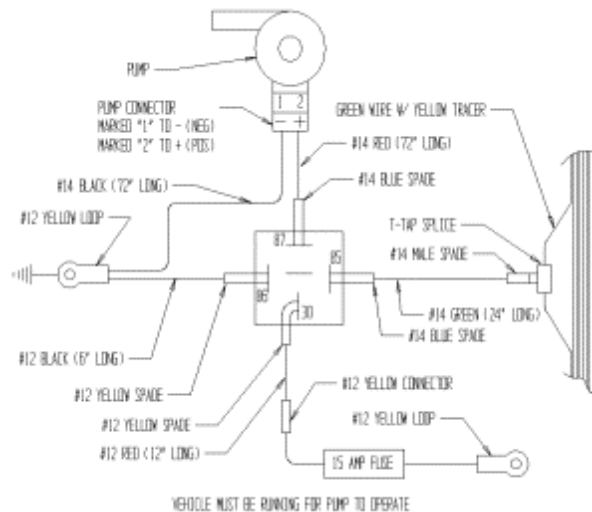
50. Remove the fuse box (located on the driver's side inner fender) from its metal support bracket. Remove the plastic cover on the bottom of the fuse box to expose the wires. Refer to vehicle owner's manual to determine fuel pump relay location in fuse box. Then locate the green wire with yellow tracer at the rear of the fuel pump relay; clamp the supplied blue T-tap connector onto this wire about 6" away from the fuse box. Connect the supplied green wire to the T-tap connector and the other end to the water pump.



Figures 50 & 51.

51. Mount the relay to the inner fender, back at the rear of the fuse box using the supplied self tapping screw. Clean the paint off around the hole and loop the relay black ground wire using a loop crimp connector, sandwiching it between the relay and inner fender.

52. Connect the wires as shown in the schematic, routing the wires away from any heat source or moving parts. Last, install the fused wire to terminal #30 on the relay. Re-install fuse box into its metal support bracket and connect the fused wire eyelet to the power lug located at the rear of the fuse box. Note: you will have to remove the plastic cover from the rear of the fuse box to gain access to the power lug.



Figures 52a & 52b.

53. Fill the intercooler coolant tank with a 50/50 mixture of antifreeze and water. Be sure all air is bled from the system before conducting a test drive.

## Fuel Pump installation Instructions

54. Vehicle should have no more than  $\frac{1}{4}$  tank of fuel before attempting this procedure! Disconnect negative battery cable (if not already). Raise vehicle on jack stands. Support fuel tank with a stable jack. Disconnect fuel fill and vent hose (by frame rail). Remove fuel tank fastening straps. Carefully lower fuel tank. Disconnect fuel feed and return fittings, and all wiring to fuel tank sending unit. Lower fuel tank to allow removal of fuel pump assembly from tank. Mask or cover all open ports. Take note of filter position. Remove the fuel pump from its cradle, disconnecting the fuel line and wiring.

55. Carefully grind or file the pump mount throat to approximately  $\frac{7}{8}$ " (.875") to accommodate the upgrade pump.



Figure 55.

56. Cut the bottom off the vibration sleeve and slide the sleeve onto new pump.



Figure 56 & 57.

57. Slide hose clamp, pump, and filter on to frame assembly. Tighten all fasteners.

58. Plug in the new fuel pump, if the electrical connection is different, cut the stock fuel pump electrical plug off by cutting the two wires about 4" from the plug. Plug the supplied new fuel pump electrical plug onto the fuel pump.



Figure 59.

59. Matching black (ground) to black and red to pink, crimp connectors from new electrical plug onto vehicles wires.

60. Carefully re-install the fuel pump assembly back into the fuel tank. Re-install the fuel tank into the vehicle, check all fuel and vent connections, electrical connections and seals.



61. Replace engine coolant and radiator cap. Re-install air cleaner, air mass meter, and hose assembly. Plug in electrical connections at IAT and mass air meter. Re-install plastic cover on top of engine, fastening the two bolts on the driver's side first. Then trim the plastic cover to clear the new position of the alternator and throttle/cruise control cable bracket, and secure it to the throttle/cruise control cable bracket with a cable tie.

62. Reconnect negative (-) cable to battery. The vehicle should be started and all connections checked for leaks or loose connections. Be sure everything has adequate clearance and is properly tightened. Run the coolant pump for a few minutes verifying that the coolant is circulating, and Check the fluid level and top off if required. When properly filled, you will be able to see coolant circulating when looking into the tank. Then install coolant cap. If by chance the Check Engine light is illuminated, recheck all your connections and vacuum routing. Once the problem is located reset the engine's computer by disconnecting the negative (-) battery cable for a couple of minutes.

63. If you purchased the optional transmission upgrade chip, install it now. See instructions included with the chip.

64. Enjoy!

Rev

11-4-02

Revision	Date	Approved By	Description
2.12	11-04-02		
2.13	12-13-02	SMG	Updated header and address. Added revision block. Added 180 thermostat.

**Posted December 7, 2003**