

2003 Ford Expedition 4.6L& 5.4L



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
- * $\frac{1}{4}$ " & $\frac{3}{8}$ " Ratchet and Metric socket set (deep and standard)
- * 3", 6", and 9" extensions ($\frac{1}{4}$ " and $\frac{3}{8}$ " drive)
- * Universal joint for sockets ($\frac{1}{4}$ " and $\frac{3}{8}$ " drive)
- * 1- $\frac{1}{4}$ " open-end wrench
- * Metric Allen wrench set
- * Drill, $\frac{3}{16}$ " and $\frac{3}{8}$ " drill bits
- * Hose-cutting tool
- * Tubing cutter
- * Belt tensioner tool or $\frac{1}{2}$ " 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
- * Quality set of crimp connector Pliers (recommended)



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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@allenengine.com

Ford 4.6L & 5.4L

Installation Instructions:

1. Disconnect the negative (-) battery cable.



Figures 1 & 2.

2. Remove connectors (3) from Electronic Engine Control (EEC) Processor, (in upper left hand corner of Figure 1). Remove two top bolts from EEC module and rotate top of unit forward and up to remove. This unit needs to be sent to Allen Engine Development for reprogramming. Be sure not to damage the unit during removal or packaging.
3. Remove engine cover. This can be accomplished by removing the 2 bolts on the passenger side, and rotating the cover upward.



Figure 4. 4.6liter



5.4 liter

4. 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.



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Figure 5 & 6.

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. Remove 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 modified and re-installed in a later step.
7. Disconnect electrical connectors from the Throttle Position Sensor (TPS), Exhaust Gas Re-circulation (EGS) Solenoid, EGR pressure transducer, and the Idle Air Control (IAC) valve, and on 4.6 equipped vehicles, the plenum flapper valve.



Figures 8 & 9

8. Using an 8mm socket, remove the three bolts retaining the power steering reservoir support bracket.
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, as they will be utilized later.



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Figures 10 & 10a.

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



Figures 11 & 11a.

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





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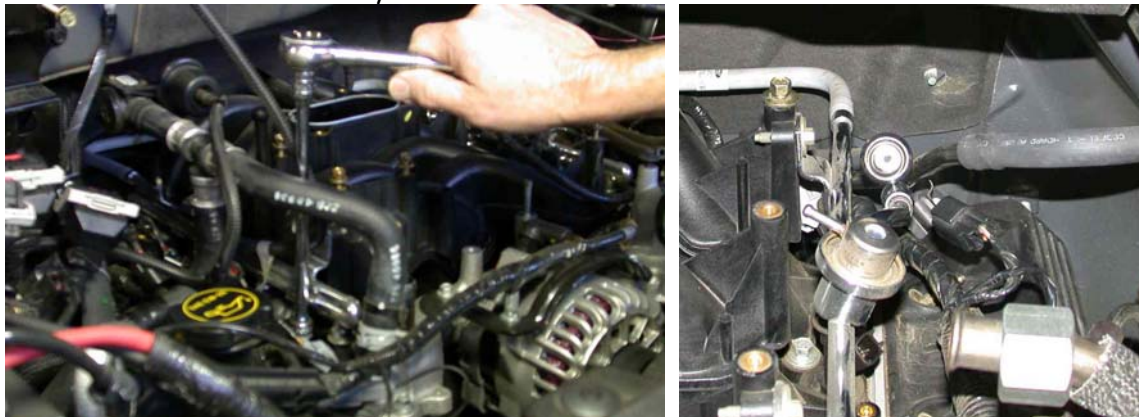
Figures 12 & 13.

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. If your vehicle is so equipped, disconnect the 1/4" coolant hose on the passenger side of the throttle body.
14. Remove coolant hose from front of intake manifold. (passenger side)



Figures 15 & 16.

15. Remove idle air hose and muffler from IAC valve.
16. Remove PCV hose assembly from vehicle.



Figures 17 & 18.

17. Unplug ignition coil electrical plugs. Remove retaining bolts (with a 7mm socket) and remove coils from vehicle. Unplug all fuel injector electrical connectors. Remove the ground strap from the fuel rail retaining bolt if equipped. Push all wires over valve cover out of the way.
18. 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.



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Figure 19

19. Loosen 4 bolts retaining throttle body adapter. Remove 3 of the bolts and the TBA from vehicle. One of the bolts cannot be removed because it runs into the firewall.



Figure 20 & 21.

20. Remove the upper radiator hose outlet. Remove the o-ring and thermostat from the manifold. Set the hose assembly aside.

21. Remove the nut and ground strap on the passenger side timing chain cover. This will need to be put back on after the alternator is installed in its new location.



Figure 22

22. Remove the serpentine belt by rotating the tensioner clockwise using a 1/2" breaker bar.



Figure 23 & 23b.

23. Remove the alternator using a 10mm socket. You can leave the wires connected and set on the passenger inner fender, or remove the wires and set aside.



Figure 24 & 24a.

24. If shop air is available, blow debris away from intake manifold prior to removal of bolts. 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.

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

25. Remove intake gaskets. Inspect gasket o-rings for damage. (I.E. wear, rips, or swollen). Carefully clean gaskets using a soft rag. If a shop vac is available, vacuum any dirt or debris away from intake flange. Tape up port flanges so as not to drop tools or debris in ports.

26. Remove the fuel rails from the stock intake manifold using an 8mm socket. Retain all stock hardware.



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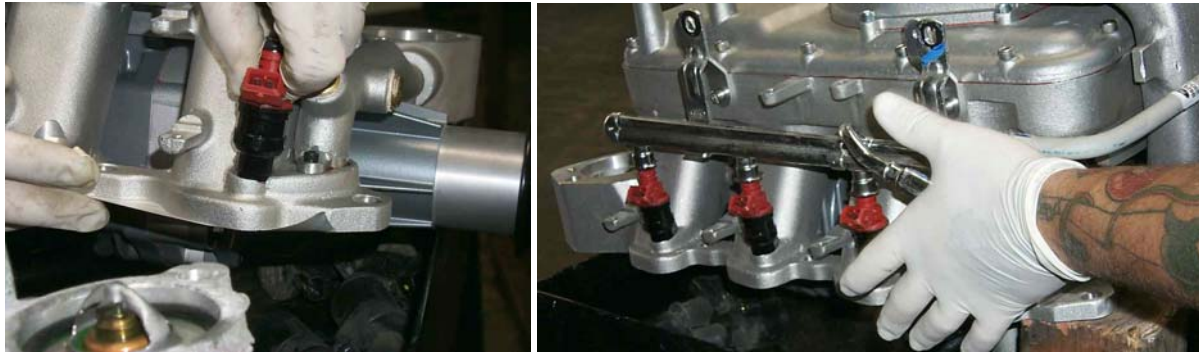


Figure 27 & 27a.

27. Install the supplied 30# fuel injectors (red) and stock fuel rails on the supercharger assembly. Rout the rubber fuel lines at the back of the fuel rails, around the back of the supercharger and the air tube. Be sure to lubricate the injector o-rings! Use stock mounting hardware. 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.



Figure 28 & 29

28. 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.



Figures 29b & 29c & 29d.

29. The electrical connectors on the fuel injectors are different for the new injectors, so the connectors all need to be changed. This can be easily accomplished when the manifold is off the vehicle. A good quality pair of crimp connector pliers (shown above) makes this an easy task. Be sure to keep the polarity of the wires (relative to injector) as they were.



Figure 29d.

30. Remove EGR (Exhaust Gas Re-circulation) feeder tube and modify. Cut along in a convenient area, and add supplied brass coupler. This effectively lengthens the EGR tube to account for the slight increase in height of the Allen manifold. Do not tighten both ends of the brass coupler, as this will need to be tightened after fitment. **Note:** Only required on 5.4L applications.



Figure 31 & 32

31. Remove the protective tape from the manifold and cylinder heads. Position 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.
32. Install the supplied intake manifold bolts, thermostat, O-ring and thermostat housing. Be sure to sandwich the two supplied .050" thick washers between the thermostat housing and intake manifold. Torque all bolts to 17-22 ft-lbs. It is advisable to initially start all of the bolts finger



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tight, and then torque them in a crisscross pattern starting from the inside and working outward. It may help if you move the intake manifold around slightly during this process.



Figure 32b & 33

33. Install the drive housing support bracket/idler bracket and lightly finger tighten the bolts that go into the block. Attach the (2) drive housing clamp and bolts. Tighten the clamp bolts to 6-10 ft-lbs. The mount should be pulled up into contact with the nose drive and in proper position. Tighten the bolts in the drive housing support bracket/idler bracket to the engine block to 17-22 ft-lbs.

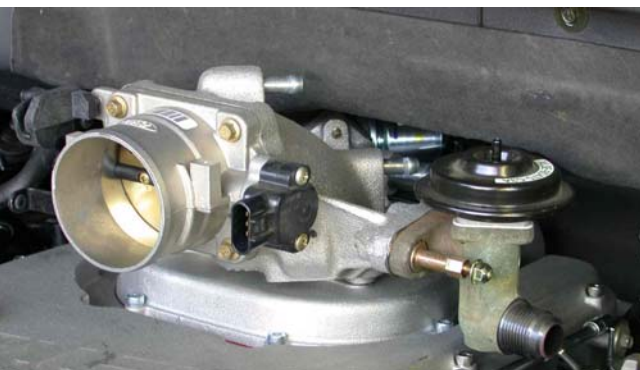


Figure 33b & 34

34. Re-install ignition coils. Connect all fuel injector and coil electrical connections.
35. Plug in fuel supply line to fuel rail. Be sure to Re-Install safety clip on snap connector.
36. Re-install the throttle body assembly using the stock hardware. Use the new gasket included in the kit. Torque bolts to 9-11 ft-lbs. Note: One of the bolts must be installed into the hole before positioning the TBA onto the manifold. Otherwise it hits the firewall.



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Figure 34b & 37

37. 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.

Picture of 90° fitting for heater

Figure 38

38. Connect coolant hose (removed from passenger side front of engine) to hose attached to rear of passenger side runner. Trim the hose coming from the supercharger to achieve best fit. Use 90° connector and route the hose carefully as not to kink or cause abrasion of the hose.
39. Re-install the EGR feeder tube and tighten all connections.



Figure 40 & 42

40. 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.
41. Re-install the vacuum line assembly removed in step #8 to all vacuum connections.



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Figure 42b & 42c.

42. Re-install the stock throttle and cruise control cable bracket using stock hardware. Slight modification (cutting/grinding) will be necessary (shown in Figure 42) to allow bracket to clear the alternator. Use supplied bolts and washers.



Figure 43

43. Depending on the engine size, there are two different PCV hose assemblies. If the vehicle is equipped with a 4.6L engine, the PCV hose assembly was connected directly to the back of the Throttle Body Adapter. In this case, simply connect as it was stock. On 5.4 Liter equipped vehicles, the PCV hose assembly attaches directly to the back of the plastic intake manifold. In this case, run the supplied 3/8" hose from the bottom of the supercharger to the modified PCV valve hose assembly.
44. 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 an out of view area, such as the power steering reservoir bracket. Failure to do this may cause the computer to illuminate a malfunction indication light (MIL).



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Figure 45

45. 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. Re-install the ground strap and nut removed previously from the lower stud. Torque fasteners to 17-22 ft/lbs.
46. Install the alternator bracket and tighten bolts.
47. Re-install the power steering reservoir support bracket. It bolts to the top of the thermostat housing. Use the stock hardware.
48. Swap the idler pulleys on the driver side of the timing chain cover. The ribbed pulley should be relocated to the top and the smooth pulley to the bottom.
49. Replace the 3.5" diameter pulley (just below the alternator) with the supplied 3" pulley.



Figure 50

50. Replace bolt with supplied bolt. Re-tighten! This new bolt gives more clearance for the belt.



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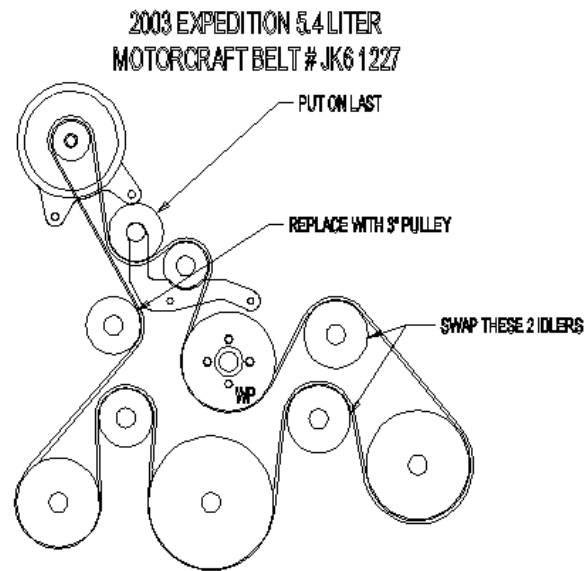


Figure 51 & belt routing diagram.

51. Install the accessory drive belt in accordance with the new belt diagram. Leave the pulley (supplied) off the idler bracket until all other connections are made. Relieve pressure from tensioner and slip on idler pulley, bolt and washer. Tighten!



Figure 52

52. Install alternator brace. Use supplied bolt for manifold end and factory hardware for alternator end.



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Figure 53 & 53b.

53. Remove the plastic cover between the core support and grill. Mount the coolant tank on the driver's side front of the core support using the supplied self tapping screws. Cut an appropriately placed hole in the plastic cover using a hole saw (from backside) or die grinder. Note: Make sure there is enough clearance between the hood and the coolant tank cap, and that the cap can be removed through the hole in the cover.



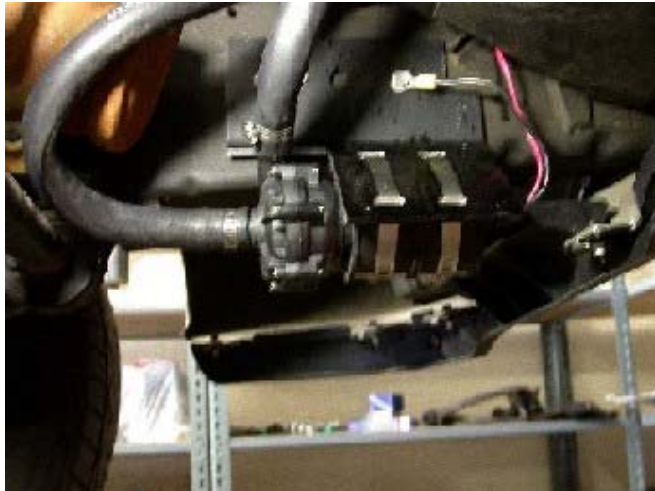
Figure 54 & 54b.

54. Install the heat exchanger to vehicle using the supplied mounting kit. There is a rubber air deflector flap moved out of the way in figure 54b. (for photo only) Cooler can be painted black for a more stealthy install.



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Figures 55a & 55b Inside frame rail

Outside frame rail

55. 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. Alternate mounting locations shown also.



Figure 55c & 57 Below radiator

56. Connect the hoses following the diagram below.

57. Rout the three intercooler hoses 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.



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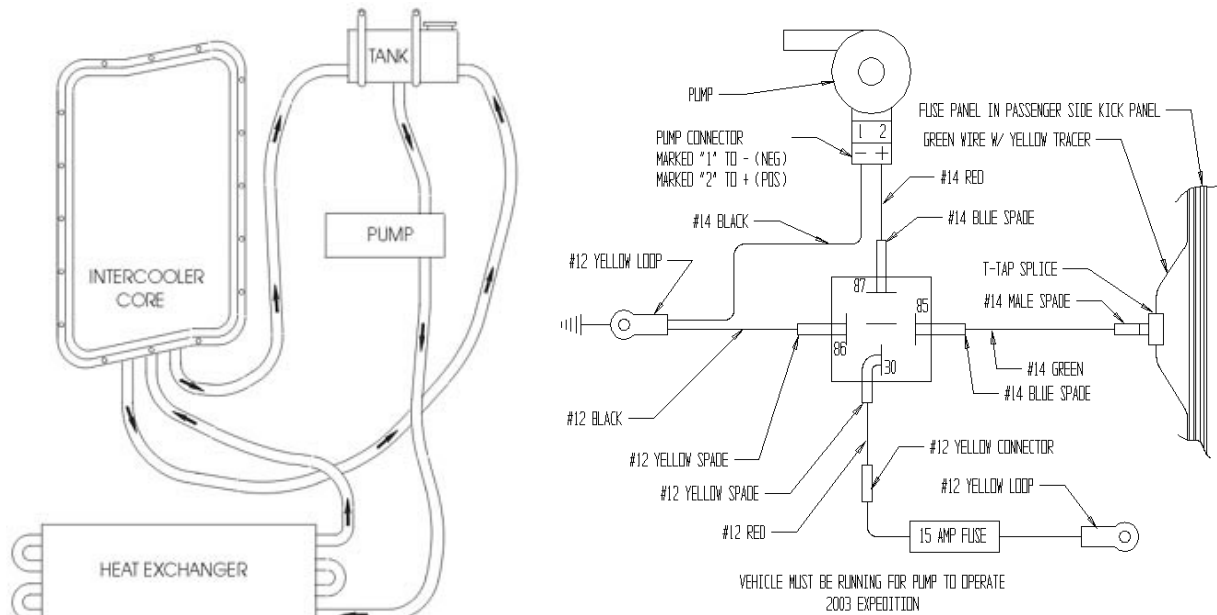


Figure 56 & 59.

58. Re-install the upper radiator hose in stock location.

59. Re-install the plastic cover.

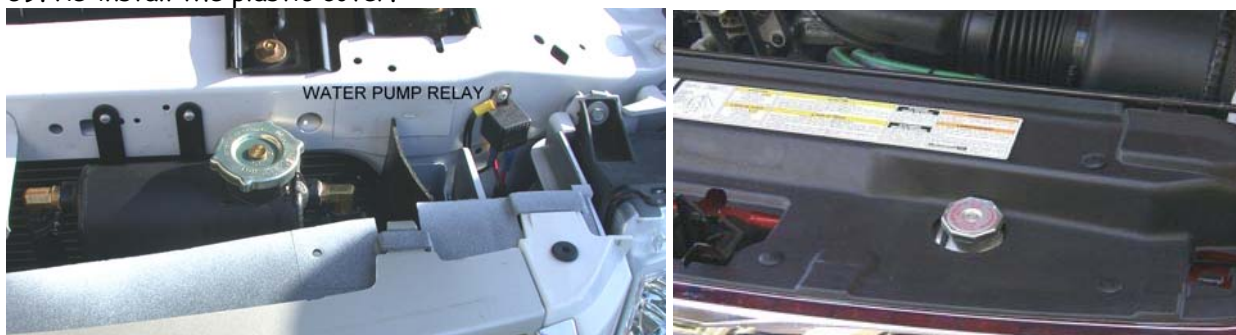


Figure 60

60. Mount the relay 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.

61. Connect the wires as shown in the schematic, routing the wires away from any heat source or moving parts. Rout the wire from terminal #30 on the relay to the (+) side of the battery. Be sure to use the fuse in this wire.



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Figure 62m & 62b.

62. Rout the wire from terminal 85 on the relay to the fuse panel in the passenger side kick panel. It will be necessary to remove the battery to drill a hole in the firewall and also makes it easier to find a good path for the wire. Use supplied zip ties to secure wire in its final location. Do not hook it up to the fuse panel just yet!
63. Rout the wire from terminal 85 on the relay to the fuse panel in the passenger side kick panel. It will be necessary to remove the battery to drill a hole in the firewall and also makes it easier to find a good path for the wire. Use supplied zip ties to secure wire in its final location. Do not hook it up to the fuse panel just yet!
64. After all wires are routed and tied proper like, Re-install Battery in tray and secure.



Figure 65 & 65b.

65. Fill the intercooler coolant tank with a 50/50 mixture of antifreeze and water. Fill the engine coolant reservoir with the anti-freeze you drained earlier. Replace caps.



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Figure 66

66. If the EEC processor has returned from its journey, re-attach it to the mount and connect electrical plugs.

67. Re-Connect (-) negative battery terminal.

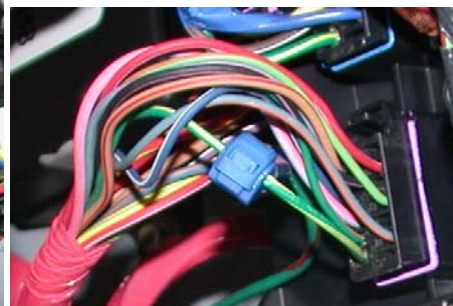


Figure 68 & 68 zoomed.

68. Remove the passenger-side kick panel. Remove the plastic cover from the fuse box. Then locate the green wire with yellow tracer. (see figure Verify that the wire is indeed the fuel pump relay wire. This can be done by turning on the ignition key and checking for voltage. The wire should energize when key is turned to "ON" and stay hot for 2.5 seconds. Clamp the supplied (blue) T-tap connector onto this wire as shown. Connect the end of the green wire (previously run through firewall) to the T-tap connector. Replace fuse panel cover, kick panel, and door sill molding.

69. Re-install air cleaner hose assembly. Make all hose connections as stock.

70. Plug in Inlet Air Temperature (IAT) electrical connections into the temperature sensor in the side of the plenum. Do not plug into the one on the air inlet tube!

71. Plug in electrical connection to the mass air meter.



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72. Re-install plastic cover on top of engine, (if desired). Align the two bolts on the driver's side first, then trim the plastic cover to clear the new position of the alternator. Secure it to the throttle/cruise control cable bracket with a cable tie.
73. The vehicle should be started and all connections checked for leaks or loose connections. Be sure everything has adequate clearance and is properly tightened.
74. Run the coolant pump for a few minutes verifying that the coolant is circulating. 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.
75. Enjoy!

Rev 1.00 1-17-03

Revision	Date	Approved By	Description
1.00	1-17-03	J. Sanborn	Release 1.00
1.01	3-4-03	SMG	ADDED WIRING DIAGRAM