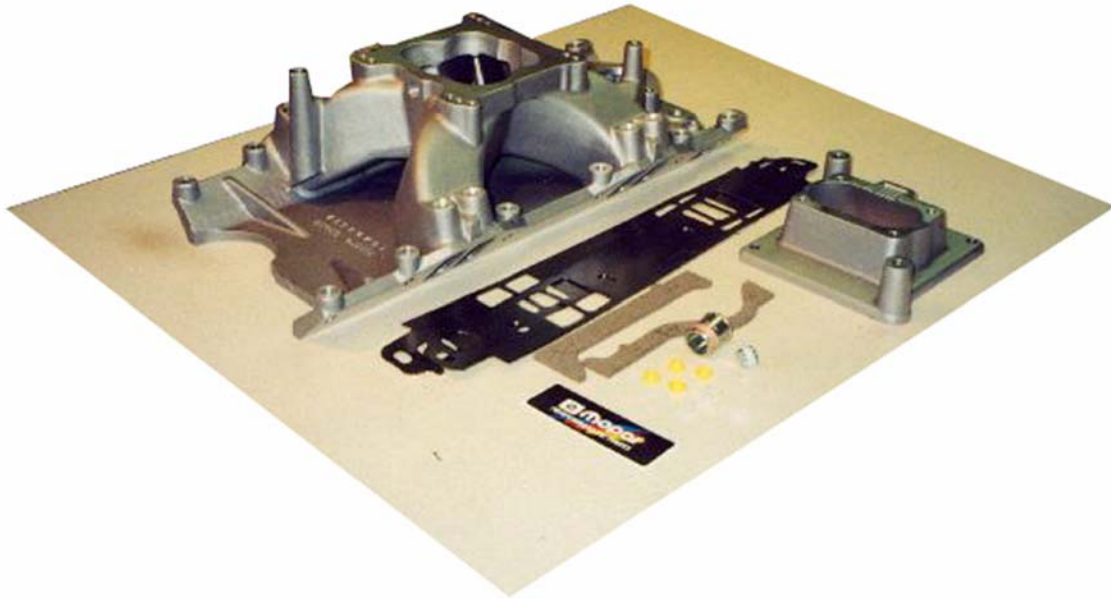


MPI Intake Manifold



Installation Guide

Steiger Performance

Version 1.2

MPI Intake Manifold Installation Guide

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This document is meant to supplement Mopar Performance's Instruction Sheet DCF-317 (5 pages) and the factory service manual. It should help to guide you through the install of a Mopar Performance MPI Intake Manifold (P/N P5249816) on your '92+ Magnum V8, utilizing one of my MPI installation kits. The majority of this document will still apply even if you don't have the install kit, but you'll need to do some running around on your own to come up with the extra parts, design, and fabrication provided by the kit.

Although this document should be detailed enough to allow an experienced wrench to use it as the sole source of instructions, it would still be a good idea to refer to the aforementioned DCF-317 instruction sheet and your factory service manual. When in doubt, they are the final authority. Hopefully there shouldn't be any discrepancies between these instructions and the "official" sources, but if there are, or you notice any errors in this document, please let me know, either via e-mail at jon@steigerperformance.com or snail mail at:

Steiger Performance
836 King Road
Forestville, NY 14062

Thanks!

Attention:

All parties involved in the installation should satisfy themselves as to the accuracy and safety of the procedures outlined in this document. This is merely meant as an aid to ease installation; do not just blindly "follow the directions" if you don't know what you're doing!! Although this is not a particularly difficult install, you should be reasonably confident in your abilities, and always keep safety foremost in your mind. I am not responsible for any damages either directly or indirectly related to your use or mis-use of this guide or my MPI Install Kit! Although I have made every effort to ensure that all information in this document is accurate and that all components in the MPI Install Kit are of superior design and quality, ultimately, the responsibility of ensuring safety and the suitability of the components in the kit falls upon yourself.

Tools required:

Miscellaneous standard tools (wrenches, sockets, pliers, screwdrivers, etc.)
Inch-pound torque wrench
Foot-pound torque wrench

Additional parts required:

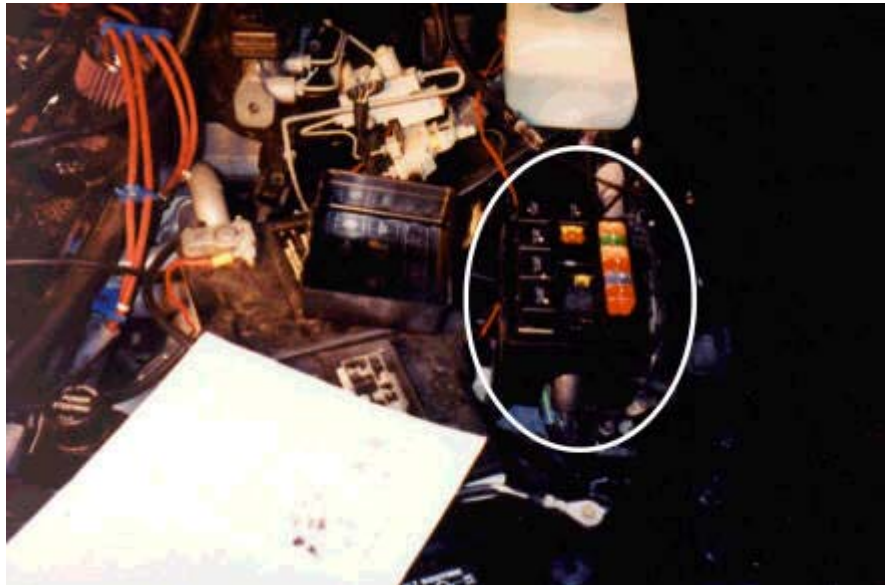
Thermostat & gasket (ask for one for a mid '70s 318 V8; Cuda, Charger, etc...)
Thermostat housing [Mopar P/N P4286759] (also available from Summit, or a parts store)
Intake manifold gasket kit [Mopar P/N 4897383AC] (has new style gaskets and includes bolts)
EGR Gasket [Mopar P/N 53010000] (1992-1995 only)
TB Gasket [Mopar P/N 53030541] (or re-use your current one)
Bypass hose [Mopar P/N H0063735] (or re-use your current one)
RTV, thread-locker, thread sealant, etc.

This is basically what we're starting with. Only the air hat and air hat gasket have been removed. The first thing you need to do is to relieve the pressure inside the fuel rail. How you do this will depend on whether or not your engine has a fuel test port. (aka: "schraeder valve") If you've got one, it'll be on the left fuel rail (its circled in the pic to the right)



Fuel Pressure Release Procedure:

1. Remove the fuel pump relay from the PDC (Power Distribution Center; circled in the pic to the right) The location of the fuel pump relay should be listed on the bottom of the PDC's cover.
2. Start the engine and wait for it to stall.
3. Try to re-start the engine. Although it probably won't, if it does re-start, let it run until it stalls again. Repeat until the engine does not start.
4. Disconnect the negative battery cable
5. Remove the fuel cap, and push open the flap with a non-metallic object to release any pressure in the tank.



If you have a fuel test port:

6. Remove the protective cap from the test port
7. Place some shop towels around and under the base of the test port, and use a screwdriver or something to push down on the valve stem inside. (Its basically the same as the valve stem on a tire.) Fuel will probably come out the top, so position a shop towel to block it so that it doesn't spray all over the place.
8. Place the protective cap back on the test port

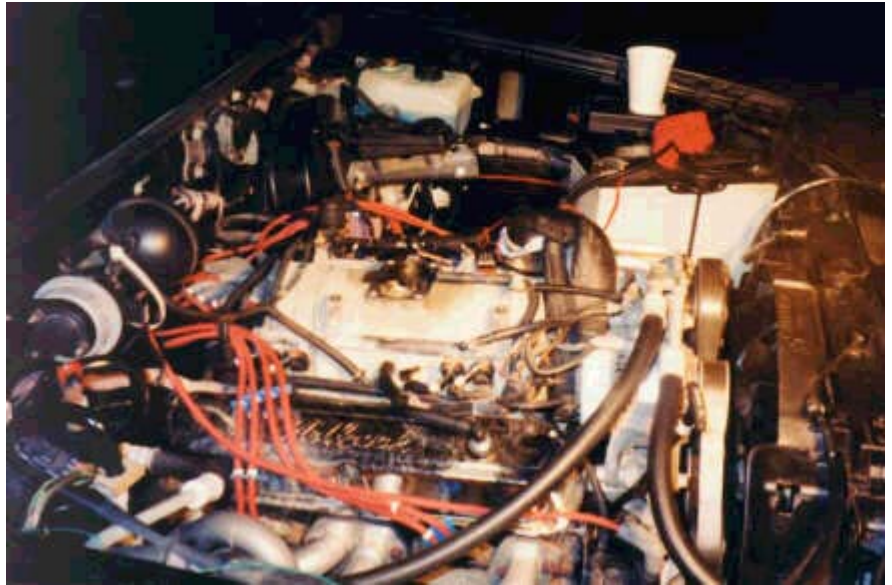
If you do not have a fuel test port:

6. Unplug the electrical connector from any fuel injector, exposing the two electrical terminals on the injector.
7. Connect either terminal to the positive terminal of the battery. This is easiest with a wire (18 gauge or smaller) which has an alligator clip on the end.
8. Connect a second wire to the other injector terminal.
9. Briefly touch the other end of the second wire to the negative terminal of the battery. (Briefly means no more than 4 seconds. Any longer, and you run the risk of damaging the injector.)

Note: If you have a fuel test port, the procedure listed above is slightly different than the one listed in the factory service manual. The manual skips the part where you run the engine until it quits; they say to hook a special hose up to the test port and just empty the fuel into a container. I didn't have that special hose, so I did it my way. If you'd like to do it differently, consult your FSM.

Now would be a good time to drain your cooling system. You don't need to worry about the block plugs, just remove the plug from the bottom of the radiator and allow the coolant to drain into a container. (If there are animals or children in the vicinity, be sure to keep the coolant out of their reach!!)

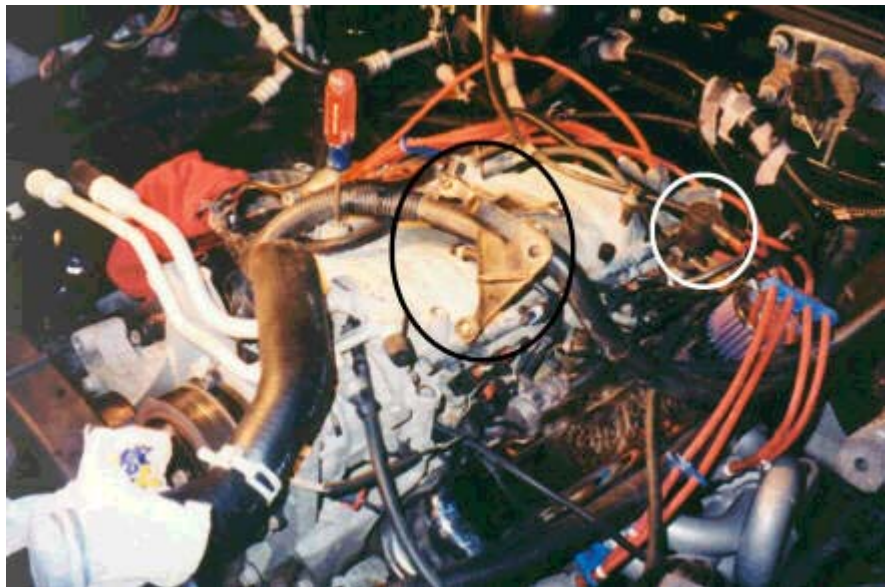
Next, remove the throttle body. You'll need to unplug the three electrical connectors on the TB, remove the air hose from the MAP sensor at the front of the TB, and disconnect the throttle and cruise control (if so equipped) cables. Remove the four bolts on the top of the TB, and lift it off of the engine.



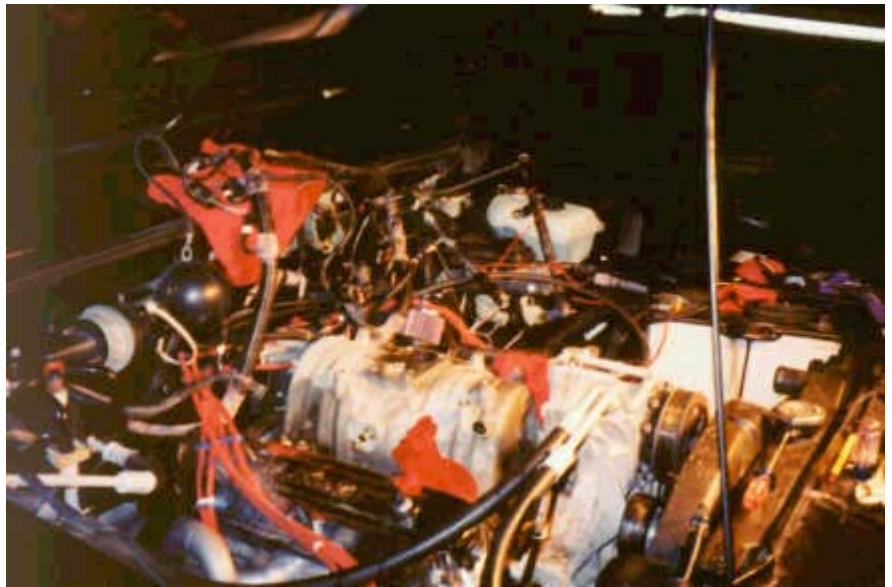
Remove the serpentine belt and then the alternator. To remove the alternator, you'll need to remove the 2 bolts attaching it to the engine, and also the few electrical connections on the back. In the pic to the right, I've removed the alternator and rested it on the passenger side valve cover before disconnecting the electrical wires from the back.



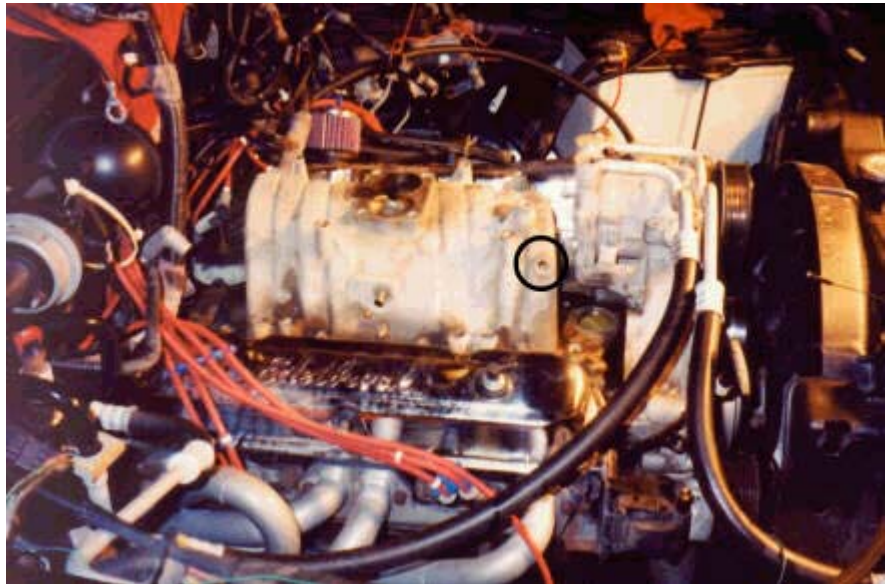
Next we'll need to remove the fuel rail. At this point, you should remove the triangular A/C compressor support bracket (if so equipped; its circled in black in the pic to the right). Unplug all of the fuel injectors. If for some reason the connectors in the wiring harness are not labeled, you may wish to do so to ensure that they are reconnected correctly. Next, disconnect the duty cycle EVAP purge solenoid and its bracket from the intake manifold. (Located at the left rear of the engine; its circled in white in the pic to the right.)



You may find it helpful to pull the wiring harness out of the way and tie it to one of the windshield wipers, as I've done in the pic to the right. At this point, the service manual procedure says to disconnect the fuel line which connects to the left fuel rail. Feel free to do so, if you have the special tool required. (Snap-On FIH 9055-1, or equivalent) I chose to just tie the entire fuel rail assembly back and out of the way. To remove the fuel rails from the intake manifold, gently rock the driver side fuel rail back and forth until the injectors start to come out of their bosses. Do the same with the passenger side fuel rail, and continue rocking the driver and then the passenger side fuel rails until the injectors have completely cleared the bosses. You can now pull the entire assembly off the engine (if you disconnected the fuel line) or tie it back out of the way. If you tied it out of the way rather than completely removing it, you may wish to remove the fuel injectors from the fuel rails, unless you are absolutely certain that you can avoid bumping into them, knocking them around, getting dirt in them, etc. To remove each injector, remove the clip at the top of the injector, and then pull the injector out of the fuel rail. Lay the injectors out or mark them in such a way that you can ensure each injector will go back into the same boss it was removed from.



Disconnect the spark plug wires from the distributor cap. (Make sure that you have some way of being sure each wire goes back onto the same terminal it was removed from.) Remove the distributor cap and rotor. (It is not necessary to remove the distributor column itself from the engine; just the cap and rotor. If you do remove the distributor column, you run the risk of messing up the timing unless it goes back in with the exact same orientation, so its best to just leave it alone...) Disconnect the IAT (Intake Air Temperature) sensor, and remove it from the intake manifold. (The location of the sensor is circled in the pic to the right.)



If you have air conditioning, you'll want to back out all of the bolts holding the A/C compressor in place, and move it out of the way. Note: If you really want to go through the hassle of disconnecting the A/C lines and the process of recharging the system, go right ahead, but its not necessary; I feel that its easier to just move it out of the way.

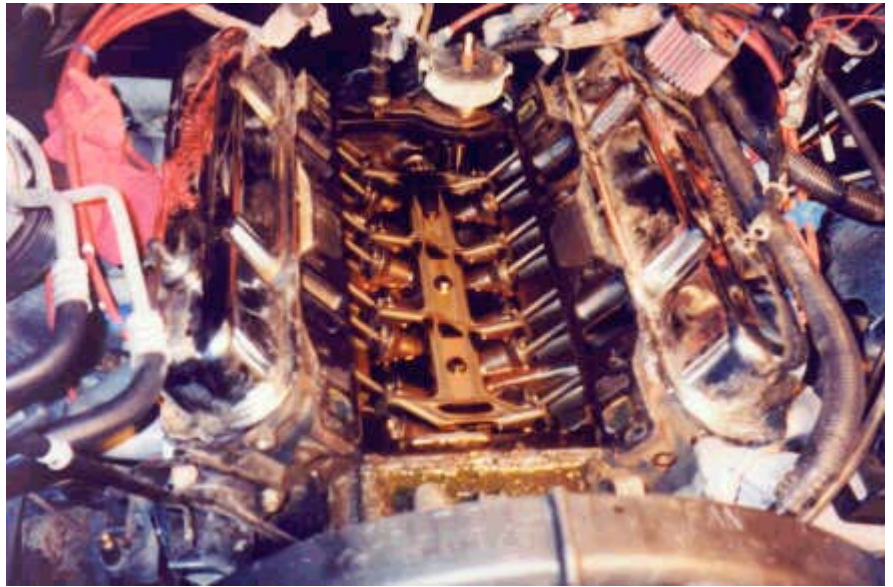
Once the A/C compressor has been moved out of the way, unbolt the accessory bracket it and the alternator were attached to. (There are several bolts on the front of the bracket of varying lengths that attach it to the engine.) You should also remove the upper radiator hose, thermostat housing, thermostat, and coolant bypass hose. Rather than trying to detach the upper radiator hose from the thermostat housing, its generally easier to just remove the housing and hose as a unit. If you want to re-use your upper radiator hose, its easier to remove from the housing once its off the engine. Speaking of re-using hoses, if your truck is more than a couple of years old, you'll probably want to replace the bypass hose. As long as you have everything apart, you might as well spend the \$5 now, that little guy is a tad inconvenient to get to... (The location of the bypass hose is circled in the pic to the right. The part number is listed at the beginning of this document.)



Disconnect the heater hose, and remove the heater hose fitting from the intake. Pull all of the vacuum hoses off of the intake. (Brake booster, PCV/EVAP, cruise control, etc.) Remove and discard the twelve intake manifold bolts. These bolts are a "stretch type" bolt, and shouldn't be re-used. New ones are included in the intake manifold gasket kit which you can get from the parts department of your friendly Dodge dealer. (Its anywhere from \$20 to \$30 US; the part number is listed at the beginning of this document.)



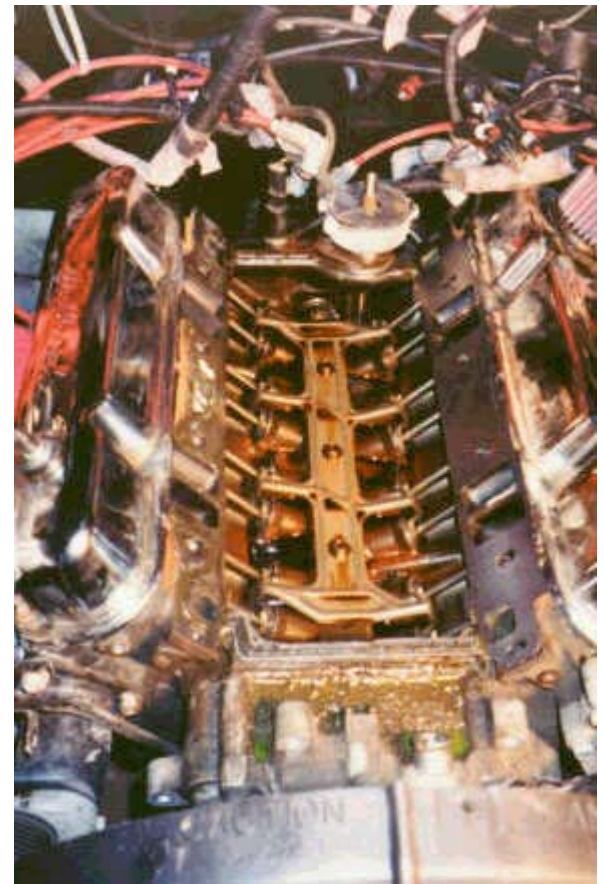
Once the bolts have been removed, you should be able to pull the intake manifold off of the engine. Since the lifter valley is right below the intake, take some time to inspect between the valve covers and the intake and clean out any debris which may have accumulated there. If you don't, it will all drop down into the valley and contaminate your engine and oil. I discovered that the tops of my valve covers were holding the intake manifold in place, so I found it necessary to remove the top valve cover bolts and loosen the lower ones so that I could bend the valve covers up and out of the way. (You can just remove your valve covers completely, if you prefer.) My intake manifold was good and stuck, so I found it necessary to use a block of wood on top of the timing chain cover to provide leverage for a small crowbar, which I placed underneath the bypass hose connector on the intake. It took a couple of tunks with a mallet on the crowbar, but eventually the intake released its death grip on the heads and block.



Finally, the disassembly is complete, and we can begin the install of the MPI manifold; you're about halfway there! Begin by scraping off the old gasket material. I used a shop towel underneath the head to catch most of the material before it could make it into the lifter valley (pictured at right).



Once the mating surfaces are clean, you can install the front, rear, and side gaskets. Rather than using the cork gaskets and plastic locating dowels included with the MPI, you should use the rubber and steel ones with built in locators included in the aforementioned Mopar intake manifold kit. (The improved gaskets are included in the kit, which you need for the new bolts anyway.) Follow the instructions included with the kit to install the gaskets. You basically just need to locate the side gaskets correctly (once you have run a bead of RTV around all of the intake and coolant ports in the heads), and put some RTV at each corner. Also, be sure to run a bead of RTV on the back of the MPI intake itself, completely around each dowel locating hole. The rubber gaskets are rather thin, and I know of at least one MPI install where oil leaked out the back of the manifold, and applying RTV around the dowel locating holes did the trick.



Before you actually drop the MPI onto your engine, you may want to install the bypass hose fitting, thermostat, and thermostat housing. It doesn't make a lot of difference, but you do have more clearance while the intake is still off the engine. Speaking of the thermostat housing, I used the chrome "o-ring" type from Summit, and found that it leaked with only the o-ring in place. A paper gasket and a bead of RTV in addition to the rubber o-ring solved the problem though. You may wish to take those additional steps now, and save yourself the hassle of having to go into the engine again. (Especially if you have A/C, because from now on, whenever you want to remove the thermostat housing you'll need to unbolt the A/C compressor and slide it out of the way first).



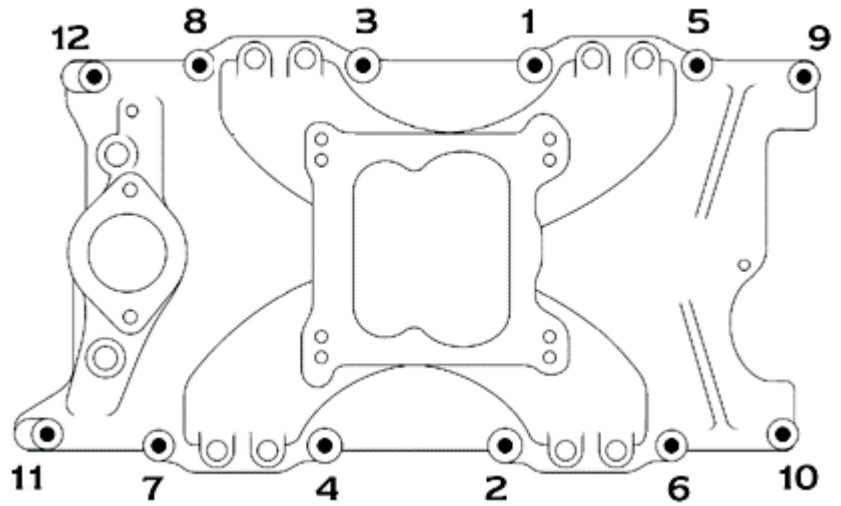
Position the MPI manifold above the engine, and lower it into place. Ideally, you'll just want to drop it into place once, so you don't have to move it around and mess up the silicon beads or shift any of the gaskets. To simplify this process, use the four alignment studs included in my kit. Simply thread them into four intake bolt holes

of your choosing (they do not have to thread all the way down), drop the MPI down on top of them, then guide it straight down onto the engine. After the manifold is seated on the engine, you can remove the studs. If they do not come out by hand, try using a pair of pliers, or if all else fails, you can use the two nuts provided in my MPI kit; simply thread them onto the stud, tighten them against each other, then put a wrench on the bottom nut and back the stud out.

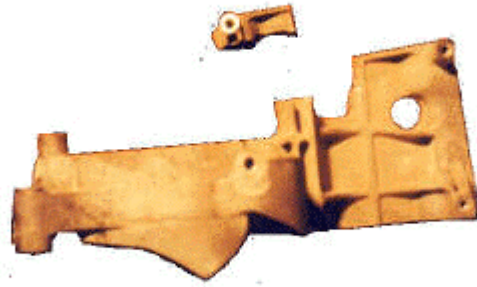
Insert the twelve bolts from the Mopar intake kit, and screw them in finger tight. Torquing them down is a 5 step process. Refer to the diagram at right for the bolt numbers and torque them down as follows:

Tighten bolts 1-4 (in that order) to 12 in-lbs, then 24 in-lbs, then 36 in-lbs, then 48 in-lbs, then 60 in-lbs, then 72 in-lbs. Next, tighten bolts 5-12, (in that order) to 72 in-lbs. Finally, tighten bolts 1-12, (in that order) to 12 ft-lbs.

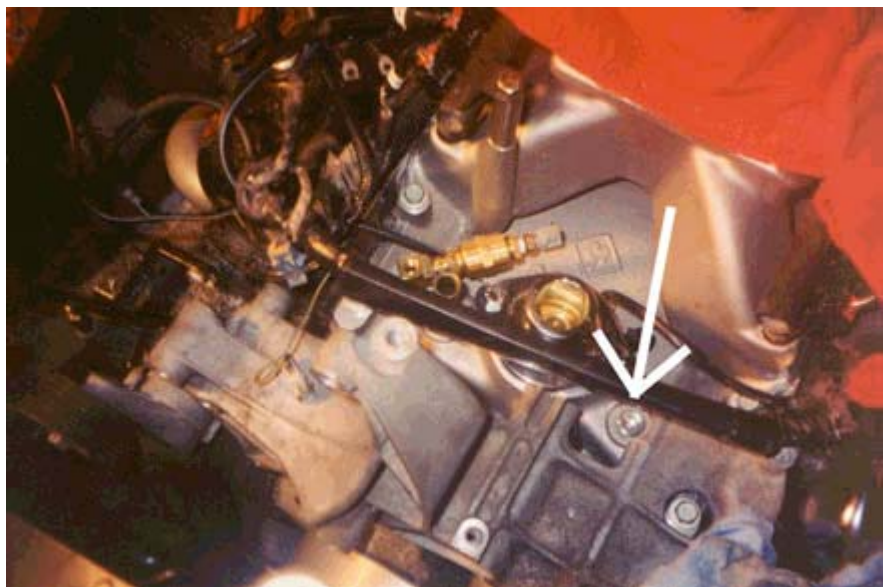
Be careful not to over-torque the bolts; doing so may create a poor seal or even crack the heads!



In the pic to the right, you can see how I cut a corner off the accessory mounting bracket. You will need to do this in order to clear the thermostat housing. If your truck is not equipped with A/C, you may not have to worry about this step. If so, you'll know it; when you attempt to bolt the bracket back in, it will be quite obvious where you'll need to cut it if it doesn't clear. At this point, you can install the accessory bracket.



To the right, you can see why it was necessary to cut the bracket. If your truck has A/C (as the truck in these pictures does), install the 3/8 NPT block-off that came with the Mopar MPI manifold in the 3/8 NPT hole to the driver's side of the thermostat housing. (Its the hole to the right of the housing as viewed in the pic to the right; there is an arrow pointing to the plugged hole.) If you do not have A/C, then insert the 3/8 NPT to 1/8 NPT ECT gauge adapter that came with my MPI Install Kit, and thread your engine coolant temperature gauge sensor into the adapter. (The ECT gauge sensor is the one that was more or less in this same location on the stock manifold; it has only one wire, as opposed to the computer ECT sensor which has two.) Install the heater hose fitting in the other 3/8 NPT hole, and the computer ECT sensor in the 1/8 NPT hole. Ignore the brass hardware installed in the 1/8 NPT hole in the pic to the right. This picture was taken during R&D tests to determine whether convection would be enough to generate correct ECT readings. (It wasn't.)



Place the throttle body adapter on top of the MPI, using RTV as a gasket. The cavity for the idle air control should be at the back of the engine. (As seen in the pic to the right.) Insert the 2 "short" bolts included in my MPI kit, and tighten them finger tight. Use the two "short bolt washers" also included in my MPI kit if you want to help protect the adapter's finish. If you removed the fuel injectors from the fuel rails, put them back in and clip them into place. Spreading some clean engine oil on the rubber o-ring at the top of each injector will help you to work it back into place without tearing the o-ring. Once all injectors are installed in the fuel rails, set the entire assembly in place on the manifold, and push the injectors down into the manifold. Once again, a small amount of clean engine oil will help to prevent the o-rings from tearing. Push the driver side fuel rail all the way down into the manifold, and then the passenger side rail. Use the 4 "long" bolts included in my MPI kit to attach the fuel rail to the intake. For the right front and left rear bolts, you'll need to use the 2.02" spacers from my MPI kit. Tighten the 4 "long" bolts and the 2 "short" bolts to 20 ft-lbs. If you disconnected the fuel line from the fuel rails, re-connect it now. You can also re-install the EVAP canister, as well as the distributor cap and rotor, and re-attach the spark plug wires to the distributor.



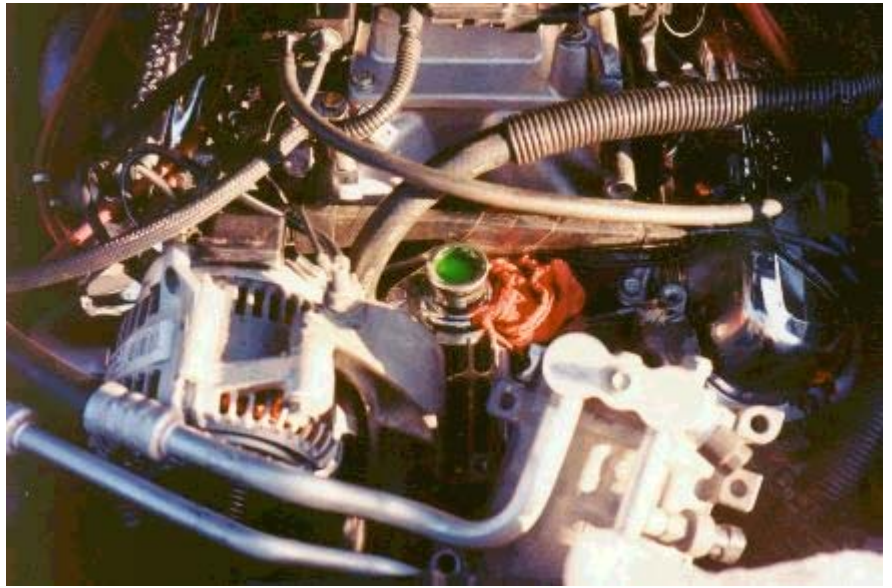
If you have A/C, you'll need to cut off a corner of your A/C compressor in order to get it to clear the thermostat housing. This can be somewhat of a chore, especially if you don't disconnect the compressor, but I suspect it would be even more of a chore to disconnect it and play with the cooling system later. To the right, you can see how I used a 2x4 to give myself a somewhat stable platform on which to work. The tools will make all the difference here. I used a hacksaw and countless cutoff wheels in my dremel tool. If you have access to some nice air tools, you will probably have a much easier time of it.



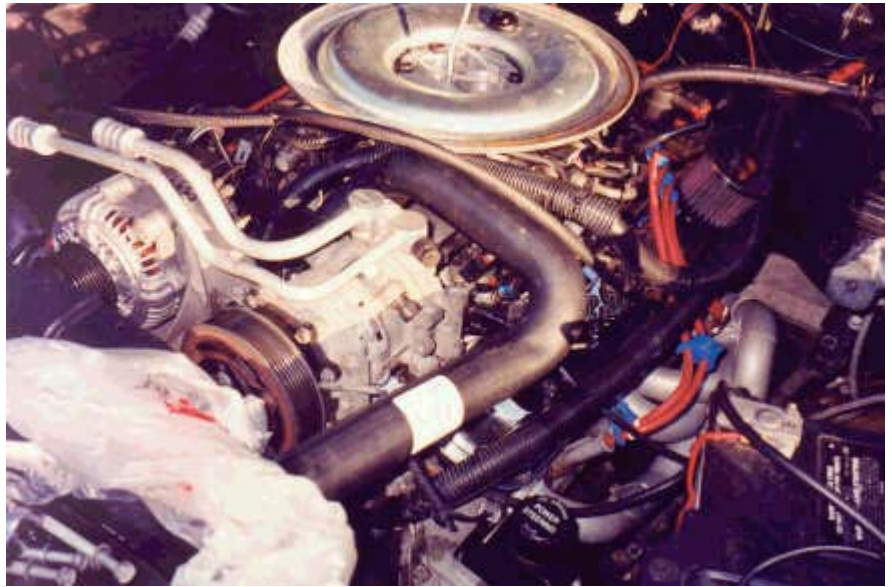
The part you need to cut off is the piece that the right rear A/C compressor mounting bolt goes through. (Earlier, you cut off the hole it threads into from the accessory bracket.) The place where it was hacked off is circled in the picture to the right.



Here's a shot from above. You can see how most of that corner has been hacked off. Be careful to just remove the material used to hold the bolt in place; don't breach the A/C compressor itself. Once you've got the A/C compressor trimmed down properly, you can install it, and button up the other items such as the alternator, heater hose, upper radiator hose, etc. If you have a 1992-1996 truck, you may want to hold off on installing the compressor for a little while, as you'll need to install an adapter in the upper radiator hose next. (Its easier to get to the hose when the A/C compressor is out of the way.)



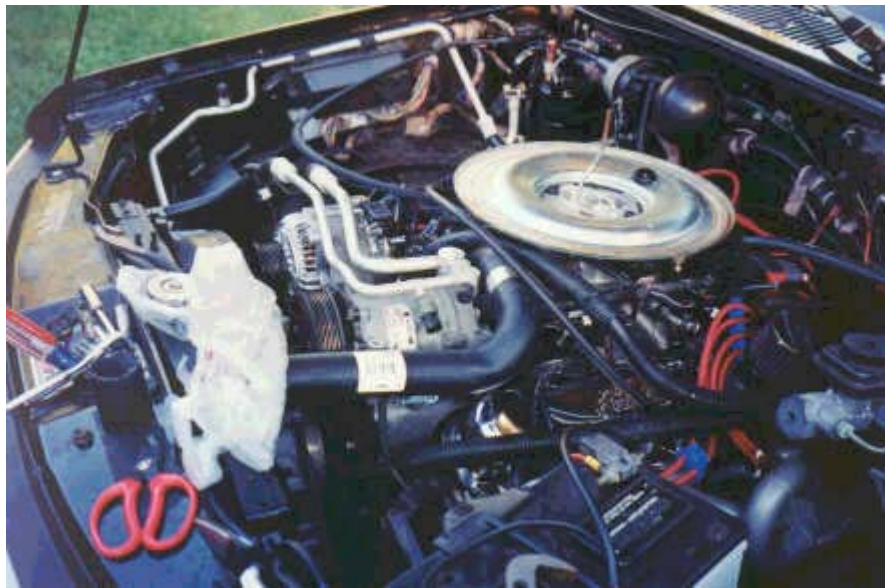
If you don't have A/C, you can just install the ECT gauge sensor right in the manifold using the small brass ECT gauge sensor adapter included in my MPI kit, but if you do, you'll need to install it in the upper radiator hose using the large aluminum ECT gauge sensor adapter (also included in my MPI kit). Before you can do so though, you may need to purchase a new upper radiator hose. As you can see from the first picture in this document, the '96 Dakota that this install was performed on had an upper radiator hose that went directly over the A/C compressor on its way to the radiator, thus partially crushing the hose; this doesn't leave enough room for the adapter. If you have an upper radiator hose like that, the solution is to purchase an upper radiator hose from a '93 Dodge Dakota with a 318 Magnum and A/C. This hose (pictured at right) goes behind and around the A/C compressor instead of directly over it.



Next, you'll need to pick a spot in the hose for the adapter, cut the hose, and insert it. It may help you to hold the adapter against the hose (pictured at right) to find and mark a place for cutting. Remember, measure twice, cut once. ;-)



I chose to install the adapter behind the A/C compressor, but you could also probably install it after the dog-leg, beside the A/C compressor. (Perhaps in the general area where the barcode label is on the hose in the pic to the right. Just be aware of the serpentine belt directly below the hose.) Once you've chosen the location for the adapter, you also have to decide how you want the sensor to be situated, and rotate the adapter to place the sensor where you want it. I mounted it so that the sensor is on the bottom to put it directly in the flow of the coolant, but it probably doesn't make much difference. If you want to be able to inspect it easily to be sure it isn't leaking, you may wish to position the sensor at the top.



The picture to the right shows a slightly better shot of the adapter installed in the hose. In this picture, the adapter is rotated such that the sensor is near the top of the hose. The stainless hose clamps have not yet been installed.

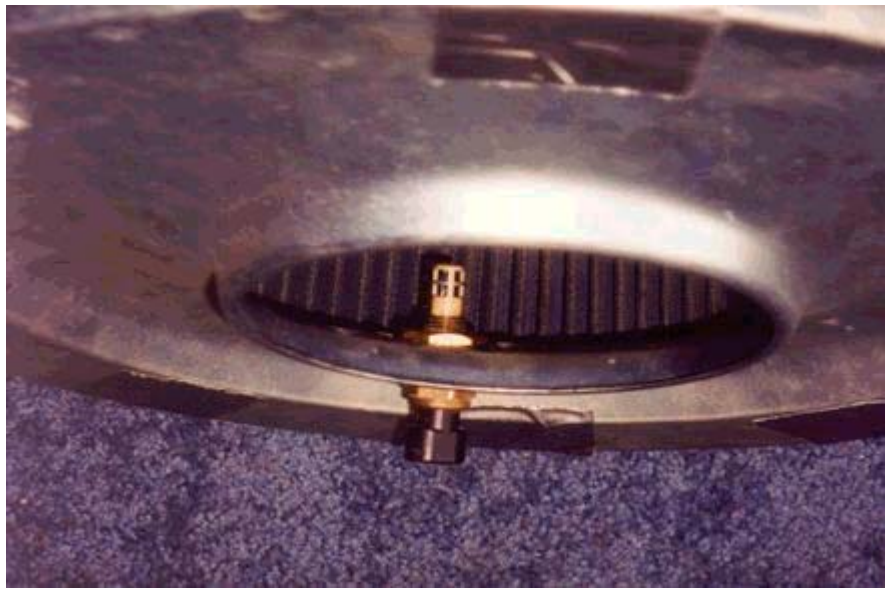


Since the ECT gauge sensor gets its ground through the body of the sensor, you'll need to ground it (or the adapter). One way to do this is to simply take a piece of wire (included in my MPI kit), strip an inch or so of insulation from one end, and insert that end between the ECT adapter and the radiator hose prior to tightening the stainless steel hose clamps, then attach the other end to a chassis ground. However, I would suggest using the round wire terminals included in my MPI kit. Crimp one of the terminals on the end of a wire (included), then put the terminal on the ECT gauge sensor before threading it into the adapter. Once the adapter is in place, you can cut the wire to length, crimp the other terminal on that end, and attach it to a chassis ground. (I recommend the stud between the A/C compressor and the alternator, which is also used to hold the A/C line bracket in place. One of the A/C compressor bolts might also be a good choice.) Note that a possible alternative to grounding the gauge ECT sensor would be put the computer ECT sensor in the upper radiator hose instead of the gauge ECT sensor. Since the computer sensor is provided with a ground (2 wires), you wouldn't need to ground the ECT adapter, and the gauge sensor would be grounded if you put it in the 1/8" NPT hole in the MPI. I chose not to do it that way because I consider the computer ECT sensor to be "more important" than the gauge ECT sensor, and the sensor in the upper radiator hose won't send out an accurate signal until the thermostat opens. If you place the computer ECT sensor in the radiator hose, you may run into a problem because the computer will expect to see the temperature hit about 180 degrees within approximately 5 minutes from engine start. In a cold startup situation, the thermostat might not open soon enough, and a trouble code may be generated because the computer thinks the engine is colder than it actually is. Whichever method you use, you will probably need to extend the length of the lead(s) to the ECT sensor(s). My MPI kit contains wire and 3M connectors which you can use for this purpose.



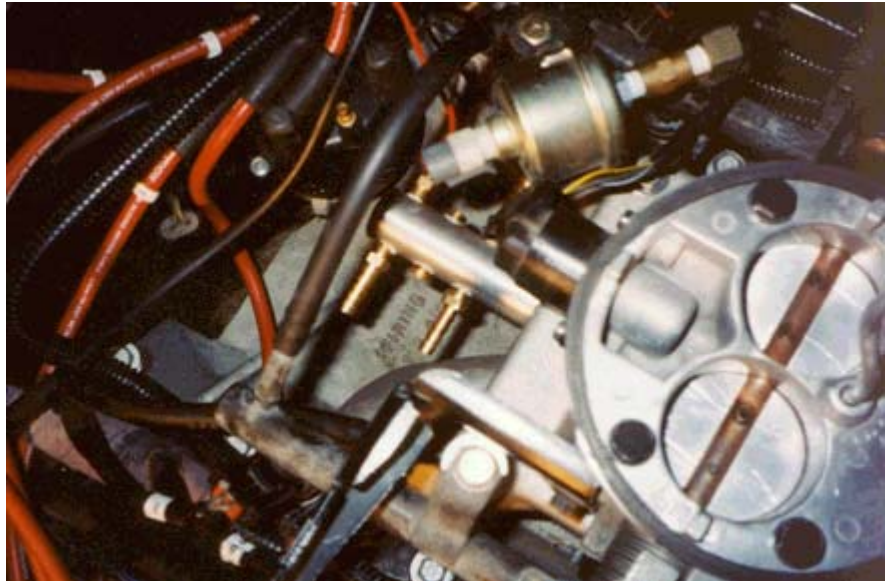
Use the two stainless steel hose clamps provided in my MPI kit to cinch down on the radiator hose on either side of the sensor.

As you have no doubt noticed, the MPI manifold doesn't have a provision for the IAT (Intake Air Temperature) sensor. You'll need to find a place to mount it. Most people either mount it in their air hat (as pictured at right), or in the air tube/ducting leading to their air hat if they're running a sealed cold/ram air type setup. There is a nut and a couple of washers provided in my MPI kit to assist you in mounting the sensor. You will probably need to drill a mounting hole (9/16"), then insert the IAT sensor, using a washer on either side if desired, and hold it in place with the nut. It would be a good idea to use a thread-locker to make sure the nut won't vibrate loose. (Especially if there is any chance it could find its way down into your throttle body!!!) Don't get any thread-locker on the sensor itself (just the threads). If you choose to mount the sensor "out in the open" you should fashion some sort of screen to keep foreign particles from contaminating the sensor.



Another possibility for mounting the IAT is to drill and tap a 1/4" NPT hole in the MPI or the throttle body adapter. Depending on the mounting location you've chosen, you may need to extend the length of the leads running to the IAT sensor. Ample wire of the proper gauge (18, stranded) is provided in my MPI kit for this purpose, along with some 3M wire connectors.

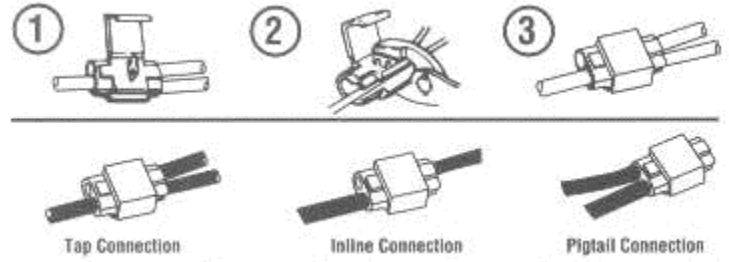
Eventually, you'll need to hook up your vacuum accessories. This is where the custom vacuum tree included in my MPI kit comes in. You should have a tree housing, 6 barbs and/or block-offs for it, and the NPT nipple to attach the tree to the manifold. Its pretty self explanatory; the large nipple goes in the bottom of the tree and will be threaded into the back of the manifold as well. The 6 barbs and/or fittings thread into the 6 holes in the tree; assemble it any way you like. At the very least, you will need to hook up your power brake booster to one of the large barbs, and your PCV valve also needs to connect to one of the large barbs. (A piece of vacuum tubing to connect your PCV valve to the tree is included in my kit. I have included more hose than you need, no matter where on your valve cover the PCV valve is located. You can just cut off the excess with a utility knife or a pair of scissors.) If you have cruise control, you'll need to connect that to one of the smaller barbs.



While threading the barbs, block-offs, and nipple into the tree, you may wish to use a thread sealant of some type. Teflon tape should work fine on the large nipple, but I found that a liquid thread sealant was easier to use on the barbs than the tape. Take care when threading these items into the tree and also when threading the tree into the manifold itself. Both the tree housing and the manifold are aluminum, and it would be quite easy to ruin the soft aluminum thread with the harder brass hardware. Additionally, the diameter of the holes in the vacuum tree housing are designed to decrease as they get deeper to create a good seal. As such, the block-offs and barbs won't thread all the way into the housing, and you shouldn't try to force them to screw in flush; doing so will damage the tree housing. Just thread them in until they are nice and tight. This isn't a structural item, so all you need to do is to make them tight enough to seal and keep from vibrating loose. In the picture, you can see how far in I screwed the barbs and block-offs.

Congratulations! For all practical purposes, you're done! Just button up any remaining items such as the serpentine belt, air hat, etc. and fire it up! During the first few days, it would be a good idea to periodically check the torque on the various bolts.

Here is a diagram explaining how to use the 3M electrical connectors supplied with my MPI kit. You simply arrange the wires how you want them (depending on what type of connection you are making) then use a pair of pliers to push down on the metal clip which will cut through the insulation and make contact with the copper wire. Close the protective cover, and you're done.



Your mileage may vary:

The install pictured in this manual was performed on a 1996 318ci Magnum Dakota with air conditioning. Although the install is the same on the 318 as on the 360, there are a few differences introduced by different model years. Those differences are listed below:

1992-1995

1992-1995 Magnums are equipped with EGR. These model years will need a block-off plate and gasket. The block-off plate is provided in my MPI kit; the gasket you'll need to get from the Mopar parts counter. (P/N 5301000) Just bolt on the plate in place of the EGR tube that connected your passenger side exhaust manifold or header to your old intake manifold.

If you have A/C, you'll need to relocate your gauge ECT sensor to the upper radiator hose using the provided adapter. If not, you can install it right in the intake manifold using the provided adapter.

1996

1996 eliminated the EGR, so you don't need to worry about blocking it off. Aside from that, the install is identical to the 1992-1995 models.

1997 and up

The big change in '97 was a switch from mechanical to electrical gauges. As a by-product of this, the gauge ECT sensor was eliminated and the computer ECT sensor is used instead. As such, you don't have to worry about installing 2 ECT sensors, so you can ignore all of the ECT adapter stuff. You'll be installing your only ECT sensor directly in the 1/8 NPT hole in the MPI manifold.

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