

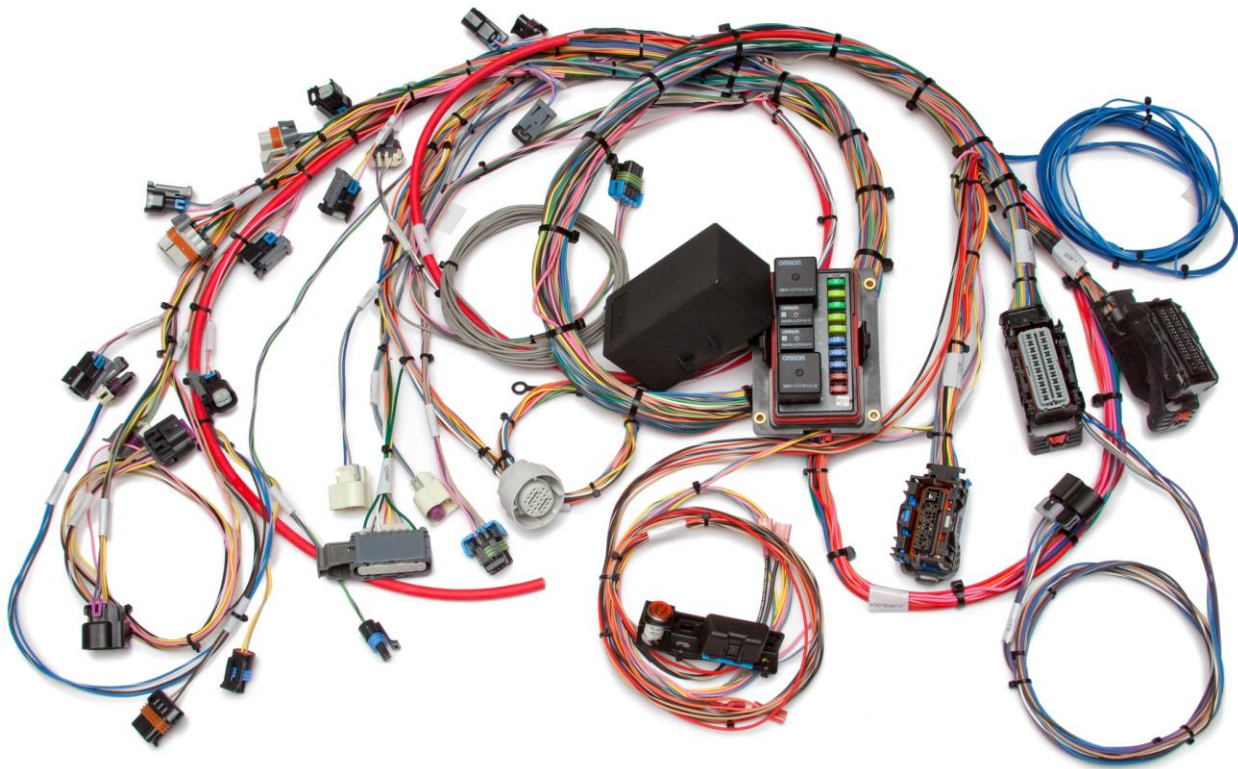
PAINLESS[®]

PERFORMANCE PRODUCTS

Wire Harness Installation Manual #90574

For Installing:

**Part # 60524
2008-UP Gen IV LS3 Engine
With Auto Trans. 4L65E**



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If you have any questions concerning the installation of this harness, feel free to call Painless Performance Products' Tech Line at 1-800-423-9696. The Tech Line can be reached from 8 A.M. to 5 P.M. central time, Monday through Thursday, and 8 A.M. to 4:30 P.M. on Fridays.

We have attempted to provide you with as accurate of instructions as possible and are always concerned about corrections or improvements that can be made. If you have found any issues or omissions, or simply have comments or suggestions concerning these instructions, please write us at the above address, send us a fax at (817) 244-4024, or email us at painless@painlessperformance.com. We sincerely appreciate your business.

Painless Performance Products, LLC shall in no event be liable in contract or tort (including negligence) for special, indirect, incidental, or consequential damages, such as but not limited to, loss of property damage, or any other damages, costs or expenses which might be claimed as the result of the use or failure of the goods sold hereby, except only the cost of repair or replacement.

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CAUTION: PLEASE DISCONNECT THE POWER FROM YOUR VEHICLE BY REMOVING THE NEGATIVE AND POSITIVE BATTERY CABLES FROM THE BATTERY. THE BATTERY IS NOT TO BE CONNECTED UNTILL AFTER THE PAINLESS FUEL INJECTION HARNESS HAS BEEN INSTALLED.

- **A full color copy of these instructions can be found at <http://www.painlessperformance.com/InfoSearch/manuals.php>**
- **Painless Performance Products recommends you, the installer, read this installation manual from front to back before installing this harness. Due to the variables involved with your particular installation, reading this manual will give you considerable insight on the proper installation of this harness. Please note the pictures within this manual are for reference only. They may not be exact representations of your particular engine or its components.**

- In the event that there are unused or unconnected wires, the ends of all unused wires will need to be terminated with an insulated terminal or taped. Doing so will prevent the wires from shorting and causing harness failure or fire.

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Introduction:

This stand-a-lone fuel injection harness operates any 2008-UP Gen IV LS3 engine with 4L65 transmissions only. Fuel injection/transmission wires are color coded as a 2007-2009 Chevrolet full size truck. With this harness fitting such a wide range of vehicles, these instructions should be considered general installation procedures. Please do not attempt to modify this Painless harness to function as your factory harness did. We have developed this harness to function as this manual instructs you to connect it.

Contents of this Painless wire harness kit:

Make sure that you have everything you're intended to have in this kit. If you find that anything is missing or damaged, please contact the dealer where you obtained the kit or Painless Performance at (800) 423-9696.

This Painless Wire Harness Kit should contain the following:

- One fuel injection wire harness that looks like the front page picture.
- A large parts bags containing heat shrink, 4 inch zip ties, 7 inch zip ties, rubber alternator wire boot, a rubber grommet, terminals, and a 40 Amp circuit breaker.
- This installation manual.
- Warranty card. Please fill this out and send it in.

Things to know about the Delphi Engine Control Module (ECM) and Transmission Control Module (TCM) utilized with this Painless harness.

- The ECM & TCM required for this harness was factory installed in many different makes and models of General Motors vehicles. Both V6 and V8 engines can be operated by these controllers. When procuring an ECM & TCM from a salvage yard, for use with this harness, be sure to specify it be from a 2007-2009 Chevrolet V8 truck/suv.
- The factory calibration on an ECM & TCM from a Chevrolet truck will not properly operate the engine/transmission without several modifications.
 - Pass-Key anti-theft system must be turned off or otherwise the engine will continuously start for two seconds and then die, when cranked.
 - Factory installed emission devices include: fuel tank pressure sensor, tank vent solenoid, tank purge solenoid, air pump, air pump solenoid, and exhaust gas recirculation solenoid. The calibration installed at the GM factory onto your ECM tells it to look for all of these emissions components. This Painless harness does not include any supporting wiring or connectors for these.

- Gear ratios and tire diameters are most likely different when comparing those from a late model truck and your project vehicle.
- Fuel, spark, idle and shift strategies need to be calibrated. **Optimal fuel economy and power will require the vehicle to be tuned by a professional tuner or do it yourself with any number of aftermarket software available to the public.**

Non-electrical parts and other things you should consider when transplanting a Gen IV engine and transmission include:

- If your engine has not ran for several months or more you will probably experience the joy of clogged injectors when you go to fire it up for the first time. Do yourself a favor and have the injectors cleaned, or purchase new fuel injectors. If you do not, your engine will probably not start due to clogged fuel injectors.
- Fuel system requirements include a high pressure, 56-60 PSI, fuel pump. The fuel feed line to fuel rail must be at least -6AN or 3/8" in size for stock engine, 400-450HP, setups. If your engine's output is more than 450HP you should use -8AN or 1/2" fuel rail feed line. Walbro manufactures a wide variety of high pressure fuel pumps and installation kits. They have many internet distributors including www.aztpi.com.

If your vehicle's fuel tank is one with the early small 1 & 13/16" hole sending unit you have several options of how to upgrade it. One option is to modify the sending unit yourself by adding a fuel return line. Another option is to replace the sending unit with an aftermarket one from a company such as www.robmcperformance.com. They offer drop in units with a variety of tube sizes and adapter fittings. The other option is to have a company such as www.rockvalleyantiqueautoparts.com cut out the old flange and weld in a large flange from a later model 1984 & up GM vehicle. The larger flange will allow for an in tank mounted fuel pump.

Gen IV engines have dead headed fuel rails. They require 58 pounds of fuel pressure. GF-822 is a Delco return type fuel filter/regulator that can be plumbed in between the fuel pump and fuel rail. It will filter the fuel and maintain 58 PSI at the fuel rail. Another option is to mount an external bypass regulator such as one from Aeromotive. Just be sure to purchase a regulator that can handle 58 PSI and the amount of fuel volume that you need.

- Gen IV engine cooling systems have some specific requirements. First, the lower radiator hose connects to the water neck with the thermostat behind it. If looking at the front of the engine it is the water neck to the lower left of the water pump. The upper radiator hose connects to the water neck at the top of the water pump. Second, the factory coolant thermostat only starts to open at 195°F and is fully open at 210°F. Aftermarket thermostats are available that will open at a lower temperature. Third, these engines incorporate steam tubes that are

plumbed into the front of each head. They are tied together and then plumbed to the radiator. Do not plug off this steam tube, it must be connected to either the upper radiator hose or to the upper third of the radiator in order to bleed off any steam that accumulates in the engine heads.

Companies such as Afco www.afabcorp.com manufacture direct bolt in radiators that are specifically designed for LSx engine transplants. These are ideal especially since the coolant inlet and outlet are both on the passenger side of the radiator. By moving the upper radiator inlet to the passenger side the driver side is opened up to allow a fresh air intake elbow to be routed there.

- Coolant temperature and oil pressure gauge senders can easily be connected to any Gen IV engine. In both engine heads are threaded coolant ports with Metric 12 x 1.5 threads. The coolant port on the driver side head is utilized by the coolant temperature sensor needed for the PCM. The port on the passenger head usually has a plug in it that can be removed and a temperature sender for a gauge can be inserted. Most aftermarket gauge manufacturers offer adapters to adapt their gauge sender so you can thread it into this coolant port.

There are two places that oil pressure senders may be connected to these engines. Behind the intake manifold is a threaded port, Metric 16 x 1.5 threads. Depending on what vehicle your engine was donated from, this port might already have a 0-5 Volt oil pressure sensor in it. This Painless harness does have connections for this sensor but you may choose to remove it and with an adapter, screw in your oil pressure gauge sender. Another spot that is common for oil pressure senders is just above the oil filter. Here you will find an aluminum cap with two hex head, 8mm bolts holding it to the oil pan. You can remove this cap, tap it to the threads that match your oil pressure sender and then reinstall it. Just keep in mind that if you plan to use headers this location for a sender may not be ideal. Heat can kill a sender quick.

- Automatic transmissions require external fluid coolers. The ports on the side of the transmission usually have quick-connect fittings installed. Most local auto parts suppliers will offer fittings that adapt these ports to pipe flare fittings. If you plan to bend your own hard lines this is your best bet. Or, on a 4L65E, you can also screw in 3/8" NPT fittings into these ports. Make sure to use Teflon tape on the threads for a good seal. Fittings are available from many online retailers or your local hydraulic hose shop that are male 3/8" NPT to male -6AN or whatever your application may need. If you can't find what you need then you can always weld steel -6AN buds on the ends of the OEM cooling line fittings.

Shifter detents are another thing to consider when transplanting a 4L65E into a vehicle that was originally manufactured with 2 or 3 speed transmissions. Companies such as Shiftworks www.shiftworks.com manufacture shifter conversion kits to upgrade your factory shifter to operate your late model transmission. Another option is to completely replace the shifter with an aftermarket one such as Lokar www.lokar.com part # **FMS64L60EEM**.

- Engine accessory and frame clearance always seems to be an issue that comes up when transplanting a Gen IV engine into any early model vehicle. Usually the alternator and power steering pumps do not have any clearance issues

associated with them. The factory Gen IV A/C compressor mounts to the passenger lower side of the engine. In this location, it will not clear most GM frames. You will either have to notch the frame to create clearance or move the A/C compressor. Companies such as KWIK Performance www.kwikperf.com offer relocation brackets that move the compressor to the upper passenger side of the engine. Moving the compressor to this location works well with most transplants. These kits utilize a Sanden style compressor.

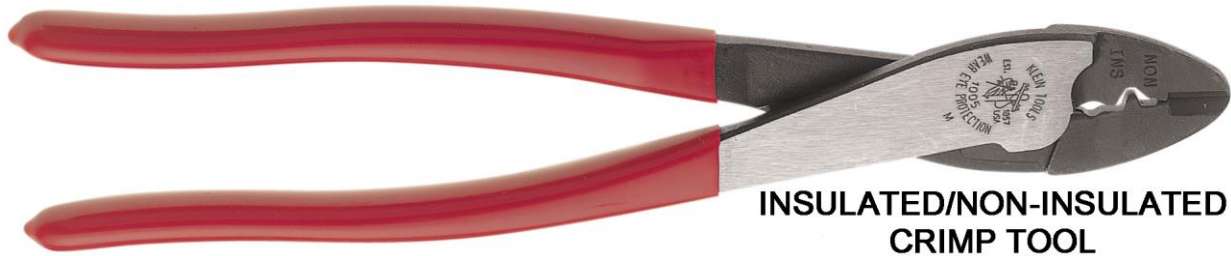
- Drive shaft length will have to be modified if you are upgrading to a 4L65E from most 2 & 3 speed automatics or manuals. You should also consider having the entire tube upgraded to a thicker wall material since you are likely to exceed the handling capabilities of the original tube.

Tools Needed:

In addition to regular hand tools such as ratchets, sockets, extensions, screw drivers, flash light or drop light, you will need the following tools:

Wire Crimping and Stripping Tools:

One style of hand crimper shown below can be purchased from just about any local electrical supply shop, home improvement store or can also be purchased online. You will need this style of crimper to crimp the heat shrinkable, insulated terminals included in the small parts bubble pack.



A good set of wire strippers are required to strip wire properly. Shown below are a pair of strippers manufactured by Klein tools and that are available from just about any local electrical supply shop, home improvement store or can be purchase online. This style of wire stripper is ideal for this harness install because of its ability to properly strip wire gauges 10awg to 20awg.



Volt/Ohm Meter:



A Volt/Ohm meter is always a good tool to have on hand when installing any type of electrical components into any vehicle. Most basic units provide the two functions required to diagnose electrical issues seen during a harness install. These two functions are the ability to read DC Voltage and electrical continuity or Ohms. They can be purchased from any home improvement store, local hardware store and electrical supply shop and online.

Electric Drill, Bits and Hole Saws:

Needed if you plan to mount the ECM, TCM and fuse block inside the vehicle's passenger compartment and also useful to drill mounting holes for these components to be bolted down.

Heat Gun:

Very useful to shrink the heat-shrink used on the alternator charge wire and the heat-shrinkable terminals for the electric fan and crank signal wires.





Disconnect battery cables from the battery and then unplug the ECM, TCM and Alternator before any welding is done on the vehicle. If you don't, you will cause permanent damage to these components.

Parts required for installation of this harness:

The LS3 engine and 4L65E transmission section of the wire harness requires the following parts for proper installation and operation. Factory installed engine sensors and components should be perfect matches for this harness. **To avoid problems the components you have must match the component part numbers listed.**

Part Description	Part Number
Engine	2008-2010 LS3
Transmission	2007-UP 4L65E
2007 ECM (Engine Control Module)	12597121 or Equivalent
2008 ECM	12612384 or Equivalent
2009 - 2010 ECM	12625455 or Equivalent
TCM (Transmission Control Module)	24234503 or Equivalent
Fuel Injectors	USCAR Connection Type
Ignition Coils	12573190 or Equivalent
Accelerator Pedal *See note on page 34*	25835421 or Equivalent
Engine Coolant Temperature Sensor	12608814 or Equivalent
Mass Air Flow Sensor	15865791 or Equivalent
Cam Position Sensor	12591720 or Equivalent
Crank Position Sensor	12585546 or Equivalent
Knock Sensor (2 Required)	12570125 or Equivalent
Oxygen Sensor	12581966 or Equivalent
Vehicle Speed Sensor	12376520 or Equivalent
Input Shaft Speed Sensor	Factory Installed or Equivalent
Manifold Absolute Pressure Sensor	12591290 or Equivalent
Oil Pressure Sensor (Not Required)	12573107 or Equivalent
PRNDL Switch	24221125 or Equivalent

Alternators and Charge Wires:

Built into this harness is a red 4 gauge alternator charge wire with an Amperage handle rating of 160Amp. The OEM alternators on Gen. IV engines are rated for 145Amp. What is the output rating of the alternator installed to your engine? If it is more than 160Amp then you must add an additional charge wire from the alternator to battery.

NOTE: Although it is not included in this wiring kit, you should install a fuse or manual resettable circuit breaker between the (+) battery cable and any connections to this alternator charge wire, your chassis harness or any other wire connected to the battery (+) post or cable. There are many online retailers that sell high Amp fuses and circuit breakers. See page 24 for more details.

Grounding your vehicle:

A properly grounded vehicle will always perform more reliably when compared to one that is lacking enough ground circuits or just doesn't have the required electrical current handling capabilities. Here is a check list to use when designing the ground circuits for your vehicle.

Engine/Transmission to Battery and/or Frame Grounding:

- ✓ The Amperage ratings in the table below represent constant current handling. Engine cranking introduces a large Amperage requirement from the battery. The ground strap connected between the engine-frame or engine-battery must be large enough to handle this amperage spike. Basically, this means your engine ground strap should be no smaller than 1 gauge and too big of a ground strap never hurt any vehicle so size accordingly.

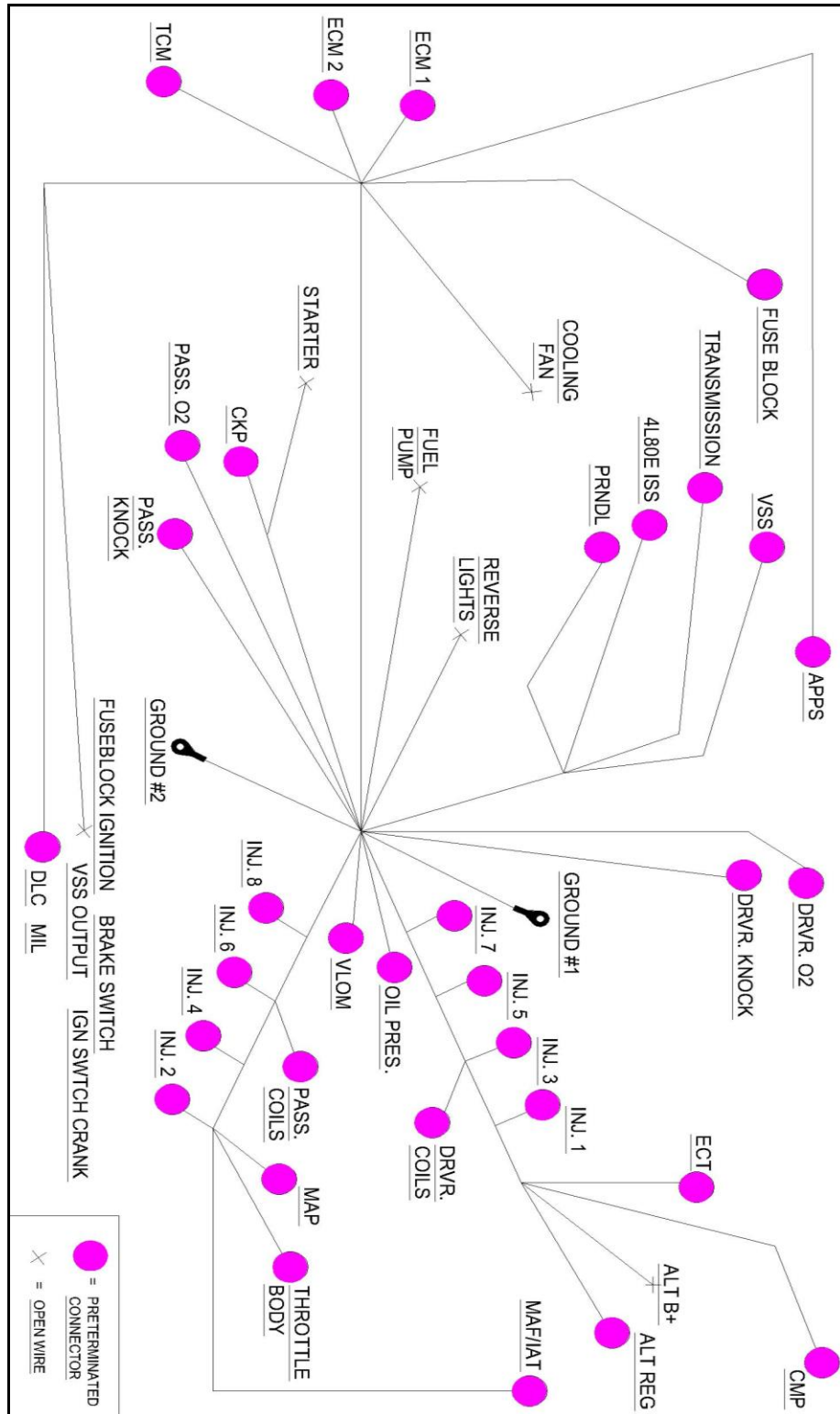
SGX Cable Size (AWG)	Current Handling (Amperage)
1	245
0	285
00	330
000	385
0000	445

Frame to Battery and Body Grounding:

- ✓ Ground straps must be installed between the frame, body and battery. These should be sized according to what your vehicle's electrical accessories Amperage requirements are. Figure up the Amperage use of your lights, electric fan(s), horn(s), wipers, A/C & heat blower motor, and any other accessory bolted to your vehicle and you might be surprised to see how much Amperage these components require to operate.
- ✓ Simple to understand yet easy to forget is that paint and rubber do not conduct electricity. If a radiator support is mounted on rubber bushings it is a good idea to connect a ground strap to it from the frame or (-) battery post. Don't rely on the painted fenders being bolted to it for a ground source.

Pre-Installation and Harness layout:

Remove the harness from the package box. Find a clean area on the floor or a work bench to unroll the harness onto. Take a look at how the harness is designed into sections. Below you see a simple line drawing of this harness that includes connector location. Now is a good time to get familiar with the harness and where each connector is located so your installation goes smoothly.



Electronics and Heat Don't Get Along:

Just as the heading above states, it is true, electronic components and heat does not get along. Heat always wins by fatality of the component. Now in the case of the Engine Control Module (ECM), Transmission Control Module (TCM), the fuse block and all the wire contained in this harness you can think of them as heat resistant. They are in fact all manufactured of automotive grade materials which are rated for environments with temperatures up to 257° Fahrenheit. Anything above this and their reliable operation cannot be guaranteed. So, don't mount, route, attach or connect any part of this harness to the exhaust pipes of your vehicle. Exhaust pipe, which can reach a temperature of 1500° Fahrenheit, is unforgiving to anything touching or mounted around it.

For added protection from heat and abrasion damage to this harness we suggest you cover it in a high quality wire loom. PowerBraid is the standard for high quality wire loom and is a Painless Performance branded product. See our website for details on part number [70921](#). This fuel injection PowerBraid kit includes the proper amount of wire loom to cover this fuel injection harness. PowerBraid, unlike the cheap convoluted tubing sold by most parts stores, is rated to resist heat damage up to 257° Fahrenheit. It is also abrasion, cut, chemical and extreme cold brittleness resistant.

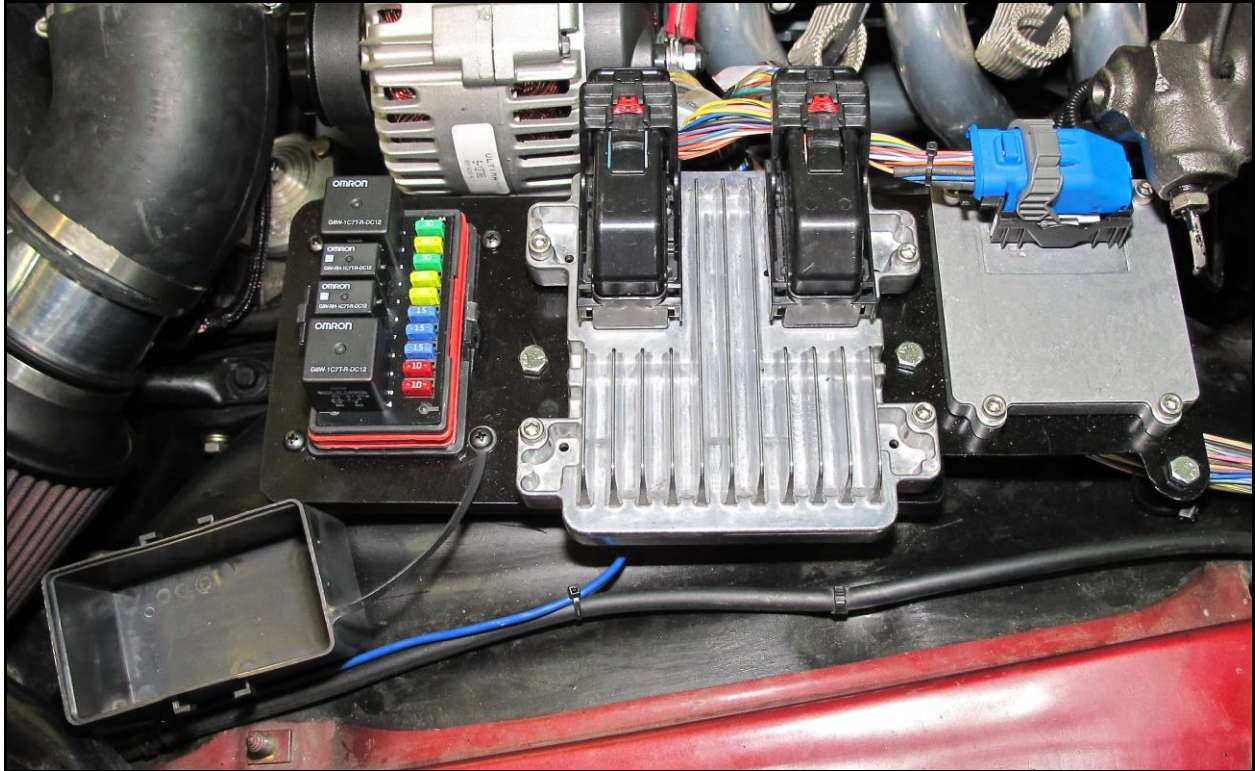
Where To Mount the ECM, TCM and Fuse Block:

You are limited to 4 feet of harness as measured from the center/back of the intake manifold to where the ECM connectors are located on the harness. Use a tape measure to figure out where you can mount the ECM. The TCM connector is wired with a 1 foot length on it as measured from the harness breakout it shares with the ECM and fuse block. So the TCM can be mounted on any side of the ECM or on top of the ECM with a custom bracket of some sort. Now look at the fuse block. It is wired with a 2 foot length on it as measured from the same main harness break out. So once again you can mount it on any side of the ECM.

NOTE: Mount the fuse block in a location of easy access. You will at one point need access to the fuse block to replace a blown fuse.

Mounting the Engine and Transmission Controllers:

Both controllers have four mounting holes cast into their aluminum housings. Use these holes as a template to create your own custom mounting solution. As you can see in the picture below we have built a simple metal bracket to mount these components onto an inner fender well. When bolting them down to their mounting point, make sure you don't over torque the bolts. Both of the cases these components are built into are cast aluminum which is easy to break if you are rough with it.

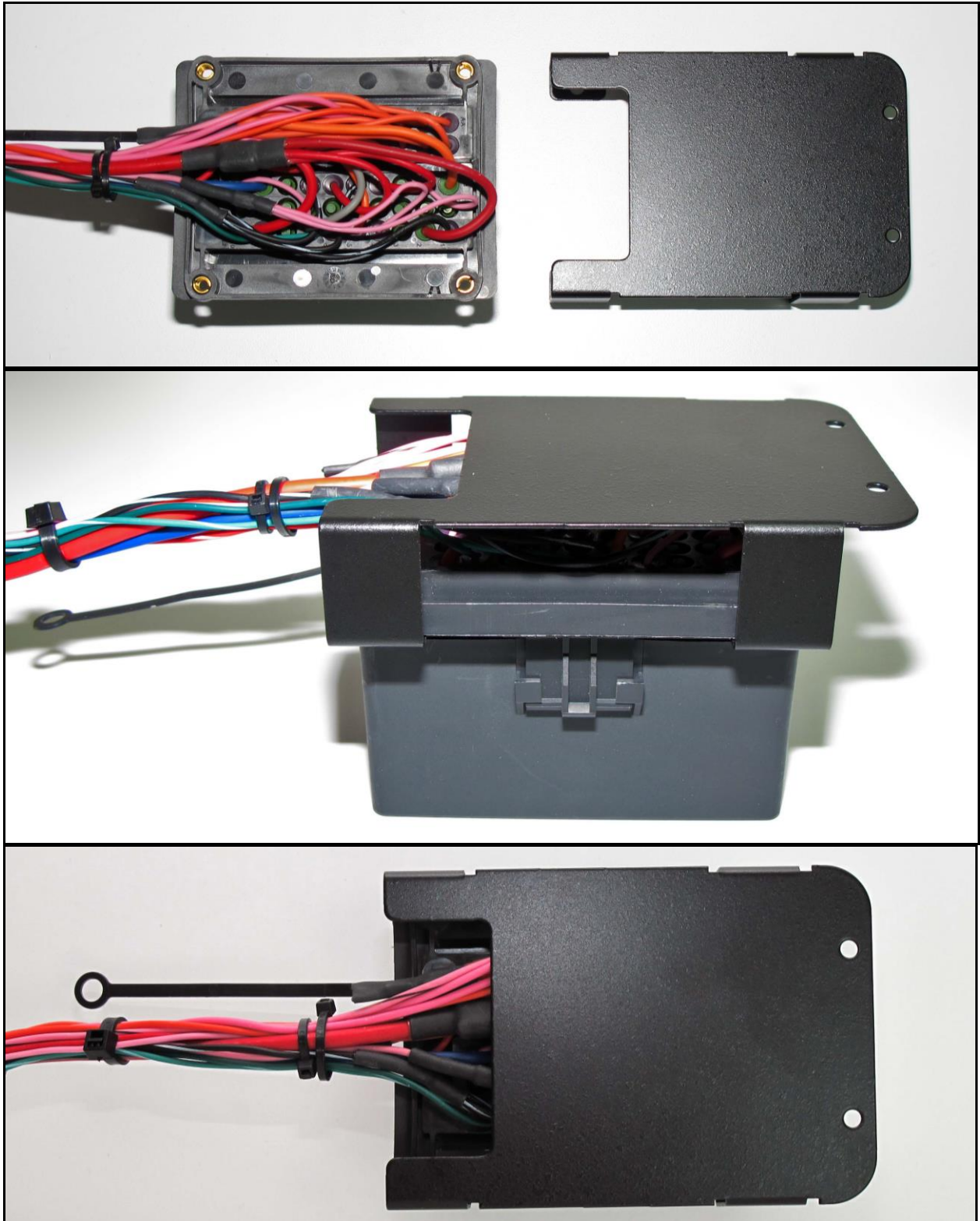


NOTE: Looking at the picture above you see how the connectors plug into the ECM and TCM. It is important that you leave room for these connectors when deciding on your mounting solution.

NOTE: If you mount these components inside the passenger compartment of your vehicle you will then need to feed the fuel injection and transmission sections of the wire harness through the fire wall. Find a suitable place to drill a 1 5/8" hole in the fire wall. Use a hole-saw and make the hole. Take a round metal file to remove the sharpness from the metal edges. Inside the parts kit you will find a rubber grommet to seal this hole around the harness.

Mounting the Fuse Block:

This fuse block is weather proof. It can be mounted under the hood or in the passenger compartment of your vehicle. The parts bag that came with this harness includes 4 black screws and a black metal bracket. You can either use the bracket to mount the fuse block or use the template on the back page of this manual to cut a hole in a mounting surface so that the face of the fuse block protrudes through the front of it.



Use the four black machine screws to mount the fuse block to the fuse block mounting bracket. Then use your choice of mounting screws to secure the bracket to its intended mounting point in your vehicle. Most people use self tap screws or machine thread screws.



Harness Routing:

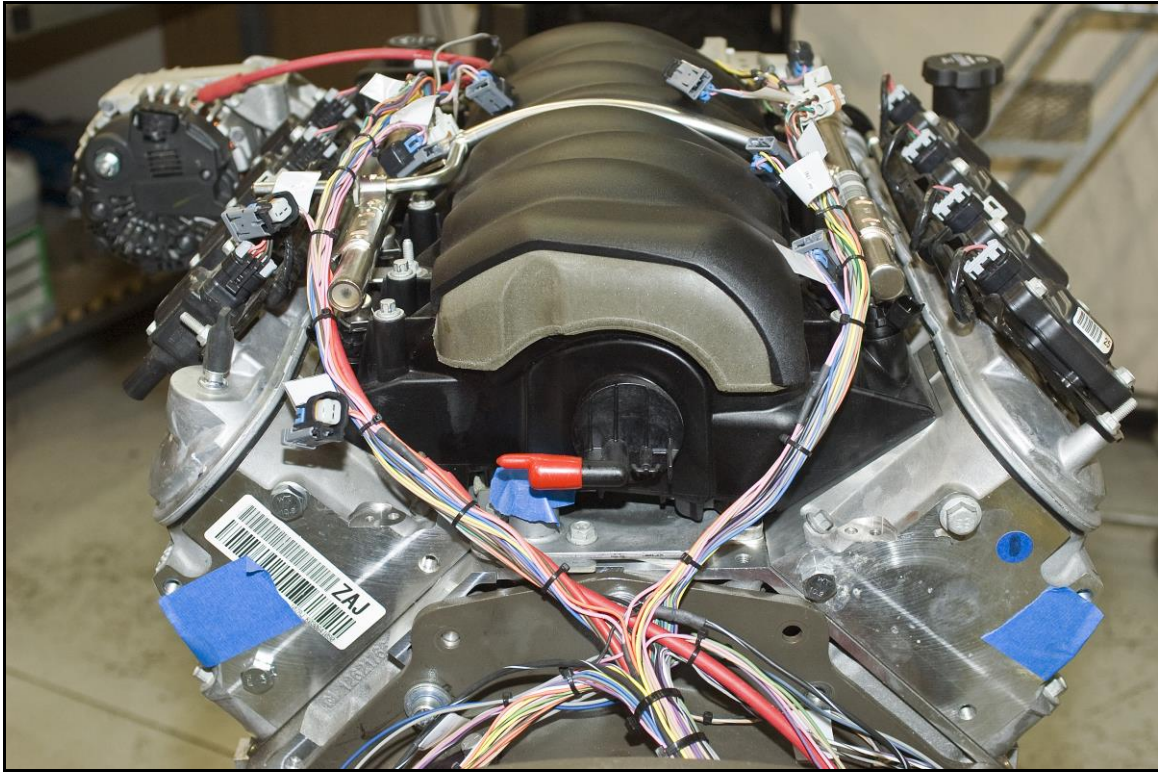
Now that the ECM, TCM and fuse block are mounted you can move onto routing the harness over to the engine and transmission. If you have mounted these components in the passenger compartment you now need to feed the engine and transmission sections of the harness out through the hole you drilled in the fire wall. Before doing so take some tape and cover the edges of the hole with it. This lessens the chance of chafing the wires in the harness.

As you can see in the picture below we chose to push the transmission connector through the hole first. We did this because it is the large connector on the harness and it would have been difficult to push through if we had the body of the harness taking up most of the area in the hole. So, just take your time on this step, don't pull hard on any connector and do not for any reason use a screw driver to force the connectors through the hole. Once you have this done then install the rubber grommet from the parts kit into the hole and around the harness. Weather-strip adhesive can be applied to the groove in the grommet that cradles the fire wall. It will help secure the grommet in place.



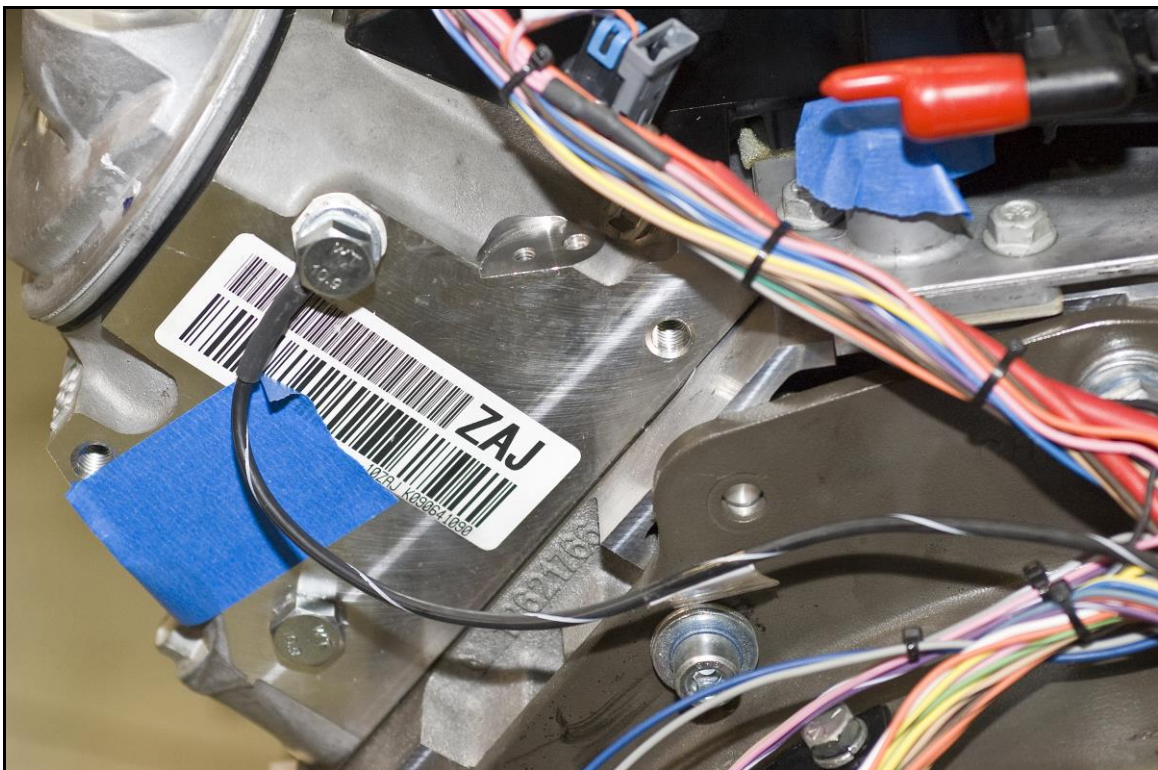
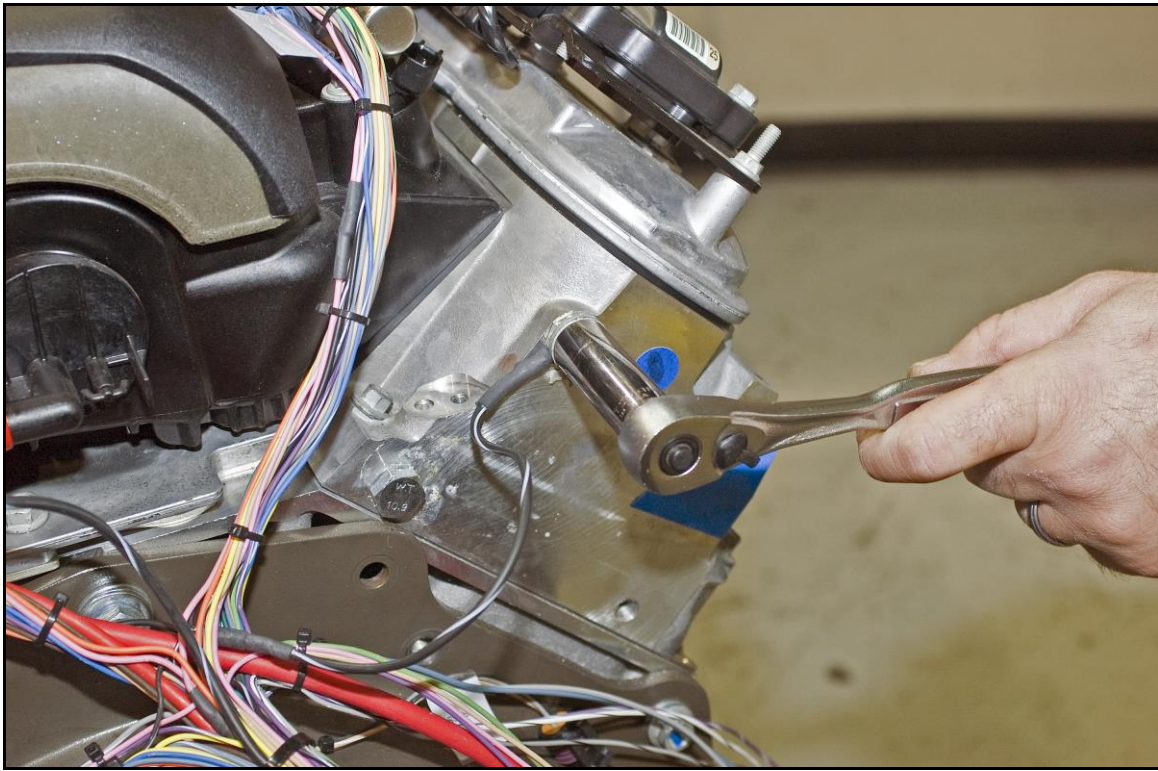
If you chose to mount the ECM, TCM and fuse block in the engine compartment then just route the engine and transmission sections of the harness over towards the center-back of the intake manifold.

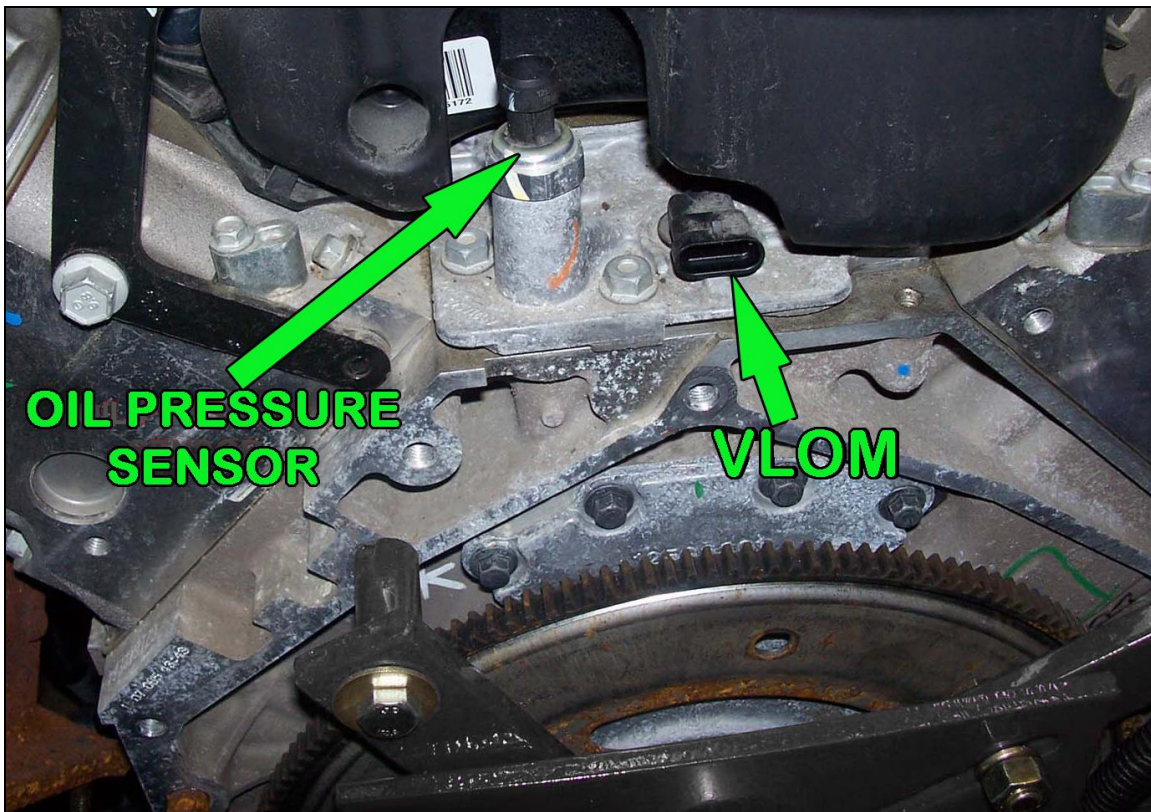
The harness has two legs of connectors that run down each side of the fuel rail. Look at the harness to locate the leg that includes the driver side coil connector along with the 4 gauge red charge wire. This leg is to be routed along the fuel rail of the driver side of the engine. Do the same for the other leg of the harness for the passenger side.



Making the Harness Connections:

At the harness breakout now located at the center-back of the intake manifold you will find two black/white wires with ring terminals on them. These are the ground wires for this harness. They need to be grounded to opposite side heads of the engine. Do not stack these two grounds together. Do this by using 10 x 1.5mm bolts and lock washers.





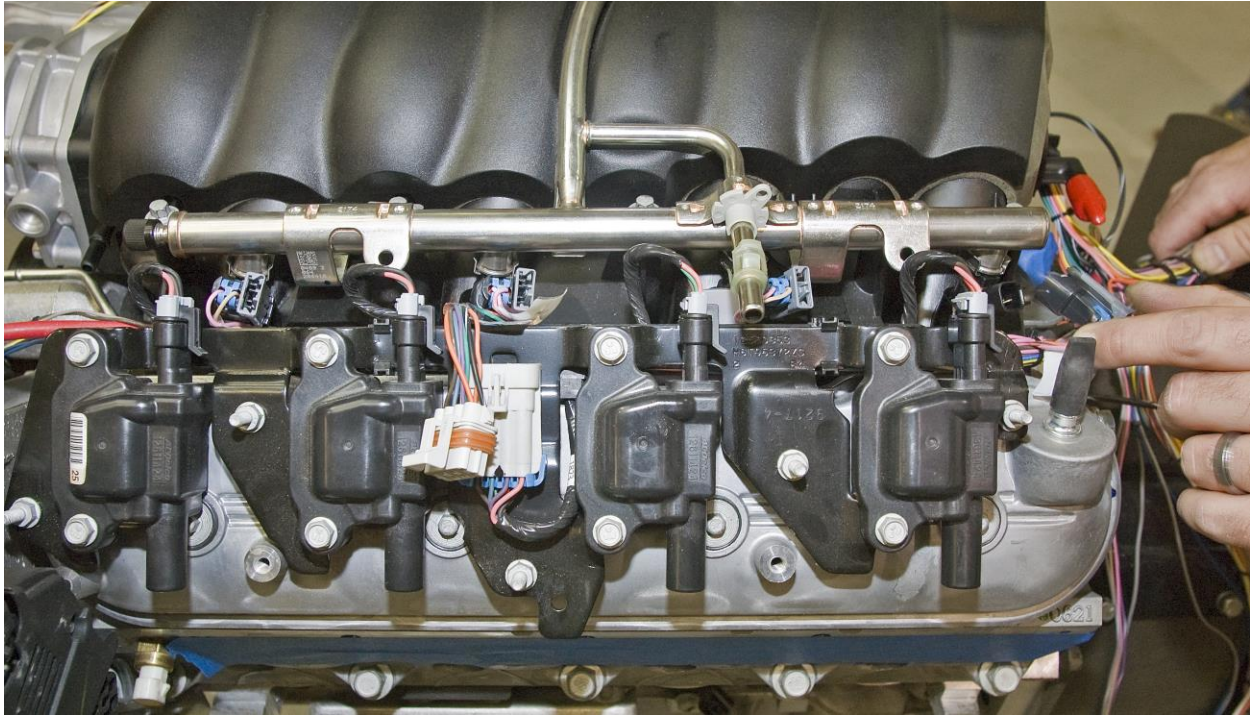
At the back of the motor is the oil pressure sensor, plug the connector into the sensor.

Some engines may have a Valve Lifter Oil Manifold, or VLOM. This is used by engines that came from the factory equipped with active fuel management also referred to as "Displacement on Demand". It allows the engine to "turn off" half of the cylinders under light-load conditions to help with fuel economy.

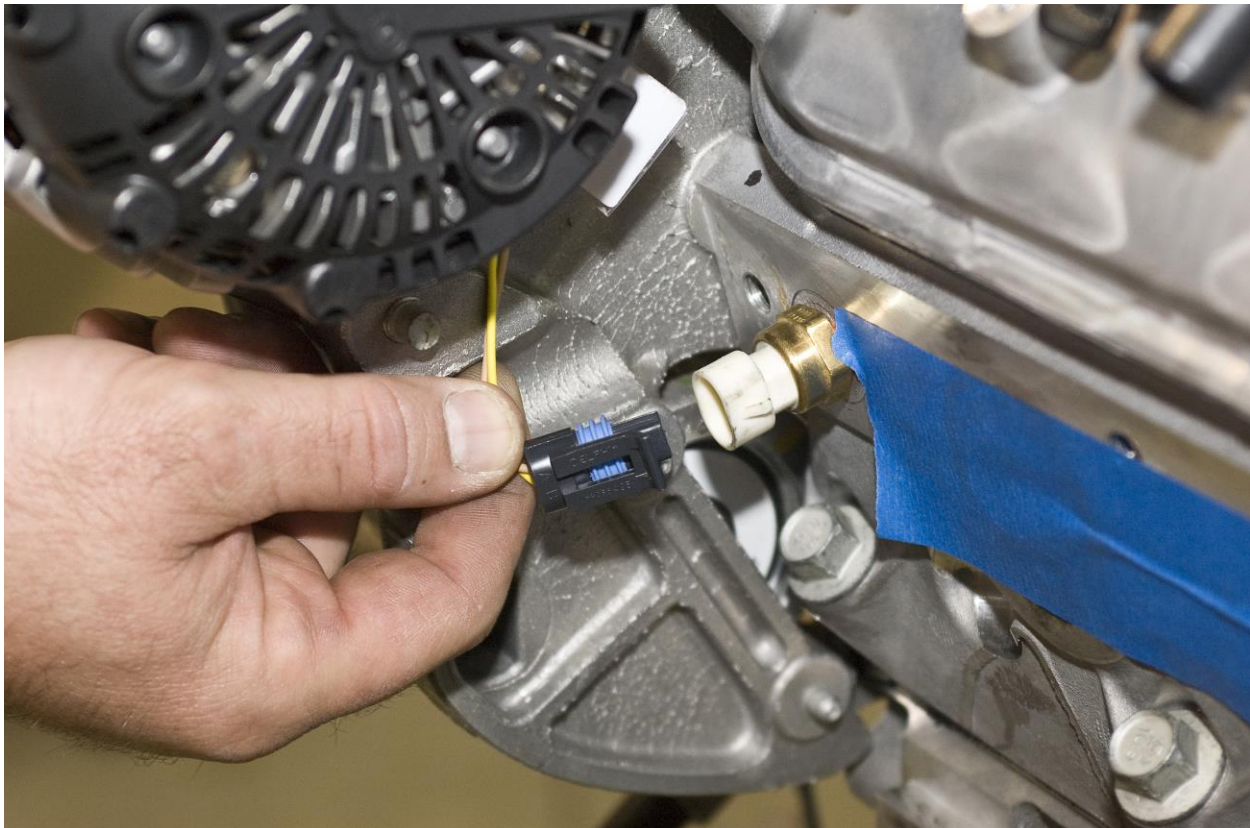
If you do not have a VLOM or plan on deleting this function either in the ECM tune or by removing the mechanical parts, the VLOM connector will not be needed.

If you plan on retaining this feature, connect the VLOM connector at this time.

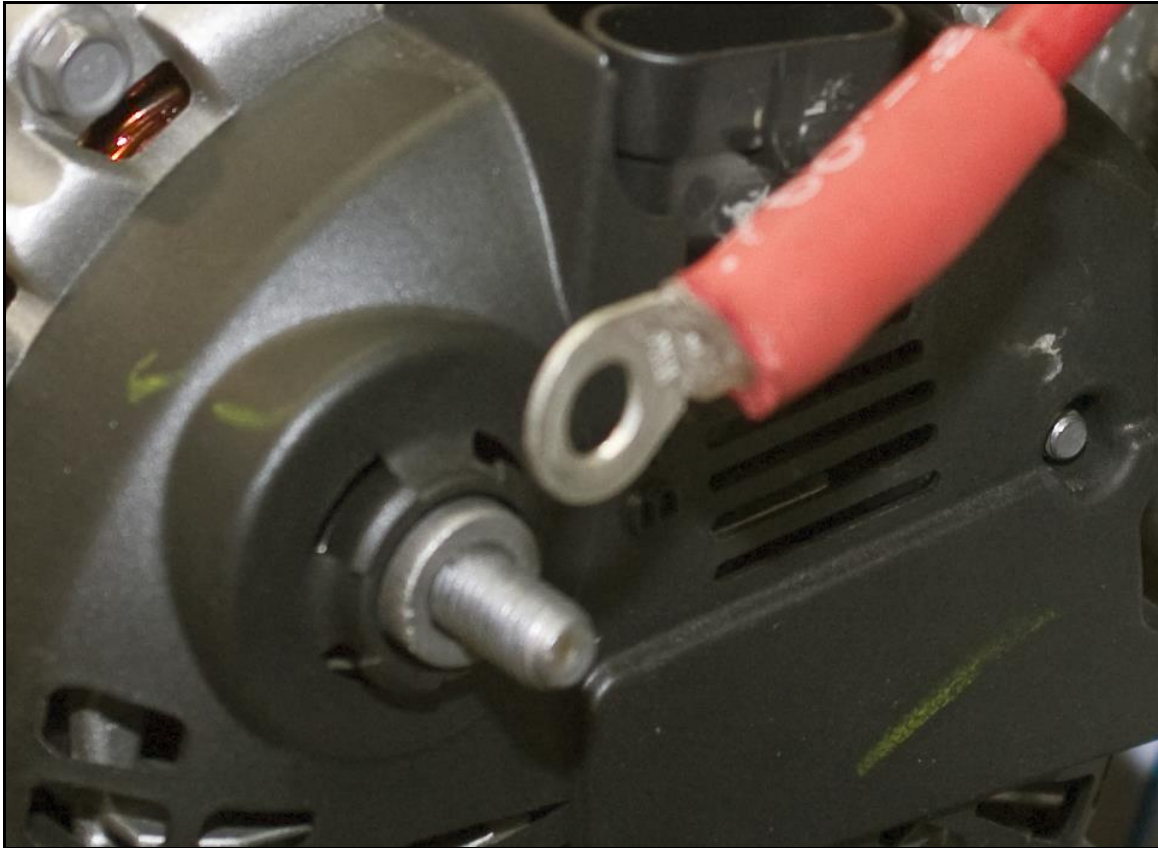
Now work your way down the drive side fuel rail and connect the fuel injector connectors to their corresponding fuel injector. From the front of the engine the injectors are numbered as 1, 3, 5, and 7. Then plug in the driver side coil connector into the coil near plug sub-harness.



Route the coolant temperature sensor connector to the sensor located right in front of #1 cylinder exhaust port. Plug it in to the sensor.



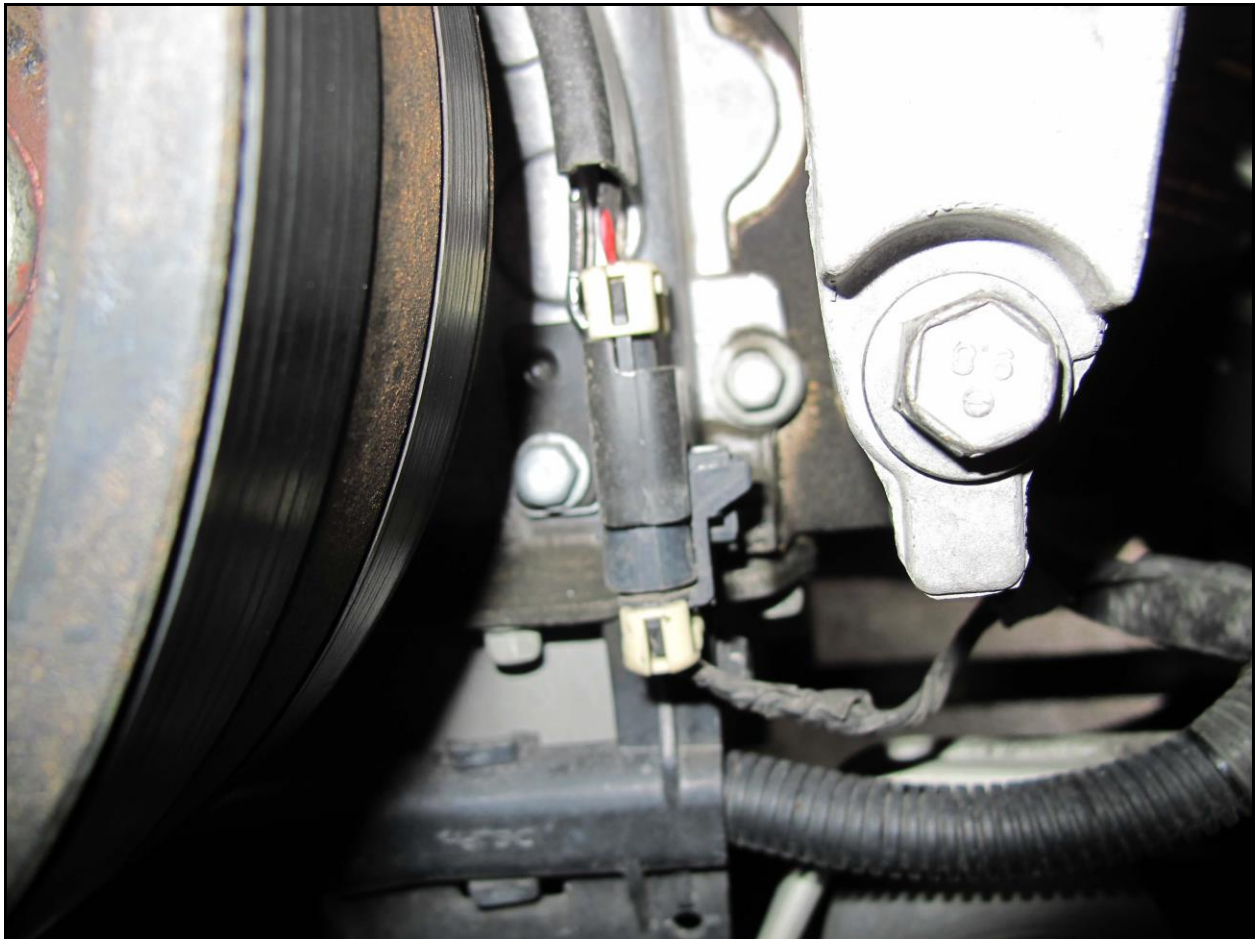
In the parts kit you should find several 4 gauge crimp on terminals and a length of red water proof heat shrink. Find the appropriate terminal that fits the threaded charge post on the back of the alternator. Cut the red heat shrink into two pieces approximately 1.5" long. Slip one of them onto the 4 gauge wire. Route the 4 gauge red wire over to the threaded post and cut it to length. Strip 3/8"-1/2" of insulation from the end of the wire. Crimp the terminal you picked out from the parts kit onto the wire by using either battery cable crimpers or some good channel locks. Make sure you get a really good crimp here. The last thing you want is a loose crimp on a very high Amp circuit such as an alternator charge wire. Now, slip the heat shrink down to the end of the wire but not covering the ring eyelet. Use a heat gun to shrink the tubing onto the wire. Excess glue will protrude from either end of the heat shrink as it reduces in size. Once shrunk let it cool and then remove any excess glue by peeling it away with your fingers.



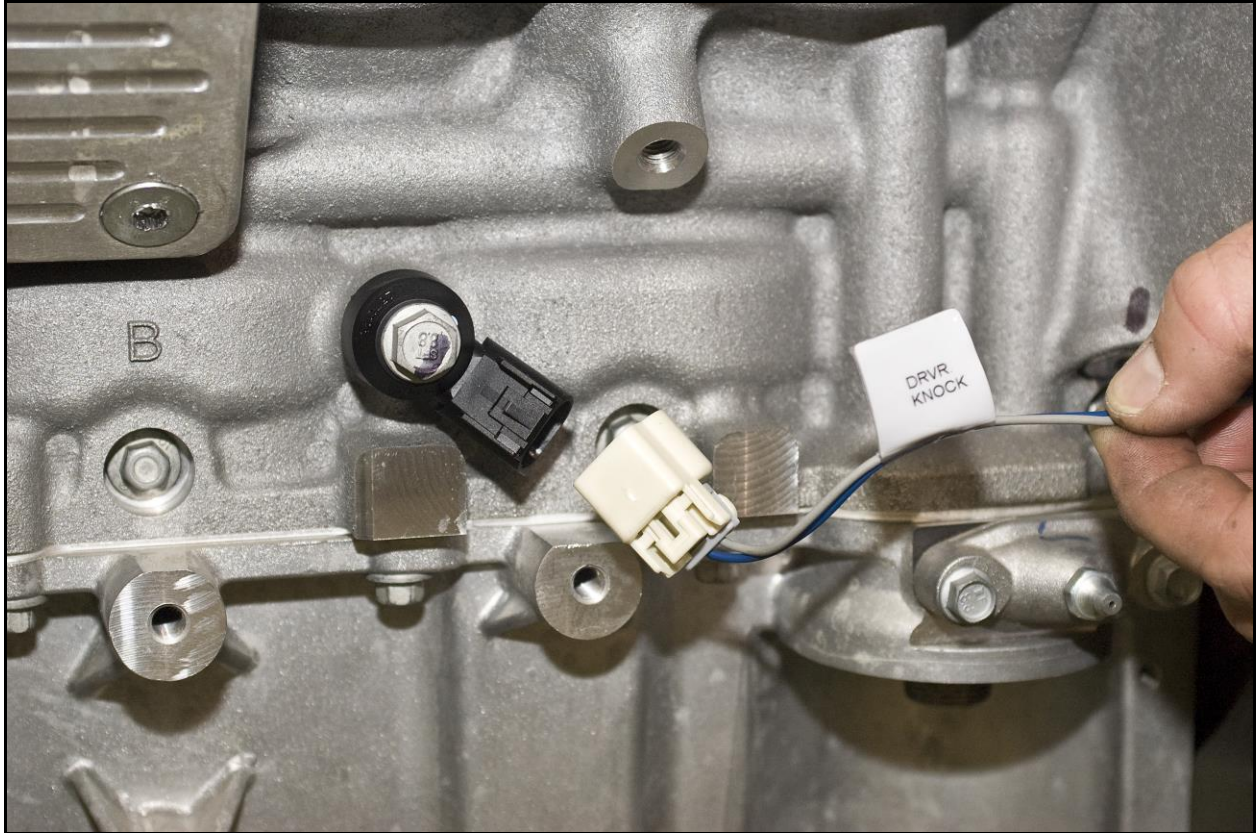
Next, take the four pin alternator connector and plug it into the alternator.



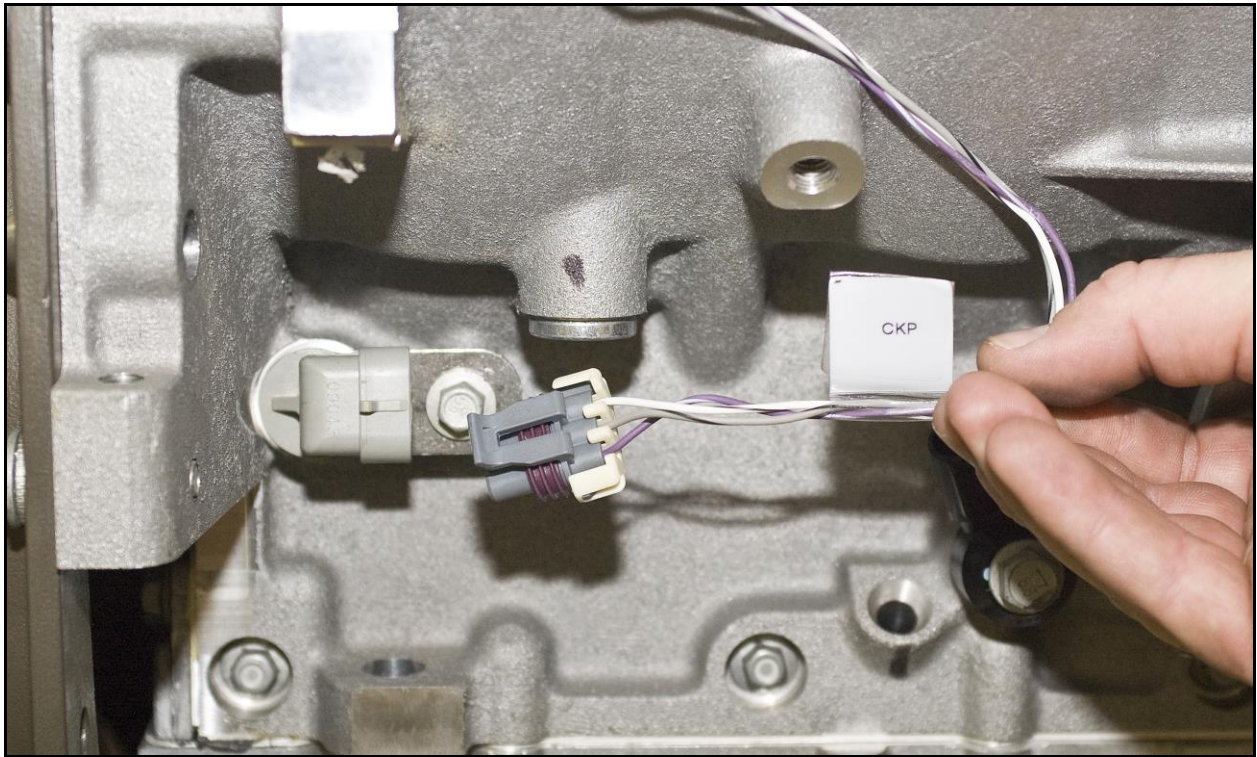
Route the cam position sensor connector down the front of the engine and over to the cam position sensor. You will find this connector has three pins. The Painless harness has an adapter pigtail plugged into it that adapts the harness to match up to the three pin cam position sensor connector on your engine. Plug the three pin connector on the end of this pigtail directly into the cam position sensor connector on your engine.



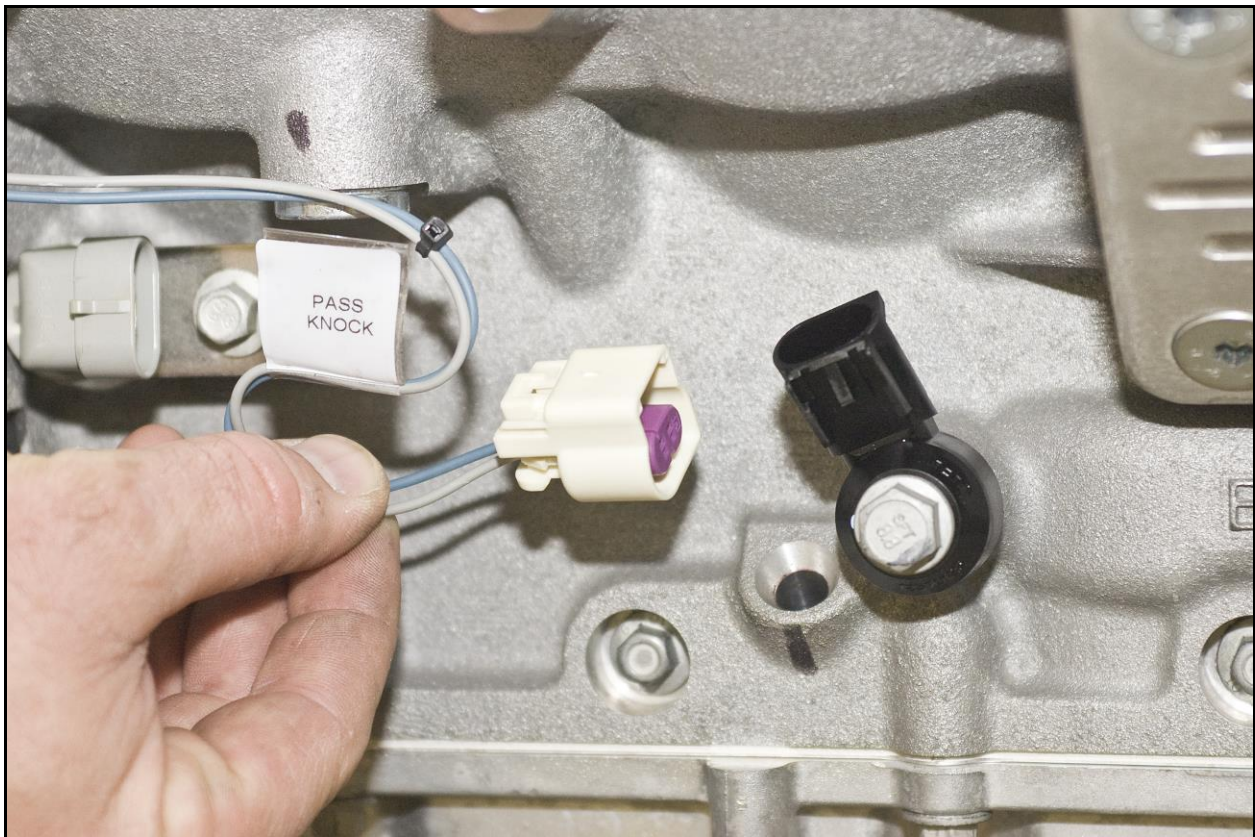
On the driver side of the engine block you will find a black, two pin knock sensor. From the main break out of the Painless harness located at the center-back of intake manifold find the two wire mating connector for this knock sensor. It is labeled DRVR KNOCK and has a grey and blue wire in it. Plug this connector into the driver side knock sensor. Make sure to route the wires so when you install the exhaust headers or manifolds it does not come in contact with them.



Move over to the passenger side of the engine. Here you will find a grey three pin connector labeled CKP. Plug this connector into your engine crank position sensor located right above where the starter bolts to the engine.



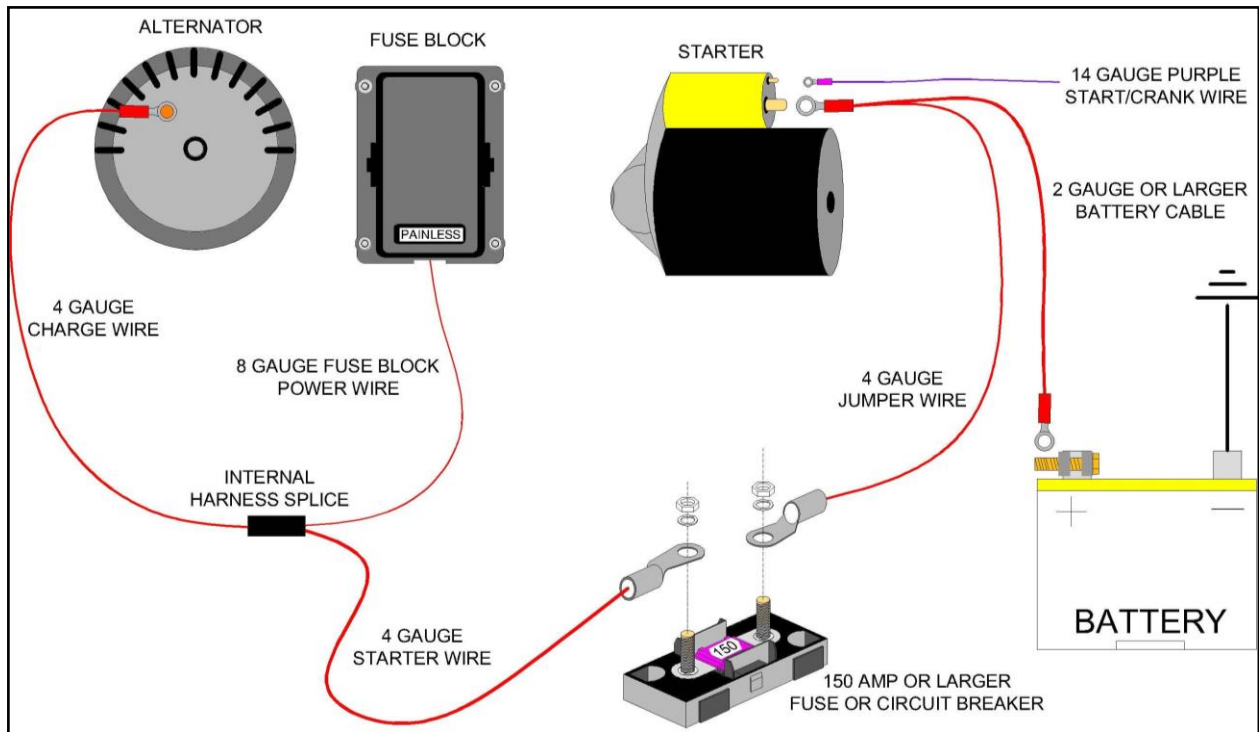
Next you will need to plug in the passenger side knock sensor. This harness has a white two pin connector labeled PASS KNOCK that is designated for this sensor.



NOTE: Don't forget about the inline fuse or circuit breaker that should be installed between the battery positive cable and the red 4 gauge charge wire you are about to connect in this next step. Without this protection, should the charge wire short to ground, your vehicle could possibly deconstruct itself through the use of fire.

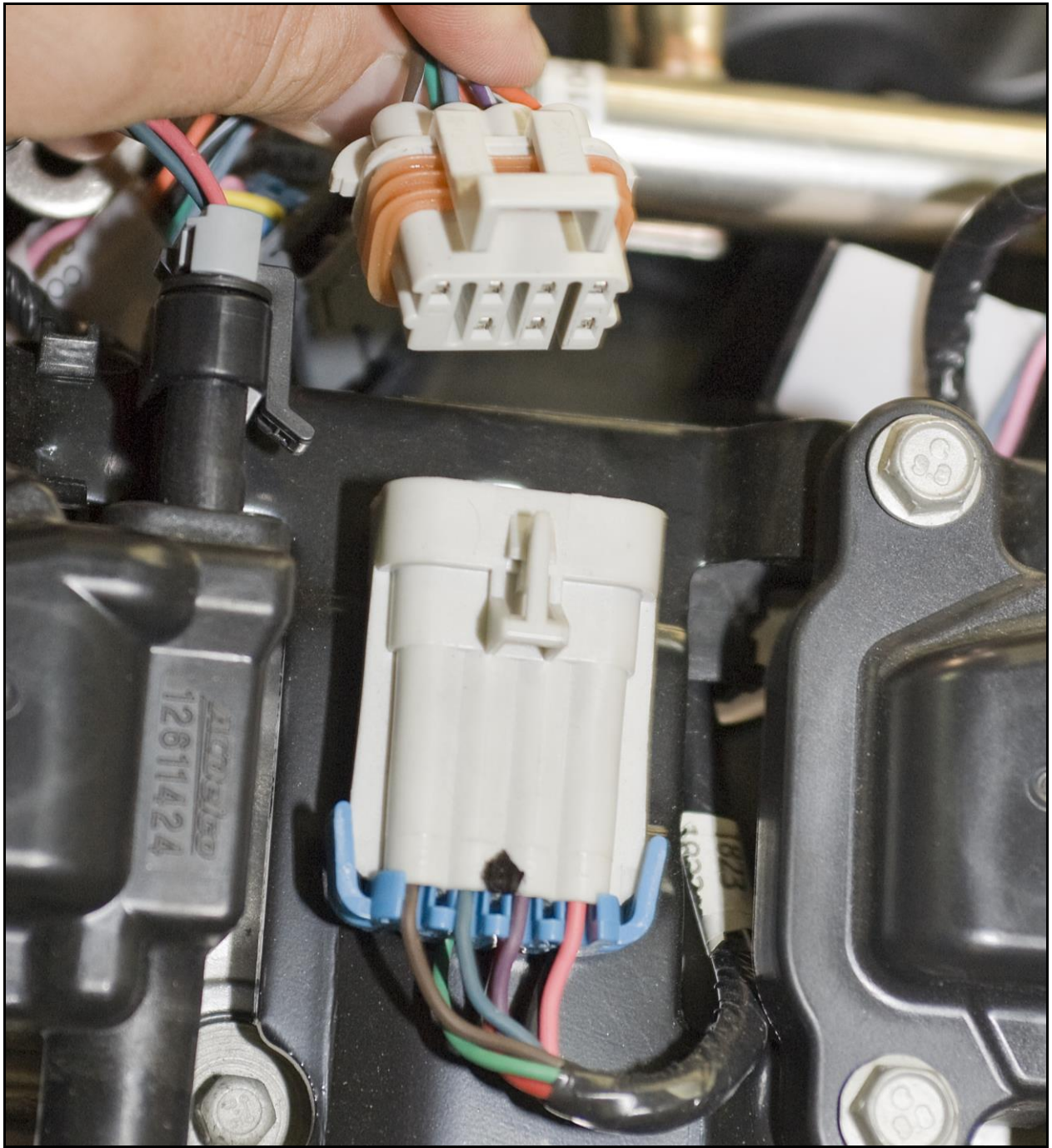
With the starter installed to the engine, route the 4 gauge red wire to the high Amp fuse or circuit breaker. As you can see in the diagram below you will then have to route a 4 gauge wire from the other side of the circuit breaker or fuse over to the battery terminal on the starter or directly to the positive post on the battery. This jumper wire and terminals are not included in this wiring kit. You will need to visit your local auto parts store to purchase them.

Then route the 14 gauge purple wire to the start/crank terminal on the starter. Make sure your routing strategy takes into consideration any clearance required between it and your headers. See the diagram below for more information.

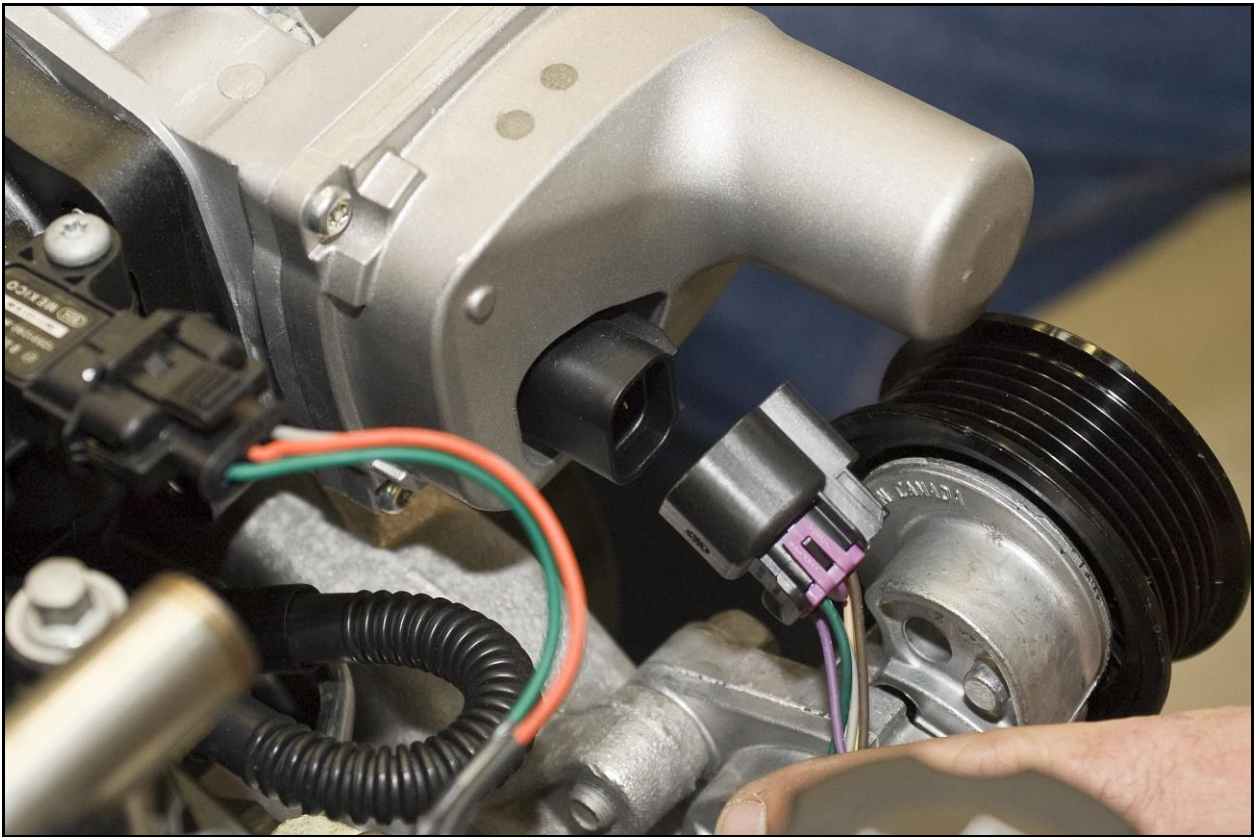


Move back up to the top of the engine. Route the large harness breakout that includes the passenger side injectors, coils, throttle body, m.a.p. sensor and m.a.f. sensor connectors down the fuel rail. Plug the injector connectors into their mating injector. The injector connectors are numbered and broke out where they should easily fall right into place.

Next plug in the passenger side coils connector into the coil sub harness.



Route the throttle body connector over to the throttle body. Plug it in as shown below.



Route the m.a.p. sensor connector up to the m.a.p. sensor, which is located front and center top of the intake manifold. Plug it in as shown here.



If you have the factory installed fresh air intake from the donor vehicle you should have then also gotten the mass air flow sensor. It should look something like what is shown below. Route the m.a.f. connector over to the m.a.f. sensor and plug it in.



If your vehicle requires a custom fresh air intake system then you must mount the mass air flow sensor between the air filter and throttle body. Shown here is a Corvette mass air flow sensor part #15865791. This sensor has mounting holes and can be easily inserted into a custom fresh air intake system.

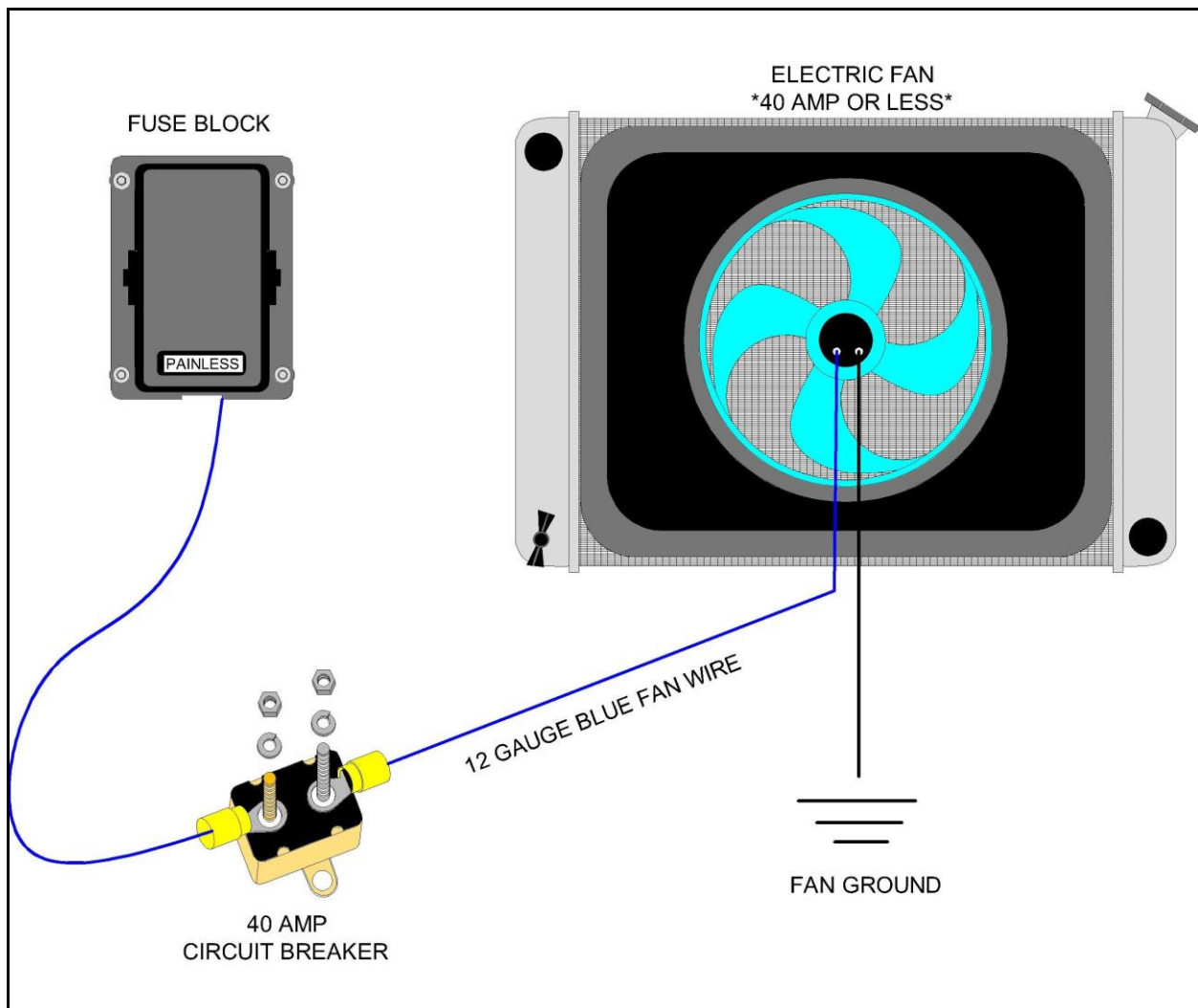
Note: Mass air flow sensors are calibrated to operate in a factory fresh air intake system. Building a custom tubing assembly will require you to have your ECM programmed in order to compensate for changes in air flow. See your local dyno tuner or purchase some aftermarket software such as HP Tuners for help with this.



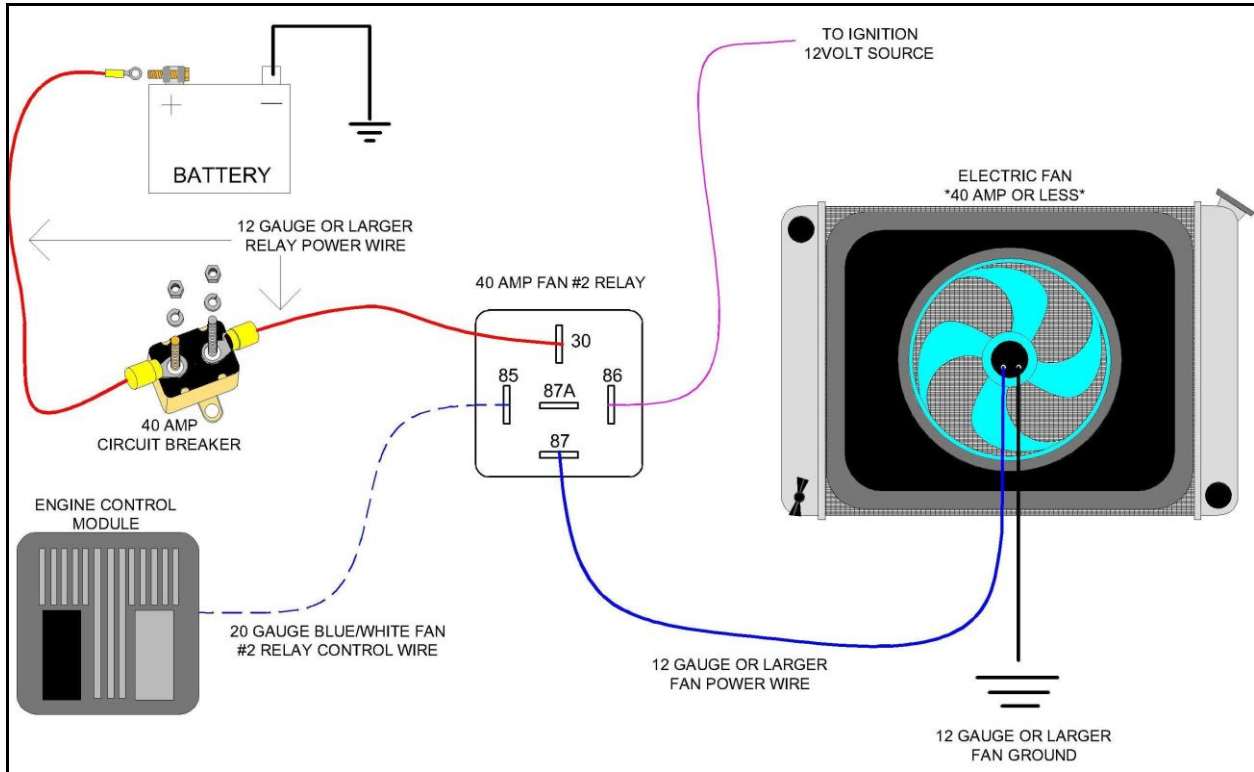
Electric Cooling Fans:

This 60524 harness provides two wires to operate a single or dual electric cooling fan set up. These wires originate from the same harness break out as the fuse block, TCM and ECM connectors do. Connect them as described below.

12 Gauge Blue Wire: This wire is relayed but **NOT FUSED** at the fuse block. It is provided power through a 40 Amp relay which sources power through the main charge wire splice that also provides power to the entire fuse block. This relay is activated by the ECM. In the parts kit is a 40 Amp circuit breaker, a red cover, two ring terminals and two self tapping mounting screws. Find a suitable mounting place for the circuit breaker. Route the 12 gauge cooling fan wire to the copper colored BAT terminal of the circuit breaker. Cut and strip the wire 1/4". Crimp one of the yellow #10 ring terminals to the wire, shrink the heat shrink and then install it to the circuit breaker. Take the extra length of 12 gauge blue wire you cut and install the other yellow #10 ring terminal to it. Install this length of wire to the other side of the circuit breaker. Route the other side of this wire to the positive (+) wire from your cooling fan. See diagram below for explanation.

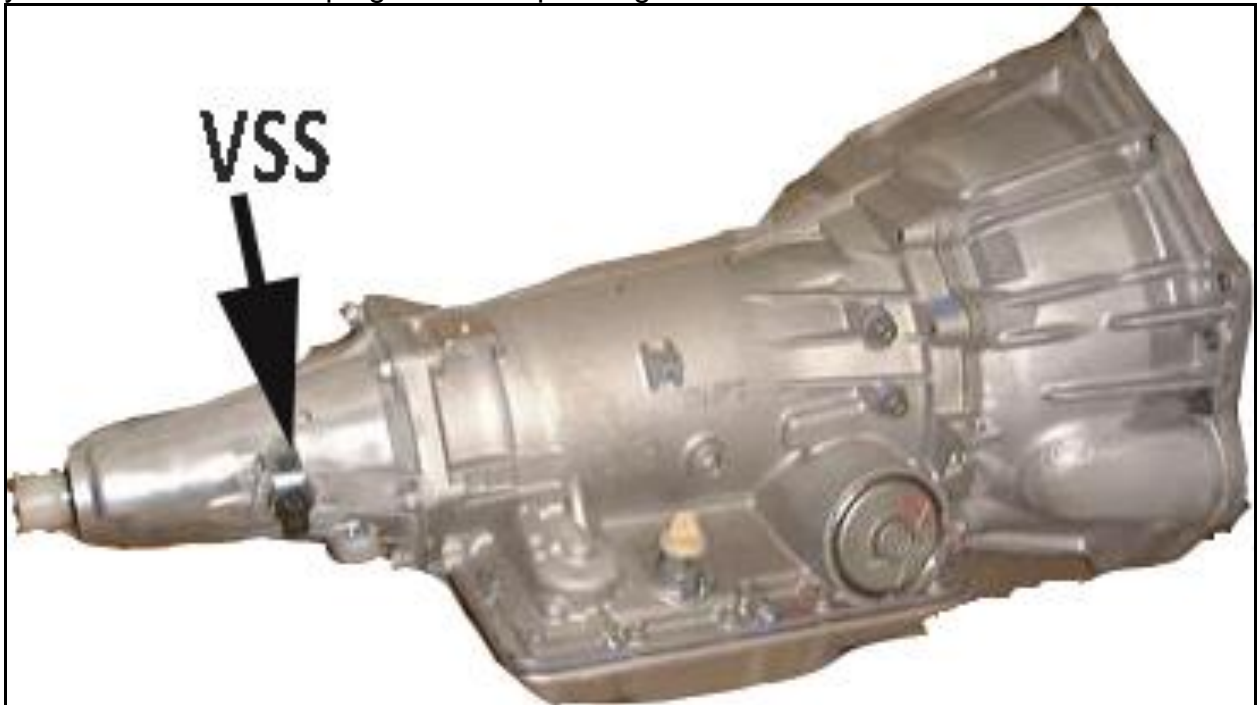


20 Gauge Blue/White Wire: This wire is to be connected to a second cooling fan relay if your vehicle utilizes two cooling fans. This wire is only to be connected to the activation terminal which controls the coil of a relay. It grounds the relay to turn it on. See diagram below for explanation. This harness only supplies the activation wire for the relay. Painless offers a simple relay kit [#30101](#) which would provide the relay, circuit breaker, terminals and wire as shown in the below diagram.

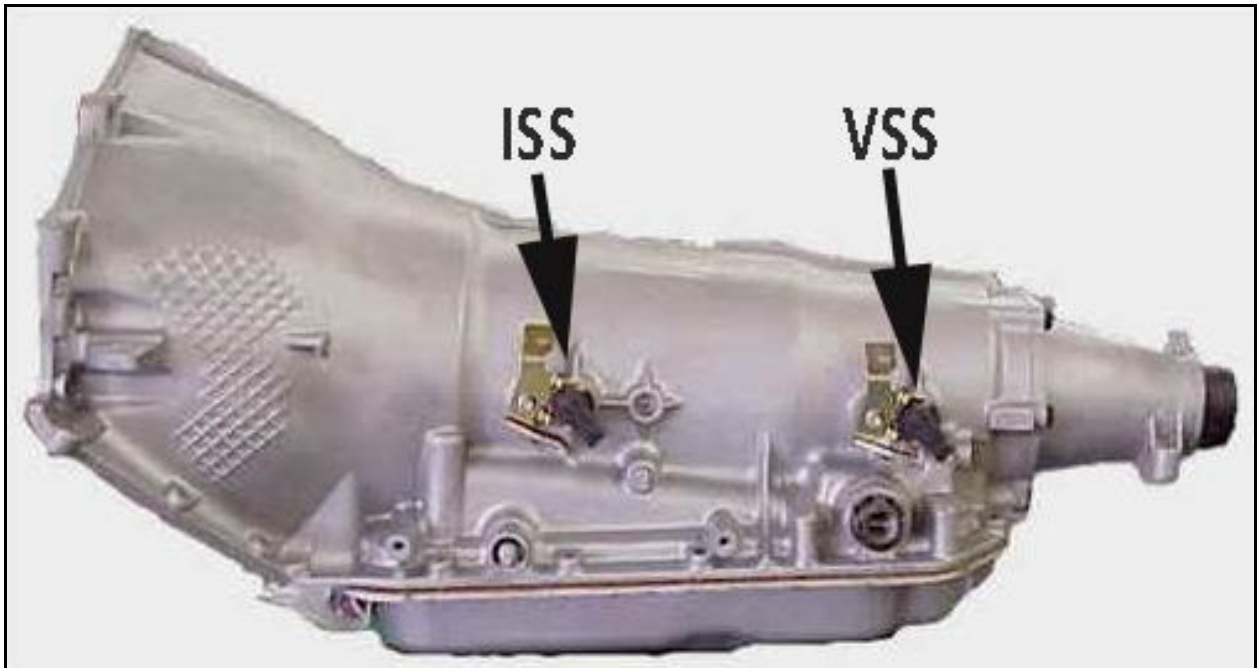


Transmission Connections:

On your 4L65E transmission the solenoid pack connector is located on the passenger or driver side of the transmission. 4L65-70E has it located on the passenger side and the 4L80-85E is on the driver side. Locate the connector on your transmission and plug the corresponding harness connector into it. The 4L65E vehicle speed sensor is located in the tail shaft housing of the transmission. Locate the vehicle speed sensor in your transmission and plug the corresponding connector labeled VSS into it.



4L80E and 4L85E transmissions have a vehicle speed sensor and also an input speed sensor located on the driver side of the transmission. Below is a picture of a 4L80E transmission for reference. This harness does not support the use of the 4L80E transmission.



Oxygen Sensors:

This harness utilizes the two primary heated oxygen sensors. You must install into your exhaust pipe and plug in these oxygen sensors to the harness. The connectors on this harness are labeled DRVR O2 and PASS O2. See the picture to the right to identify you have the correct oxygen sensors to mate to this harness.



Always install oxygen sensors as close to the engine as possible. Most aftermarket headers come with oxygen sensor bungs already welded into the header collectors.

Always clock the oxygen sensors between ten O'clock and two O'clock in the exhaust pipes or header collectors. If you need bungs to weld into the exhaust, Painless offers part number [60406](#), which is pictured to the right.



Rear of Vehicle Connections:

Off of the main harness breakout you will find open ended wires for the fuel pump and the reverse lights. Connect these wires as described below.

Fuel Pump: This wire connects to one of the small 30 Amp relays in the fuse block. It is fused through a 15 Amp fuse. Most fuel pumps require a maximum of 15 Amps to operate. If your fuel pump requires more Amperage feel free to insert up to a 25 Amp fuse in this fuse slot. See fuse block diagram at end of manual for fuse location.

Route this fuel pump wire to your fuel pump and connect to the positive (+) terminal of the pump. In the parts kit you will find two terminals with #6 rings on them. These should fit most aftermarket fuel pumps. Use them to make the connections to the (+) and (-) posts on the fuel pump. Make sure to shrink the heat shrink on the terminals once you have crimped them to the wires. You will also find a #10 ring terminal in the parts kit that you can use to connect the other side of your fuel pump ground wire to the chassis or body.

Reverse Lights: This wire should be routed out to the reverse lights on your vehicle. Since you have installed a PRNDL switch that has an internal reverse switch you no longer need a column mounted or floor shifter mounted one. With the transmission shifted into reverse and with the ignition key on this wire will provide the 12 Volts needed to operate the reverse lights. You will find a blue heat shrinkable butt splice in the parts kit that you can use to make this connection.

Passenger Compartment Connections:

Ign. Switch Crank: This 14 gauge purple wire connects to the crank terminal of your ignition switch. It originates at the PRNDL switch mounted on the transmission. If the vehicle is in park or neutral and the ignition switch is in the crank position, 12 Volts will travel from the ignition switch, down this wire to the PRNDL switch, back out of the PRNDL switch on the purple wire that leads to the starter solenoid.

Fuse Block Ignition: There are two wires with this section label wrapped around them.

- **Pink**- This 20 gauge wire connects to an ignition/crank 12 Volt source. Make sure where you connect this wire has 12Volts with the ignition switch in the run and crank positions. With 12Volts applied to it this wire turns on this fuel injection harness. Use one of the blue Posi-Taps in the parts kit to make this connection.
- **Lt. Green**- This 18 gauge wire connects to the reverse light fuse of your chassis harness' fuse block. This wire provides 12 Volts to the part of the PRNDL switch that controls the reverse lights of the vehicle. Use one of the blue Posi-Taps in the parts kit to make this connection.

Brake Switch: This 20 gauge Light Blue/White must be connected to your brake switch. It must see 12Volts when the brake is applied.

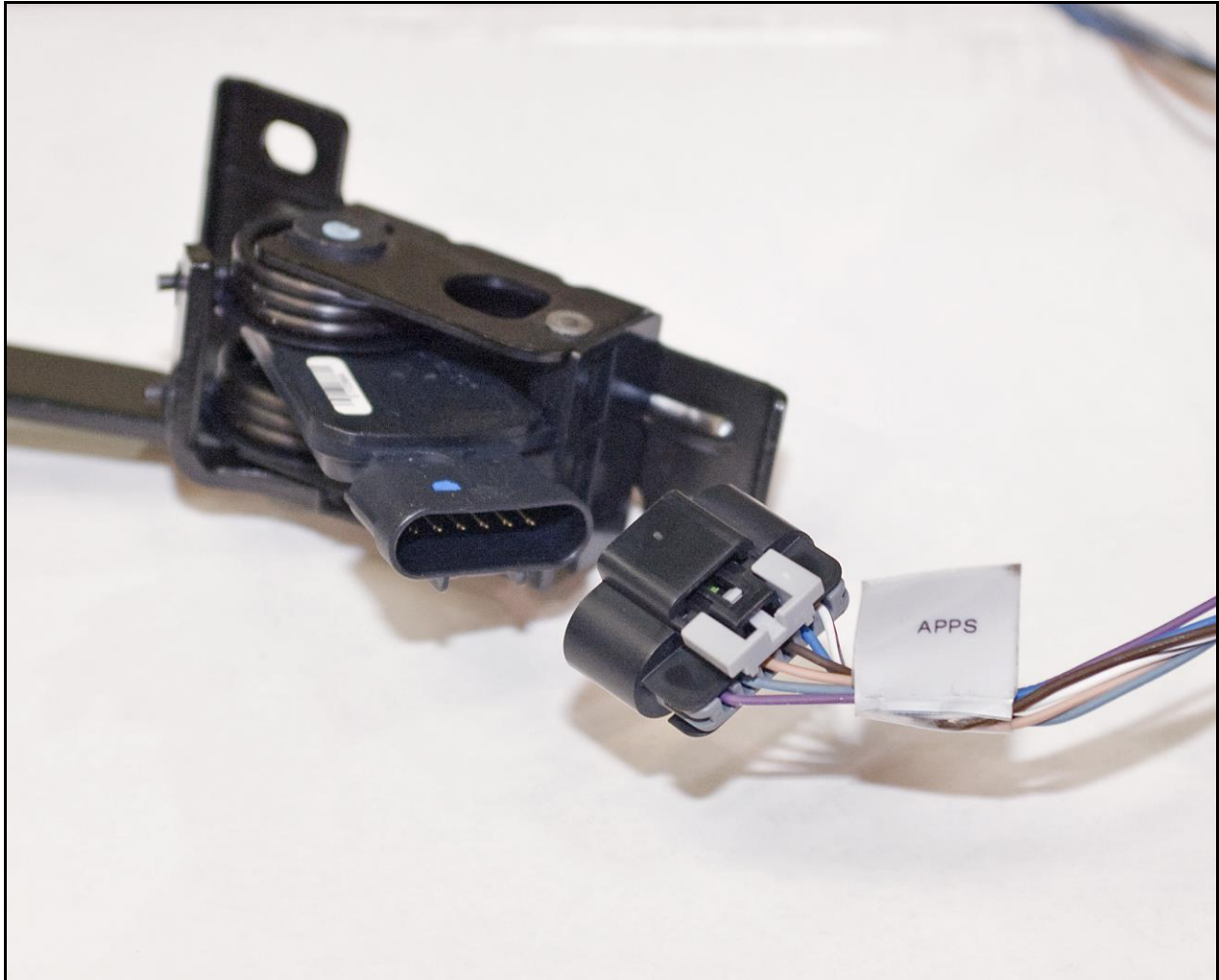
VSS Output: This 20 gauge Yellow/Black wire connects to your electric speedometer's signal input terminal. This wire originates from the ECM which transmits a signal relative to vehicle speed that can be read by most aftermarket electric speedometers. See the installation manual for your speedometer for instruction on how to calibrate it according to the ECM's signal.

DLC: This OBD-II connector is your link to what the ECM, TCM, engine and transmission are doing. It is a good idea to mount the connector in an easily accessible location such as the glove box, console or under the dash. You can use the bracket already zip tied to the connector or build your own mounting solution.

MIL: This check engine light is OBD-II compliant. Mount the light somewhere in the dash so that you can easily see it. The ECM will command this light on if it sees an operational problem with the engine or transmission.



Accelerator pedal: Pictured below is the OEM accelerator pedal from a 2006-2010 Chevrolet Corvette. This is the part number listed in the part list on page 9. As you can see the pedal is made from steel. You should also notice the foot pad is offset to the wrong side of the mounting flange. If you were to try to mount this pedal into just about any hot rod you would find that the mounting flange would need to be mounted right where the steering column pokes through the fire wall.



The pictures on the next page show a custom built bracket designed to offset the mount points on the accelerator pedal and the OEM mounting points on this 1978 Camaro that received a LS3 engine with this harness. Notice that we had to build a custom mounting bracket in order for the foot pad to line up with the brake pedal.

Another alternative to the OEM Corvette pedal is to purchase an accelerator pedal from an aftermarket company such as Lokar. They manufacture custom accelerator pedals with the hot rod look to them.



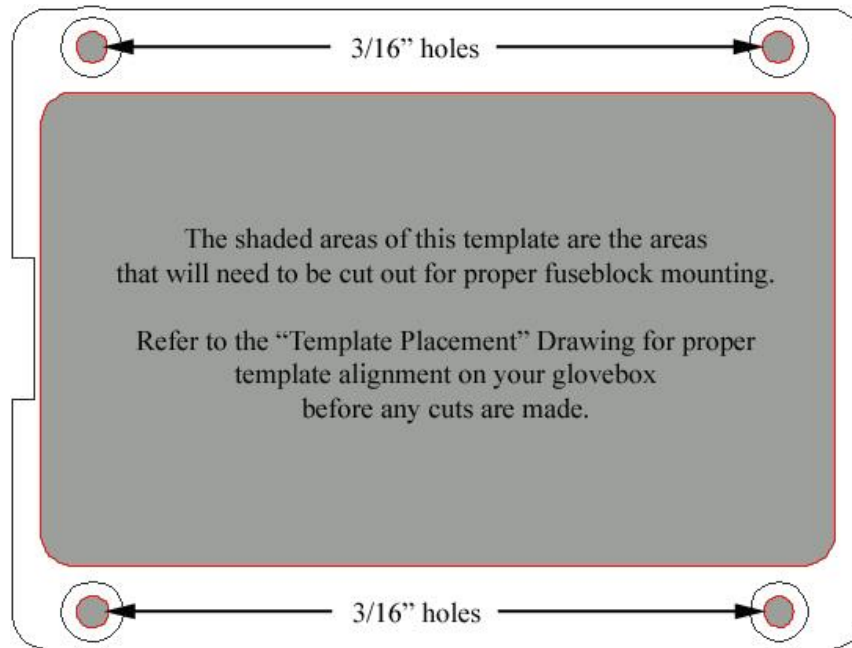
Prestart-up Checks:

1. Now that you have finished installing this fuel injection harness it is time to go back and double check you have all components plugged in and secured with tie wraps. Again, be sure the harness does not touch or get too close to any header/manifold or exhaust piping.
2. If the vehicle has sat for any extended period of time please make sure that you purge the old fuel out of the fuel lines and the fuel tank. Start your engine with new fuel, preferably 92 Octane.
3. If you have assembled a new fuel system for this vehicle make sure you purge the fuel lines of any dirt before you connect it up to the fuel rail. It doesn't take much dirt to clog up your injectors.
4. With the fresh air intake tubing removed from the throttle body, key the ignition switch on. Depress the accelerator pedal and make sure the throttle reacts accordingly to the pedal movement. Make sure you get wide open throttle when the pedal is fully depressed.
5. Fuel
 - a. Bleed the air out of the fuel rail by purging it through the Schrader valve. Be careful and safe when doing this. **FUEL = FIRE if you are not!**
 - b. Thread a fuel pressure gauge onto the same valve or to your fuel pressure regulator. Key the ignition on a few times and make sure you have approximately 58 PSI of fuel pressure.
6. Air
 - a. Check that you have not left any shop rags in the fresh air intake tubing.
 - a. Check that the clamps holding the tubing together is tight.
 - b. Make sure you have a clean air cleaner installed into this tubing.
7. Spark
 - a. Check that you have properly gapped spark plugs and that each cylinder has a spark plug.
 - b. Check that you have the coil to plug wires installed.
 - c. Make sure the coil sub harnesses are correctly plugged into each coil. If you have for some reason removed these sub harnesses from your engine make sure you reinstall it exactly how the OEM factory had originally installed it.

Now you can install your battery cables and start the vehicle. If you have any issues show up while trying to start the vehicle please call our tech line at 1-800-423-9696 or email us at tech@painlessperformance.com.

Fuse block through hole template:

Cut this template out and use it to mark where your cuts are made in order to through-hole mount the fuse block. The template is to scale. After marking your material to be cut make sure to cut the line or even 1/16" over the line on the outside of the shaded area. Otherwise you may need to file to fit the fuse block in the cut hole.



Painless Performance Products, LLC **Limited Warranty and Return Policy**

Chassis harnesses, fuel injection harnesses, and Trail Rocker units are covered under a lifetime warranty.

All other products manufactured and/or sold by Painless Performance are warranted to the original purchaser to be free from defects in material and workmanship under normal use. Painless Performance will repair or replace defective products without charge during the first 12 months from the purchase date. No products will be considered for warranty without a copy of the purchase receipt showing the sellers name, address, and date of purchase. You must return the product to the dealer you purchased it from to initiate warranty procedures.