HEMI Installation Instructions

Thank-you for choosing Swap Specialties for your HEMI project needs. Expect everything to be the highest of quality, craftsmanship, and detail. Every product is 100% tested and customized to fit your project needs.

Please follow these simple guidelines to ensure proper installation and function of your product(s).

Getting to know your Powertrain Control Module (PCM, ECM, ECU, ect…)

If you received a PCM from Swap-it comes tuned and setup for the powertrain platform you are running. Some minor performance and drivability enhancements have been altered in the computer to give your engine the best performance and ease of economy. Some changes may need to be made and/or programmed if you have made engine enhancements such as:

Larger Fuel Injectors

Aftermarket Camshaft

Electronic Transmission Enhancements

Turbo or Supercharger Installation

Significant Internal Motor Modifications

Gear Ratio and Tire Size of your project

We can provide the changes you need with our simple and fast Mail-In program. We do recommend that any major motor modifications be tuned on a dynamometer by a professional to achieve maximum potential and operation.

Installation

If your PCM is a factory OEM style, its manufactured unit and is completely weatherproof. Many popular mounting locations are on fenders, under dash, under battery trays, and on a firewall- The options are virtually endless. However, DO NOT MOUNT IN CLOSE PROXIMITY TO HEAT such as close to exhaust or heat exchanger.

!!! If you're running a Holley Terminator or are unsure if your PCM is weatherproof it is best to mount it in a Interior or weatherproof location. !!!

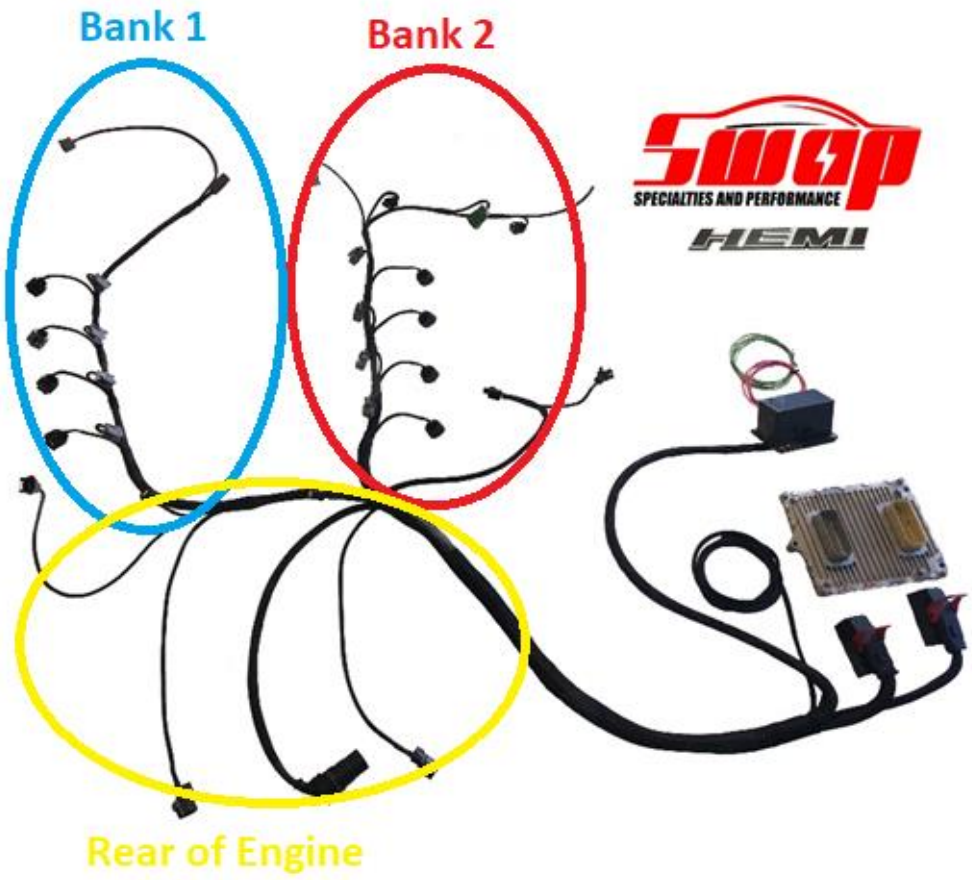
Mounting brackets are available for your PCM but some fabrication may be needed to fit in custom areas. As will all electrical components, do not weld on, screw to, or drill any PCM. Vital interior components of the computers are sensible to electricity and must not be tampered with.

It's Harness Time!

Your standalone harness comes setup to run from the PASSENGER REAR of the engine unless otherwise ordered. The harness will come with a "Natural" form to fit on the motor and ensure ease of installation. Please keep adequate clearances from turbo, exhaust, and/or high temp areas to prevent any damage to the harness. Also assure any tight wires may need to be rerouted to ensure integrity.

Connectors and wires will all be labeled accordingly. Furthermore, each wire and connector is formed to specific lengths to reach components. If for any reason something looks like it wont reach, please take the time to ensure you have the correct item you are trying to connect.

Note*- The Hemi engines do have some variations to them in reference to sensor locations. Your harness comes setup according to the year and model you ordered it for. If something is not in the correct location please let us know- we have extensions and pigtails available to make things connect if your engine and harness are not fitting correctly.

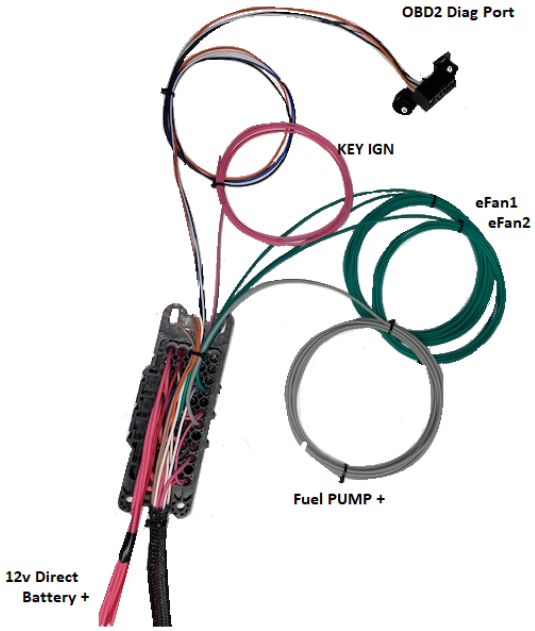


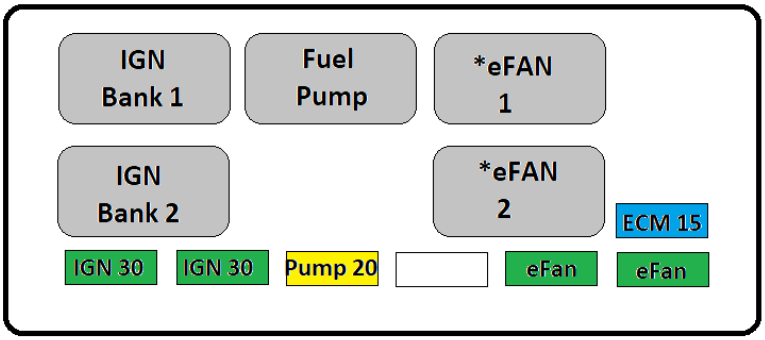
Relay & Fuse Box

The relay and fuse box is completely weatherproof and can be mounted anywhere on the vehicle. A diagram on the inside cover shows relay and fuse location. This can be a main point of troubleshooting if problems ever arise.

ALL RELAYS COME WITH WIRE OUTPUTS. All output wires are labeled and appropriate lengths.

The wires provided are not long enough?
If you need to extend any wires please make sure the wire size is the same size or larger. DO NOT use "crimp connects" as these are not weatherproof and my malfunction as time passes. Please use a rosin-core solder if possible to connect any extending wires and use a heat shrink sleeve to shield and cover the joint.





Where do my wires go to?

Battery *Do I need this? YES!*

There is a bundle of wires coming out of the back of the fusebox. A wire DIRECTLY FROM THE BATTERY needs to be run to this and terminated with a barrel crimp or solder. A minimum of 10 GA WIRE or larger should be used. This fuse box protects the entire setup so no need to fuse this connection.

DO NOT setup a disconnect to this wire. The PCM learns your driving habits, power and efficiency data, and fuel habits and it needs battery power to store it. If you kill power to the battery the computer has to learn this data from the start and repetitive on/off may ultimately harm its processor.

12v Key IGN *Do I need this? YES!*

This wire needs to see 12v with ignition on AND WHILE CRANKING. Also known as IGN 1, this wire tells the computer when you turn the key on and also shuts the system down.
Popular locations for this wire should the key switch only. The engine will not shut down until this wire looses power. If you cannot connect it directly to the key switch please refer to a wire that is not powering another vehicle component- A draw could keep this circuit hot or make it loose power while cranking.

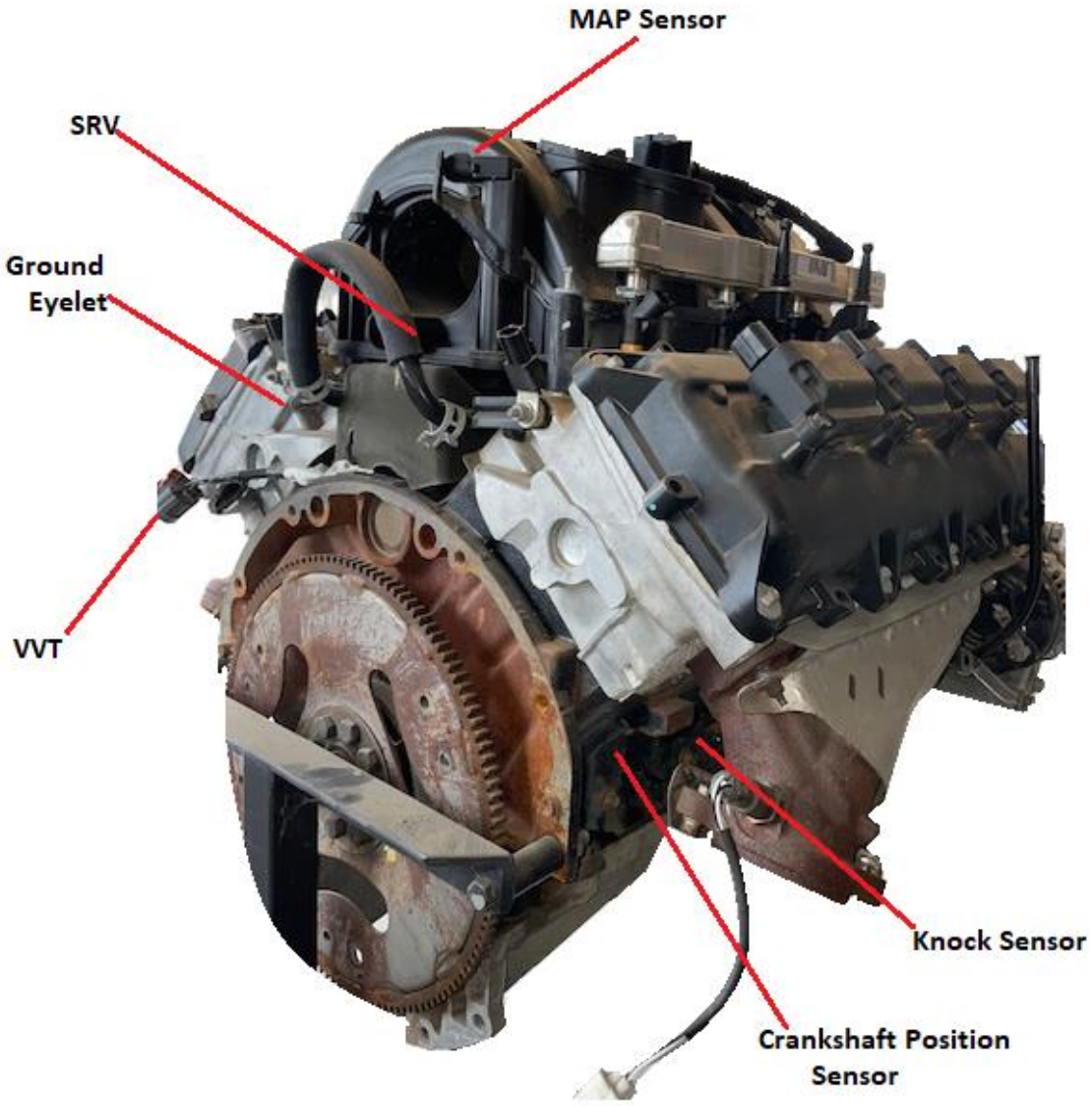
Fuel Pump *Do I need this? YES!*

This wire is the output from your fuel pump relay. This needs to go directly to the fuel pump "+" terminal on the pump. A 12v supply with max of 15 amps will be supplied. For dual pump setups please assure a jumper wire from pumps or addition to this wire is soldered securely and shielded from weather.

If your running an aftermarket ECU (holley, MoTec, AEM, ect…..) there will be more outputs that you can designate/assign functions to-we also may have already designated some already in the wiring to accommodate your platform.

On to the good stuff….

REAR OF THE ENGINE



Ground Eyelet

This eyelet needs to be fastened to the back of the cylinder head or the stud on any hard steel/aluminum point on the engine. There are lots of open spots, pick a good one and bolt it down. To assure it is a good ground, use a volt meter to check between it and the 12v post on the battery.

Crank Sensor (CKP) and Knock Sensor

The crank position sensor (CKP) is the sensor that is the PCM uses with the Cam position sensor to fire injectors and adjust timing control. The sensor is a 3 pin plug located behind the starter on the passenger side of the block.

Knock/Detonation Sensor(s)

There are 2 Knock sensors on the Hemi Block, 1 on each side of the main block. They can be tuned out however we recommend you run them to help protect the engine and control timing conditions.

MAP Sensor

The Manifold Absolute Pressure Sensor (MAP) relays the negative or positive manifold pressure to the computer. The computer then uses it to judge engine loading and adjust fuel and spark control. The sensor is a 3 pin connector located on the back of the manifold on most 06+ hemis and usually in the front of the manifold on the 03-05 model year intakes.

I am running an aftermarket intake without a MAP sensor.
Some aftermarket intake manifolds do not come with a provision or hole for a MAP sensor. You will need to have the manifold drilled to accept the sensor, it cannot be tuned out.
What kind of sensor do I use
There are a lot of types of sensors on the market. We suggest you use a stock application sensor unless your tuner tells you otherwise. Your PCM tune will need to be setup to accept a different style that factory (1 Bar, 2 Bar, 2.5 Bar, 3 Bar). The only difference between these sensors is pressure range it which it can read. DO NOT USE A CHEAP AFTERMARKET SENSOR. *Its best to stay with a OEM or higher quality sensor in this case.*

SRV

The Newer model year intake manifolds have a short runner valve that re-directs the airflow to change torque and hp curves. It is located at the rear of the intake. If you do not want to run it it can be left alone, however the PCM tune will need to omit the function as well

VVT

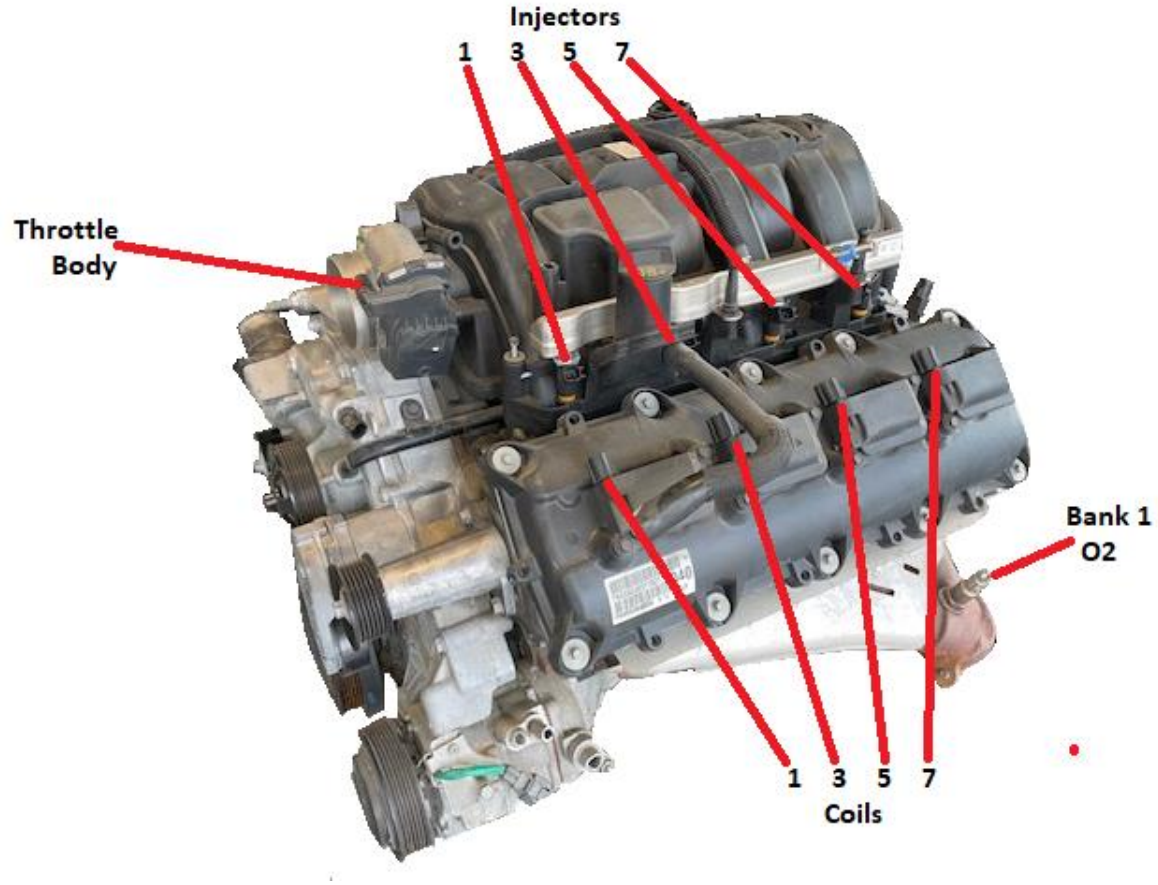
Newer model year Hemi's also use VVT (variable valve timing) to operate camshaft timing. The VVT solenoid is under the intake manifold. The hemi utilizes a sub-harness so you don't have to remove the manifold to get to it. The sub-harness exits the manifold at the rear of the engine/manifold. The plug also has MDS (cyl shut down/4 cyl mode) solenoid wiring included-our harness does not include this unless it is ordered to include

Oxygen Sensor(s)

OEM PCM's will use 1 Oxygen sensor on each side (upstream) to monitor and adjust fuel trims. Aftermarket computers can use 1 or 2 O2 sensors, usually a wideband setup as opposed to the narrow band the OEM PCM uses.

Sensor(s) should be located in the top 180' of the cross-section of the exhaust pipe. It should include a minimum of 4 cyl gas reading. New manifold gaskets are recommended, and no exhaust leaks can be present. Any amount of unmetered outside air can throw the sensor off and create abnormal readings.

BANK 1 DRIVER SIDE OF ENGINE



Fuel Injectors

On to these babies…… Your harness will be setup with factory injector connectors unless otherwise ordered. These 2 pin connectors should be set up to reach 1 and only 1 injector, they fire in sequential order and cannot be swapped around. Bank 1 cylinder will be labeled #1 and bank 2 #2 cylinder will be marked #2.

I'm not running stock injectors?
Please let us know, do not cut into the harness yourself as it will void all warranties. The PCM will also have to be tuned to run a different size injector. If you have a stock motor we recommend you do not change the size (they are rated by lbs./flow). Consult a tuner or us for recommendations and advise on injector sizing higher HP motors.

Coils

Just like the injectors each coil fires sequentially. Each coil first 2 spark plugs (Hemi design) underneath the coil itself. Simply plug the connector into the coil and your all set.

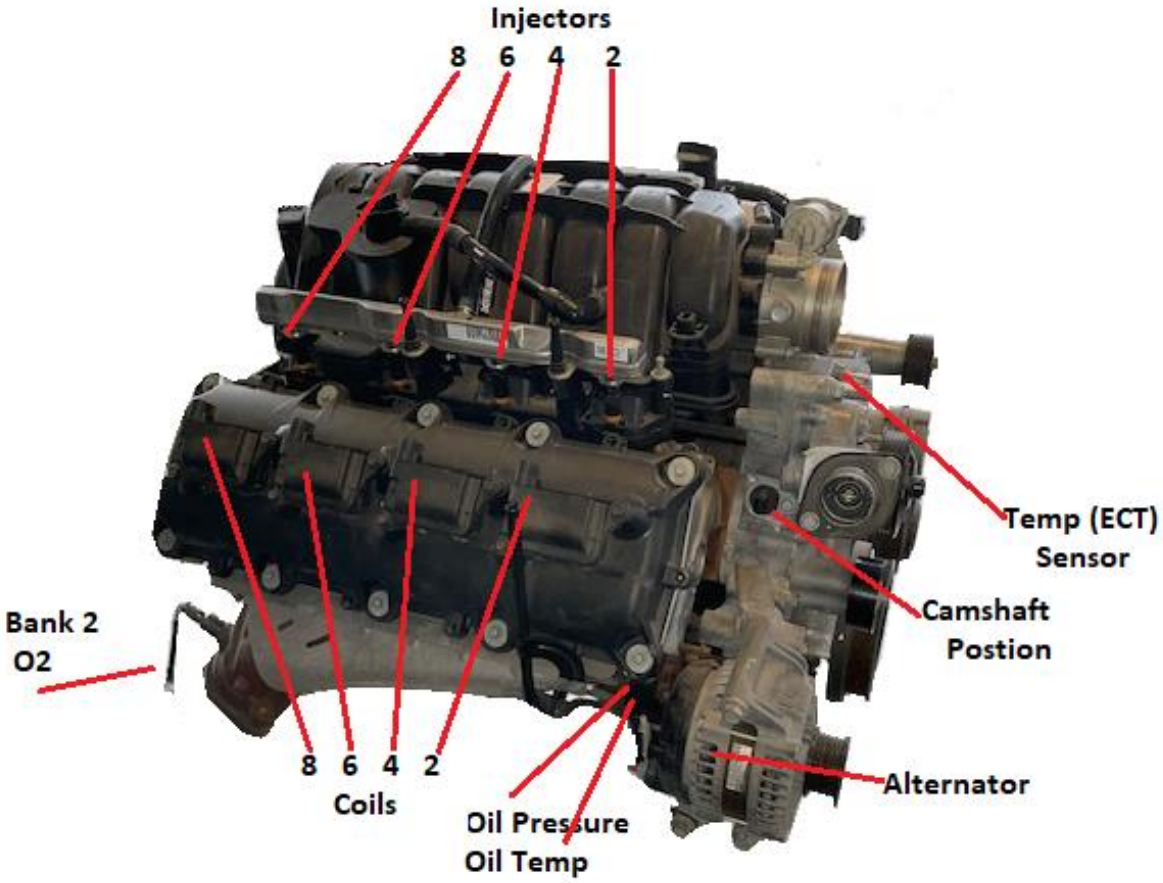
Throttle Body

Depending on the intake manifold your running the throttle body can be in slightly different locations. The plug will only go on 1 way, assure it is completely on and the locking tab is secured to keep it from coming off. All Hemi engine platforms come DBW/electronic throttle from factory, however if your running an aftermarket ECU or controller DBC is an option. If your running DBC then simply plug in the TPS (throttle position sensor) and the IAC (Idle air control valve) for correct operation.

IAT

Nearly all Hemi platforms that are Naturally aspirated are speed density-meaning they don't have a mass airflow sensor. Instead they just use a intake air temp sensor for calibration adjustments. Supercharged platforms come with a MAF in the air intake tube. If your running a OEM computer there will be a plug for the MAF. We suggest you run the factory intake tube to the throttle body with the MAF installed. The IAT on the superchargers will be in the lid of the charger itself, separate from the MAF.

BANK 2 PASSENGER SIDE OF THE ENGINE



Fuel Injectors

Just like the Driver side- Your harness will be setup with factory injector connectors unless otherwise ordered. These 2 pin connectors should be set up to reach 1 and only 1 injector, they fire in sequential order and cannot be swapped around. Bank 1 cylinder will be labeled #1 and bank 2 #2 cylinder will be marked #2.

Coils

Just like the injectors each coil fires sequentially. Each coil first 2 spark plugs (Hemi design) underneath the coil itself. Simply plug the connector into the coil and your all set.

Camshaft Position Sensor

The Cam sensor in located in the front of the motor on the cover by the water pump and is used for timing of injectors and spark by the ECU. There are 2 basic styles of these connectors and they do represent different reluctor rings on the camshafts. They are not interchangeable and aftermarket camshafts must be setup correctly to match which sensor and year engine you have.

Coolant Temp Sensor

The ECT sensor is located in the front of the motor almost to the center of the front cover.

Setting Up Your Coolant Temp Gauge
DO NOT TIE A GUAGE WIRE INTO THIS PLUG OR HANRESS!!! It will create an incorrect reading to the ECM and running troubles will surely be the result. If you need to run a temp gauge, find a port in the head coolant cavity to put a sensor in. You can also run CANBUS gauges that get data directly from the ECM via the OBD2 port.

Oil Pressure

Located on the lower front corner of the passenger side of the engine is the Oil pressure sensor. Early hemis used a single wire and in 2006 they switched to a 3 wire sensor.

Setting Up Your Engine Oil Pressure Gauge
DO NOT TIE A GUAGE WIRE INTO THIS PLUG OR HANRESS!!! It will create an incorrect reading to the ECM and running troubles will surely be the result. If you want to run a engine oil pressure gauge you can "T" into the port on the engine and add a pressure sensor for your gauge. Again, there are also CANBUS or digital dashes that can read info directly from the ECU OBD2 port.

Engine Oil Temperature

All factory Hemi engines have a oil temp sending unit right by the oil pressure sensor. Aftermarket computers don't use this as heavily as the OEM computers do.

Alternator/Generator

Factory computers will control the mopar alternator. Aftermarket ECUs usually do not have this option and it suggested that you run a 1 wire alternator or run a key power with a resistor to the correct voltage to control. If you need help with this please let us know.

!!You will need to run a heavy battery cable from alternator charging stud to the battery or starter!!

EXTRAs

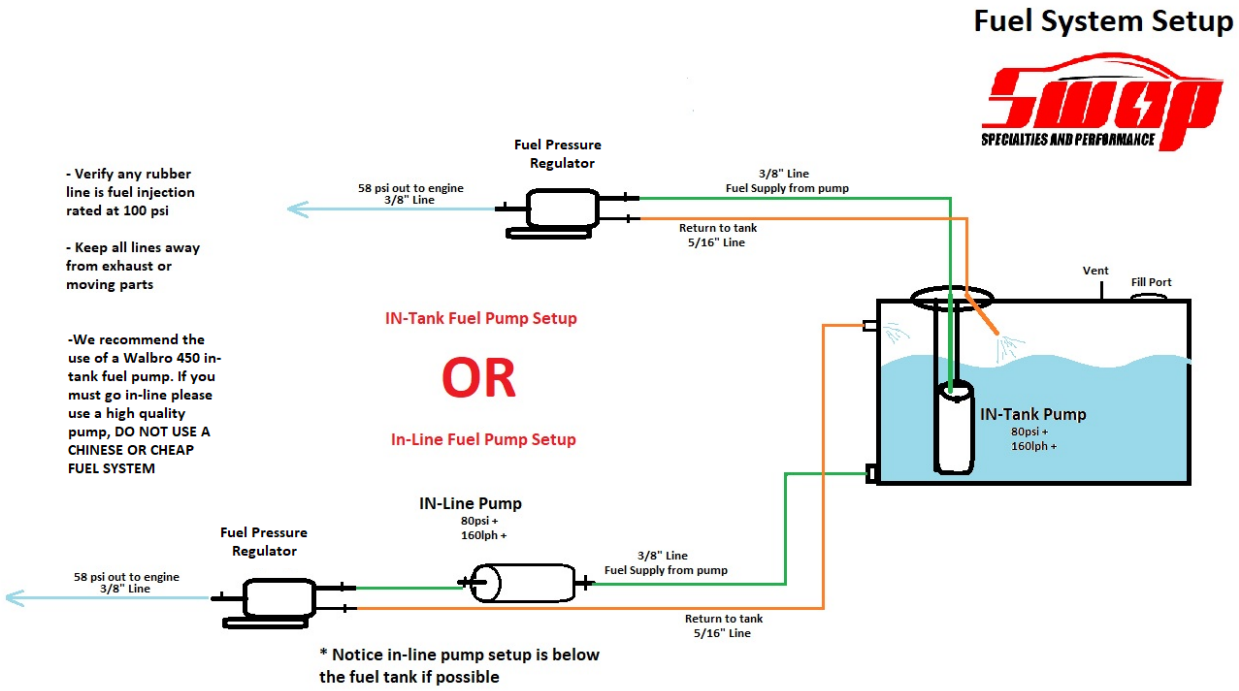
Accelerator Pedal

The accelerator pedal should be mounted in a location that is comfortable and clear of any obstruction. The Hemis can use the factory pedal truck or car, as long is it is the same generation as your engine- ie- 03-05, 06-10, 11+ Fabrication may be needed to accomplish a safe, clean, and comfortable pedal mount

How do I Setup the Starter
For safety reasons we leave that up to you. You can run the original vehicle start wire to the Hemi starter or run a new wire direct from key switch, push button, or output module. No specific ECU control is needed.

How do I Setup My Fuel System

The Hemi needs a minimum of a 3/8" Fuel Feed Line and a regulator setup for 60 psi.



Grounds Grounds Grounds Grounds GROUNDS!

PLEASE make sure you have good ground from engine block to frame, Block to battery, and frame to cab. You can spend a lot of time and money chasing a grounding issue. To verify use a volt meter or ohm meter and go directly from the battery positive and negative to make sure your grounds are clean, correct, and sufficient.

Starter

To control your starter you will want to run a wire from key switch to the starter solenoid on the starter Itself. You can also use a push button or control unit to crank the motor. Swap does not provide this for safety and legal reasons.

Transmission

If you are running an electric transmission your harness will come with the correct plug. If you are running a standalone transmission, no need to read any further, your all set! The computer is setup with the gear ratio and tire size you gave us on the order. Simply plug in the appropriate connections shown below and its time to turn the tires.

The Package will include specific transmission instructions in it.

Aftermarket ECU Extra Outputs and Inputs

Depending on the setup you harness will have an extra plug for outputs and inputs that are available on the ECM platform. You will get a specific sheet with your harness if this is the case showing what the pinout and options are.

Questions, Comments, Gripes, Moans, or Frustrations……
Please email us, we would love to help out with any questions you have. You can also call us at anytime, we are here to help and make your Hemi swap the best investment of your project. Info@SwapSpecialties.com *(989) 720-SWAP (989-720-7927) call or text* *Phones 9am-4:30pm EST* Text 24/7 Email 24/7