



LS Standalone Harness/PCM Installation and Troubleshooting

Thank-you for choosing Swap Specialties and Performance for your LS project needs. Expect everything to be the highest of quality, craftsmanship, and detail. Every product is 100% tested. Please follow these simple guidelines to ensure proper installation and function of your product(s).

Getting to know your Powertrain Control Module (PCM)

Your PCM from AFI comes tuned for standalone operation free of the vehicle of its origin. 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

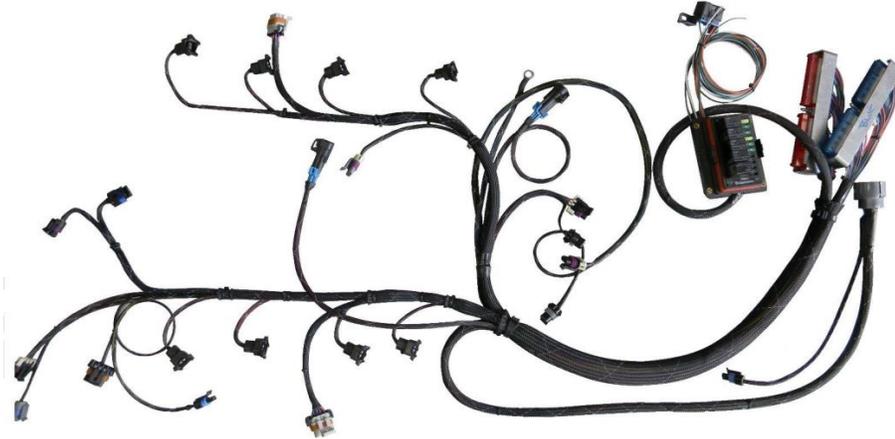
Your PCM is a factory manufactured unit and is completely weatherproof. Many popular mounting locations are on fenders, under dash, under battery trays, and on a firewall- The options are virtually endless. However, DO NOT MOUNT IN CLOSE PROXIMITY TO HEAT such as close to exhaust or heat exchanger.

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 the motor and intake and ensure ease of installation. Please keep adequate clearances from exhaust and tight areas to prevent any issues down the road. Also assure any tight wires may need to be rerouted to ensure longevity.

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.



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 may 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!

The back of the fuse box has a 1/4" stud. A wire DIRECTLY FROM THE BATTERY needs to be run to this post. 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 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 be the key switch only. The engine will not shut down until this wire loses 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 lose 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.

Fan 1 and Fan 2

Do I need this? Only if you are running electric fans

These wires are outputs from your fan relays. These provide power to your fan(s) and need to go directly to the "+" on each fan. Of course, you will need to ground out the other wire on the fans themselves.

I'm Not Running Electric Fans?

No Problem, Just omit this step and don't install these wires. It will not make a difference in the system itself. If you ever want to add these relays and wires just let us know, we have the hook-up!

CE Light

Do I need this? No

This here is your Check Engine Light. This wire PROVIDES THE GROUND for the light operation. The other side of your light will need to see 12v IGN1, not battery power. This light functions just like a normal car and will illuminate if the engine is not running or if the computer senses an issue.

Tach

Do I need this? No

This wire is a tachometer OUTPUT. It gives a output signal for a gauge hookup. Keep in mind different gauges use different signals to operate. Refer to your gauge manual for proper operation

Speedo

Do I need this? No

Yup, just like it says, this wire is a speedo output for your convenience. Again, all gauges are different so please refer to your gauge manual to see what your gauge is looking for. This is a standard GM 4k output.

Brake Switch

Do I need this? Only on 4L and 6L electronic transmisison

This wire needs to see 12 volts when the vehicle brakes are applied. It is for transmission operation and makes sure the tourqe converter unlocks when you are stopping.

On to the good stuff....

Ground Eyelet

This eyelet needs to be fastened to the back of the cylinder head. There are lots of open spots, pick a good one and bolt it down.

O2 Bank 1

This is the upstream sensor for bank #1. Cylinders 1,3 5, and 7 are trimmed from this sensors reading. The sensors need to see all 4 cylendars to read correctly. Please put these as close to or in a collector/collection point. The hotter the sensor gets the better it works.

O2 Bank 2

Just the same as the above but for the opposite side, Bank 2. Cylinders 2,4 6, and 8. DO NOT MIX THESE UP. It will confuse the computer and you will get an extremely rich or lean condition.

My O2 connectors are different than the harness?

It's possible, GM uses many different sensors and it can be confusing! For simplicity sake please run the same style connector O2's as what is on the hanress. Some PCM's need certain sensors to read correctly. Please let us know if you have any questions here.

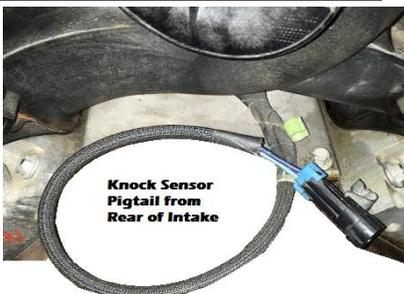
I am not going to run Oxygen Sensors?

If you are running a very high performance setup, or your tuner does not use O2's they will need to be programmed out of the PCM. These are fuel trim devices and sometimes boats or race cars run without them. This setup is called "Open Loop"

Knock Sensors

Depending on the motor you are running, there are 2 different configurations- they are shown below. Just plug it in and your all set. These sensors detect spark knock and protect the motor accordingly. If you do not run these they need to be programmed out of the PCM funtion.

Gen 3 24x Located at Rear of Block



Gen 4 58x Located on Side of Block



Crank Sensor

The crank position sensor (CKP) is the sensor that 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. 24x engines have a **BLACK** connector and 58x engines have a **GREY** connector.

How to check your Crank Position Sensor?

If you have everything all set to go and your motor will not start, well the Crank Position Sensor is a good place to start and likely the culprit. To check this sensor turn the key on once - the fuel pump will then cycle or "prime" when you do so. Next crank the engine over, if the fuel pump DOES NOT come back on then the sensor is likely faulty. Also, if you have a scan tool you will not be getting an RPM reading during cranking as well. IT IS IMPORTANT TO USE A HIGHER QUALITY OEM SENSOR as opposed to a Off-Branded one.

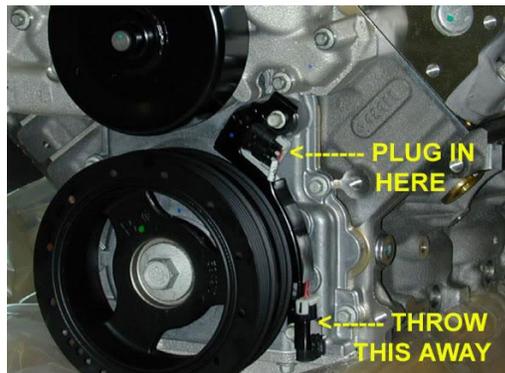
Cam Position Sensor

The Cam Position Sensor (CMP) is used by the PCM to judge injector timing as well as spark timing. This is a 3 pin connector and can vary in location. Some 58x engines have the capability to adjust the Camshaft's position in which you will have a larger connector on your harness. For most 24x engines the stock location is in the rear of the block right behind the manifold (where a distributor would usually set). On 58x engines the factory location is in the front of the block on the mid to upper driver side timing chain cover.

Gen 3 24x



Gen 4 58x



MAP Sensor

The Manifold Absolute Pressure Sensor (MAP) relays the negative or positive 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 in the manifold usually along the top half of the manifold.

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 than factory (1 Bar, 2 Bar, 2.5 Bar, 3 Bar). The only difference between these sensors is pressure range in 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.

Fuel Injectors

On to these babies..... Your harness will be setup with factory injector connectors unless otherwise ordered. These 2 pin connectors could 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.

Im 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.

Coolant Temp Sensor

The ECT sensor is located in the front of the driver side cylinder head. It is a 2 pin connector and is in the same locaiton on all LS style engines.

Did you know?

There is not difference between the Left or Right cylinder head on an LS platform engine. This means there is a port for a coolant temp gauge in the back of the passenger side head.

Coil Packs

Each engine has a sub harness that routes the coil pack wiring to a single plug on each valve cover. The standalone harness you purchased has a single white plug on both Bank1 and Bank2 that plug into these sub harnesses. That's it, coils are done! If you need this sub harness, please contact us and we will be happy to get you setup with one (or two).

What if I'm Relocating my Coils?

You will have to purchase an extension or relocation harness to accommodate for any engine setup with the coils NOT mounted on the factory position (valve covers)

Alternator

Each harness is built for the factory alternator, in the factory position, unless otherwise specified and acknowledged. The harness will reach in BOTH and high mount and a low mount locaiton. If you are running a different style of alternator you will need to purchase an Adapter from us to accomodate a different style plug.

TPS and IAC (DBC Setup ONLY)

On Drive-by-cable setups there is an IAC and TPS located on the Driver side of the throttle body. These control Idle, and throttle input. Simply just plug these into their designated plugs and you are ready to roll! Drive-by-wire operations have these sensors built into the internals of the throttle body.

My Engine isnt Idling Correctly!?

Please call us! There are many factors that affect the idle from a bad IAC valve to engine mods. Together we will get your issues pinpointed and fixed!

Throttle Body and Pedal (DBW Setup ONLY)

So, some 24x engines and ALL 58x engines are drive-by-wire from the factory. Your harness will come specified for the year and size engine it is for, no exceptions can be made here unless you personally take the vehicle to a dyno tuner. The computers are very unforgiving in throttle body and pedal changes that deviates from the factory setup.

I want to run DBC on my 58x engine!

No problem, you will have to purchase a Crank sensor converter so we can adapt a 24x DBC computer to your engine. 58x computers Will Not run a DBC setup.

Transmission (a-k-a, the tranny)

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.

ECM, PCM, TCM..... Whats the heck is the differece?

*The 24x Gen3 **PCM** (Powertrain Control Module) Controls **BOTH** the engine AND the tranny. 58x, Gen4 setups have them **SEPARATED** into the **ECM** (Engine Control Module) and the **TCM** (Transmission Control Module). So, if you have a 58x Engine you will have 2 controllers that are Matched from us to operate both together. If you are providing your own computer(s) make sure they (ECM and TCM) are from the same vehicle or you may have issus.*

4L60e / 4L80e Computer is SEPARATE from Trans



6L60e / 6L80e Computer is INSIDE Trans



Quesitons, Comments, Gripes, Moans, or Frustrations.....

Please email us, we would love to help out with any quesitons you have. You can also call us at anytime, we are here to help and make your LS swap the best investment of your project.

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8am-5pm EST or leave a message

