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AEROFLOW PERFORMANCE

GM LS1 WITH 4L60 / 4L80 TRANSMISSION

STANDALONE WIRING HARNESS

WARNING!

THIS PRODUCT REQUIRES DETAILED KNOWLEDGE OF AUTOMOTIVE SYSTEMS. WE RECOMMEND THAT THIS INSTALLATION BE CARRIED OUT BY A QUALIFIED AUTOMOTIVE ELECTRICAN.

INTRODUCTION

Congratulations on your purchase of Aeroflow Performance GM LS1 wiring harness. Aeroflow Performance products cannot and will not be responsible for any damage, or other conditions resulting from misapplication of the parts described herein. However, it is our intention to provide the best possible products for our customer, products that perform properly and satisfy your expectations. Should you have any questions? Please call technical support at +61 2 8825 1900 and have the product part number on hand when calling.

This Aeroflow Performance wiring harness is designed to be a complete plug and play harness for EFI GM LS1/LS6 series engines with drive by cable throttle body and 4L60E or 4L80E automatic transmissions. The harness is constructed with GM Delphi connectors and terminals and high temperature wires. It includes all wiring that is required by the Powertrain Control Module (PCM) to run and control the fuel injection system and automatic transmission.

NOTE : A few recommendations are important to take note of before and after installation of this wiring harness.

- Never disconnect the battery or the PCM connections while the ignition is turned on
- Always use a digital volt/ohm meter when testing of any electrical circuit is being carried out and do not back probe any connectors as this can lead to permanent damage of connectors and wires.

PRE-INSTALLATION

1. All LS1 engines will require the Vehicle Anti-Theft (VAT) systems to be removed. The PCM input will prevent the engine from starting.
2. All LS1 engines utilize 4 oxygen sensors (o2) in OEM configuration. They will be mounted on each bank of the engine with one before the catalytic converter and one after. Both rear mounted o2 sensors (after the catalytic converter) MUST NOT be used in the installation of this wiring harness. The GM part number for the front oxygen sensor is GM 25161131.
3. All LS1 engines feature emission control devices fitted such as Exhaust Gas Recirculation (EGR) , Air pump (AIR) and Charcoal Canister Purge (CCP). This wiring harness does not include any provisions for all of these emission control devices. It is recommended if you are not reusing these devices to have the PCM reprogrammed to avoid any Diagnostic Trouble Codes (DTC) being stored.
4. When using a 4L60E or 4L80E transmission you must have a two-position brake switch installed (Sold Separately). This is designed to allow the Torque Converter Clutch (TCC) to operate correctly. The brake switch should be closed (electrically connected) when the brakes are not applied and open (not electrically connected) when the brakes are being applied. This is opposite of a standard brake light switch.

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ROUTING HARNESS

Routing your harness depends upon the particular make and model of the vehicle. Each application is different especially with custom retro fit or conversion vehicles.

- This harness is designed to have the PCM mounted in the passenger front compartment area such glove box, under the dash or the kick panel. Decide where and how the PCM & fuse box will be mounted. These two must be mounted no further then the wiring will allow.
- Route the harness away from any sharp edges and components that open and close such as doors and hood.
- When routing the harness ensure to provide extra mounting support to protect from any hazards.
- When routing the harness ensure enough slack is placed where movement could possibly occur
- Route harness away from any extreme heat sources such as exhaust systems. If required build a heat shield or heat sleeve the wiring for protection.

This wiring harness is equipped with a ground wiring section that is designed to bolt to the rear portion of the driver's side cylinder head and adjacent to the fuse block supplied with the harness. As with all automotive wiring the grounding is critical for proper operation. Ensure a clean and secure spot is used for all grounding.

- A ground cable (no smaller than 4 gauge) must be used from the negative battery terminal to the chassis frame (not included in this harness)
- A ground cable (no smaller than 4 gauge) must be used from the engine block to the chassis frame (Do not use the engine mounts as this connection is not effective)
- A ground strap must be used from the engine block to the vehicle body.

INSTALLATION OF HARNESS

Before attempting this installation guideline below. Disconnect the battery cables from the battery and ensure they will not touch at any point.

This harness is designed to have the PCM mounted in the passenger compartment area. This harness has been split into two main sections, Engine Compartment Section & Under Dash Section. The Engine Compartment Section is on one side of the firewall rubber grommet and the other side is considered the Under Dash Section (refer to figure 1).

- Engine Compartment Section : includes wiring for the fuel injector, ignition coils, starter motor, engine sensors and transmission wiring.
- Under Dash Section : includes ignition feed wire, Data Link Connector (DLC) , under dash wires, PCM connectors, Chassis ground and fuse/relay box.

Below is a general guideline to connecting the wiring harness. Each setup may be different for your application. If you are unsure please contact a professional.

ENGINE COMPARTMENT SECTION

1. Mark the position where the wiring harness will come through the firewall. Using a 2" hole saw, drill the hole in the firewall for the rubber grommet. Make sure to debur the hole with a deburring tool or file for a smooth finish.
2. From inside the cabin, feed the Engine Section of the wiring harness through the 2" hole. Push the grommet into the hole until it is seated.
3. Route the entire Engine Compartment section to the top of the engine. The Engine Compartment section of the wiring harness is designed to be split into two banks, a left hand bank for the left side of the engine and a right hand bank for the right side of the engine. This should be very similar to how the factory wiring harness was routed. Each of these banks are not labelled but they are individually loomed with conduit. The Right hand bank should contain the connectors for the IAC , TPS , IAT and MAF sensors.
4. Route the right hand bank of the wiring harness between right hand valve cover and fuel rail.
5. Route the left hand bank of the wiring harness between left hand valve cover and fuel rail.
6. Route the transmission wiring harness and Vehicle Speed Sensor (VSS) harness over the transmission case to the rear of the transmission. **NOTE :** When routing the VSS wiring ensure it is at least 300mm (12") away from any ignition wiring such as spark plug leads.
7. Plug in the connector for the transmissions. Plug in the connector for the VSS which is located on the tail shaft of the transmission. **NOTE :** if using a 4L80E transmission, a separate Input Speed Sensor (ISS) connector must be used and connected. This is plugged into the sensor towards the front of the bell housing on the transmission. If you are not using it be sure to tie up the connector in a safe spot.
8. Route the battery positive ring terminals (2 large ring terminals with red heat shrink) and Crank Angle sensor connector behind the left hand cylinder head. If routing under the exhaust manifold to the correct location an extra heat sleeve may be required.
9. Locate the black wires in the left hand bank of the wiring harness. It will be two small ring terminals with black heat shield over the wires. Route these to the back of the cylinder head and bolt them down to ground the engine.
10. Using the table below connect the wiring and connectors ensure you match up the number of the connector with the correct component. Ensure the wiring colours match up so you know you have the right connector.

Connector	Connected To	Wire Colours	Check List
1	#1 Fuel Injector	Pink , Black	
2	#2 Fuel Injector	Pink , Dark Green	
3	#3 Fuel Injector	Pink , Tan	
4	#4 Fuel Injector	Pink , Light Blue	
5	#5 Fuel Injector	Pink , White	
6	#6 Fuel Injector	Pink , Yellow	
7	#7 Fuel Injector	Pink , Red	
8	#8 Fuel Injector	Pink , Dark Blue	
9	Alternator	Red	
10	ECT Sensor	Black , Yellow	
11	Camshaft Sensor	Brown , Pink , Red	
12	Left Bank Ignition Coil Plug	Black, Red , Dark Green , Brown , Light Blue , Purple , Pink	
13	Left Bank Oxygen Sesnor	Tan , Purple , Black , Pink	
14	Crank Angle Sensor	Dark Blue , Yellow , Light Green	
15	Knock Sensor	Dark Blue , Light Blue	
16	MAF Sensor	Yellow , Black , Pink	
17	IAT Sensor	Purple , Tan	
18	IAC Sensor	Light Green , Dark Green , Light Blue , Red	
19	TPS Sensor	Grey , Black , Yellow	
20	MAP Sensor	Orange , Light Green , Grey	
21	Right Bank Ignition Coil Plug	Black , Red , Dark Green , Brown , Light Blue , Purple , Pink	
22	Right Bank Oxygen Sensor	Tan , Purple , Green , Pink	
23	VSS Sensor	Green , Purple	
24	Transmission Connector	Light Green , Yellow , Red , Light Blue , Pink , Yellow , Black , Pink , Red , Dark Blue , White , Tan , Brown	
25	Starter Motor	Large Ring Terminals (Black)	
26	Ground	Small Ring Terminal (Black)	
27	ISS Sensor (4L80E only)	Tan , Orange	

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UNDER DASH SECTION

The wires in this section of the harness consists of the Data Link Connector (DLC), ignition feed , Malfunction Indicator Light (MIL), Speedometer/Cruise control signal, Tachometer, Primary Cooling fan, Secondary cooling fan, Park/Neutral Signal & Brake Signal wires.

NOTE : Do not make any connections while the PCM is plugged into the harness

1. Route the under dash wires bundled together to the driver's side of the dash.
2. Using the table below connect all wires as shown in the table. Ensure to use correct electrical connectors and procedures.

UNDERDASH WIRES (GROUPED TOGETHER)			
WIRE COLOUR	**CONNECT FROM**	**CONNECT TO**	**CHECKLIST**
Brown	MIL Light Ground	Throught automotive light to 12 volts	
Black	Speedometer	Speedometer module	
White	Tachometer	Electronic tachometer	
Dark Green	Fan 1 Ground	Ground side of Fan 1 relay (Sold Separately)	
Dark Blue	Fan 2 Ground	Ground side of Fan 2 relay (Sold Separately)	
Orange	Park / Neutral Signal	To Ground (In park & neutral)	
Purple	Brake Signal / TCC Ground	To 12 volts (When brakes are applied)	
Grey	ECT Lead	Water Temp gauge (Sold Separately)	
Tan	Oil Pressure Lead	Oil pressure gauge (Sold Separately)	
UNDER DASH SECTION WIRES			
Black Multiple Wires	Chassis Ground Ring Terminals	Chassis Ground	
N / A	Fuel Pump (Line)	To 12 Volts Battery Power	
N / A	Fuel Pump (Load)	To Fuel Pump	
Red	Ignition Feed (Relay Centre)	12 Volts Fused Switched Power (Key On & Cranking)	
Multiple	PCM Connectors	PCM	
White	A / C Request (at PCM connector)	12 Volts when A / C turned ON	
CRUISE CONTROL WIRES (FROM PCM CONNECTOR)			
Green	Cruise Control (if required)	Cruise Engaged (Cruise Control Module)	
White	Cruise Control (if required)	Cruise Engaged (Cruise Control Module)	

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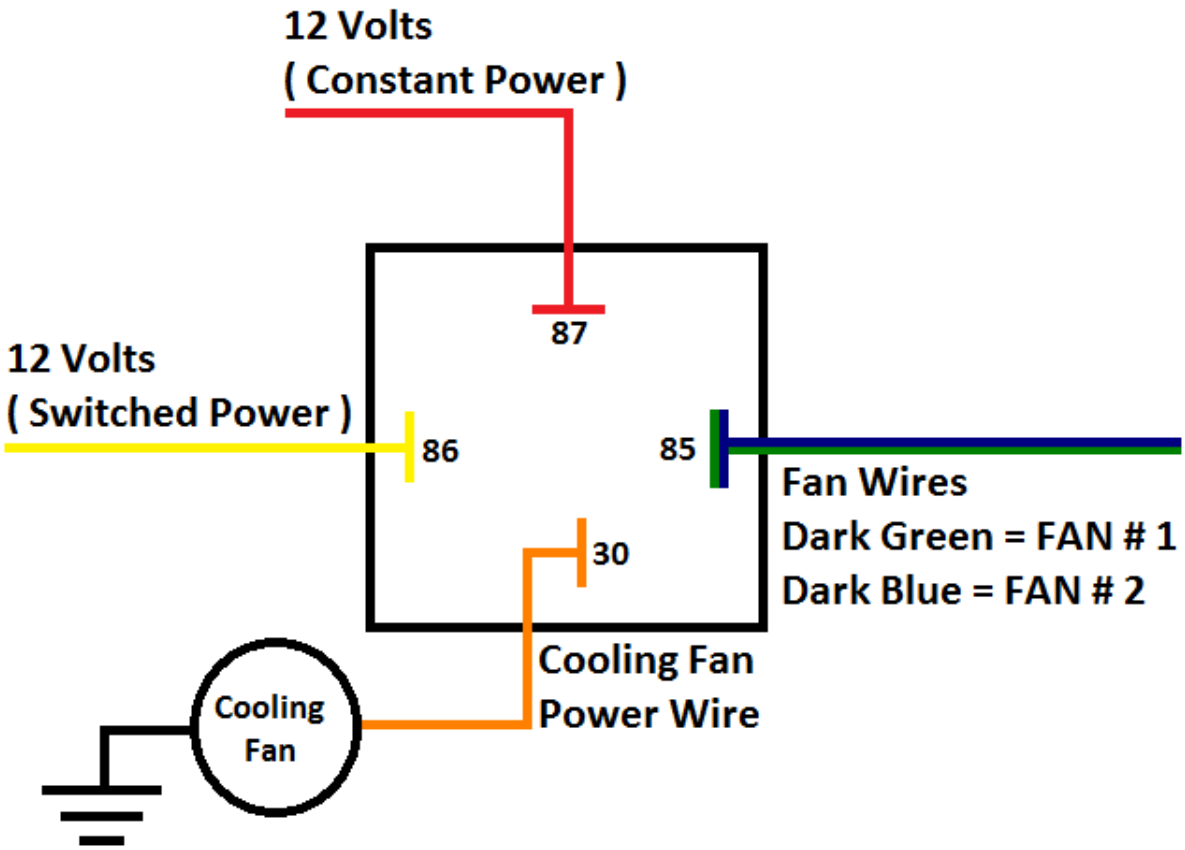
3. In the stock configuration when wired up FAN # 1 will come ON at 107 °C (226 F) and go OFF at 105 °C (221 F). FAN # 2 will come ON at 112 °C (235 F) and go OFF at 110 °C (230 F). A diagram is provided below for a guideline for the cooling fans wired up to an automotive relay (Sold Separately).



4. A fuel pump relay is provided in the relay centre. The signal side of the relay is pre wired into this harness. The feed and out sides of this relay are not wired or supplied with this harness. Two blade terminals are supplied separately to complete the circuit. Ensure that the correct sized wire is used and fused wiring is installed when wiring in your fuel pump depending on our application (refer to your fuel pump manufacturer for details). Measure the length of wires from your fuel pump to the relay and strip the wires and crimp the supplied blade terminals onto the wires. Insert the crimped terminals into the relay holder to complete this circuit. **NOTE :** Ensure to correctly Ground and Fuse your fuel pump circuit or engine damage may occur.

5. When wiring the purple wire to the brake switch. Remember when using a 4L60E or 4L80E transmission you must have a two-position brake switch installed (Sold Separately).
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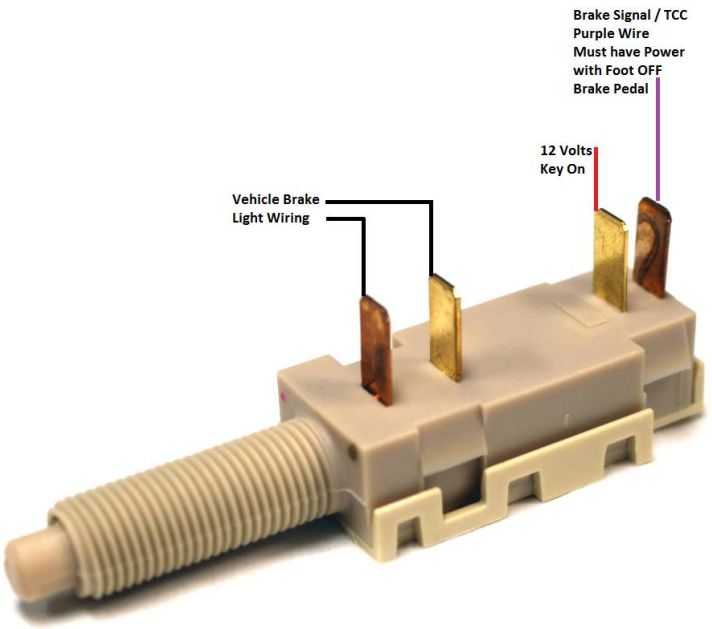

6. Connect the two PCM connectors from the wiring harness to the vehicles PCM module. The Connectors are coloured coded to prevent incorrect installation. **NOTE :** care must be taken not to bend any pins in the PCM.
7. All wires not being used should be individually tape and secured to prevent any electrical shorting.
8. Permanently mount the vehicles PCM and the Fuse/Relay centre in the appropriate location.
9. After all connections have been made throughout the entire harness and they have been double checked to ensure no loose wires or connections. Place the ignition in the off position and reconnect the battery terminals.
10. Before starting the engine it is recommended to check the following.
    - Harness is completely connected (including o2 sensors, Check Engine Light and Brake Switch)
    - Exhaust is installed
    - Air intake duct and MAF are installed correctly
    - Battery is installed in vehicle and is at 12 volts
    - Ground are secured

TROUBLE SHOOTING GUIDELINES

If you are having trouble with your engine running poorly or not running at all. First perform the basic trouble shooting advised in your particular engine / service manual. Check for faulty connections, blown fuses, disabling of VATS in the PCM, spark, timing, fuel pressure and check for any trouble codes that the PCM may have stored.

Please see below a guideline on checking the trouble codes stored in the PCM (refer to factory service manual if unsure or for further instructions)

1. In order to retrieve the trouble codes in the PCM. A scanner must be connected the Data Link Connector (DLC) connector in the wiring harness. Follow the instructions provided with the scanner to read all the codes stored in the PCM.
2. After you have check and noted down all codes remover the connector from DLC connector. **NOTE :** A code indicates a problem in a specific circuit and may not be the particular part that is defective.
3. Before taking more extensive correction actions for any trouble codes, make sure all connections on the trouble circuit are clean and tight (including the PCM). Inspect the wiring in the circuit for any broken, shorted or exposed / damaged wires. Ensure all ground wires are clean and secure.
4. If a trouble is detected and the problem has been fixed, clear the codes by first making sure the ignition is off and then disconnecting the NEGATIVE battery cable for at least 3 minutes.

IF NO START

1. Ensure the red ignition wire from the back of the fuse / relay centre has 12 volts with the key in the ON position and the CRANKING position. If not present trace back to the wiring issue at the source with a multimeter.
2. Check fuel pressure is present at the correct value. (refer to factory service manual)
3. Check all fuel injectors are firing when CRANKING. (refer to factory service manual)

IF COOLING FANS STAY RUNNING

1. Check Engine light is connected properly.
2. Trouble codes exist in the PCM and must be cleared and fixed.

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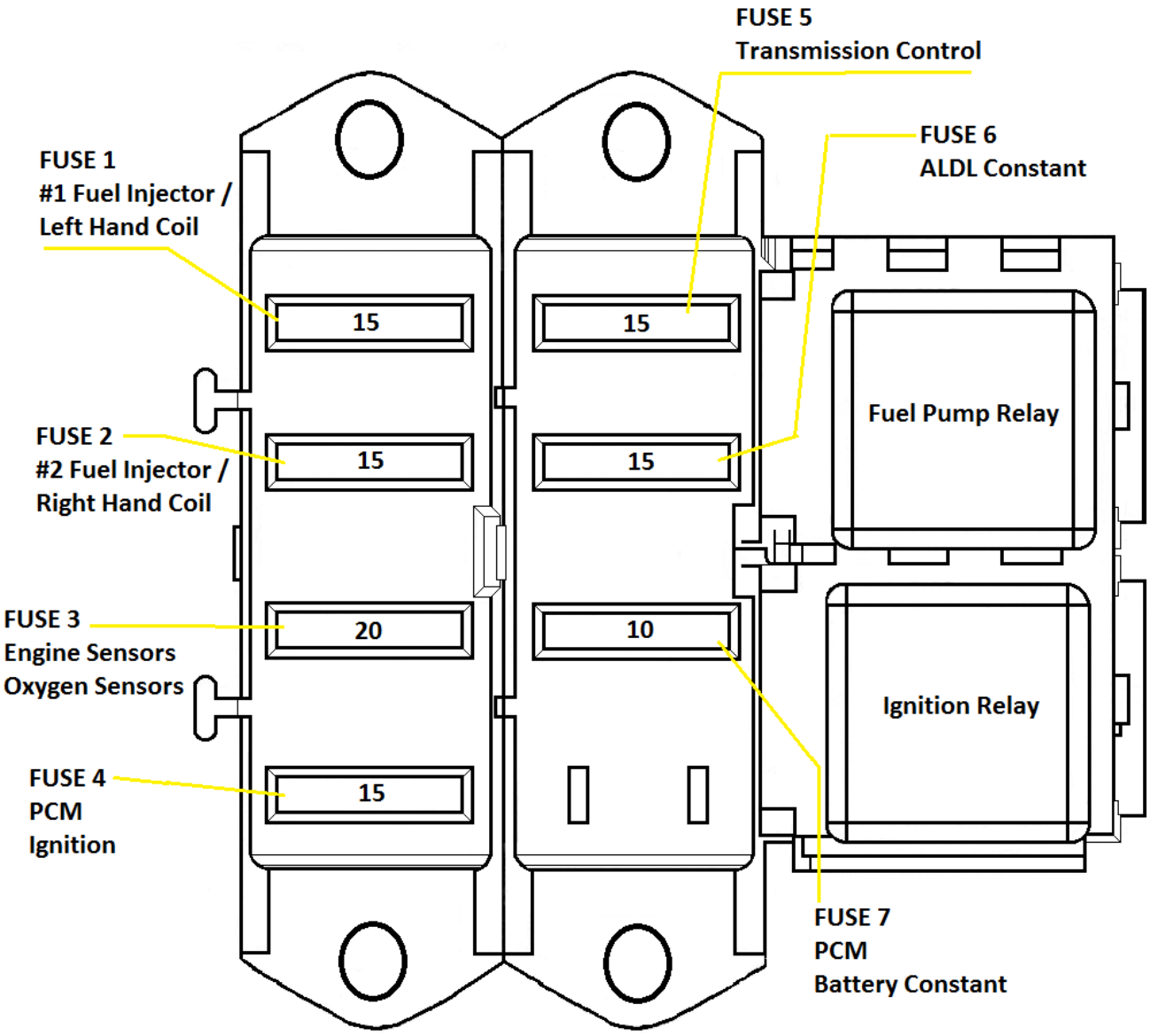
FUSE / RELAY CENTER FRONT VIEW



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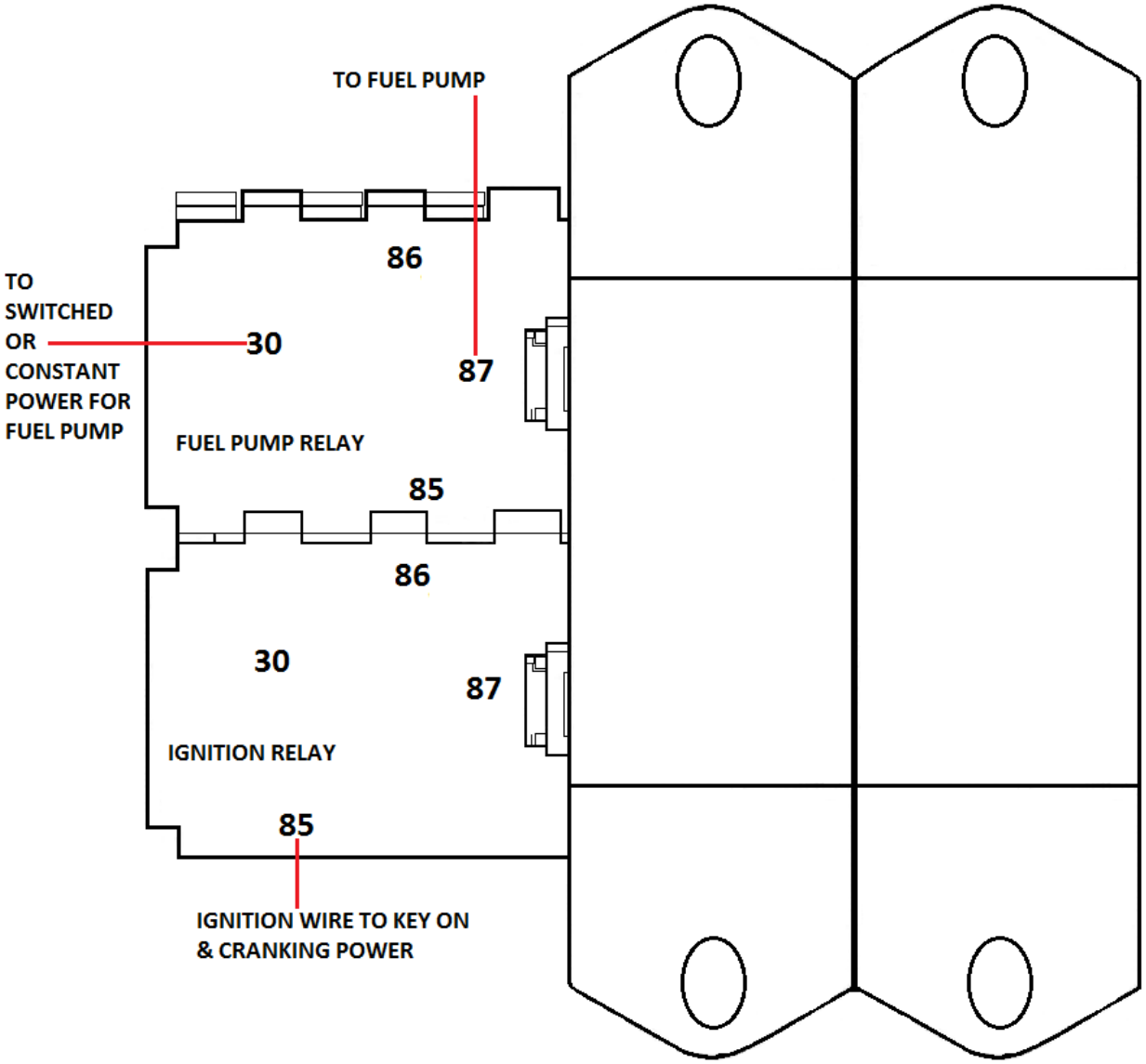
FUSE / RELAY CENTER REAR VIEW



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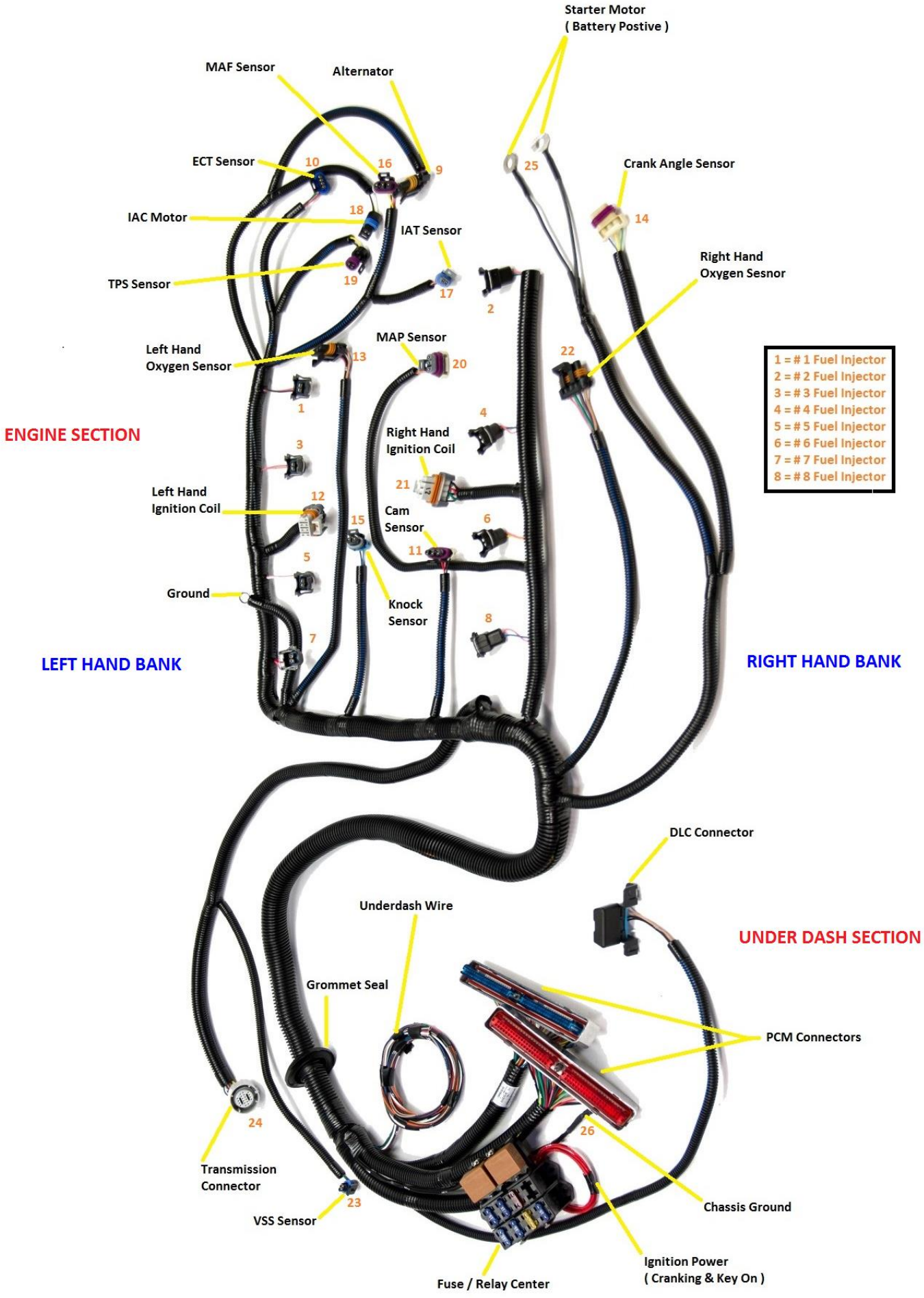
Starter Motor
(Battery Postive)
MAF Sensor
Alternator
ECT Sensor
10
16
9
25
Crank Angle Sensor
IAC Motor
18
14
IAT Sensor
Right Hand
Oxygen Sesnor
TPS Sensor
19
17
2
MAP Sensor
Left Hand
Oxygen Sensor
13
20
22
1 = # 1 Fuel Injector
2 = # 2 Fuel Injector
3 = # 3 Fuel Injector
4 = # 4 Fuel Injector
5 = # 5 Fuel Injector
6 = # 6 Fuel Injector
7 = # 7 Fuel Injector
8 = # 8 Fuel Injector
1
ENGINE SECTION
4
Right Hand
Ignition Coil
3
21
Left Hand
Ignition Coil
12
Cam
Sensor
15
6
11
5
Ground
Knock
Sensor
8
7
LEFT HAND BANK
RIGHT HAND BANK
DLC Connector
Underdash Wire
UNDER DASH SECTION
Grommet Seal
PCM Connectors
24
26
Transmission
Connector
23
Chassis Ground
VSS Sensor
Ignition Power
(Cranking & Key On)
Fuse / Relay Center