LS Series Crate Engine Control System

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This control system is a stand alone, fully-integrated kit designed to run Chevrolet Performance Parts LS Series crate engines with 58x crankshaft reluctor wheels, 4x camshaft indexing, and electronic throttle control (ETC) - typically 2006 and newer. Included in the kit are the engine control module (flashed with the appropriate calibration), engine harness, accelerator pedal, mass air flow (MAF) sensor, MAF sensor mounting boss, oxygen sensors (2), and oxygen sensor mounting bosses (2). This control system requires a fuel system which maintains 400 kPa (60 psi) constant pressure and can deliver 40 gph for the LS2/LS3/LS376s or 50 gph for LSX454 & LS7s. Vehicle performance/ driveability and engine durability may be affected if the correct pressure or flow are not maintained.

IMPORTANT: Read the “System DOs and DON’Ts” section below before attempting to install the engine and then review again before attempting start the vehicle. Note that if the engine will not come off idle after the control system installation, check for an illuminated MIL (malfunction indicator light, which is located in the fuse/relay center, sometimes called the “Check Engine Light” or “Service Engine Soon” light) which indicates stored fault codes. Check for codes and make any required repairs if the MIL is illuminated (typically it is a connector issue or a wiring issue), consult a service manual if necessary (Use information from Chevrolet Performance Parts Diagnostics, 2006- 2011 Cadillac CTS, 2006 – 2010 Corvette or 2010-2011 Camaro).

Observe all safety precautions and warnings in the service manuals when installing this package in any vehicle. Wear eye protection and appropriate protective clothing. Support the vehicle securely with jack stands when working under or around it. Use only the proper tools. Exercise extreme caution when working with flammable, corrosive, and hazardous liquids and materials. Some procedures require special equipment and skills. If you do not have the appropriate training, expertise, and tools to perform any part of this conversion safely, this work should be done by a professional.

System DOs and DON’Ts:

Do:

• Ensure all intended engine/vehicle side connections are made before connecting ignition or battery power to the system.

• Ensure the wiring harness is secured as required, and that the routing avoids locations which can potentially damage the wiring (e.g.: sharp edges, pinch points, rotating components, exhaust components, etc.). Make sure any unused connectors or wiring are properly secured and protected (sealed or taped as required to avoid short circuiting).

• Ensure all engine and wiring harness grounds are clean and secure. Minimum ¾ inch braided strap from the engine to the vehicle chassis is recommended.

• Ensure the MAF sensor is oriented correctly in the induction (it will only read correctly in the proper direction). An arrow is located on the sensor indicating correct flow direction. Verify this before welding the mounting boss, as the sensor will mount only one way in the boss.

• Ensure the oxygen sensor mounting boss (2). This control system requires a fuel system which maintains 400 kPa (60 psi) constant pressure and can deliver 40 gph for the LS2/LS3/LS376s or 50 gph for LSX454 & LS7s. Vehicle performance/ driveability and engine durability may be affected if the correct pressure or flow are not maintained.

Don’t:

• Change or alter any wiring in the accelerator pedal or electronic throttle systems.

• Vacuum reference the fuel system, it must run constant 400 kPa (60 psi).

• Solder or alter any Oxygen Sensor wiring.

Vehicle Requirements

Vehicle Speed Input - optional

The ECM is programmed and looking for 40 pulses per revolution typical for automatic transmissions. The LS Control System harness is designed to plug into the output speed sensor of 4L60 & 4L80 Transmissions, which have a 40 pulse output. NOTE: If you are using the CP Supermatic Connect and Cruise Transmission Control System, the vehicle speed input must be plugged in.

Axle Ratio and Tire Size Requirements

The axle drive ratio in the calibration is set to 3.42:1 and is okay for ratio from 3.08 to 4.11. Tire diameter needs to be between 26” and 30”.

NOTE: For optimal performance choose an axle ratio and a tire size within the recommended range.

NOTE: All Engines are shipped with an automatic transmission flex plate. For manual applications, the clutch and flywheel used must be purchased separately and is up to the end user.

See www.chevyperformance.com for recommended CP clutches and flywheels.

Also see the CP Catalog or www.chevyperformance.com for recommended starter, flywheel and clutch components.

NOTE: The parts listed here may have been updated or superseded, go to www.chevyperformance.com for the latest part number list.

Parts List:

These instructions cover the following packages:

19258553 LS7 Controller Kit for all years
( Supersedes 19166567 & 19243066)
19166568 LS2 Controller Kit
19258267 LS376/480 Controller Kit (Supersedes 19201327)
19259261 LS376/525 Controller Kit
19258270 LS3 Controller Kit (Supersedes 19201861)
19244481 LSX454 Controller Kit

Each Package includes an Engine Control Kit:

Each Kit will contain an Engine Control Unit pre-programmed for the specific engine kit.

All Engine Control Kits have the following parts:

19171935 I-Sheet (Instruction Sheet)
19166573 Engine Harness
19202597 MAP Sensor Jumper LS3/LS376
- or - 19202598 LS2/LS7/LSX454
15865791 Mass Airflow Sensor
19165574 Mass Airflow Sensor Bracket
10379038 Accelerator Pedal
12581966 Oxygen Sensor - Quantity 2
1515688 Oxygen Sensor mounting boss – Quantity 2

Ensure the fuel pump has the following flow capability: Minimum 40 gph @ 400 kPa for LS2/LS3/LS376s and Minimum 50 gph @ 400 kPa for the LSX454 & LS7s.

Ensure battery voltage is connected using a minimum 8 gauge wire to one of the studs on the fuse block.

Ensure that the accelerator pedal clearances meet the guidelines below.
Installation Instructions:

ECM
The Engine Control Module (ECM) is environmentally sealed and can be mounted underhood, however, avoid extremely hot locations (exhaust, etc.) or high splash areas. It is not recommended that the ECM be mounted directly to the engine.

Accelerator Pedal
Mount the accelerator pedal per the following dimensional guidelines, mounting details are application-specific and are left to the user. Ensure that the pedal is securely mounted to the vehicle. A grommet is required in any sheet metal hole that the harness routes through to avoid wire damage.

ACCELERATOR PEDAL ASSEMBLY MINIMUM SPACING GUIDELINES

Mass Air Flow (MAF) Sensor
NOTE: It is critical that the MAF sensor is mounted per the instructions below. Vehicle performance and/or driveability may be affected if it is not mounted as recommended.

The mass air flow sensor must be installed in the induction system using the supplied MAF sensor mounting boss. The induction system should be 4 inches in diameter and have a minimum straight section 6 inches in length. Mount the MAF sensor in the middle of the straight induction section, ensuring that the middle of the mounting boss is at least 10 inches from the throttle body.

The MAF sensor must be oriented correctly in the induction system– note the arrow on the sensor indicating flow direction. Be sure to weld the mounting boss correctly – the sensor will only mount one way in the boss (see diagram).

Weld the boss in place before installing the sensor. When installed in the vehicle, the MAF sensor should be mounted with the connector end pointing between horizontal and fully upright – do not mount with the connector oriented downward.

MAF SENSOR MOUNTING GUIDELINES

Air Cleaner: It is recommended that a dry element air cleaner be used. NOTE: Fueling cannot be guaranteed if an oiled element type air cleaner is used.

Oxygen Sensors: NOTE: It is critical that the Oxygen Sensors are mounted per the instructions below. The exhaust system MUST be properly sealed – any leak near the sensors (upstream or downstream) can cause incorrect operation of the fuel control system. Vehicle performance and/or driveability may be affected if sensors are not mounted as recommended or if an exhaust leak exists. Leak check the exhaust system to ensure adequate sealing (even small leaks can affect fuel control).

Oxygen Sensors should be mounted in the collector area of the exhaust manifolds in a location that allows exhaust from all cylinders to be sampled equally (stock exhaust manifolds include a mounting boss for the oxygen sensors). Be sure the connectors and wiring are routed away from high heat areas. The oxygen sensors should be mounted with the sensor tip pointing between horizontal and fully downward – do not mount with the tip oriented upward. Weld in the mounting bosses supplied (7/8” hole) if using headers.

Exhaust Manifolds: It is recommended that you use the provided exhaust manifolds or similar LS Engine style Exhaust Manifolds.

Positive Crankcase Ventilation System (PCV)
How to set up your PCV system:

There are two ports on the engine that make up the PCV system. The ports on the engine are:

1) Left rear (driver side) valve cover.
2) Top center of the inlet manifold.

There is one fresh air port which is on the front of the right (passenger side) valve cover. Again this is a silver tube that faces forward on the valve cover. This port should be connected to filtered clean air. This connection must be within the engines air cleaner system and must be between the MAF (Mass Air Flow Sensor) and engine’s throttle body.

The engine burns the air that enters the PCV system so, if the fresh air port is prior to the MAF then, this air will enter the engine without being sampled.

Power Brake Booster Vacuum Source: The vacuum port for the Brake Booster is a plug in the rear of the intake manifold. If you need the vacuum source for your brake system the plug needs to be removed and you will need fitting #12559760 available from any GM dealer.

Oil Pressure Sensor: If your harness connector does not fit your oil pressure sensor you can purchase sensor p/n 12616646 or equivalent. This is an optional connection and is not required for your control system to operate.

Engine Wiring Harness: The following lists the engine and vehicle side connections. Optional circuits are described in the ‘System Features’ section below. NOTE: A Malfunction Indicator Lamp (MIL- sometimes called a “service engine soon” light) is mounted inside the fuse/relay center. A redundant MIL output is also available in the harness near the pedal module connector. It is recommended that a MIL also be installed in a visible location in the passenger compartment. This circuit requires any 12v low current light and an ignition 12v power source. The ECM MIL output supplies the ground for the circuit.
Connections Required for Correct Operation
- Coolant Sensor – 2 pin Connector
- Mass Air Flow (MAF) Sensor – 5 pin Connector
- Camshaft Position Sensor – 3 pin Connector
- Electronic Throttle Control – 6 pin Connector
- Manifold Absolute Pressure (MAP) Sensor – 3 pin Connector
- Oxygen Sensors (2 total) – 5 pin Connectors
- Knock Sensors (2 total) – 2 pin Connectors
- Ignition Coil Blocks (2 total) – 8 pin Connectors
- Fuel Injectors (8 total) – 2 pin Connectors
- Crankshaft Position Sensor – 3 pin Connector
- Accelerator Pedal Sensor – 6 pin Connector
- Ignition Switch Input (Wire) Wire
- Fuel Pump Control (Wire) Wire
- Engine Grounds (3 total) Eyelets
- Battery Power (Stud at Fuse/Relay Center)
- Cooling Fan Control Wire

Optional Connections (Not required for operation)
- Alternator Control Connector
- Engine Oil Pressure Sensor – 3 pin Connector
- Vehicle Speed Sensor – 2 pin Connector Only required for CPP
- Connect & Cruise Transmission Controls
- Optional User Outputs Bulkhead – 12 pin Connector (12-way)

Connections
Connect all engine/vehicle-side connectors before connecting the harness to the ECM. All engine/vehicle-side connectors are functionally labeled, consult a service manual if necessary to determine connection locations (see following service manual information).

NOTE: It may be easier to install the harness on the engine before installing the engine into the vehicle.

The harness includes a fuse/relay center containing all required fuses and relays, and also a 12-way bulkhead connector (with sealed mating connector) which contains outputs that may be useful to the user (see ‘Bulkhead Connector Outputs’ section below). The fuse/relay center should be mounted as high in the engine compartment as possible to avoid unnecessary splash and road debris. Likewise, keep the 12-way bulkhead connector and diagnostic link connector (both connect from the fuse/relay center) as high and protected as possible.

The 3 ECM connectors are indexed to connect only in the correct locations. Install by pressing down firmly until the connector is seated, then pull the top slider bar down until it snaps and locks into place. The bar should slide easily and will not move unless the connector is seated properly, do not use excessive force.

Attach the harness ground eyelets (3 total) to the engine block, ensuring the connections are clean and secure, and attach the fuel pump wire from the fuse/relay center to the power side of the pump (this feed is fused and relay-controlled from the ECM).

Make sure all intended engine and vehicle side connections have been made before proceeding to connect power.

Attach a 12 volt ignition switch feed from the vehicle to the pink ignition switch wire in the harness (this is required to enable the proper power-up sequence of the ECM). This can be routed into the passenger compartment with the accelerator pedal connector and diagnostic link connector. Next, connect battery power (minimum 8 gauge wire) to the horizontal stud on the fuel relay center. The other two studs are for accessories and are 50 amp fused), and the harness installation is complete.

Additional features and bulkhead connector descriptions are also included below:

System Features
- The Fuse/Relay center contains all required fuses and relays for proper engine operation. Spare fuse and relay openings are provided for possible future customer use.
- The Fuse/Relay center includes a malfunction indicator light (MIL) which will illuminate in the event of an engine fault code. See your Chevrolet Performance Parts dealer to have this code retrieved at the diagnostic link connector in the fuse/relay center (using a Tech2 with Chevrolet Performance Parts Diagnostics selection or 2009 CTS LSA Manual Trans Configuration). Codes can also be retrieved using an aftermarket diagnostic scan tool capable of reading this configuration. NOTE: The MIL will illuminate when the vehicle is keyed-up — this is normal, and it will go out once the engine is started if there are no current fault codes. A redundant MIL wire is included in the wiring harness to allow a light to mounted inside the passenger compartment. The wire is located in the wire bundle near the pedal connector and the ignition voltage.
- A cooling fan is controlled by the ECM. Control is set to turn on a 12 V fan at 97 Deg C (207 Deg F) coolant temperature. The fan control wire is fused/relayed and must be connected directly to your fan.
- The fuel pump is controlled by the ECM. The control wire supplies 12 V and is fused/relayed and should connect to the 12 V side of the fuel pump.
- A tachometer signal is included in the bulkhead connector (see below). This is a 2 pulse/rev output which may correspond to a 4-cylinder setup in some tachometers or transmission controllers. Note the signal is a low voltage square wave, some tachometers or transmission controllers may need a pull-up resistor in order to read the signal, similar to a 5000 ohm, ½ watt resistor—this detail is left to the user. The following circuit has worked for numerous devices—the resistor value may need to be changed if your device does not read this output properly.

```
<table>
<thead>
<tr>
<th>Connection Name</th>
<th>Pin(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulkhead Connector Pin C</td>
<td></td>
<td>Engine Speed – Tach Out</td>
</tr>
<tr>
<td>Bulkhead Connector Pin L</td>
<td></td>
<td>Ignition Voltage</td>
</tr>
<tr>
<td>Pull High Tach Out</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

NOTE: When connected to the CP Supermatic Connect and Cruise Harness the pull up resister is not required for the Transmission Controller.

- An oil pressure output is included in the bulkhead connector and can be used for a pressure gauge if desired (see below for scaling). If you are using the optional oil pressure signal in the bulk head connector, ensure the harness is plugged into oil pressure sensor.
- A vehicle speed output is included in the bulkhead connector for use with auto-scaling speedometers. The vehicle speed sensor connector in the harness must be attached to a variable reluctance type speed sensor (typical of most late model GM automatic transmissions) for this to function.
### Bulkhead Connector Outputs

<table>
<thead>
<tr>
<th>Circuit #</th>
<th>Position</th>
<th>Wire Gage</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2501A</td>
<td>A</td>
<td>22</td>
<td>Tan</td>
<td>GMLAN High Speed (-)</td>
</tr>
<tr>
<td>419A</td>
<td>B</td>
<td>22</td>
<td>Brown/White</td>
<td>MIL</td>
</tr>
<tr>
<td>121</td>
<td>C</td>
<td>22</td>
<td>White</td>
<td>Engine Speed</td>
</tr>
<tr>
<td>818</td>
<td>D</td>
<td>22</td>
<td>Brown</td>
<td>Vehicle Speed - Out</td>
</tr>
<tr>
<td>432B</td>
<td>E</td>
<td>22</td>
<td>Lt. Green</td>
<td>MAP Signal</td>
</tr>
<tr>
<td>- F -</td>
<td>-</td>
<td>-</td>
<td>Plug</td>
<td>Empty</td>
</tr>
<tr>
<td>2500A</td>
<td>G</td>
<td>22</td>
<td>Tan/Black</td>
<td>GMLAN Low Speed (+)</td>
</tr>
<tr>
<td>331B</td>
<td>H</td>
<td>22</td>
<td>Tan/White</td>
<td>Oil Pressure Signal</td>
</tr>
<tr>
<td>468B</td>
<td>J</td>
<td>22</td>
<td>Purple</td>
<td>Tach Pos #2 (0.5V - 45V)</td>
</tr>
<tr>
<td>40F</td>
<td>K</td>
<td>18</td>
<td>Orange</td>
<td>Battery Power Fuse</td>
</tr>
<tr>
<td>5292</td>
<td>L</td>
<td>18</td>
<td>Pink</td>
<td>Ignition *OnPower</td>
</tr>
<tr>
<td>50B</td>
<td>M</td>
<td>18</td>
<td>Black</td>
<td>Ground</td>
</tr>
</tbody>
</table>

### Notes
- **GMLAN Communication Link (TAN/BLACK STRIPE [+], TAN [-])** – This provides the GMLAN communication messages containing engine operating parameters for potential use in future add on modules – any current integration of this is left to the user. Can be used with a LAN dash or an electronic dash readout display.
- **Tachometer Signal (WHITE)** – This is a 2 pulse/rev output (see features above).
- **Vehicle Speed (BROWN)** – This is a non scaled output for use with auto-scaling speedometers and will not function unless a vehicle speed sensor (VSS) is connected to the ECM through the VSS wire in the harness.
- **MAP (LT GREEN)** – This is an output for use in gauges or for load indication in transmission controllers (any connection must be to a high-impedance device). The output is a 0-5 Volt signal ranging from 10 – 105 KPa (1.5 – 15.2 psia). Use the ground wire in the bulkhead connector as the low reference (ground).
- **Throttle Position (PURPLE)** - This is an output for use in gauges or for load indication in transmission controllers (any connection must be to a high-impedance device). The output is a 0.5 – 4.5 volt signal ranging from 0 – 100 %. Use the ground wire in the bulkhead connector as the low reference (ground).
- **Oil Pressure Sensor (TAN/WHITE STRIPE)** – This is a zero to five volt output from the oil pressure sensor which can be used for monitoring oil pressure (Pressure (psig) = \(32 \times \text{Sensor Voltage} - 16\)). **See Chart Below.** Use the ground wire in the bulkhead connector as the low reference (ground).

### Start-up and Break-in Procedures

**Safety first.** If the vehicle is on the ground, be sure the emergency brake is set, the wheels are chocked and the car cannot fall into gear. Verify everything is installed properly and nothing was missed.

**1. Oil & Fluid Fill:** This engine assembly may need to be filled with oil or have oil added. After installing the engine, ensure the crankcase has been filled with the appropriate motor oil to the recommended oil fill level on the dipstick. All LS Chevy Performance Crate Engines require a special oil meeting GM Standard GM4718M (this will be specified on the oil label). Mobil 1 is one such recommended oil. Other oils meeting this standard may be identified as synthetic. However, not all synthetic oils will meet this GM standard. Look for and use only oil that meets GM Standard GM4718M. Also check and fill as required any other necessary fluids such as coolant, power steering fluid, etc.

**2. Oil System Prime.** a. The engine should be primed with oil before starting. Install an oil pressure gauge (the existing oil pressure sensor location at the upper rear of the engine may be used) and disconnect the engine control system (removing power from the engine control module is generally recommended).

**NOTE:** Disconnecting only ignition or fuel injector connectors is
not recommended – make sure the control system will not provide ignition or fuel to the engine. b. Once the engine control system has been disconnected, crank the engine using the starter for 10 seconds and check for oil pressure. If no pressure is indicated, wait 30 seconds and crank again for 10 seconds. Repeat this process until oil pressure is indicated on the gauge.

3. Initial Engine Start: Reconnect the engine control system. Start the engine and listen for any unusual noises. If no unusual noises are noted, run the engine at approximately 1000 RPM until normal operating temperature is reached.

4. Engine Warm Up Recommendation: When possible, you should always allow the engine to warm up prior to driving. It is a good practice to allow the oil sump and water temperature to reach 180°F before towing heavy loads or performing hard acceleration runs.

5. First 30 Mile Break-In Period: The engine should be driven at varying loads and conditions for the first 30 miles or one hour without wide open throttle (WOT) or sustained high RPM accelerations.

6. Medium Accelerations for Break-In: Run five or six medium throttle (50%) accelerations to about 4000 RPM and back to idle (0% throttle) in gear.

7. Hard Accelerations for Break-In: Run two or three hard throttle (WOT 100%) accelerations to about 4000 RPM and back to idle (0% throttle) in gear.

8. Change the Oil and Filter: Replace the oil per the specification in step 1, and replace the filter with a new PF48 AC Delco oil filter. Inspect the oil and the oil filter for any foreign particles to ensure that the engine is functioning properly.

9. 500 Mile Break-In Period: Drive the next 500 miles (12 to 15 engine hours) under normal conditions. Do not run the engine at its maximum rated engine speed. Also, do not expose the engine to extended periods of high load.

10. Change the Oil and Filter after 500 Mile Break-In: Again, inspect the oil and oil filter for any foreign particles to ensure that the engine is functioning properly.

Service information
Contact your Chevrolet Performance Parts Dealer for Service or for instructions on how to obtain Service Manuals and Service Information. Use information from Chevrolet Performance Parts Diagnostics which can be selected from the first menu on the Tech2 for engine and harness diagnosis (use this information for all LS Crate Engine Systems).

Appendix: See www.chevyperformance.com for recommended starters, clutch and flywheels for the manual applications and accessory drive parts.

How the PCV System Works:
A closed crankcase ventilation system must be used in order to provide a more complete scavenging of crankcase vapors. Filtered air from the air induction system (air cleaner) duct is supplied to the crankcase, mixed with blow-by vapors, and passes through a crankcase ventilation metering device before entering the intake manifold. The primary component in the positive crankcase ventilation (PCV) system is the PCV flow metering orifice. Vacuum changes within the intake manifold result in flow variations of the blow-by vapors. If abnormal operating conditions occur, the design of the PCV system permits excessive amounts of blow-by vapors to back flow through the crankcase vent tube and into the engine induction system (air cleaner) to be consumed during normal combustion. This engine ventilation system design minimizes oil consumption and significantly reduces the potential for oil ingestion during vehicle limit handling maneuvers.

ECM Connectors Pinouts:

<table>
<thead>
<tr>
<th>Circuit #</th>
<th>Pos</th>
<th>Wire Gage</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>239M</td>
<td>10</td>
<td>22</td>
<td>Pink</td>
</tr>
<tr>
<td>419</td>
<td>12</td>
<td>22</td>
<td>Brown/White</td>
</tr>
<tr>
<td>465</td>
<td>13</td>
<td>22</td>
<td>Green/White</td>
</tr>
<tr>
<td>33467-0005 Term (18 GA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33467-0003 Term (22 GA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34586-0001 Plug</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34575-003 Dress Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All Other Positions to have Cavity Plugs
### LS Series Crate Engine Control System

**Circuit #** | **Pos** | **Wire Gage** | **Color** |
--- | --- | --- | --- |
2123 | 55 | 22 | Lt. Blue Odd Coils Pin F |
633 | 59 | 22 | Brown/White Cam Sensor Signal Pos C |
331A | 60 | 22 | Tan/White Oil Pressure Sensor Signal Pos C |
472 | 62 | 22 | Tan MAF Pos E |
1869 | 63 | 22 | Blue/White Crank Sensor Power Pos A |
485 | 64 | 22 | Green ETC Throttle Pos. Sensor #1 Pos D |
486 | 66 | 22 | Purple ETC Throttle Pos. Sensor #2 Pos F |
492 | 67 | 22 | Yellow MAF Pos A |
3113 | 68 | 22 | Gray/White Odd Fr O2 Heater pos E |
844 | 70 | 22 | Lt. Blue/Black Injector 4 Pin B |
877 | 71 | 22 | Orange/Black Injector 7 Pin B |
1744 | 72 | 22 | Tan Injector 1 Pin B |
750 | 73 | 14 | Black Ground |

All Other Positions to have Cavity Plugs

### ECM Black

**Item C2**

- 34566-0103 Connector
- 33467-0003 Terminal (22 GA)
- 33467-0005 Terminal (18 GA)
- 7158-3113-40 Seal (1 each)
- 7116-4152-02 Term (1 each)
- 34586-0001 Plug (40 each)
- 34565-0003 Dress Cover

### ECM Gray

**Item C3**

- 3466-0203 Connector
- 33467-0003 Terminal (22 GA)
- 7158-3113-40 Seal (1 each)
- 7116-4152-02 Term (1 each)
- 34586-0001 Plug
- 34565-0003 Dress Cover

### Circuit # | Pos | Wire Gage | Color |
--- | --- | --- | --- |
1667 | 3 | 22 | Tan Even Fr O2 Pos A |
1666 | 4 | 22 | Purple Even Fr O2 Pos B |
225 | 7 | 22 | Orange Generator Pos B |
3212 | 15 | 22 | Lt. Green Even Fr O2 Pos E |
469 | 23 | 22 | Orange/Black MAP Pos A |
2501 | 33 | 22 | Tan ALDL Pin 14 |
2761 | 35 | 22 | Tan ECT Pos 1 |
2704 | 39 | 22 | Gray MAP Pos C |
335 | 49 | 22 | Green Fuse Bus Pos 7D |
2500 | 53 | 22 | Tan/Black ALDL Pin 6 |
410 | 55 | 22 | Yellow Engine Coolant Sensor Pos 2 |
432 | 59 | 22 | Lt. Green MAP Pos B |
821 | 66 | 22 | Purple/White VSS TOSS Hi Pos 2 |
822 | 67 | 22 | Lt. Green/Black VSS TOSS Lo Pos 1 |
750A | 73 | 14 | Black Ground |

All Other Positions to have Cavity Plugs
These specifications are intended as a supplement to GM service manuals. It is not the intent of these specifications to replace the comprehensive and detailed service practices explained in the GM service manuals.

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