

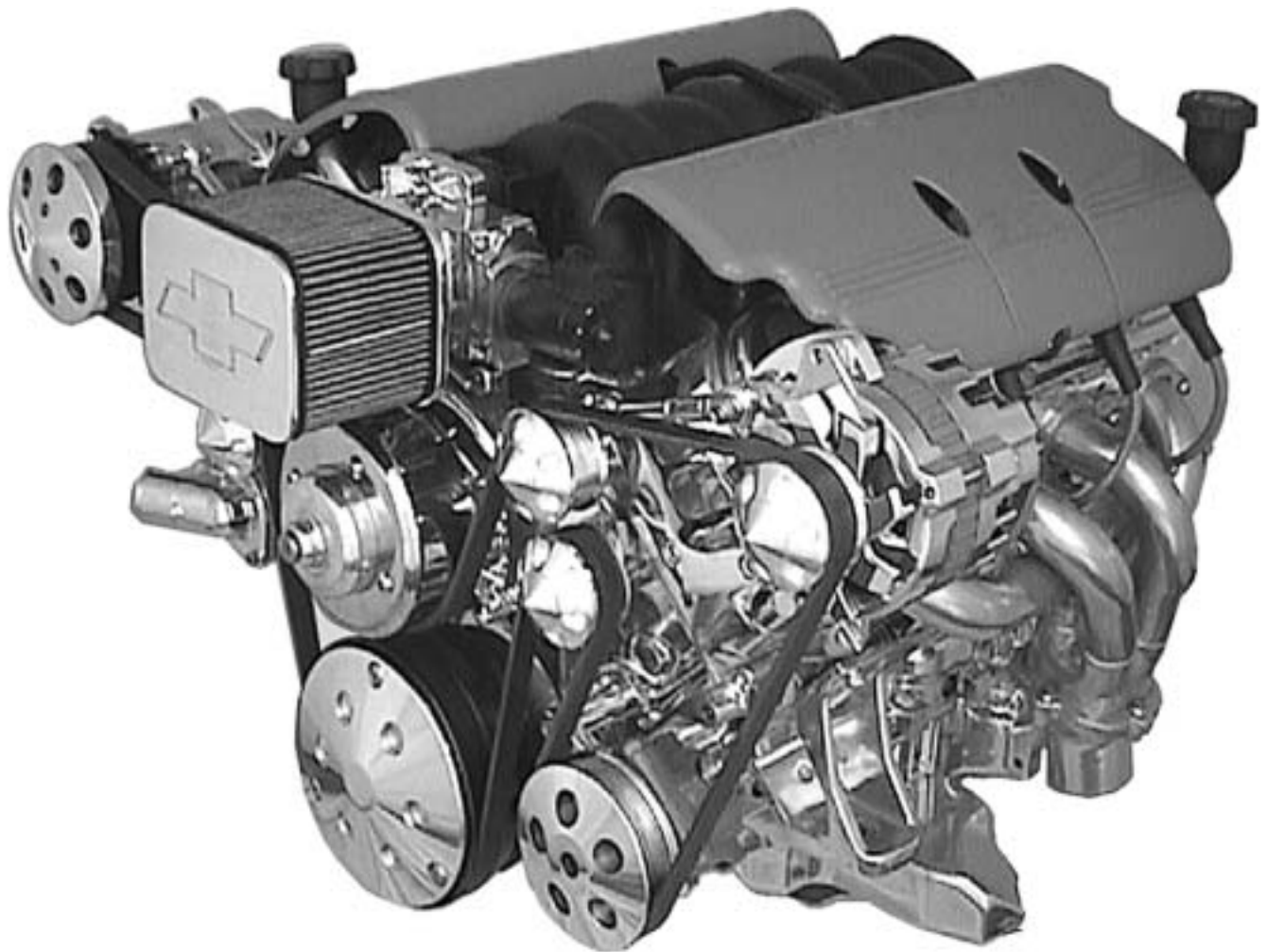


# Street & Performance

## LS-1 Wiring Harness

INSTRUCTIONS & SUPPLEMENTAL INFORMATION

**T-56 Borg Warner 6-Speed**



# Street & Performance

#1 Hot Rod Lane ~ Mena, AR 71953

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# LS-1 Harness Installation Instructions

The following instructions are intended as an aid to assist in harness installation. More in depth information can be obtained by ordering the applicable GM service manual (in three volumes). Troubleshooting techniques and diagnosis are beyond the scope of these instructions. Diagnostic flow charts and troubleshooting advice are included in the GM service manual.

The general design of the harness allows for length for computer mounting in the dash & kick panel or underhood area. Special harness lengths can be provided on a custom order basis.

All harness connections are clearly tagged. If for some reason a tag has been removed consult the LS-1 Harness layout.

The following information will briefly discuss the individual harness connections.

1. **Passenger Side Injectors (4 plugs w/green, blue, yellow, & purple uncommon wires)** - Lay the harness up over the intake with the passenger side and driver side injector and coil connectors on each side of the engine. Connect the injector plugs into the fuel injection. The longest plug to the farthest point and so forth. This will help hold the harness in place
2. **Driver Side Injectors (4 plugs w/black, red, white & brown uncommon wires)** - Repeat the steps outlined above.
3. **Passenger Coil (4 plugs w/tan waterproof rubber seal w/orange, yellow, gray, & white uncommon wires)** - Connect passenger side coils into injector coil packs.
4. **Driver Coil (4 Plugs w/tan waterproof rubber seal w/purple, blue, green, red uncommon wires)** - Connect driver side coils into injector coil packs
5. **Mass Air Flow Plug (MAF) (black connector w/white cap and purple waterproof rubber seal)** - Located on the air duct, in the front of the intake manifold. Take care when handling the MAF. Do not touch the sensing elements or allow anything to come into contact with them. MAF is measured in grams per second. The PCM converts the mass air flow sensor input signal into grams per second, indicating the amount of air flow entering the engine.
6. **MAP Sensor Plug (grey plug w/white cap and purple waterproof rubber seal)** - The Manifold Absolute Pressure (MAP) measures the change in the intake manifold pressure from engine load, and speed changes and sends proportional adjustments to the computer. Lightly coat the MAP sensor seal with clean engine oil before installing the sensor. Push the MAP sensor down in order to engage the sensor into the retainer. Run a vacuum line from a port on the psgr side of the plenum to the port on the MAP sensor. Connect the MAP sensor electric connector from the harness.
7. **CAM Sensor Plug (black connector w/white cap and purple waterproof rubber seal)** - The camshaft position sensor (CPS) must be installed prior to installing the intake manifold. The camshaft position sensor is located on the timing cover behind the water pump near the camshaft sprocket. As the camshaft sprocket turns, a magnet in it activates the Hall effect switch in the camshaft position sensor. When the Hall effect switch is activated, it grounds the signal line to the ICM, pulling the camshaft position sensor signal circuit's applied voltage low. This is interpreted as a CMP Sensor signal. The CMP Sensor signal is created as piston #1 is approximately 25 degrees after top dead center (TDC) on the power stroke.
8. **Knock Sensor Plug (black connector w/blue cap and grey waterproof rubber seal)** - Two knock sensors (KS) are used, one for each bank of injectors. Input signals from the knock sensors are used to detect engine detonation, allowing the PCM to retard Ignition Control (IC) spark timing, based upon the amplitude and frequency of the KS signal being received. If a knock is detected the computer will automatically retard the timing. Connect the knock sensor plug to the plug extending out the rear of the intake.
9. **Linear EGR Plug (white connector w/lite blue waterproof rubber seal)** - Must be in use when running full emissions in 74 & later vehicles. Some state requirements differ.

10. **Crank Sensor Plug** - The crankshaft position sensor (CPS) is located in the lower front of the engine.
11. **Engine Temp Sensor Plug (black connector w/purple waterproof rubber seal)** - Senses engine coolant temperatures during all operating conditions and signals electric fan operations. Located front head exhaust port. Must use IROC/TA Coolant Sensor #12551708, 3 prong plug on Vette motors.
12. **Air Temp Sensor Plug (grey connector w/lite blue waterproof rubber seal)** - Operates in the same fashion as the coolant temp sensor, except it relates to the air temp entering the plenum.
13. **Canister Purge Plug (red connector w/blue cap & grey waterproof rubber seal)** - Use with emission vehicles, connects to the EVAP canister vent solenoid.
14. **Idle Air Motor Plug (black connector w/blue waterproof rubber seal)** - Computer controlled stepper motor which adjusts engine idle at different loads.
15. **Throttle Position Sensor Plug (black connector w/purple waterproof rubber seal)** - Returns a proportional voltage to the computer that relates to the angular position of the throttle plates. Relaxed throttle-low voltage (approx. 8V) wide open throttle-high voltage (approx 4.5V).
16. **Oil Level Plug (black connector w/blue cap and grey waterproof rubber seal)** - Wire to warning light for determining low oil levels in the oil pan. Connects into oil pan.
17. **Anti Theft** - By-passes computer anti-theft.
18. **Diagnostic Link Plug (ALDL)** - Automatic Line Diagnostic Link is used in conjunction with the check engine light and testing or troubleshooting.
19. **Fuel Pump Relay Plug** - Starts and stops fuel pump. During key-on runs 2 seconds to load injectors.
20. **Brake Light Switch Wire (purple)** - 12V Ignition normally closed switch. This wire must have 12 volts all the time, except when you put the brake-on which will take the torque converter out of lock-up. Use GM switch #25524845
21. **Check Engine Light Wire (brown)** - For the use of a check engine light. Any 12V automotive light will work. It can be mounted as a permanent fixture in the dash, or used as a diagnostic aid only. The wire is hot when the key is in start or run. If light is not used, ensure the brown wire is properly capped.
22. **Tach Wire (if desired) (white)** - Feeds pulse to tachometer. If Tach fails to operate on this pulse contact Abbott Enterprises, 800-643-5973 for alternate pulse signal simulator.
23. **Battery Wire (orange)** - Connects to main post on positive side of starter. If you're using a battery disconnect this lead must go to the hot side of the disconnect.
24. **Park Neutral Position Wire (orange ) (if desired)** - The Park/Neutral Position (PNP) switch indicates to the PCM when the transmission is in park, neutral, or drive. This information is used for the EGR and IAC valve operation.
25. **Electric Speedometer Wire (green)** - 4000 pulse to cruise or electric speedometer
26. **Low Oil Level Wire (white)** - For low oil indicator light
27. **Hot Feed Electric Fuel Pump Wire (brown)** - Provides 12V to the fuel pump. A fuel pump relay is also provided with the harness and is energized/de-energized by the ECM.
28. **Ignition Switch Hot Wire (red)**- The single ignition wire must be connected to provide 12V with the key in START (crank) and RUN position. 12V is then distributed through the fuse block to the computer (ECM), injectors and coil. The fuse block has six (6) 10 amp and one (1) 20 amp fuses. Each injector bank is fused as is the computer, battery and coil.

29. **Engine Ground Wire (black wire w/sodered aluminum grommet)** - The ground system is critical for proper operation. A good battery to motor, and motor to harness ground is essential

**Ground Battery to Motor or Trans (a must)!**  
**Ground Motor to Frame and Motor to Body!**

30. **Vehicle Speed Sensor Plug (VSS) (black connector w/lite blue waterproof rubber seal)** - The vehicle speed sensor is a pulse counter type input that informs the PCM how fast the vehicle is being driven. The VSS system uses an inductive sensor mounted in the tail housing of the transmission and a toothed reluctor wheel on the tail shaft. As the reluctor rotates, the teeth alternately interfere with the magnetic field of the sensor creating an induced voltage pulse.
31. **Driver Front O2 Plug** - Oxygen Sensor
32. **Passenger Front O2 Plug** - Oxygen Sensor
33. **Driver Rear O2 Plug** - Must be placed after catalytic converter, if not running catalytic converters contact Street & Performance for simulators
34. **Passenger Rear O2 Plug** - Must be placed after catalytic converter, if not running catalytic converters contact Street & Performance for simulators
35. **Coolant Temp Sensor Wire (green) (ECT)** - The coolant temp light is a green wire for connecting up the temperature warning light. The coolant temp sensor returns a proportional voltage to the computer that relates to the collant temp. **Cold**-high voltage, **hot**-low voltage. Located on the lower left side of the engine.

Oil pressure for your gauge must be provided by its sending unit. The unit can be installed down in block-off plate by filter.



Street Rod Style Coated Headers



G-body Style Coated Headers



Taylor Custom Color LS-1 Spark Plug Wires.



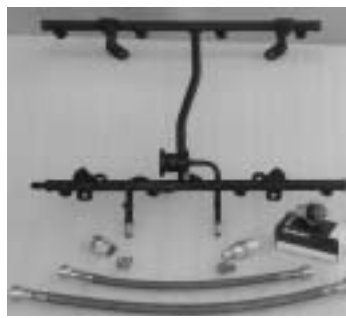
New 55 - 57 Headers, clear the 605 power steering. LS-1 motor mount kit available.



'99-up Stainless Hardline to Passenger side



97-98 Stainless Hard Fuel Line Kit to Passenger Side



97-98 Vette Fuel Rails



LS-1 Vette Fuel Lines and connectors



LS-1 Top Covers



LS-1 Polished Water Pump



LS-1 Vette Biscuit Motor Mounts



LS-1 Camaro Pan Kit

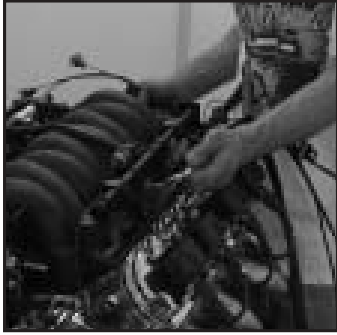
DTC	ALDL Diagnostic Description	Domestic	Illuminate MIL
P0101	Mass Air Flow System Performance	A	Yes
P0102	MAF Sensor Circuit Low Frequency	A	Yes
P0103	MAF Sensor Circuit High Frequency	A	Yes
P0107	MAP Sensor Circuit Low Voltage	B	Yes
P0108	MAP Sensor Circuit High Voltage	B	Yes
P0112	IAT Sensor Circuit Low Voltage	B	Yes
P0113	IAT Sensor Circuit High Voltage	B	Yes
P0117	ECT Sensor Circuit Low Voltage	B	Yes
P0118	ECT Sensor Circuit High Voltage	B	Yes
P0121	TP Sensor Performance	A	Yes
P0122	TP Sensor Circuit Low Voltage	A	Yes
P0123	TP Sensor Circuit High Voltage	A	Yes
P0125	ECT Excessive Time to Closed Loop	A	Yes
P0131	HO2S Circuit Low Voltage Bank 1 Sensor 1	B	Yes
P0132	HO2S Circuit High Voltage Bank 1 Sensor 1	B	Yes
P0133	HO2S Circuit Slow Response Bank 1 Sensor 1	B	Yes
P0134	HO2S CKT Insufficient Activity Bank 1 Sensor 1	B	Yes
P0135	HO2S Heater Circuit Bank 1 Sensor 1	B	Yes
P0143	HO2S Circuit Low Voltage Bank 1 Sensor 3 (post converter)	B	Yes
P0144	HO2S Circuit High Voltage Bank 1 Sensor # (post converter)	B	Yes
P0146	HO2S Circuit Insufficient Activity Bank 1 Sensor 3 (post converter)	B	Yes
P0147	HO2S Heater Circuit Bank 1 Sensor 3 (post converter)	B	Yes
P0151	HO2S Circuit Low Voltage Bank 2 Sensor 1	B	Yes
P0152	HO2S Circuit High Voltage Bank 2 Sensor 1	B	Yes
P0153	HO2S Circuit Slow Response Bank 2 Sensor 1	B	Yes
P0154	HO2S Circuit Insufficient Activity Bank 2 Sensor 1	B	Yes
P0155	HO2S Heater Circuit Bank 2 Sensor 1	B	Yes
P0171	Fuel Trim System Lean Bank 1	B	Yes
P0172	Fuel Trim System Rich Bank 1	B	Yes
P0174	Fuel Trim System Lean Bank 2	B	Yes
P0175	Fuel Trim System Rich Bank 2	B	Yes
P0201	Injector 1 Control Circuit	B	Yes
P0202	Injector 2 Control Circuit	B	Yes
P0203	Injector 3 Control Circuit	B	Yes
P0204	Injector 4 Control Circuit	B	Yes
P0205	Injector 5 Control Circuit	B	Yes
P0206	Injector 6 Control Circuit	B	Yes
P0300	Engine Misfire Detected	B	Yes
P0325	Knock Sensor System	D	Yes
P0327	Knock Sensor Circuit Bank 1	D	No
P0332	Knock Sensor Circuit Bank 2	D	No
P0336	18x Reference Signal Circuit	B	Yes
P0341	CMP Sensor Circuit Performance	B	Yes
P0401	EGR System Flow Insufficient	A	Yes
P0403	EGR Solenoid Control Circuit	B	Yes
P0404	EGR System Performance	B	Yes
P0405	EGR Pintle Position Circuit Low Voltage	B	Yes
P0420	TWC System Low Efficiency	A	Yes
P0440	EVAP System	A	Yes
P0442	EVAP Control System Small Leak Detected	A	Yes
P0446	EVAP Canister Vent Blocked	A	Yes
P0452	Fuel Tank Pressure Sensor Circuit Low Voltage	B	Yes
P0453	Fuel Tank Pressure Sensor Circuit High Voltage	B	Yes
P0500	Vehicle Speed Sensor Circuit	B	Yes
P0506	Idle Control System Low RPM	B	Yes
P0507	Idle Control System High RPM	B	Yes
P0530	A/C Refrigerant Pressure Sensor Circuit	D	No
P0560	System Voltage	D	No
P0601	PCM Memory	B	Yes
P0602	PCM Not Programmed	B	Yes
P0704	Clutch Anticipate Switch Circuit	D	No
P0705	Trans Range Switch Circuit	D	No
P0706	Trans Range Switch Performance	D	No
P0711	Transaxle Fluid Temperature (TFT) Sensor Circuit Performance	D	No
	Refer to 4:60-E Automatic Transmission Diagnosis		
P0712	Transaxle Fluid Temperature (TFT) Sensor Circuit - Low Signal	D	No
	Refer to 4:60-E Automatic Transmission Diagnosis		
P0713	Transaxle Fluid Temperature (TFT) Sensor Circuit Performance	D	No
	Refer to 4:60-E Automatic Transmission Diagnosis		

P0713	Transaxle Fluid Temperature (TFT) Sensor Circuit - High Signal Refer to <i>4L60E Automatic Transmission Diagnosis</i>	D	No
P0716	Automatic Transmission Input (Shaft) Speed Sensor Circuit Performancd Refer to <i>4L60E Automatic Transmission Diagnosis</i>	B	Yes
P7017	Automatic Transmission Inut (Shaft) Speed Sensor No Input Refer to <i>4L60E Automatic Transmission Diagnosis</i>	B	Yes
P0719	Brake Switch Circuit Low Refer to <i>4L60E Automatic Transmission Diagnosis</i>	D	No
P0724	Brake Switch Circuit High Refer to <i>4L60E Automatic Transmission Diagnosis</i>	D	No
P0730	Incorrect Gear Ratio - Refer to <i>4L60E Automatic Transmission Diagnosis</i>	D	No
P0741	Torque Coverter Clutch System Stuck Off Refer to <i>4L60E Automatic Transmission Diagnosis</i>	B	Yes
P0742	Torque Converter Clutch System Stuck On Refer to <i>4L60E Automatic Transmission Diagnosis</i>	A	Yes
P0748	Pressure Control Solenoid Valve Circuit Malfunction Refer to <i>4L60E Automatic Transmission Diagnosis</i>	D	Yes
P0751	Shift Solenoid 1 - Performance/Stuck Off Refer to <i>4L60E Automatic Transmission Diagnosis</i>	B	Yes
P0753	Shift Solenoid 1 - Electrical Refer to <i>4L60E Automatic Transmission Diagnosis</i>	A	Yes
P0756	Shift Solenoid 2 - Performance/Stuck On Refer to <i>4L60E Automatic Transmission Diagnosis</i>	A	Yes
P0758	Shift Solenoid 2 - Electrical Refer to <i>4L60E Automatic Transmission Diagnosis</i>	A	Yes
P1106	MAP Sensor CKT Intermittent High Voltage	D	No
P1107	MAP Sensor CKT Intermittent Low Voltage	D	No
P1111	IAT Sensor CKT Intermittent High Voltage	D	No
P1112	IAT Sensor KCKT Intermittent Low Voltage	D	No
P1114	ECT Sensor CKT Intermittent Low Voltage	D	No
P1115	ECT Sensor CKT Intermittent High Voltage	D	No
P1121	TP Sensor CKT Intermittent High Voltage	D	No
P1122	TP Sensor CKT Intermittent Low Voltage	D	No
P1133	HO2S Insufficient Switching Bank 1 Sensor 1	B	Yes
P1134	HO2S Transition Time Ratio Bank 1 Sensor 1	B	Yes
P1153	HO2S Insufficient Switching Bank 2 Sensor 1	B	Yes
P1154	HO2S Transition Time Ratio Bank 2 Sensor 1	B	Yes
P1336	CKP System Variation Not Learned	A	Yes
P1351	IC Circuit Open	B	Yes
P1352	Bypass Circuit Open	B	Yes
P1361	IC Circuit Not Toggling	B	Yes
P1362	Bypass Circuit Shorted	B	Yes
P1374	3X Reference Circuit	B	Yes
P1380	EBCM DTC Rough Data Unstable	D	No
P1381	Misfire Detected No EBCM/PCM Serial Data	D	No
P1404	EGR Valve Closed Pintle Position	B	Yes
P1441	EVAP System Flow During Non-Purge	B	Yes
P1554	Cruise Control Status Circuit	D	No
P1626	Theft Deterrent System Fuel Enable CKT	D	No
P1629	Theft Deterrent Crank Signal Malfunction	D	No
P1635	5 Volt Reference (A) Circuit	B	Yes
P1639	5 Volt Reference (B) Circuit	B	yes
P1641	A/C Relay Control Circuit	D	No
P1651	Fan 1 Relay Control Circuit	B	Yes
P1652	Fan 2 & 3 Relay Control Circuuit	B	Yes
P1653	Fuel Level Output Control Circuit	D	No
P1662	Cruise Control Inhibit Control Circuit	D	No
P1663	Generator Lamp Control Circuit	D	No
P1665	EVAP Vent Solenoid Control Circuit	B	Yes
P1671	MIL Control Circuit	D	No
P1672	Low Engine Oil Level Lamp Control Circuit	D	No
P1676	EVAP Canister Purge Solenoid Control CKT	B	Yes
P1810	Auto Transmission Fluid Pressure Manual Valve Position Switch Malfunct Refer to <i>4L60E Automatic Transmission Diagnosis</i>	B	Yes
P1811	Maximum Adapt and Long Shift Refer to <i>4L60E Automatic Transmission Diagnosis</i>	D	No
P1860	Torque Converter Clutch PWM Solenoid Circuit Refer to <i>4L60E Automatic Transmission Diagnosis</i>	A	Yes
P1887	TCC Release Switch Malfunction Refer to <i>4L60E Automatic Transmission Diagnosis</i>	B	Yes

## 4L60 E Wiring Harness Installation Instructions

Before you begin it is important that you familiarize yourself with the harness. Try and visualize how the harness fits with your particular application.

Identify the locations of the computer, the fuse panel etc. The more organized you are when you begin the easier the installation will progress. The Street & Performance Harness is designed to compliment the looks and performance of your engine. Proper planning will insure your complete satisfaction. **Remember Fuel Injection Technology; If you don't know where it goes ASK!**



Lay the harness in the valley between the intake & heads under any existing hosing.



Connect the injectors being careful that the disconnect clip is to the outside of the engine.



Clip the injectors into place



Place the coils in the same manner as the injectors.



Gently push the coil plug into the connector on the underneath of the coil pack.



Lay all the plugs for the front of the engine connections into place.



Install cam sensor at rear of intake



Install knock sensor at rear of intake



Install MAP sensor at rear of intake.



Install throttle position sensor at front of engine



Install idle speed motor at front of engine



Install air temp sensor at rear of air filter



On Vette remove Coolant Temp sensor and replace with IROC/TA. pt#12551708. Part is available from Street & Performance or G.M. The Collant Temp Sensor uses a three prong plug.



Connect Engine Temp Sensor plug.



Connect crank sensor plug



Install your Oxygen sensor to the O2 plug



Check the O2 sensor for breaks or chafing. Replace if necessary. Available from G.M or Street & Performance



Install the O2 sensor into the front O2 bun on your header collector.



For non-emission vehicles, install the rear O2 plugs to the LS-1 Simulator, this eliminates the catalytic converter.



Wire tie the installed wires neatly



Clip excess off of ties



Attached tied wires to the top cover clip bar



Reinstall the top cover



Install Vat by-pass to Vats plug in harness.

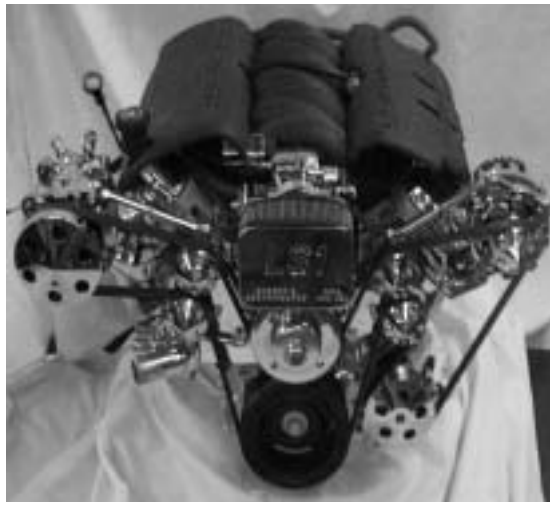


**\*\*\*Caution!\*\*\***

Connect the brown fuel pump wire directly to the fuel pump. Do not connect thru buss or panel.



**Street Rod Style**  
Low Driver side Alternator  
Low Passenger side A/C



**50's & Later**  
High Driver side Alternator  
High Passenger side A/C  
Low Driver side P/S



1999 & up  
Vette ~ IROC ~ T/A ~ Trucks  
#09354896  
Auto VIN # 2G1FP22G9Y2126954  
Manual VIN # 2G2FV22G5X2232687



**Street Rod Style**  
Low Driver side Alternator  
Low Passenger side A/C  
2:00 O'Clock Passenger P/S



**Street Rod Style**  
Low Driver side Alternator



1997-98 Vette Computer  
1998 - IROC/TA  
#16238212  
Auto VIN # 2G2FV22G5W2206587  
Manual VIN # 2G1FP22G9W2124277



**Street Rod Style**  
Low Pass side Alternator  
Low Driver side P/S

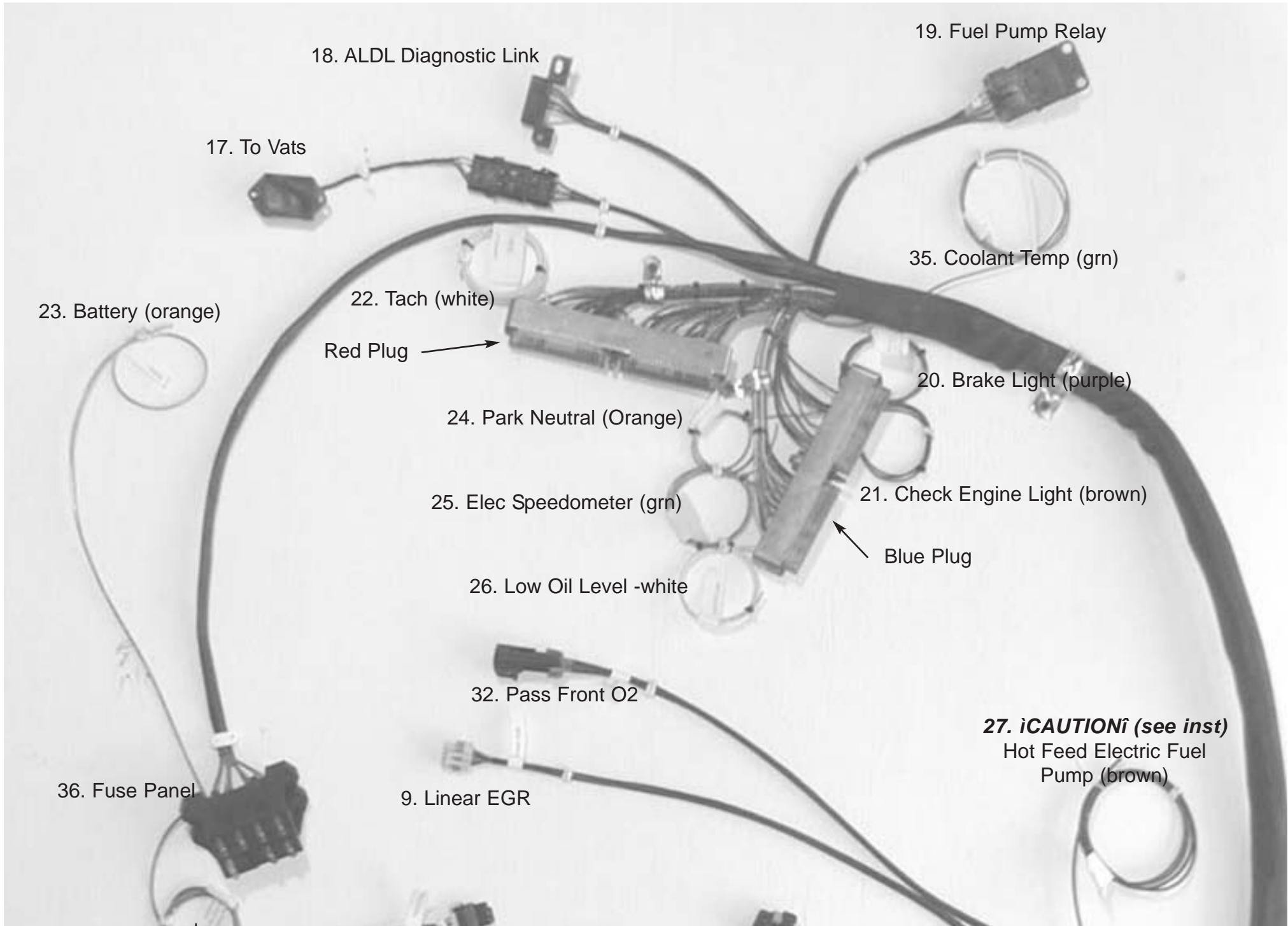


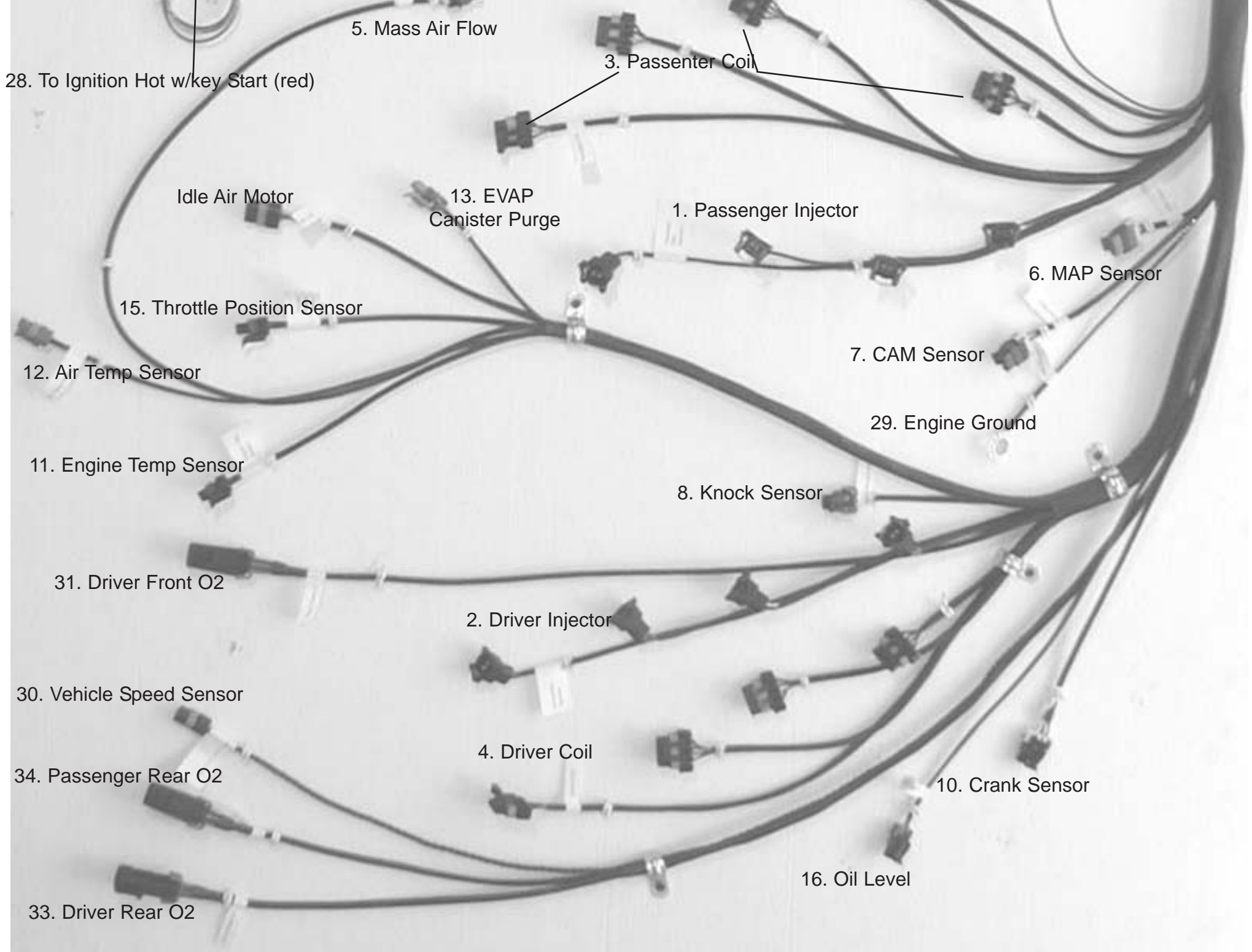
**Street Rod Style**  
Low Pass side Alternator



Street & Performance Video Series  
New LS-1 Video coming soon.

# LS-1 Wiring Harness - T-56 Borg Warner 6-sp





5. Mass Air Flow

3. Passenger Coil

28. To Ignition Hot w/key Start (red)

Idle Air Motor

13. EVAP  
Canister Purge

1. Passenger Injector

6. MAP Sensor

15. Throttle Position Sensor

7. CAM Sensor

12. Air Temp Sensor

29. Engine Ground

11. Engine Temp Sensor

8. Knock Sensor

31. Driver Front O2

2. Driver Injector

30. Vehicle Speed Sensor

34. Passenger Rear O2

4. Driver Coil

10. Crank Sensor

33. Driver Rear O2

16. Oil Level

# Common Installation Questions;

**Q. Is it important to follow any particular order when installing the harness?**

A. Starting at the engine intake manifold, and installing the injectors and coils helps hold the harness in place while completing your installation. The order of installation of the none engine connectors depends upon your application.

**Q. What happens if I have a short?**

A. The quick burn fuseable 30 amp link should protect the system in the event of a short. You must find the short before proceeding. Never jumper around the fuseable link. Use proper diagnosis and repair techniques.

**Q. Where can I purchase the G.M. Service Manual.**

A. Helm's 800-782-4356. Most local parts houses have many Helm's books. The Street & Performance Video Series is packed with useful information. Contact your S & P dealer.

**Q. Where can I find professional help with my harness installation?**

A. Your local Street & Performance dealer, Street Rod Shop can normally assist you in the installation. In addition Street & Performance conducts a fuel injection school dealing with the latest in Fuel Injection Technology. Periodically information is available on our web site to help in your installation.

**Q. Do you have technical assistance available?**

A. For technical assistance.call Street & Performance or your local dealer.

**Q. What should I do if I accidentally split or chaf a wire?**

A. The G.M. 1998 Service Manual, Second Edition, Volume 3 of 3, provides detailed instructions on repairing damaged flat wires and HO2S wiring. Sections 8-307 and 8-309.

**Q. If I break a plug or connector, what should I do?**

A. The G.M. 1998 Service Manual, Second Edition, Volume 3 of 3, provides detailed instructions on repairing damaged flat wires and HO2S wiring. Section 8-310.

**Q. Can you explain voltage?**

A. You must use a 90 amp or larger alternator with fuel injection. **YOU MUST HAVE GOOD GROUNDS.** Battery to motor or trans, engine to frame and engine to body.

**Q. Do I need to save my old harness?**

A. No, although its helpful to save the old ends in case of damage to your new harness.

**Q. Where can I find the trouble code references?**

A. Included with your harness..



LS-1 in a 1998 S-10



LS-1 in a 1998 Crew Cab



LS-1 in a Chevy Suburban

## Street & Performance

#1 Hot Rod Lane ~ Mena, AR 71953

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