

Power-Mileage-Driveability

Gary Johnson's '69 Camaro came to S&P with a big block, big cam 5 speed. This setup had poor driveability and very poor fuel mileage. Gary wanted to update his Camaro to a reliable, fuel efficient tire burner with air conditioning and power steering. Since Gary owns an auto salvage business, Mark at S&P recommended that he use a low mileage LS-2 pullout that would provide him with the mileage, horse power and durability that he wants, so Gary went to work and found one.



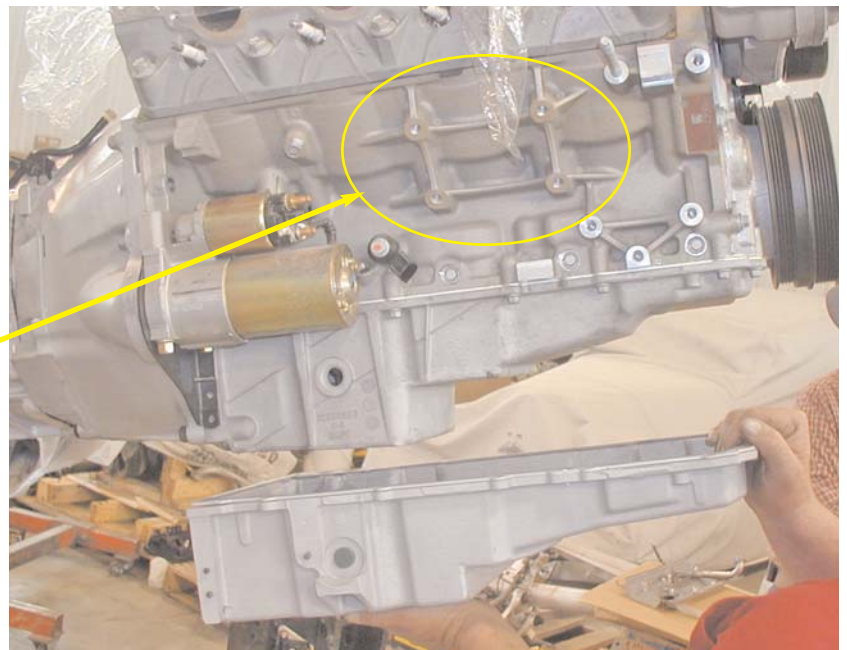
Before removing the engine, it is a good idea to take the time now and label all of your wires and engine connections, this will save you time and headaches when hooking everything back up to the LS-2. The LS-2 will use the same connections that the big block used for the coolant, oil pressure sensor and wires, starter wires, alternator wires etc.

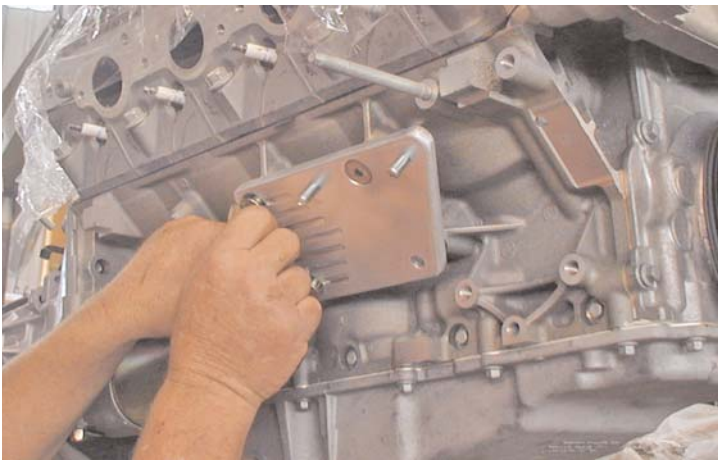


With the big block removed, the engine bay is now ready for the team at S&P to detail for the LS-2 installation. Notice all the green tape used to label the wires and hoses. Note: When getting an engine and transmission from a salvage yard, you need to also get the computer, oxygen sensor, gas pedal, mass air flow and the TAC module.



We removed all of the factory accessory brackets so that it would be easier to set the engine into the compartment and check all the mounting points. We then bolted the T-56 6 speed transmission to the engine. Since we installed a new Steeriods rack & pinion kit, we knew we would have to change the oil pan to keep it from hitting. The pan that we use is a S&P modified pan which also has the modified pick up tube. Note the factory front engine mount holes, these are the same on all LS engines.





S&P makes an aluminum mounting plate to adapt to the early Chevy style rubber engine mount. The plates come with all the bolts needed and are marked for the driver and passenger side. There are also mounting plates that will move the engine toward the firewall one inch and a new mounting plate for the 94-96 Caprice and SS Impala when installing the LS engines. Be sure to use anti-seize compound on all bolts to prevent electrolysis of the two different types of metals.

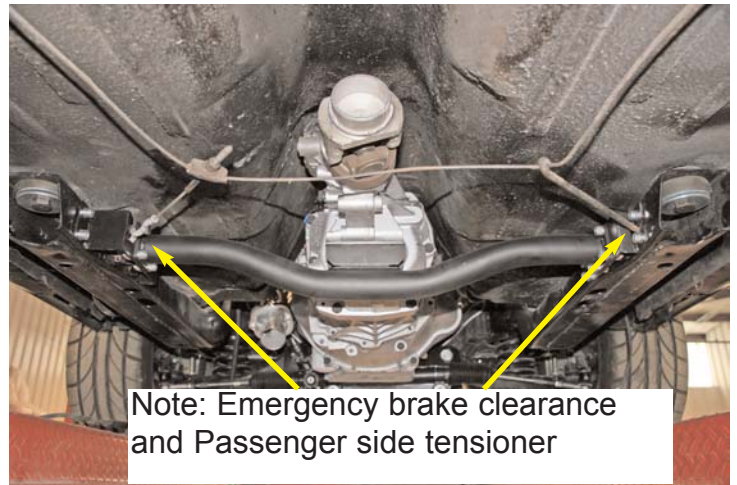
With the mounting places installed, we are now ready to drop the LS-2 and T-56 6 Speed into the Camaro's engine bay. It is much easier to install the engine without the accessories and headers and bolt the accessories and headers later.



Shown left is how the engine will mount on the factory stands and how the modified oil pan will clear using the S&P engine plates

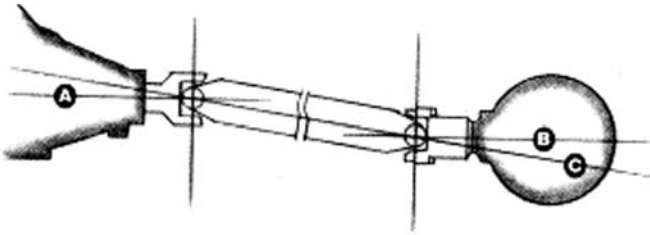
Note: The S&P modified oil pan clears the Steroids rack & pinion. This pan will also clear the '67-'69 stock drag link. This modified pan will only reduce the oil volume by 1/2 quart.





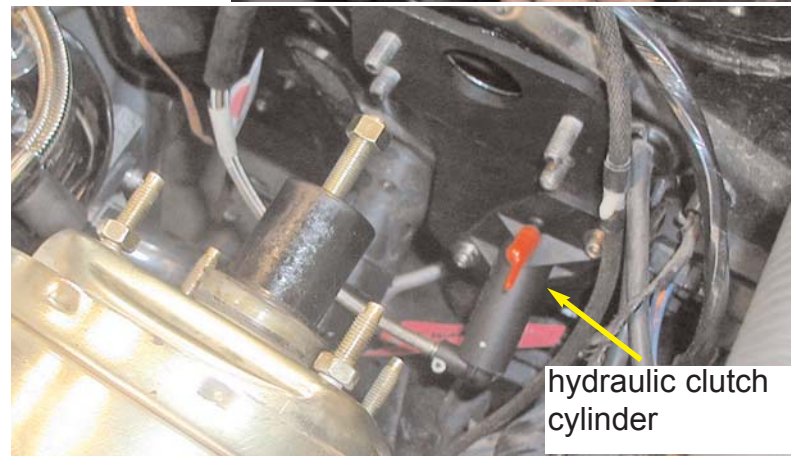
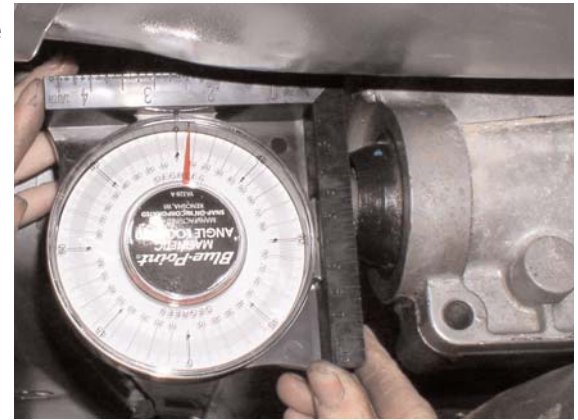
Note: Emergency brake clearance and Passenger side tensioner

With the engine sitting on the front mounts, we then installed the new S&P rear transmission crossmember. The crossmember comes complete with all the mounting hardware and is designed to clear the factory emergency brake cables.

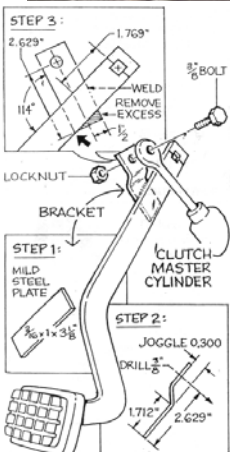


Drive shaft angle is important for strength and reliability. The transmission MUST be angled

1 to 5 degrees low on the yoke, but + or - 2 degrees is idea for performance applications. To check the drive line, hold the angle finder against the tail shaft and locate the transmission mount bracket to the cross member.



hydraulic clutch cylinder



Next we used a S&P T-56 slave cylinder mounting plate. This mount will bolt between the firewall and brake booster allowing for the mounting of the hydraulic clutch cylinder. The cylinder rod will then connect to the bracket that must be welded to the original clutch pedal as shown in the drawing below.

Welding the clutch master cylinder arm in place.



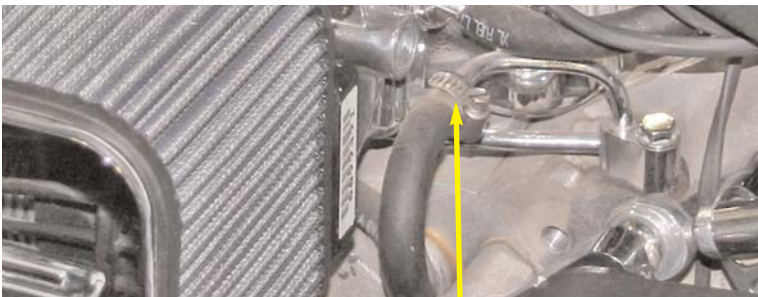


Mounting the 6 speeds hydraulic clutch cylinder reservoir to the firewall to ease the checking of fluid level.

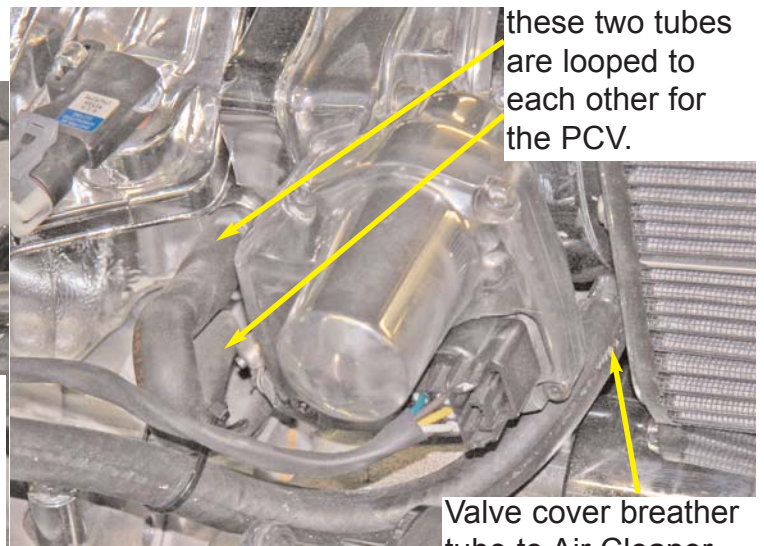
S&P's '67-'69 Chromex coated headers were then installed. When using headers you need to use a set of custom Taylor plug wires that will allow the wire to reach around the header tubes. Black wires were used in this application, however there are several other colors to choose from.



The small fitting closest to the firewall goes to the heater and the larger fitting closest to the waterneck is the return from the heater.



On the right we drilled and tapped the top of the waterpump and installed an 1/4 pipe 90 degree fitting to route the steam line from the top of the waterpump to the driver side steam line fitting. This is a cleaner look than routing to the radiator.



Note on the LS2 these two tubes are looped to each other for the PCV.

Valve cover breather tube to Air Cleaner

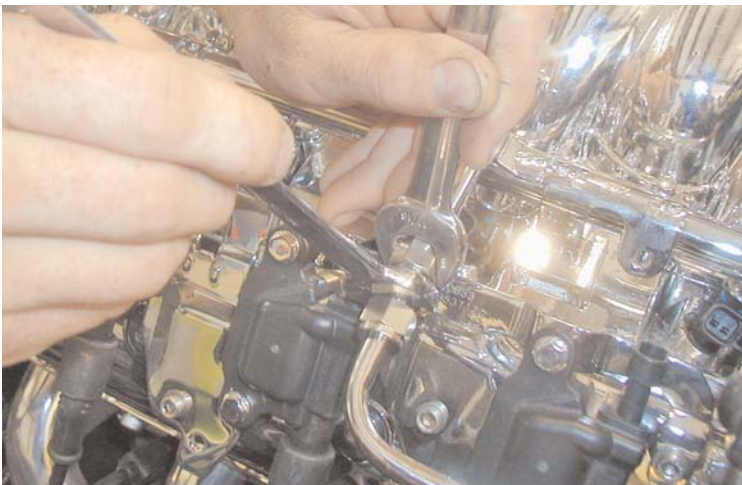


A S&P 2004-up 360/45 degree swivel waterneck is installed to ease the installation of the lower radiator hose. '97 to '03 uses an incorporated thermostat and the 04-up does not.



Left; Installing the float level 0-90 ohm assembly for stock gauges into the Rock Valley Stainless Steel tank, if you are using aftermarket gauges, you will need to provide the ohm requirements. Right: Stainless fuel line kit for the '67-69 Camaro from Tube Tech in single or double line configurations.

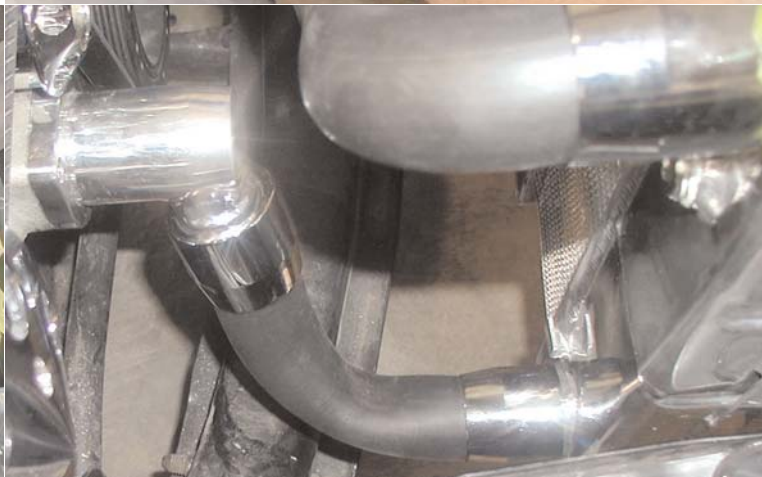
Using a '99-up Vette fuel filter regulator kit from S&P which comes with an GM filter and inlet/return and AN-6 outlet adapter fitting. The inlet is S.S 3/8 compression to male AN-6 and return is an S.S 5/16 compression to male AN-6. Outlet to engine is a quick disconnect to AN-6. This kit is used because the LS-2 is a single fuel line system. When making the connections to these fittings you must use oil on the threads and flairs to insure a proper seal. We used the same size hose on both lines from the tank to the filter regulator for ease of installation.



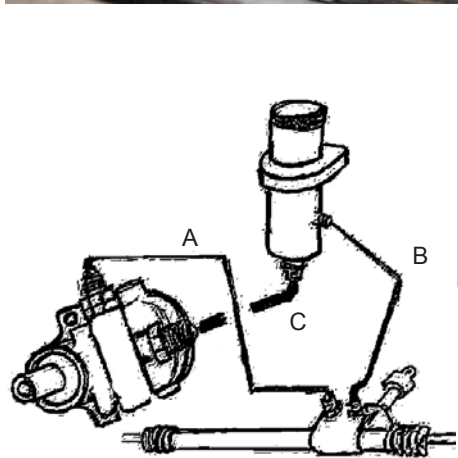
S&P S.S hard line to braided hose kit from frame to fuel rail is connected using a S.S compression to AN-6 fitting that can with the kit.

Before trying to start the engine check that you have all of your connections tight, then turn the key to the on position to power up the fuel pump and check for leaks.

Bolting up the LS Cross Flow radiator provided by Griffin Radiator which came complete with the electric fan. Note LS radiator comes with the top and bottom outlets on passenger side. This make routing of the radiator hoses much easier. The upper hose that we used is a Goodyear 61331 and the lower is a Goodyear 60374. These hoses are long and must be trimmed to fit.



We used the S&P braided power steering hose kit to connect the power steering pump to the Steeriod rack and S&P Aluminum reservoir. The Steeriod rack uses an 18mm to AN-6 and a 16mm to AN-6 back to reservoir. AN-8 fitting is used from the bottom of the reservoir back to the pump with a special vacuum rated hose.



A..#6 Pressure Line to Rack or Gear Box
B..Return #6 or 3/8 from Rack or Gear Box to side of reservoir.
C..#8 or 5/8 Return from reservoir to pump

Notice...Type II Pumps also are available with 3/4" Shaft. But we don't use these pumps because they just have a front bushing and not a bearing.





GROUNDS, GROUNDS, GROUNDS!!!

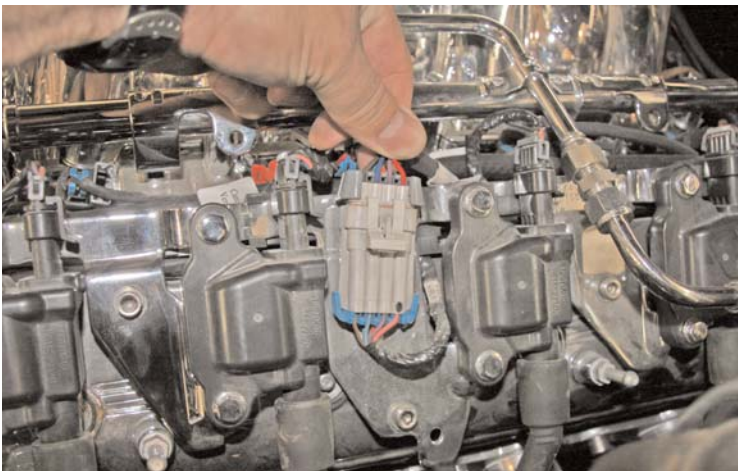
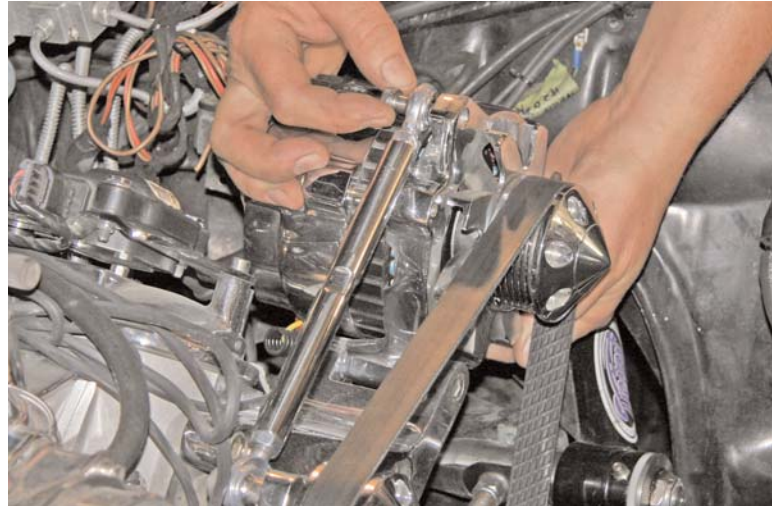
Grounds are one of the most important steps to ensure a trouble free system. All grounds must be free from paint and grease, or use star washers to bite through to the bare metal. You MUST have the following ground connections.

BATTERY TO ENGINE or TRANSMISSION (even if battery is in the trunk).

ENGINE TO FRAME

ENGINE TO BODY

After installing all of the brackets and accessories, we installed a Goodyear Gatorback belt #4061145 and tightened it by using the stainless steel alternator turn buckle. The proper tension is when you can turn the belt 90 degrees with your fore finger and thumb easily.



The S&P wiring harness comes complete with all GM connectors. All the connections are labeled and the plug descriptions and wire colors are detailed in the instruction sheet that comes with the harness or can be downloaded from S&P's website, www.hotrodlane.cc. There is also a DVD video to show how to install the harness. S&P engine harness with 4 wire hook-up plugs into the engine and the transmission. Red wire to key, orange wire to starter, black to ground and brown to the fuel pump. All wires are labeled and color coded with instruction sheet. The harness also includes relays, vats by pass, and diagnostic link.

Tony mounted the Vette Drive by Wire Throttle Pedal to the firewall and attached the S&P harness to the pedal. Check the S&P website for more details since the 4.8, 5.3, 6.0, 7.0 and 8.1 engines use different tech modules and pedals. GTO's in '05 used the same computer as Vettes but different throttle pedals. If you have a non-adjustable tach you must use tach signal interface such as the SGI-8 offered by Dakota Digital. If you have an adjustable tach, then it must be set for four cylinders to make it read properly.





S&P's harness will plug right into the drive by wire throttle body. '97-04 Vettes use a different throttle body, computer and tach module than the 4.8, 5.3, 6.0 which use the same computer as '97-04 Vettes, but different tach modules and pedals. These configurations are fully detailed in the instructions, DVD and website.

Hooking the harness to the LS-2 five pin mass air flow which S&P incorporates into the air cleaner assembly. Before starting the engine for the first time, always check all fluid levels, and possible fuel leaks. It is very important to check the throttle for proper operation. Safety is of most importance when doing any engine conversion. S&P maintains technical staff to answer any questions the you may have.



LS-2 installed into a '69 Camaro by Street & Performance. This installation will provide you with years of trouble free service, horse power, drivability, emissions and mileage.

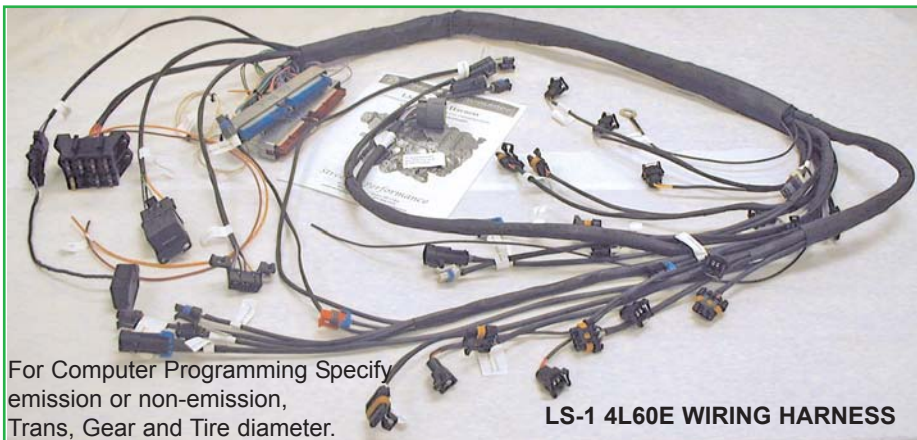


LS2
Stainless
Fuel Line
Kit



Single
Line Filter
Regulator

Uses 99-Up Vette fuel filter, allows the use of one line to engine. Filter will return excess fuel to tank.



For Computer Programming Specify emission or non-emission, Trans, Gear and Tire diameter.

LS-1 4L60E WIRING HARNESS

LS-1 AUTOMATIC TRANS. DRIVE BY CABLE WIRING HARNESS

LS-1 are designed for easy of installation, come ready to plug in with only 4 wires to hook-up. All harness are available with full emission. Also have harness up through 2003.

- 16238212 97 - 98 LS-1 Vette/IROC/TA Wiring Harness complete for 4L60E
- 9354896 99 - up LS-1 Vette/IROC/TA Wiring Harness complete for 4L60E
- 9354896 99 - up LS-1 **Truck Wiring** (4.8-5.3-6.0) Harness for 4L60E/4L80E
- 12576106 97 - up LS-1 **Drive by Wire** Harness for Manual or 4L60E/4L80E



1997 - 1998 Vette ~ IROC ~ T/A ~ Trucks .
(Red & Blue Plug)
#16238212 / 16232148

Need to know if you have a 3 Pin or 5 Pin MAF



LS-1 MANUAL TRANS. DRIVE BY CABLE WIRING HARNESS

LS-1 are designed for easy of installation, come ready to plug in with only 4 wires to hook-up. All harness are available full emission and compatible with other manual transmissions.

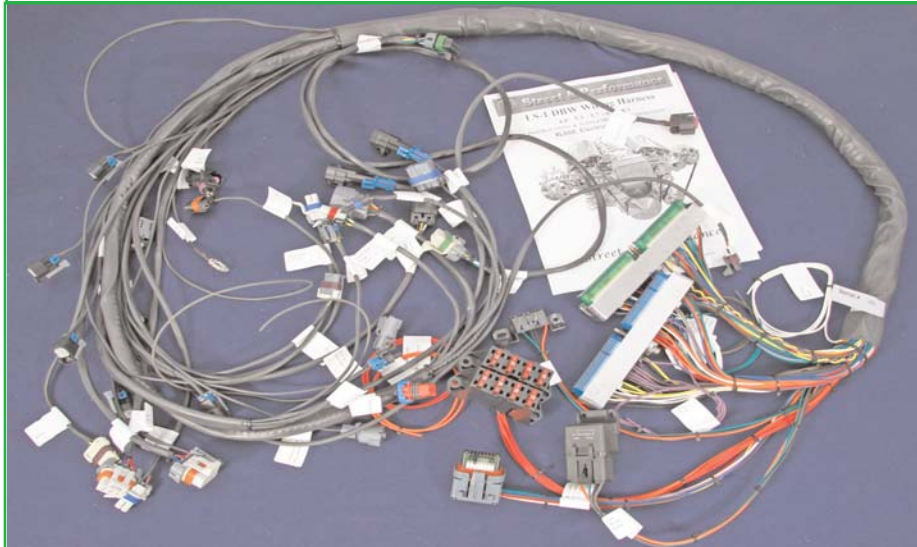
- 16238212 97 - 98 LS-1 Vette/IROC/TA Wiring Harness complete for Manual 6-speed
- 9354896 99 - up LS-1 Vette/IROC/TA Wiring Harness complete for Manual 6-speed
- 9354896 99 - up LS-1 **Truck Wiring Harness** for Manual Transmission



1999 & up Vette ~ IROC ~ T/A ~ Trucks .
(Red & Blue Plug)
99-2000 #09354896 / #16263494
2002 #12200411



2004 Drive by Wire
(Blue & Green Plugs)



GTO / SUV / Truck Drive by Cable
(For vehicles using Blue & Green Plug Computer)
Must Know if 3 pin or 5 pin MAF, Year & Trans.

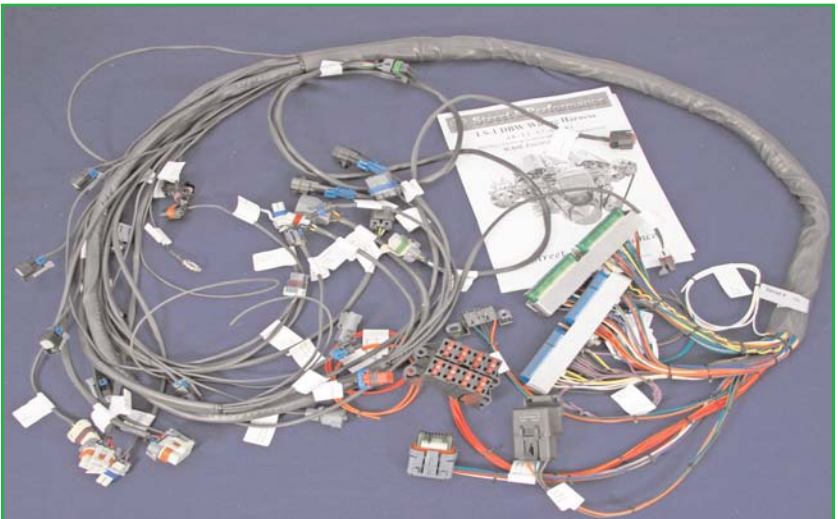


Universal Speedometer Signal Interface, Recalibrates Speed Signal to Correct for Gearing and Tire size Changes Unit can also Solve Pulse Rate Incompatibility Problems by Converting a Pulse Rate to Multiple Lower or Higher Pulse Rates. **Not for use with Anti-Lock Brake Systems**
If you are using Classic Instruments Speedometer or a non-programmable speedometer you will need this speed signal interface.

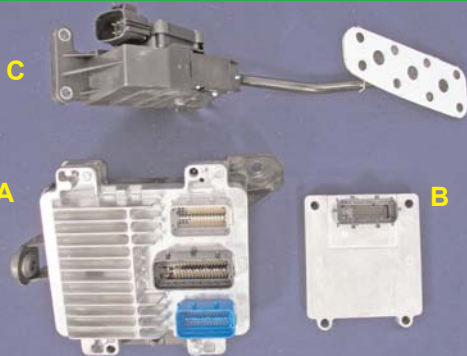
The new SGI-8 Tach Signal Interface unit is capable of recalibrating most tachometer signal to make them work with tachometers originally designed for a different number of cylinders.
 For instance, if you have put a V-8 into a vehicle with a factory tachometer that was originally equipped with a 4 or 6 cylinder engine, the SGI-8 would be able to alter the tach signal so that the factory tach will read correctly.
LS-1, if tach is not programmable, you will need this tach signal interface to make your tach work.



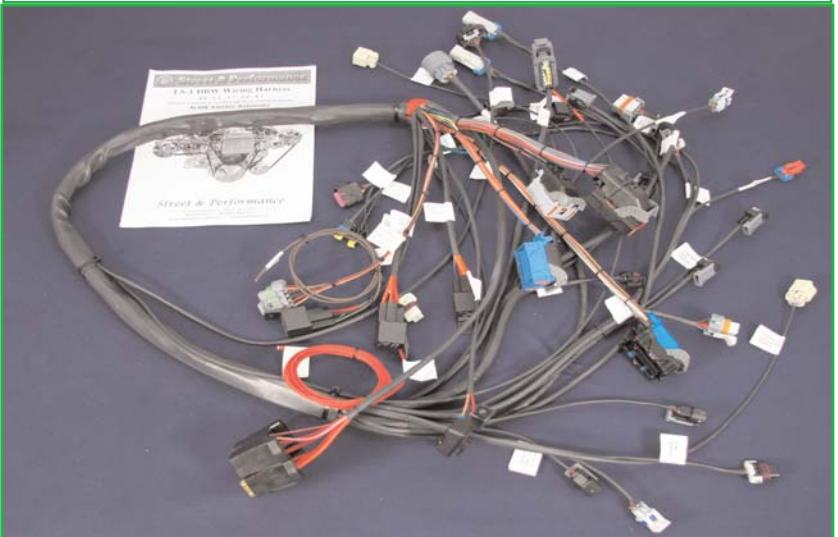
03-04 Computers can only be Programmed as Drive By Wire.
12586243 Pictured Above
(Blue & Green Plugs)



2004 Up Drive by Wire
(using computer # 12586243)
Must Know if 3 pin or 5 pin MAF



A. 05 LS2 Computer 12597883
B. Transmission Controller
C. GTO DBW Throttle Pedal Assembly

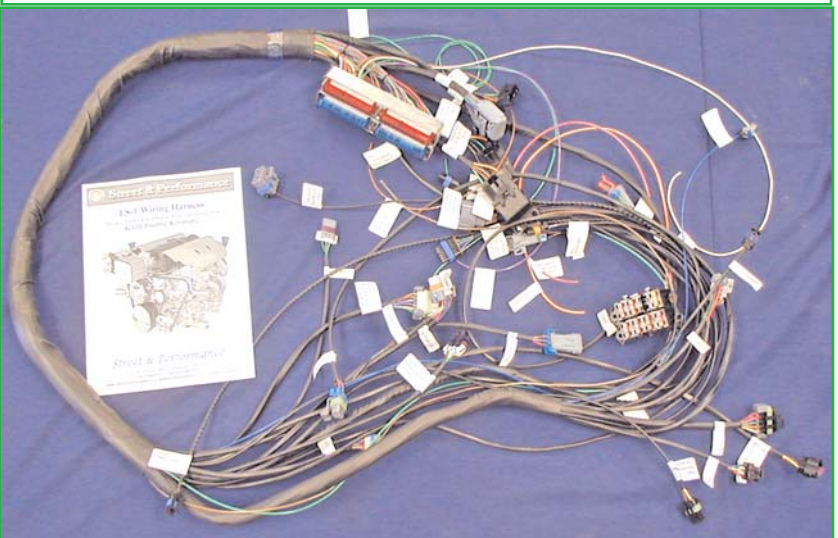


2005 - LS-2 - GTO - SSR - DRIVE BY WIRE

SERV NO.	ENGINE/VEHICLE
9254896- 99-00	4.8, 5.3 & 6.0
12200411- 01-02	4.8, 5.3, 6.0 & 8.1
12200411- 01-03	IROC/TA Vette LS1/LS6
12586242- 04	Vette LS1/LS6
12576106- 03	4.8, 5.3 & 6.0
12586243- 04	4.8, 5.3 & 6.0
12589463- 05-06	4.8, 5.3 & 6.0
12597191- 05	Vette LS2
12597883- 05	Vette LS2
12598343- 04	GTO / SSR
12597883- 05	GTO / SSR
12603892- 06	LS-2/LS-7
12583560- 06	5.3 Truck
12583561- 06	5.3 Truck
12596679- 06	5.3 SSR

When getting the donor engine and transmission, get the **MASS AIR FLOW, COMPUTER, TAC MODULE, GAS PEDAL, OXYGEN SENSORS**. S&P keeps a complete line of new and used accessories.

8.1 DBW Gas Pedal



NEW 8.1 Big Block Chevy
with or without 4L80E & Allison Transmission
Easy 4 wire Hook-up (Plug and Go) \$950.00
With Allison Transmission, Add \$300.00



LS2 Air Cleaner using 5 Pin MAF adapter with PCV Vent



97-04 Vette

SUV / Truck



LS-2 05 GTO

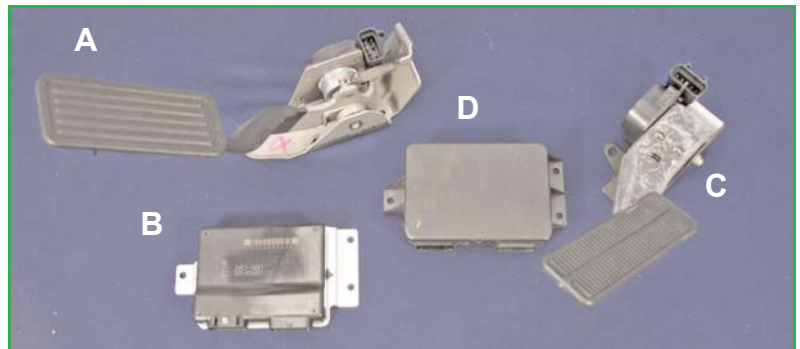
Drive by Cable



**55-57/67-69 Camaro
\$235.00 Exchange**



S&P's LS-2 Bracket Kit for mid '50s and Later applications (Vette Style). Street Rod Style Bracket Kits Available. See S&P's online catalog at www.hotrodlane.cc



DRIVE BY WIRE PEDALS & MODULES

A. Truck/SUV Throttle Pedal. (12177923)

B. Truck/SUV Tac Module

(05-12588923* 03-05-12573059* 02-12574221)

C. 97-04 Vette Throttle Pedal. (12565643)

D. 97-04 Vette Tac Module (12578953)



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Stainless steel fuel tanks w/high pressure pump installed
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www.rockvalleyantiqueautoparts.com

Tube Tech

Custom made stainless steel fuel lines

479-394-6466

96-Up 4L60E 6 Bolt to 4 Bolt Tail Housing Adapter. Comes with tail housing gears and hardware

For Manual Speedometer. Gear ratio and tire rollout is needed when ordering.

Griffin Thermal Products

Aluminum cross flow radiators
1-800-722-3723

www.griffinrad.com



Detroit Speed and Engineering

Front Suspension

Phone: 704-662-3272

Fax: 704-731-0989

Email: info@detroitsspeed.com

Steeriods (Rack Pinion)

SpeedDirect (888) 425-2776

Tech Line (970)-731-1381

Fax (970)731-1386

www.speeddirect.com

T-56 6-Speed Manual Tail Housing Kit.

Comes with gear and hardware on exchange basis

For Manual Speedometer. Gear ratio and tire rollout is needed when ordering.

Street & Performance

Engine and accessories
479-394-5711

www.hotrodlane.cc



Adapter to relocate the T-56 shifter handle

McLeod Industries

Shifter Relocator

714.630.2764

Fax 714.630.5129

Tech 714.630.3668

www.mcleodind.com