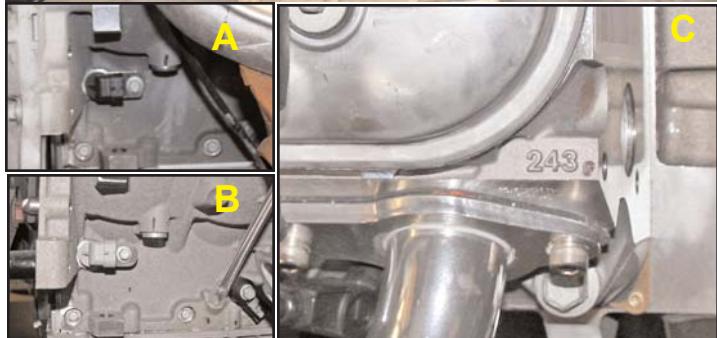




Ken brought the Camaro to Street & Performance less an engine, but he already had the Steeriods rack in place. Later we will show that the oil pan MUST be modified to allow the LS-2 to fit down over the crossmember and rack.



Note the factory front engine mount holes, these are the same on all LS engines. The S&P motor mount plates allow for the use of the old style 3 bolt design and position them to the proper location.

Ken Ross decided that wanted his '68 Camaro to have the muscle of a big block and the fuel efficiency and drivability of the new GM LS-2 to allow it to be a pro touring vehicle for power tours and cruising. The LS-2 allows Ken to make the power of the big block and the drivability of a small block. The LS-2 with a cam change, head porting, roller rocker arms, headers and computer reprogramming can make over 528 HP and still provide the comfort of AC without the overheating problems that come with the old big blocks and AC in stop and go driving. This Camaro can be a daily driver as well as cruise the power tours.

Street & performance provided the LS-2 crate motor. The '05 LS-2 GM part # 12499750 has a 24 tooth reluctor ring on the crank. All GTO's Vette's, SSR's, Cadillac CTSV's and Trail Blazers come with the LS-2. GM produced 145,000 of them in 2005.

The '06 LS-2 GM part # 19156261 has a 58 tooth reluctor ring on the crank. You must know which year engine you have to have the correct computer (PCM). If you purchase a pull out engine, besure to also get the computer, mass air flow, oxygen sensors, gas pedal and if an automatic, you must also get the transmission module.

- A. 2005 24 tooth reluctor ring (BLACK)
- B. 2006 up 58 tooth reluctor ring (GRAY)
- C. LS-2 / LS-6 Head Casting #243





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.

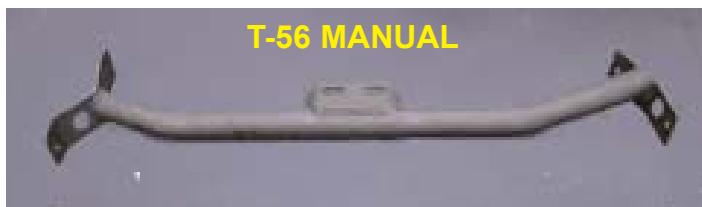


Left: Shows an early rubber side mount from a '70 307 Chevelle that has a slotted hole which can make installing the cross bolt easier.

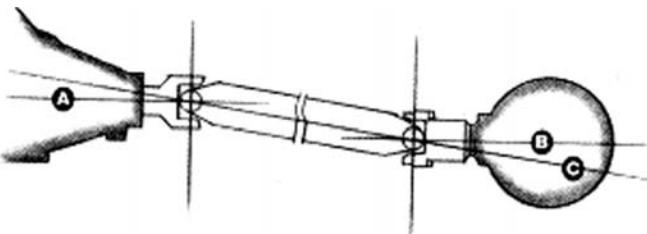
Shown right is how the engine will mount front to back on the factory stands using the S&P engine plates. We will lower the engine into position to check the final fit.



Note: The S&P modified oil pan clears the Steeroids 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.

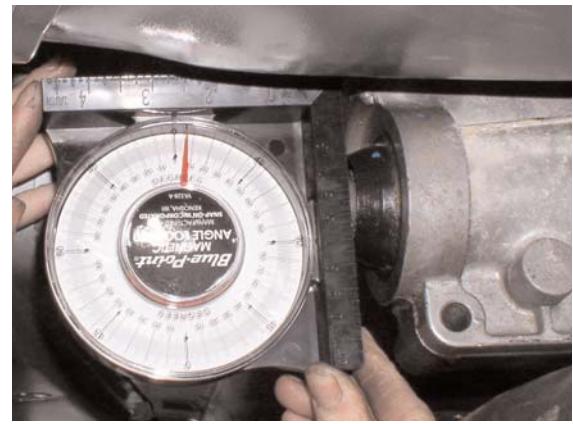


With the engine sitting on the front mounts, we then installed the new S&P rear transmission crossmember. The crossmember comes complete with all the mounting hardware and is designed to clear the factory emergency brake cables.

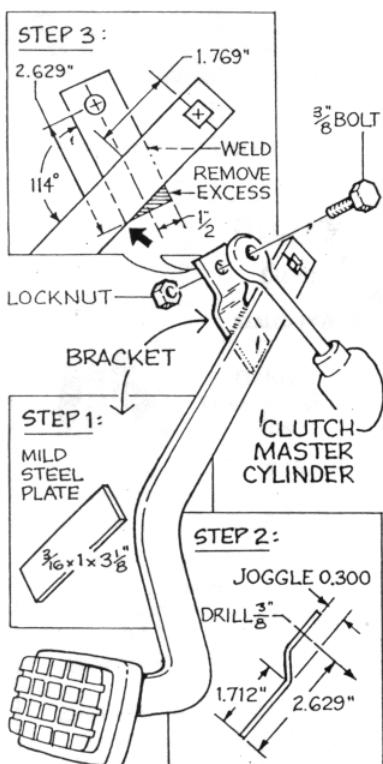


Drive shaft angle is important for strength and reliability. The transmission MUST be angled

1 to 5 degrees low on the yoke, but + or - 2 degrees is ideal 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.

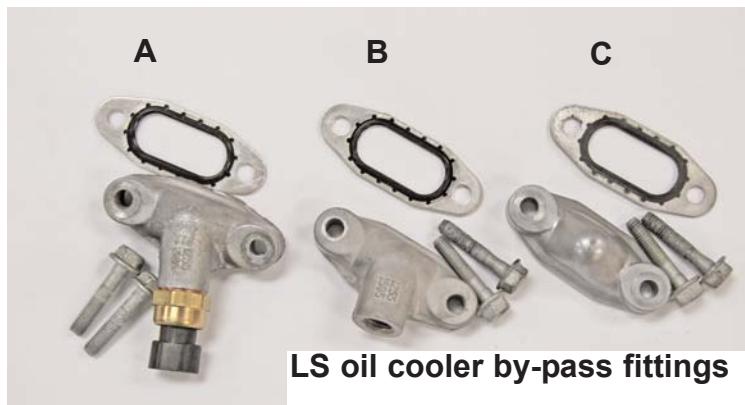


Next we used a S&P T-56 slave cylinder mounting plate. This mount will bolt between the firewall and brake booster allowing for the mounting of the hydraulic clutch cylinder (GM PT # 12570277). The cylinder rod will then connect to the bracket that must be welded to the original clutch pedal as shown in the drawing below. After mounting the brake master cylinder, we installed the clutch reservoir to the firewall. NOTE: '98-up T-56 have an internal slave cylinder and '93-'97 have an external slave cylinder. The '98-up T-56 bolt pattern and input shaft is better suited for the GEN III engines, But McLeod can help you adapt the older T-56 to the GEN III engines.



Welding the clutch master cylinder arm in place.

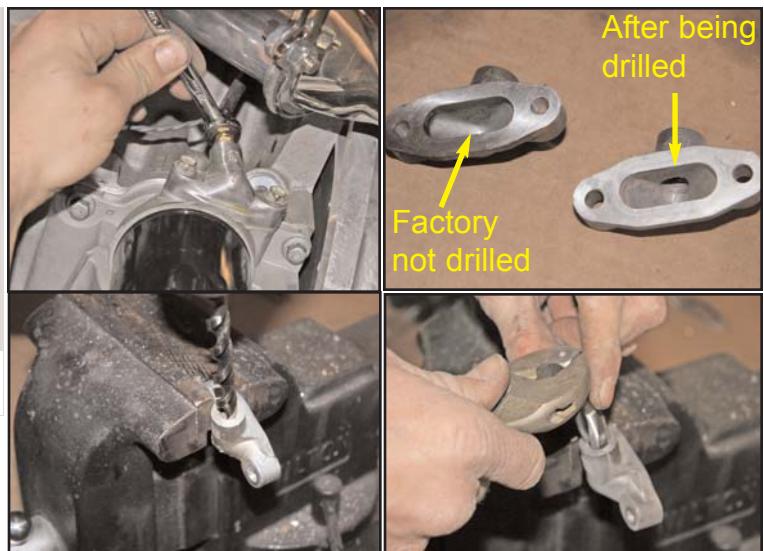




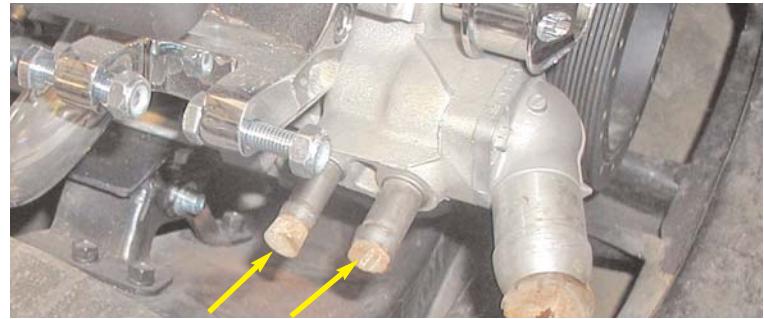
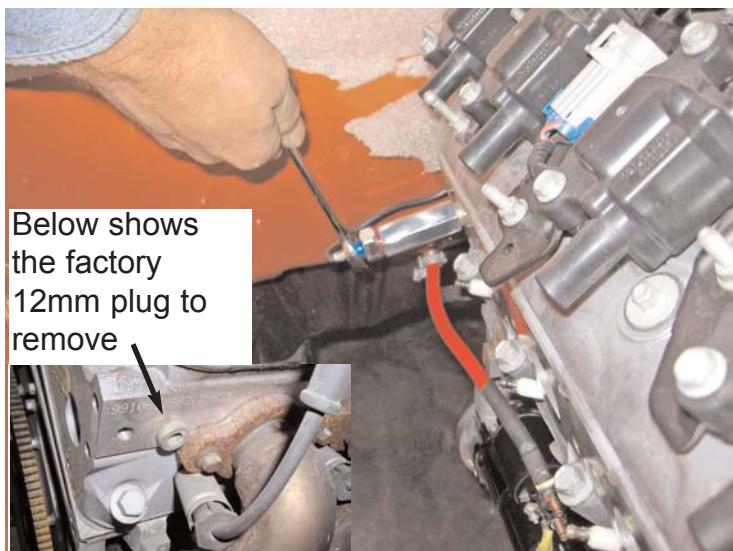
- A.** '97-'04 Corvette with factory oil temp sensor, drilled and tapped to 1/4" pipe from factory.
B. '98-'02 IROC/TA comes not drilled or tapped.
C. '05-up LS-6/LS-2/LS-7



S&P makes this 16mm oil pressure adapter fitting which locates behind the intake manifold available in 1/8", 1/4", 3/8" and 1/2" NPT.



The Camaro uses a manual oil pressure gauge, which we connected to an early model LS-1 oil cooler by-pass fitting (PT # 12551595)above the oil filter. The factory by-pass can be drilled and tapped to a 1/8" pipe thread.



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. These press in fittings can be removed with vise grips and tap the firewall side to 3/8" pipe and the radiator side to 1/2" pipe to except AN-8 fittings provided by S&P shown below.

S&P produces the 12 mm adapter fitting which is located in the back of the passenger side head to adapt to 1/8", 1/4", 3/8" or 1/2" female pipe thread for the coolant sensor required for you gauges.



1. 1/2" pipe swivel 90 degree to AN-8
 2. 3/8" pipe swivel 90 degree to AN-8
 3. 1/2" pipe to AN-8
 4. 3/8" pip to AN-8
- Also available to AN-10.



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.



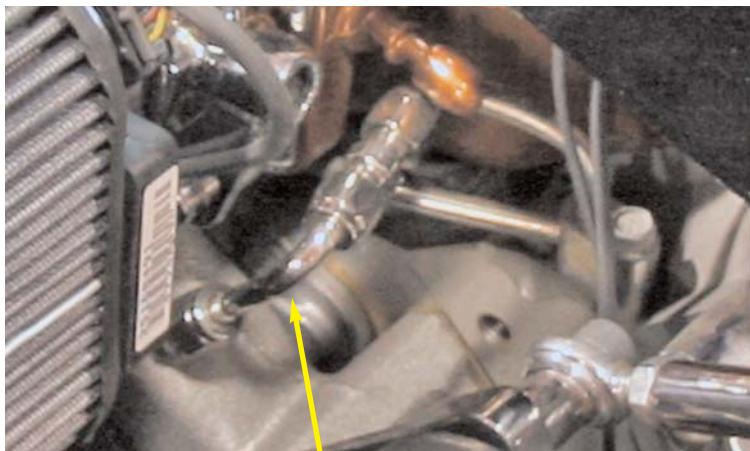
S&P '67-'69 Camaro/TA headers are available in plain or thermal coated with Chromex. Comes complete with bolts, gaskets and collectors with oxygen sensor buns installed. The LS-2 needs to use the front oxygen sensors even if doing a non-emission vehicle. Emission vehicles must use front and rear O2 sensors.



S&P '67-'69 headers are designed to clear the 605 steering box as well as rack and pinion kits.



The stainless '67-'69 Camaro exhaust kit from Stainless Works was fitted to Ken's Camaro prior to being polished by Street & Performance.



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

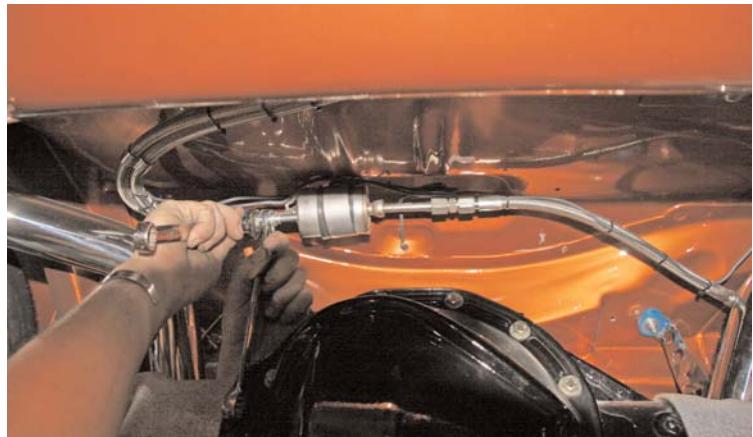


A S&P 2004-up 360/45 degree swivel waterneck is installed to ease the installation of the lower radiator hose. '97 to '03 uses an incorporated thermostat and the 04-up does not.



Left: The stock tank was sent to Rock Valley for the intank pump installation and we will Install the float level 0-90 ohm assembly for stock gauges. 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.

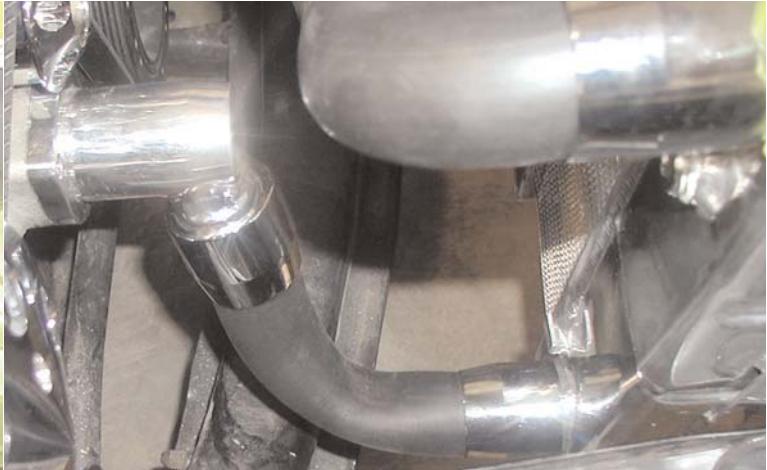
Using a '99-up Vette fuel filter/regulator kit from S&P which comes with a GM filter and inlet/return and AN-6 outlet adapter fitting. The inlet is S.S 3/8 compression to male AN-6 and return is an S.S 5/16 compression to male AN-6. Outlet to engine is a quick disconnect to AN-6. This kit is used because 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 came 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.

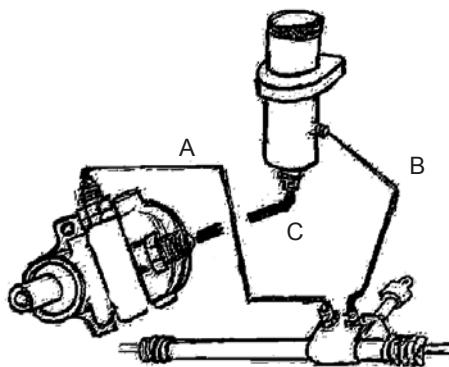
Bolting up the LS cross flow radiator provided by Griffin Radiator which came complete with the electric fan. Note LS radiator comes with the top and bottom outlets on passenger side. This make routing of the radiator hoses much easier. The upper hose that we used is a Goodyear 61331 and the lower is a Goodyear 60374. These hoses are long and must be trimmed to fit. S&P offers aluminum hose end covers to hide the hose clamps in polished or chrome that we will install after we trim the hoses 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.



We 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 tach 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.



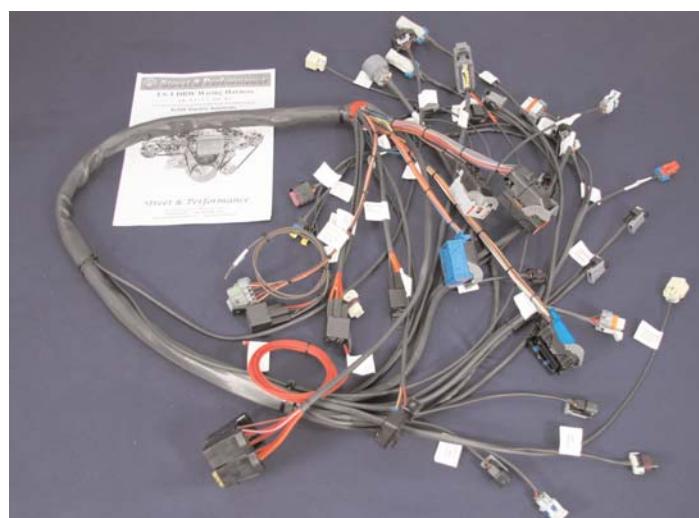
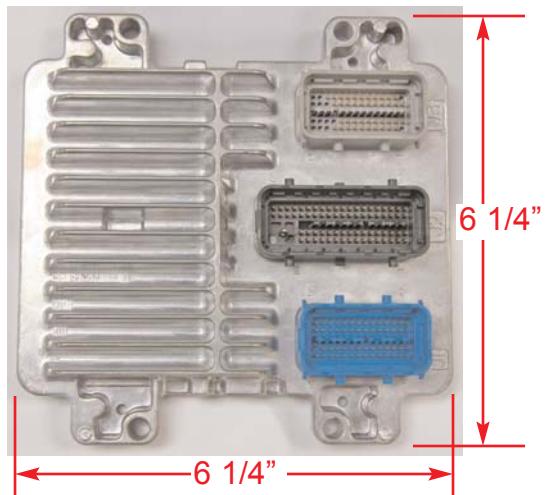
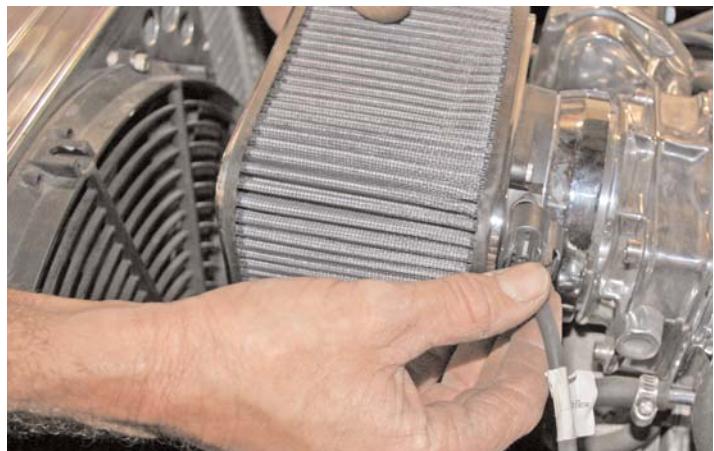
The S&P wiring harness comes complete with all GM connectors. All the connections are labeled and the plug descriptions and wire colors are detailed in the instruction sheet that comes with the harness or can be downloaded from S&P's website, www.hotrodlane.cc. There is also a DVD video to show how to 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, fuses and diagnostic link.





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.

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.



Wiring Harness available for automatic and manual transmissions, drive by wire or drive by cable.

We mounted the computer, fuse block and fuel pump relay behind the headlight on the inner fender panel. The computer used with the 2005 LS-2 engine with a 24 tooth reluctor ring is (GM PT# 12596732) . Since Ken's Camaro is using a T-56 6 speed we did not need the transmission control module (GM PT# 24226863) which is needed for the 4L60E / 4L65E transmission. All LS-2 computers will need to be reprogrammed due to the anti-theft feature in the computer. We must know gear ratio and tire diameter as well as emission or non-emission to reprogram. The S&P wiring harness used comes with an instruction sheet and all connections are labeled for an easy installation. S&P can also make this harness in custom lengths and drive by cable for the LS-2 or earlier engines.



We ordered a McLeod Industries shifter Relocate to move the T-56 shifter handle 2 3/8" forward in order to have the shifter handle back in the stock location in the console.



Finishing under the Camaro we installed the Wiles aluminum driveshaft and the Stainless Works exhaust that was polished by S&P.



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.

If you are not sure which GEN III engine that you have, contact one of the techs at Street and Performance for help with your application.

'05 Computer
GM PT# 12596732



'06-up Computer
GM PT# 12596732



4L60E / 4L65E
Transmission
Controller





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

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



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

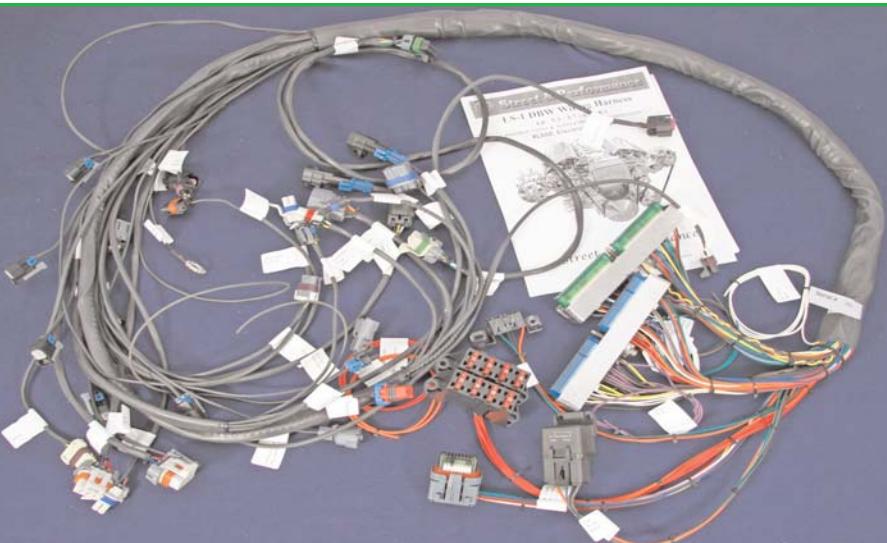


**1999 & up Vette ~ IROC ~ T/A ~ Trucks .
(Red & Blue Plug)**
99-2000 #09354896 / #16263494
2002 #12200411



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



GTO / SSR / 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 tachometers 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)



A. 05 LS2 Computer 12597883

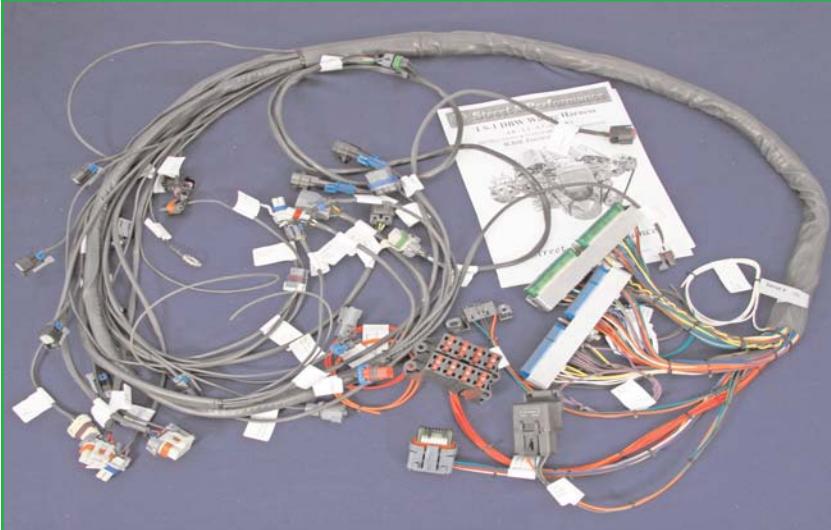
B. Transmission Controller (GM PT# 24226863)

C. '05-up GTO DBW Throttle Pedal Assemembly

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.

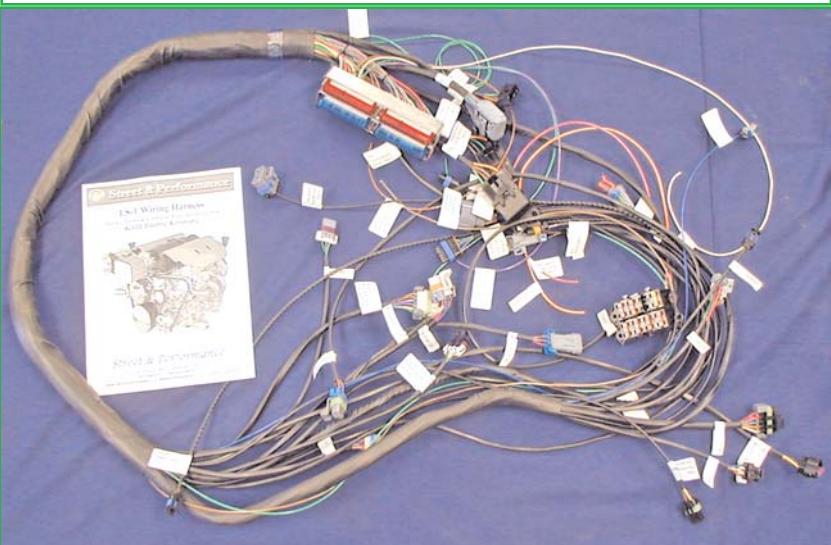
'05-up Vette DBW Gas Pedal



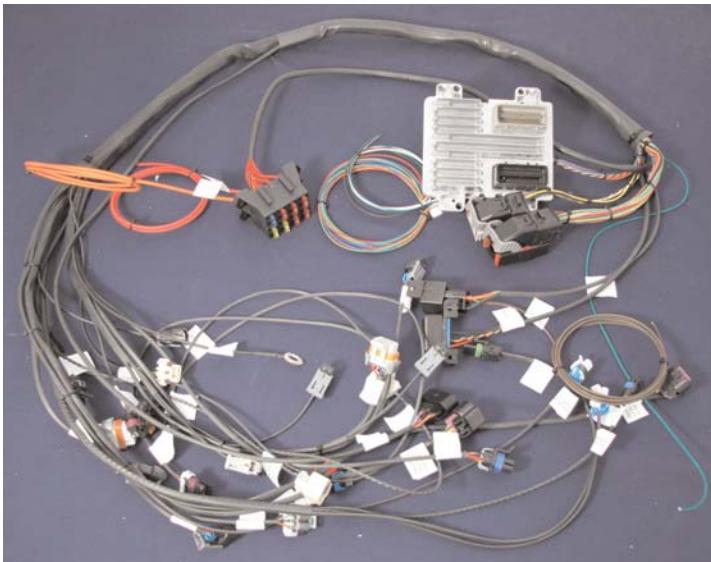
**2004 Up Drive by Wire
(using computer # 12586243)
Must Know if 3 pin or 5 pin MAF**



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



**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



S&P '06-up wiring harness for the LS-2 using the 58 tooth reluctor ring with computer number 12603892. Comes complete with fuse panel, fuel pump relay, dianostic link and all the needed plugs for T-56 or 4L60E / 4L65E transmissions. Available in full emission or non-emission



**Billet 90 mm Throttle
Body Drive by Cable
for LS-2
2005 ONLY**

(78mm Billet TB for LS1/LS6)

S&P makes three styles of waternecks for the GEN III engines, above are the '04-up style waternecks which have a slip in thermostat and the '97-'03 use a twist lock thermostat. Available in polished only.



SSR / Trail Blazer lift out engine with automatic transmission. Complete with engine computer, transmission module, mass air flow and oxygen sensors.



GTO lift out engine with T-56 transmission. Complete with computer, mass air flow and oxygen sensors. '05-up GTO SSR Trail Blazers with automatics come with the heaver duty 4L65E



LS2 Air Cleaner using 5 Pin MAF adapter with PCV Vent

97-04 Vette SSR / Truck



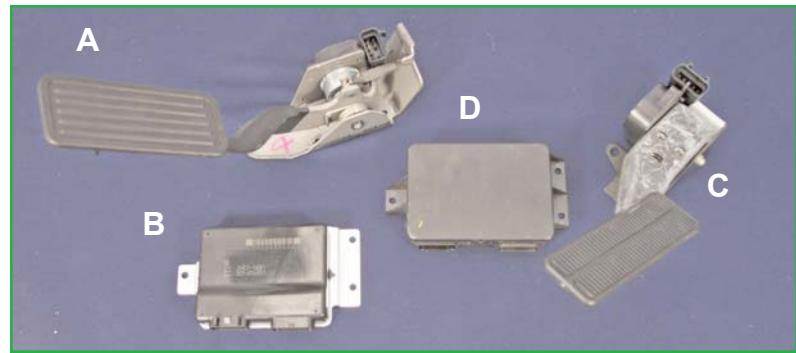
LS-2 05 GTO Drive by Cable



**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/SSR Throttle Pedal. (12177923)**
- B. Truck/SSR 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
1-800-344-1934
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

Stainless Works

Stainless Exhaust
(800) 878-3635 or (440) 543-6593
www.stainlessworks.net

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

McLeod Industries

Shifter Relocate
714.630.2764
Fax 714.630.5129
Tech 714.630.3668
www.mcleodind.com

Adapter to relocate the T-56 shifter handle

Wiles Driveshaft Service

Jackson, TN
(731) 642-2777