

# UPDATE YOUR TRUCK!

*Dependability, Driveability, Mileage, Emissions, Simple Install*



Got a nice vehicle with high mileage or engine trouble? Update it to one of the new GEN III engine & transmission. Our vehicle is a '96 4 wheel drive Tahoe which had a Vortec with only 70,000 miles. The problem with this vortec was that the intake leaked coolant into the crank case so rather than rebuild the Vortec we decided to switch out to the newer GEN III engine to allow for better mileage, emissions and dependability. We located a low mileage 2002 5.3 engine complete with computer, Mass Air Flow (MAF), Oxygen Sensors, (O2 sensors) starter and accessories. We used a 2002 because that year was still drive by cable, meaning that a cable is used to operate the throttle rather than an electric motor as Drive by Wire. GEN III engines after

2003 are Drive by Wire. Because the Tahoe only had 70,000 miles we kept the same transmission and transfer case. Keep in mind that if you are making this swap in a vehicle older than '96 you will have to change the fuel pump because the older model TBI only supplied 20 PSI where the GEN III must have 50 to 58 PSI. If you need to, change the pump to an AC DELCO EP-381.



We took the Vortec out leaving the old computer on board and leaving the old wiring harness intact. Label all the connectors as you remove them so that it will be MUCH easier to reconnect them later. Many of the connections will be used on the new engine such as the starter, alternator, oil pressure, coolant temp, and AC compressor.



S&P provides these engine mounting plates that will allow the older style 3 bolt motor mount to the new GEN III 4 bolt mount. It also moves the 3 bolt mount back to the proper location. The GEN III block motor mount is moved back from the older style engine. Use anti-seize on all the bolts that come with the mount kit.



Our 5.3 came with a dished flex plate that is used on late model 4L60E transmissions. Since we are using our original early model 4L60E transmission, we need to change to a flat flex plate with spacer and longer bolts which can be purchased from S&P. This flat flex plate kit is be used for the 350, 400, 700 R4 and '95-'98 4L60E and 4L80E transmissions.

While on the subject of transmissions, it should be known that '94 and earlier 4L60E transmissions used a 12 pin connector and can not be controlled by the GEN III computer, only '95 and Later 4L60E transmissions using 13 pin connector can be used. An S&P tech can help you with you application and reprogram your computer for gear ratio and tire size to insure proper shifting.

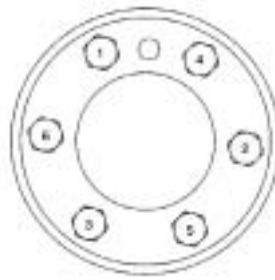




When using an early model torque converter you will have to egg shape the torque converter bolt holes on the flex plate. Check your flex plate to your torque converter before mounting. You will be able to use the same torque converter bolts. Install the engine flywheel bolts. Tighten the engine flywheel bolts first pass in sequence to 20 N·m (15 lb ft).

Tighten the engine flywheel bolts second pass in sequence to 50 N·m (37 lb ft).

Tighten the engine flywheel bolts final pass in sequence to 100 N·m (74 lb ft).



Tighten flywheel bolts in this sequence. Torque Converter bolts should be torqued to 46 Ft Lbs.



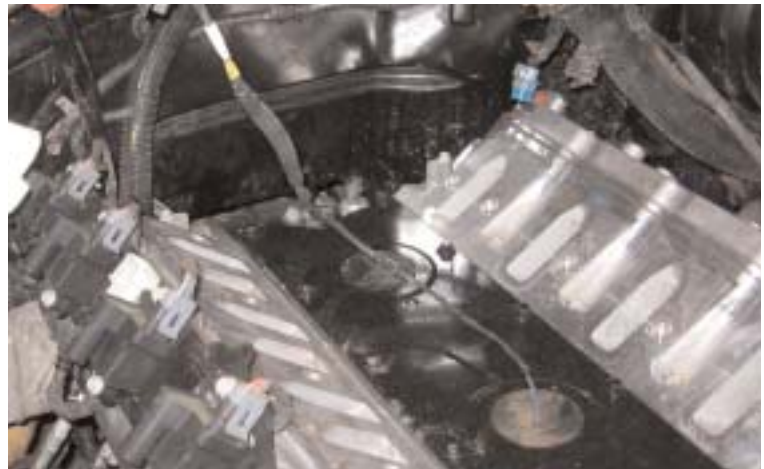
We removed the intake and accessories in order to ease the installation. Note the 5.3 truck oil pan, It fits over the crossmember without any mods.



After setting the engine on the engine stands, we bolted up the torque converter and the transmission. The transmission will have to move forward slightly. Loosen the transmission rear mount to allow the transmission to move while tightening the bell housing bolts and the retighten the rear mount on the transmission. NOTE: If you do install the later model transmission that comes with a GEN III engine all of the shifting linkage will work. S&P tech line can help you when mating a later model 4L60E to a early model transfer case.



The S&P motor mount plates placed the engine back onto the original engine stands. We then bolted up the transmission, torque converter and motor mounts.



Two Knock sensors are located under the intake manifold, These have a wire harness that needs to be routed out from under the back of the manifold and will be hooked up to the harness later, be sure to label this wire.



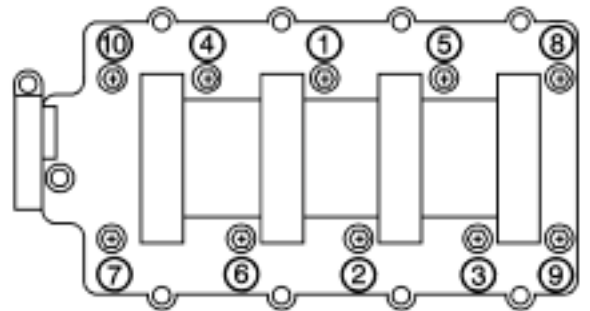
The 5.3 oil pressure sensor is located at the rear of the block behind the intake manifold. The sensor is very low on the stock block so we used an S&P 16mm adapter to install the vehicles original oil pressure sending unit. The original sending unit provides the proper settings for your gauges. Note that the cam sensor is just left of the oil pressure sending unit.



James removes the old 5.3 power brake hose from the intake manifold to connect the Tahoe's brake line later. Some of these ports are plugged and will need a power brake line adapter which can be purchased from GM (Part # 12559760).



This is the bib that is plugged into the manifold vacuum port for the power brakes.



We installed the intake and attached the throttle cable cables. Tighten the intake manifold bolts a first pass in sequence to 5 N·m (44 lb in). Tighten the intake manifold bolts a final pass in sequence to 10 N·m (89 lb in).





The original Vortec throttle cable will insert into a hole and wrap around the cam arm of the 5.3 throttlebody with no modification and the Votrec cruise cable with the plastic end snaps onto the stud on the side of the cam arm.



We then bolted the S&P AC bracket to the passenger side head using the stainless steel bolt that came with it to install a Sanden 508 compressor. This is done because the original GEN III compressors are all climate control compressors designed to run all the time. The older style AC system has to have a compressor that will cycle on and off and will not mount to the passenger side of the GEN III engine.



The original heater hoses were then attached. The small fitting is for the pressure side to the heater core and the large is the return from the heater core.



Above we mounted the original 5.3 bracket for the power steering and alternator. The original 5.3 power steering pump is also used.



(Left) The Tahoe's original factory power steering lines hooked up to the new 5.3 pump with a little adjusting.

Tech Note: Notice the engine temp sensor in the front of the driver side head just in front of the spark plug. This is the engine temp sensor that you will be connecting the 5.3 engine harness to later.





James attaches the stainless steel braided fuel lines to the factory fuel filter (AC Delco 481) If your engine is a later design with only one fuel inlet and no return, you will need to install an AC Delco GI 822 fuel filter/regulator which will have two lines from the tank and one line to the engine. S&P supplies this kit, (see last page of this story.)



Slip-on adapter fittings slide over the factory fuel rails. The top line is the supply line and the bottom is the return line. NOTE: Fuel pressure regulator has a vacuum line to the plenum. This regulates the fuel pressure to 50 psi at normal driving and 55-58 psi under acceleration or load.



Apply oil to the treads and taper on the fitting then tighten the fuel line to the adapter fitting.



Fuel lines attached. **Before you start the vehicle, BE SURE to turn the key to the on position and let the system build pressure and check for leaks.**



Attach the Sanden 508 compressor to the bracket using the bolts that come with the bracket kit.



Making the AC fittings and lines, these fitting and lines are available from S&P





Attaching the new AC line from the 508 compressor to the factory dryer. When installing the AC lines, be sure to coat the threads with refrigerant oil.



We attached a stock '99 truck lower radiator hose to the lower waterneck and ran it to the lower radiator connection.



S&P 5.3 engine harness. All connections are labeled for easy connection. The S&P harness comes with instructions and wiring detailed info on wire colors and plugs or can be downloaded for the website. [www.hotrodlane.cc](http://www.hotrodlane.cc)



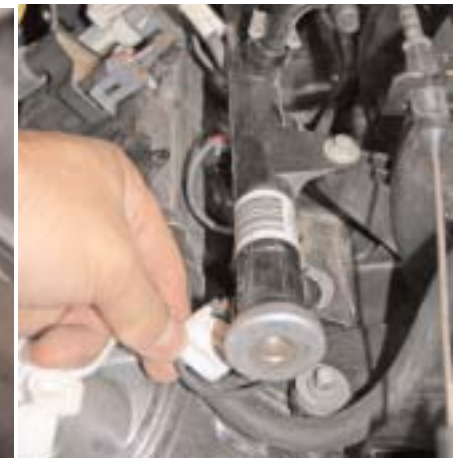
There is a water temp sensor in the front of the driver side head that is used by the engine computer. The 12mm plug located at the rear of the passenger side head can be removed to provide a locating point to install a sending unit for your coolant gauge (Factory, VDO ECT.) The head can be drilled and tapped for a pipe thread or S&P can provide you with a bushing to go from 12mm to either female 1/8, 1/4, 3/8 & 1/2 pipe.



There are two coil plugs (one for driver side and one for the passenger side). These will plug to the center of each coil rack.



S&P coolant adapter 12mm to 3/8 pipe allowed us to use the Tahoe's original coolant gauge sending unit into the back of the passenger side head.



Connect the injector plugs to the injectors. The injector plugs are labeled driver side and passenger side.



The knock sensor connection on the S&P harness connects to a pigtail that comes from under the back of the intake manifold.



Plug the wire labeled MAP sensor into the map sensor located at the rear of the intake manifold.



The throttle position sensor connection plugs into the bottom right side of the throttle body.



The idle speed motor is located at the top right side of the throttle body.



The two prong coolant temp sensor at the front of the driver side head connects to the S&P harness to provide the computer with the engine temp.



The computer engine harness is grounded to the back of the passenger side head. All grounds must be clean for a good contact. **Battery to engine, engine to frame, engine to body are all needed to insure proper operation.**





A stock '99 truck upper radiator hose was also used to connect the thermostat neck to the upper radiator connection.



The steam line from under the throttle body needs to be connected to the upper radiator hose or to the radiator. This line is used to provide warm coolant to the throttle body from the heads in cold weather to prevent icing of the throttle body. We decided to drill and tap the water pump like many street rods are done and return the coolant to the pump right before the upper radiator hose. S&P also provides a "T" for radiator hose installs.



'99-up battery to alternator connection box works great for making the alternator to battery connection.



The '97 original AC control wire is connected to the Sandan 508 compressor clutch lead. This is why it is so important to label the wires while removing the old engine. The connection will be determined by the year model. Call the S&P tech line for help.





The 5.3 engine/4L60E transmission computer was placed on the passenger side inner fender. The original computer is left on the driver side to control the anti-lock brakes, speedometer and other non engine/trans functions. A bracket was made to support the new computer.



The battery on the passenger side was moved to the driver side to allow for the mounting of a '99-up truck induction air/filter box. We then cut a hole for fresh air mounted the box and connected the ducting to the 5 pin mass air flow.



The original computer on the driver side is left in place. If running a tech, S&P provides a tech interface. This is needed because the GEN III computer outputs 1/2 of the old V8 signal. NOTE: The S&P harness vehicle speed sensor wires (twisted yellow and purple) must be spliced into the transfer case original vehicle speed sensor wires and two wheel drive are spliced in at the transmission tail housing speed sensor wires (dark to dark and light to light).



The S&P harness connection marked mass air flow connects to the mass air flow sensor.

The Tahoe now has the look of a late model with increased fuel mileage and better emissions than before at a much lower price than a new vehicle. This swap is one of the least expensive and easiest to do and can even be done in your driveway. Note: Drive by wire is just as easy as drive by cable.



Late model engines with a single fuel line will need this S&P fuel filter / regulator kit. This kit will let you convert the earlier dual fuel line systems to the single line fuel rails that come on the later style engines. **This kit must be used with a single line fuel rail because it is both a fuel filter and regulator with a return to the tank.**

2003-2005 4.8L, 5.3L & 6.0L GM may be equipped with any of these injector connectors



**Flex Fuel Injectors**

"Z" Style has plastic gray slider lock on top



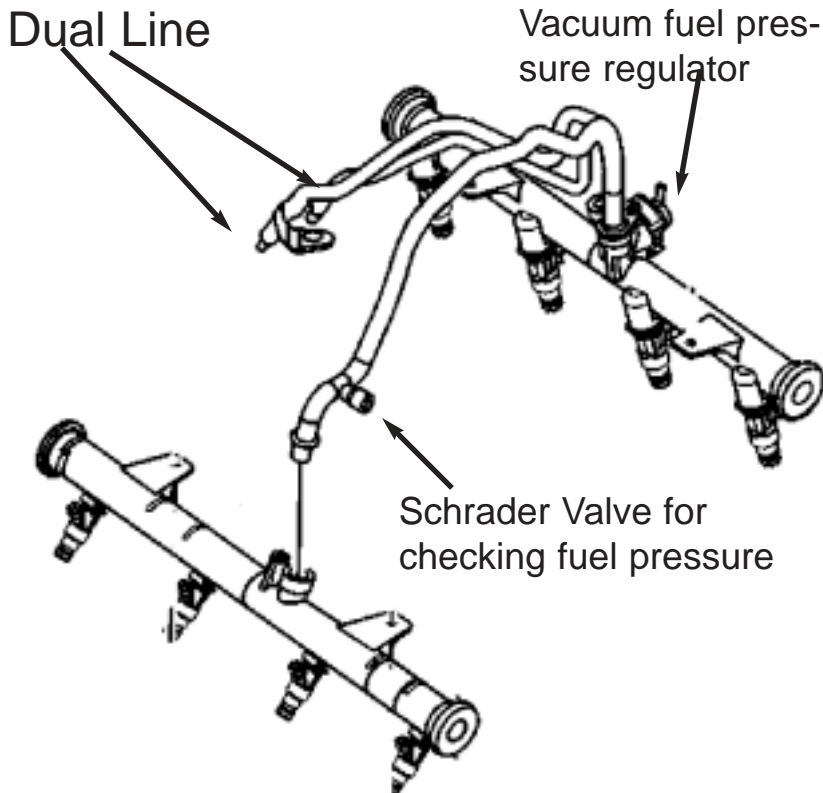
**Old Style Standard Injectors**

has metal bail clip on top



**Small 'T' - Style Injector**

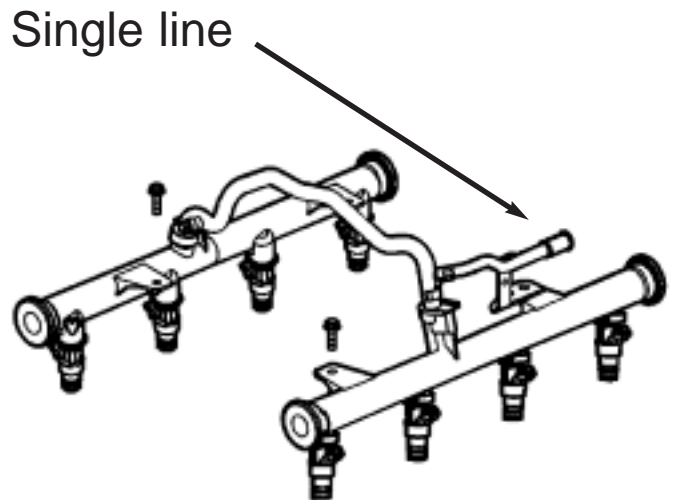
has Delphi -45 on plug



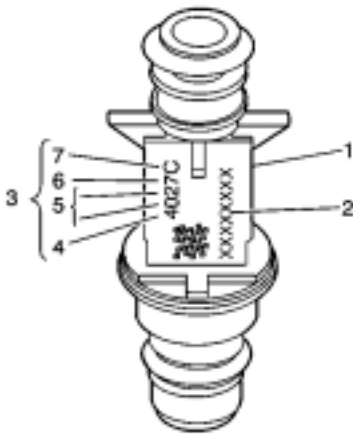
**What you need to know and get to make this swap easy.**

*From the salvage yard you will need engine, transmission, computer, mass air flow, air filter box, air ducting, radiator hoses, oxygen sensors,(for full emission you will need rear o2 sensors) exhaust manifolds and connectors, alternator battery connector box, Vin number to help ID engine/trans. and injectors. In '05 their were three types of injectors. You will have to know what type of injector you have when ordering the harness. If an 03 up engine/trans get all above plus gas pedal, and tach module.*

*New Products needed fuel line kit, engine/trans management harness, computer programming, fittings/adapters, AC bracket & idler kit with Sandan 508 compressor. S&P is open 7 days a week and can answer any questions and provide you will all of your needs. Be sure to check out the website at [www.hotrodlane.cc](http://www.hotrodlane.cc) for more details, tech support and other installation stories.*







When ordering injectors or an harness we will need to know what type of injector you have, this information will be needed before calling S&P for tech help.

The fuel injector (1) is stamped with a part number identification (2). A four-digit build date code (3), which indicates the month (4), day (5), year (6), and the shift (7) that built the fuel injector.

2003 - up 4.8L, 5.3L & 6.0 GM may be equipped with any of these injector connectors



**DRIVE BY WIRE PEDALS & MODULES**  
Some 2002 were drive by wire. All 2003 up are drive by wire. Drive by wire is not a problem if used with an S&P harness. You will need to get the tach module and pedal assembly with the engine.



All 4.8, 5.3 & 6.0 engines will use a 5 pin Mass Air Flow

**Visit S&P  
Web Site  
for  
ONLINE  
Tech help  
&  
Install Info**

***See Fastener Tightening Specifications (4.8, 5.3, 5.7, 6.0 LS Engines) on the next page***

# Fastener Tightening Specifications (4.8, 5.3, 5.7, 6.0 LS Engines)

	<b>Metric</b>	<b>English</b>
Accelerator Control Cable Bracket Bolt	10 N·m	89 lb in
Accessory Drive Belt Tensioner Bolt	50 N·m	37 lb ft
Air Conditioning (A/C) Belt Tensioner Bolt	50 N·m	37 lb ft
Automatic Transmission Oil Level Indicator Tube Nut	18 N·m	13 lb ft
Battery Cable Channel Bolt	12 N·m	106 lb in
Camshaft Retainer Bolt	25 N·m	18 lb ft
Camshaft Sensor Bolt	25 N·m	18 lb ft
Camshaft Sprocket Bolt	35 N·m	26 lb ft
Clutch Pressure Plate Bolt	70 N·m	52 lb ft
Crankshaft Balancer Bolt (Installation Pass-to Ensure the Balancer is Completely Installed)	330 N·m	240 lb ft
Crankshaft Balancer Bolt (First Pass-Install a NEW Bolt After the Installation Pass and Tighten as Described in the First and Final Passes)	50 N·m	37 lb ft
Crankshaft Balancer Bolt (Final Pass)140 degrees		
Crankshaft Oil Deflector Nut	25 N·m	18 lb ft
Crossbar Bolt	100 N·m	74 lb ft
Cylinder Head Bolt (First Pass all M11 Bolts in Sequence)	30 N·m	22 lb ft
Cylinder Head Bolt (Second Pass all M11 Bolts in Sequence)		90 degrees
Cylinder Head Bolt (Final Pass all M11 Bolts in Sequence-Excluding the Medium Length Bolts at the Front and Rear of Each Cylinder Head)		90 degrees
Cylinder Head Bolt (Final Pass M11 Medium Length Bolts at the Front and Rear of Each Cylinder Head in Sequence)		50 degrees
Cylinder Head Bolt (M8 Inner Bolts in Sequence)	30 N·m	22 lb ft
Drive Belt Idler Pulley Bolt	50 N·m	37 lb ft
Engine Flywheel Bolt (First Pass)	20 N·m	15 lb ft
Engine Flywheel Bolt (Second Pass)	50 N·m	37 lb ft
Engine Flywheel Bolt (Final Pass)	100 N·m	74 lb ft
Engine Front Cover Bolt	25 N·m	18 lb ft
Engine Mount Bolt	50 N·m	37 lb ft
Engine Mount Bracket Bolt	75 N·m	55 lb ft
Engine Mount-to-Engine Mount Bracket Bolt	50 N·m	37 lb ft
Engine Rear Cover Bolt	25 N·m	18 lb ft
Engine Service Lift Bracket (M10 Bolt)	50 N·m	37 lb ft
Engine Service Lift Bracket (M8 Bolt)	25 N·m	18 lb ft
Engine Shield Bolt	20 N·m	15 lb ft
Engine Wiring Harness Bracket Nut	5 N·m	44 lb in
Engine Valley Cover Bolt	25 N·m	18 lb ft
EGR Valve Pipe-to-Cylinder Head Bolt	50 N·m	37 lb ft
EGR Valve Pipe-to-Exhaust Manifold Bolt	30 N·m	22 lb ft



	Metric	English
EGR Valve Pipe-to-Intake Manifold Bolt	10 N·m	89 lb in
Evaporative Emission (EVAP) Purge Solenoid Bolt	10 N·m	89 lb in
Fuel Rail Cover Bolt	9 N·m	80 lb in
Generator Bracket Bolt	50 N·m	37 lb ft
Generator Output Terminal Nut	9 N·m	80 lb in
Harness Ground Bolt	25 N·m	18 lb ft
Harness Ground Bolt (ar Rear of Block)	16 N·m	12 lb ft
Hood Hinge Bolt	25 N·m	18 lb ft
Ignition Coil Bracket Stud	12 N·m	106 lb in
Intake Manifold Bolt (First Pass in Sequence)	5 N·m	44 lb in
Intake Manifold Bolt (Final Pass in Sequence)	10 N·m	89 lb in
Knock Sensor	20 N·m	15 lb ft
Oil Filter	30 N·m	22 lb ft
Oil Filter Adapter	55 N·m	40 lb ft
Oil Level Indicator Tube Bolt	25 N·m	18 lb ft
Oil Level Sensor	13 N·m	115 lb in
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan Bolt	25 N·m	18 lb ft
Oil Pan (to Front Cover)	25 N·m	18 lb ft
Oil Pan (to Rear Cover)	12 N·m	106 lb in
Oil Pan Skid Plate Bolt	20 N·m	15 lb ft
Oil Pressure Sensor	20 N·m	15 lb ft
Oil Pump Bolt	25 N·m	18 lb ft
Oil Pump Screen Nut	25 N·m	18 lb ft
Oil Pump Screen Bolt	12 N·m	106 lb in
Positive Battery Cable Clip Bolt	9 N·m	80 lb in
Power Steering Pump Rear Bolt	50 N·m	37 lb ft
Spark Plug	15 N·m	11 lb ft
Torque Converter Bolt		
4L60-E Transmission	63 N·m	37 lb ft
4L80-E Transmission	60 N·m	44 lb ft
Transmission Bolt/Stud	50 N·m	37 lb ft
Transmission Cover Bolt	12 N·m	106 lb in
Intake Manifold Sight Shield Bolt		
(6.0L Engine with RPO's Y91 and Z88)	9 N·m	80 lb in
Intake Manifold Sight Shield Bolt		
(4.8L, 5.3L, and RPO LQ4-6.0L Engines)	10 N·m	89 lb in
Intake Manifold Sight Shield Retainer Bolt	5 N·m	44 lb in
Valve Lifter Guide Bolt	12 N·m	106 lb in
Valve Rocker Arm Bolt	30 N·m	22 lb ft
Valve Rocker Arm Cover Bolt	12 N·m	106 lb in