



INSTALL GUIDE

June, 2019

STOP!

KEEP FROM FREEZING!

Engines are tested with water only in the cooling system.

Storage in freezing temperatures will cause damage!

CHANGE OIL / FILTER

Engines are tested with original filter and generic oil. It is recommended to change oil / filter after engine is installed and initial test run and heat cycle has been completed.

INITIAL STARTUP

It is not unusual for engines to make a reasonable amount of valve train noise / “ticking” when started for the first time. This is normal and will generally go away within 30 seconds or so. It is natural for oil to drain down over weeks / months of storage. If you “crank” engine without ignition power for 30-60 seconds will minimize this situation.

PLEASE READ ALL!

Read the COMPLETE “Install Guide” as it will answer all of your questions! Some wire hook ups are 12V- Ground and important for proper operation. Improper hookup WILL result in damage to ECM.

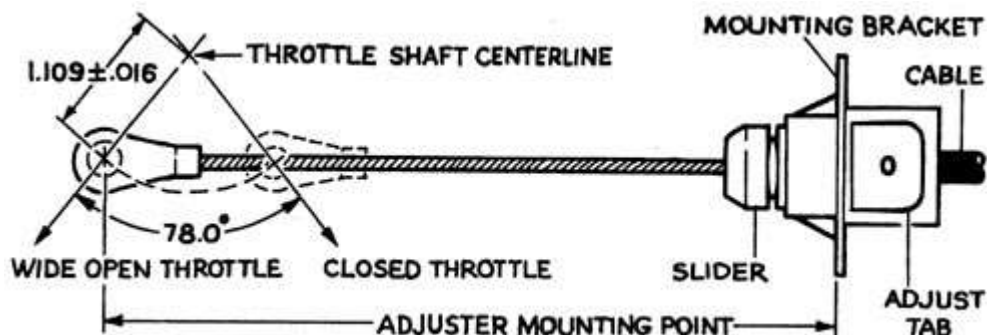
TH350, 700R4, TH400, or Powerglide Transmissions – BOLT UP

First off, there are NO issues with physically bolting any of the GENIII engines to these transmissions. One less bell-housing bolt is used as the newer GENIII blocks are missing the “1 o'clock” hole. The issues are solely with the torque converter bolt pattern, and snout depth. Depending on what vehicle your engine came from, you may or may not need an adapter or flexplate modification.

5.3L & 6.0L LQ9 ENGINES: Most, if not all 5.3's & 6.0 LQ9's will need a spacer a longer bolts to be added behind the flexplate as they came with a “dished” flexplate for the 4L60e / 4L65e transmissions. All GENIII flexplates use the old TH400 converter larger bolt pattern diameter. So, if you are going to use a TH350 or 700R4 with the standard torque converter you will need to elongate the flexplate converter holes inward, making a smaller diameter pattern. Or, you can run a TH400 converter on your TH350 or 700R4 and it will bolt right up. Elongating the holes is usually the most cost effective.

6.0L LQ4 ENGINES: Most, if not all 6.0 LQ4's came in 2500 series cars and trucks, which had the 4L80E transmission. A spacer & longer bolts are NOT needed, but the torque convert bolt pattern is still an issue as with the 5.3L when using the smaller TH350 & 700R4 Converters. If you are using a TH400 Converter, then it will bolt right up and NO adapter or modification is necessary.

700R4 Specific: First off, it is not feasible to use a 700R4 with a DBW engine as there is no throttle body mechanism to hook the TV (throttle valve) Cable to. There are some Internet threads about hooking it directly to the DBW gas pedal, but I don't recommend it. For a DBC engine the 700R4 is a little unusual because it has this TV (throttle valve) cable that needs to be hooked to the throttle body with VERY specific geometry to work properly. The TV cable is NOT a “kick down” cable. It controls transmission valve body pressure relative to throttle position (load). A bracket that supports the end of the TV cable will need to be fabricated and attached to the intake manifold near the existing gas-pedal cable bracket. A universal TV cable from Summit Racing: [ATI-702050](#) works well. Follow the diagram below for correct throttle body modification. A cable mounting point needs to be attached or welded to the bottom side of the throttle body 1.10” from the throttle body pivot point. At full throttle the TV cable should be completely pulled tight. If you are uncomfortable with this procedure have a qualified transmission shop adjust it. If not properly adjusted serious transmission damage WILL occur, and quickly.



FLEXPLATE MODIFICATION: Using a mill to elongate the holes is best, but a Dremel tool and 1 bit per hole will usually get the job done too. Check torque converter bolt alignment and snout fitment into flexplate before installing in vehicle. Shop around for these parts, you can save yourself some money!

Spacer – [GM Part# 12563532](#) (\$49.95)

Bolts – [GM Part# 19257940](#) (6 needed, \$5.95/each)

OR, you can use the Hughes converter snout extension is the cheapest - [HUP-HP3795](#) (\$44.97)

4L80E TRANSMISSION: If you want to use a 4L80E transmission with full ECM control it is most cost effective to start with a 6.0L LQ4 2500 Truck motor as it came factory with this transmission and it is no problem. FYI - 4L60E & 4L80E transmissions are NOT directly interchangeable. The wiring pinout of the trans plug is different, and 2 VSS's are used versus 1 on the 4L60E. Besides the wiring difference, the ECM also requires a segment swap as that portion of the transmission control is completely different. It can be done, but I do not do this conversion. If you require a 4L80E transmission with any engine other than the 6.0L LQ4 here are a few options:

Manual Shift kit / Vacuum Pressure Modulator 4L80E-3 & 48-MOD: <http://www.transgo.com/>

This option is the cheapest but you loose all “auto” features and reverses shift pattern.

OptiShift: <http://www.optishift.com/index.shtml>

PCS: <http://www.powertraincontrolsolutions.com/transcontrol.php>

Automatic Shifters

There is a large selection of shifters and styles available. For offroad use I prefer a "gated" shifter with a modified gate. With a modified gate, I see no need for a manual transmission valve body, as full automatic mode is nice for basic trails & cruising. The modified gate will allow you to instantly find reverse with no confusion, but still allow full automatic mode when in "drive". These are 2 of the most economical gated shifters that work great for rock crawling and general offroad use, both around \$150.00:

B & M Sport Shifter, \$154.95 ----- [BMM-80776](#)

TCI Thunder Shifter, \$149.50 ----- [TCI-616131](#)

Manual Transmissions

SM420, SM465, NV4500, etc.

I HIGHLY recommend calling Advance Adapters or Novak for a complete kit as many variations of these transmissions have been made.

Fuel Pump & Fuel Pressure – IMPORTANT!

RETURN SYSTEMS (1999-2003): GENIII engines require about 58psi of fuel pressure. The inlet is 3/8" with a built in regulator. Supply the 3/8" port with 58+ psi of fuel and use the smaller 5/16" to return unused fuel to the tank. *Note: the OEM fuel-rail mounted regulator is "vacuum referenced" and MUST remain as it is "tuned" for it. It will register approximately 52 psi at idle, and 58 psi when vacuum increases.*

I recommend a serviceable filter pre pump, and a 10 micron filter post pump. Summit Racing has all these parts.

Pre Filter,	\$12.95 -----	RUS-645120
Fuel Pump, Walbro 255 inline	\$135.97-----	VPN-GSL392BX
10mm x 1.0 / -6 AN (fuel pump adapter fittings)	\$9.97-----	FRA-491961-BL
Post Pump Filter	\$16.95 -----	SUM-G1512
Fuel Rail RETURN A/N Adapter 5/16	\$14.97 -----	RUS-644113
<u>Fuel Rail INLET A/N Adapter 3/8</u>	<u>\$14.97 -----</u>	<u>RUS-644123</u>

RETURNLESS SYSTEMS (2004+): The newer GENIII engines do not have the regulator & return port on the fuel rail. You can use a special **filter / regulator** that has a return port built in. It can be mounted in the rear of the vehicle right after the fuel pump. The excess fuel is quickly returned to the tank eliminating the need of a return line ran all the way to the engine compartment. Remember, fuel flow is what keeps fuel pumps cool. **IMPORTANT:** If you do not use this type of filter / regulator you **MUST** verify that you have 58 psi at the fuel rail. BD Turnkey Engines are tuned with this filter / regulator. Engine performance & reliability will be compromised if the correct fuel pressure is not maintained!

Pre Filter,	\$12.95 -----	RUS-645120
Fuel Pump, Walbro 255 inline	\$135.97-----	VPN-GSL392BX
10mm x 1.0 / -6 AN (fuel pump adapter fittings)	\$9.97-----	FRA-491961-BL
Returnless System Filter / Regulator	\$39.95 -----	WIX-33737
Fuel Filter / Regulator INLET A/N Adapter 3/8	\$14.97 -----	RUS-644123
Fuel Filter / Regulator RETURN A/N Adapter 5/16	\$14.97 -----	RUS-644113
Fuel Filter / Regulator OUTLET A/N Adapter 3/8	\$11.97 -----	RUS-640940
Fuel Rail INLET A/N Adapter 3/8	\$14.97 -----	RUS-644123

A/C Compressor

The A/C compressor comes with the factory port blocks but has a/c hoses cut.

ON BOARD AIR - The port blocks are easily drilled and tapped to standard NPT threads for “onboard air” applications. The upper port is the inlet and should be filtered – This is where to add an ounce of synthetic gear oil once in awhile. The lower port is the pressure side. I don’t see the need to filter the oil back out, but an inline “unloader / check valve” can be used.

AIR CONDITIONING - You will probably need to use the port blocks and have custom hoses made. Your harness will have a green wire that will activate the compressor clutch when 12V+ is applied.

Alternator

There really is nothing to do with the alternator if running it in the factory location. It is located on the drivers-side, front & top of the motor (see photo on front page). It is tied into the battery via the battery connection and will start charging when the engine is running. It is often the most difficult to deal with if packaging is tight. Relocation is sometimes necessary. My recommendation is to run it in its factory location unless APSOLUTELY necessary. Relocating it will cost a lot of money.

Power Steering Pump

The OEM Saginaw pump comes with the turnkey engine package. Many aftermarket pumps use the same bolt pattern and will bolt into the existing factory bracket. A new pulley and serpentine belt is often needed. Unless APSOLUTELY necessary, run your pump in the factory location. Relocating it will cost a lot of money.

Motor Mounts



These are from [RockTactics](#) and are available in both standard and offset for use with the block hugger style headers for about \$65. The bolt pattern is a little odd at 4.410” x 3.078” if you want to make your own. Chevy ½ ton spring bushings work great.



Exhaust Manifolds / Headers

The stock exhaust manifolds actually flow pretty good. Unless packaging is an issue and an aftermarket header, or “block hugger” header is required, I would use them. Headers are going to add \$200-\$400 to your engine swap project. And, the factory collectors are far superior in design and don’t leak compared to the common 3-bolt header flange. Both are available in steel & ceramic coated. [Summit Headers](#), & [Hooker Headers](#). And [Earl’s Collector Gaskets](#) are the best I’ve found for the 3 bolt collectors.

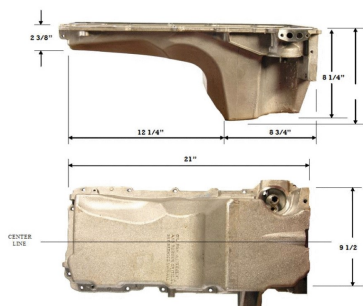
O2 Sensors

The factory O2 sensors and “down” pipes are included in the engine turnkey package. If possible leave them in the factory location. Otherwise, you will need to locate them somewhere between the exhaust manifold collector and any “Y” pipe, or muffler if you run dual exhaust. They are Left (bank 1) and Right (bank 2) specific. Summit Racing sells a variety of O2 weld in bungs. These work well: [SLE-30115](#) Or, you can cut the factory ones out of the supplied “down” pipes and save yourself a few bucks!

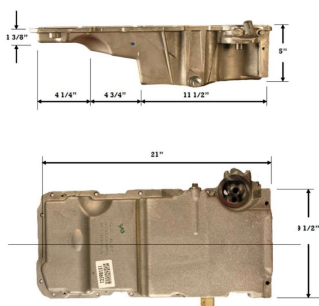
Oil Pan

The depth (8.75") of the stock truck oil pan is often an issue. The most common swap is to the "F" body (camaro / firebird) oil pan at 5.5". They can be found on Ebay, LS1Tech, Corvetteforum, and other Forums in the classifieds or from GMPARTSDIRECT.COM for \$242. The shallowest pan is the [Kevco LS F-Body "gated" pan at 5" deep](#). A remote oil filter will be needed with the Kevco pan as well as their specific pickup. Try to use the factory truck oil pan unless all else fails to save you some money. Here is a great link to many different oil pans with dimensions & part numbers: [LS1Tech-Oil Pans](#)

GM TRUCK PAN



GM F-BODY



KEVCO F-BODY W/GATES



Battery

The engine will have the factory positive & negative battery terminals attached to it. It connects ground to the engine & chassis, and routes the positive led to the starter motor & alternator. It generally has one other smaller gauge wire that can be used to power the rest of the vehicle. It is usually located on the front drivers-side of the engine. You can use it, or route your own battery cables. It is NOT part of the engine run harness.

Water Temp Sensor

There is a factory ECM temp sensor on the drivers side head towards the front. An additional sensor for an in-cab gauge can be located in the same port of the passenger side head, towards the rear. Here is the metric to 1/8" NPT adapter: [ATM-2277](#)

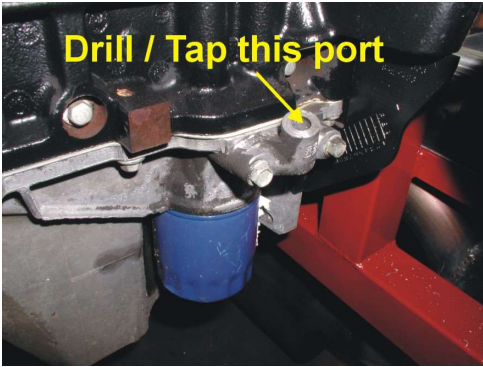
ECM Mounting

The ECM (engine control module / computer) is mounted under the hood in the factory truck or suv. It is completely waterproof and is easiest to mount there. Although you can locate it in the cab it is not necessary and a large hole in the firewall would be required to pass the connecting plugs through. [M & M Offroad](#) and others make brackets that can be helpful as well.

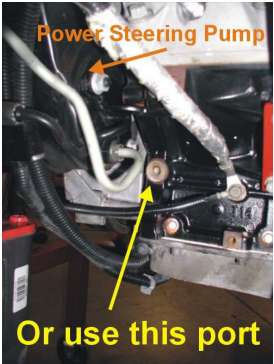


Oil Pressure Sensor & Oil Accumulator

For an aftermarket oil pressure sensor and/or oil accumulator the following ports should be used. They are *primary* oil passages, showing oil pressure at the crank, rods, cam, and general “lower end” of the engine. The factory oil pressure sensor that is located in the rear, behind the intake manifold is a *secondary* passage and for the ECM. Although aftermarket billet aluminum blocks can be bought, the factory port block near the oil filter can be easily drilled and tapped to standard NPT threads for access to the *primary* oil passage. Otherwise use the forward port shown below with metric to standard adapter.



The port near the filter is used for an oil cooler on HD Trucks and 6.0L vehicles.



For any kind of rock-crawling application I HIGHLY recommend the use of an oil accumulator. The Moroso or Canton 3 quart versions are the best: [MOR-23900](#)

Radiator

The key to an adequate cooling system is a radiator with a proper fan shroud, and an electric fan will do that (see below). These engines do not require extra large cooling systems. The heads are aluminum, the water pump flows well, and they generally dissipate heat easily. A generic 2-row aluminum radiator in the 24” wide range is usually enough, but if you have additional room, use it. A dual bypass radiator can add an additional 10% off cooling or so. A dual bypass with the inlet/outlet on the passenger side is configured well to the GENIII coolant ports.

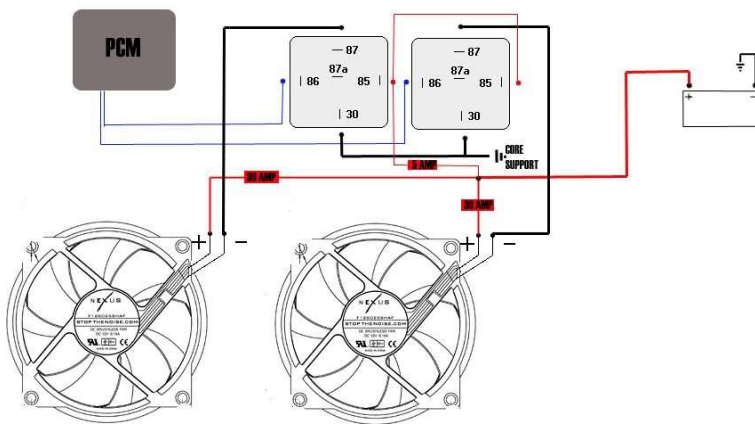
Cold Air Intake – VERY IMPORTANT

All consideration should be taken to allow the coolest air possible to enter the engine intake. If there is not a radiator right in front of the intake, an air filter can be attached right to the throttle body. Otherwise an intake system should be designed to draw air from the side / front of the vehicle. Behind one of the headlights is a common place. The hot air from the radiator entering the engines intake will dramatically reduce horsepower in the upper rpm range. As seen from in the timing table of *engine load vs intake air temp*, as much as 10 degrees of timing will be removed with an air intake temperature of 190 degrees. In testing, even well laid out systems often see 120 degrees. So pay close attention to this in your design. The cooler the intake charge = FREE horsepower.

		Intake Air Temp (°F)																					
		14	23	32	41	50	59	68	77	86	98	104	113	122	131	140	149	158	167	176	185	194	
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1 -2	
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-2 -3		
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-2 -3 -4			
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-2 -3 -4 -5				
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-2 -3 -4 -5 -6					
70	0	0	0	0	0	0	0	0	0	0	-1 -1 -1 -1	-2 -3 -3 -3	-4 -5 -5 -6 -7										
75	0	0	0	0	0	0	0	0	0	0	-2 -4 -4 -4 -4	-4 -4 -4 -4 -4	-5 -6 -7 -8 -9										
80	0	0	0	0	0	0	0	0	0	0	-2 -4 -4 -4 -4	-4 -5 -5 -5 -5	-6 -7 -8 -9 -10										
85	0	0	0	0	0	0	0	0	0	0	-2 -4 -4 -4 -4	-4 -5 -5 -5 -5	-6 -7 -8 -9 -10										
90	0	0	0	0	0	0	0	0	0	0	-3 -5 -5 -5 -5	-5 -5 -5 -5 -5	-6 -7 -8 -9 -10										
95	0	0	0	0	0	0	0	0	0	0	-3 -5 -5 -5 -5	-5 -5 -5 -5 -5	-6 -7 -8 -9 -10										
100	0	0	0	0	0	0	0	0	0	0	-3 -5 -5 -5 -5	-5 -5 -5 -5 -5	-6 -7 -8 -9 -10										

Fan

It has been my experience that the 94-97 Ford Taurus & Thunderbird electric fans flow more air than any aftermarket fan. The Taurus 3.8 V6 fan, and V8 Thunderbird fan could be found at Pick-N-Pull for about \$35, but are getting harder to find. I recently bought one brand new on Ebay for \$85. They are both dual speed and I HIGHLY recommend them. Depending on your radiator shape, you may want to consider both, as their shape is different. My wiring harness has provisions from the ECM to control both HI & LOW fan circuits, saving you money as well! You will have to provide appropriate sized relays. I have measured the Thunderbird fan on HI to be 25-27amps, and LOW to be around 15amps. The standard "ice cube" relay will not survive for the high side. I recommend this [75 amp continuous duty relay](#) from Summit Racing.



Vacuum Port / Break Booster

There is a vacuum port on the back of the intake manifold. It can be used for a brake booster. Some engines have a plug here. The plug can be carefully drilled & tapped to 1/8" NPT to accept a barb fitting for hose hookup.

Gas Pedal & TAC installation

If you have purchased a DBW engine you will have an APP (gas pedal) and TAC module (small black box) with your turnkey engine package. The gas pedal easily mounts to a vertical surface inside the cab. The TAC module is weather proof and can be mounted anywhere within reach of the corresponding harness plug and APP wiring. Avoid high heat locations near exhaust. *Note: The Gas Pedal can be modified if needed. Shortening the throw will increase throttle sensitivity. Ensure the sensor maintains full range. Some came with an adjuster for movable pedals, you will want to remove this portion and attach the actual pedal to the sensor at your desired angle.*

PCV Valves & Crankcase Gas Evacuation



The factory crankcase evacuation system draws gases from both valve covers into the intake manifold. For rock-crawling this can lead to a hydro-locked engine in a roll-over. Engine oil gets drawn into the intake and further into the cylinders. I have been happy with evacuating the crankcase gases through the exhaust system. A [venturi](#) is welded into the tail pipe past the muffler and a [check valve](#) is threaded on it. The flowing exhaust gases create a vacuum on the crankcase with little to no possibilities of oil getting into the intake manifold. It is highly recommended to maintain some sort of POSITIVE crankcase gas evacuation. Without positive crankcase vacuum, moisture and oil sludge builds up decreasing the longevity of the engine.



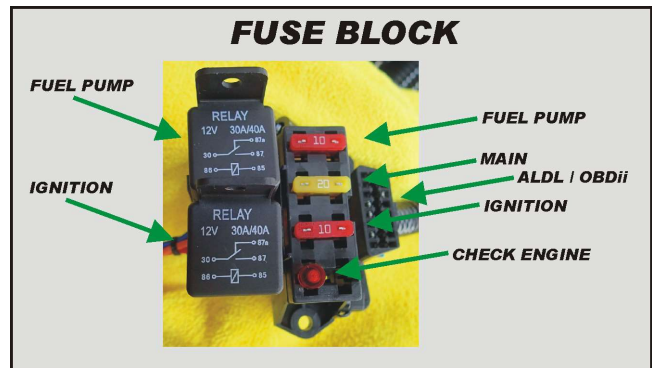
For HARDCORE rock-crawling, I also recommend relocating the drivers-side valve cover port to the same location as the factory passenger-side valve cover port. It is easily drilled and tapped to 1/8" NPT and a 90-degree barb fitting threaded in. Simply cap the factory PCV valve at the rear and leave in place. This modification will eliminate oil that "puddles" in the rear of the valve cover and subsequently get drawn into the evacuation system on step, near vertical climbs.

COOLANT SYSTEM FILL

I recommend initially filling the coolant system via the water pump outlet port on the top as well as the radiator. This helps eliminate an air lock, particularly when not using the heater ports.

WIRING HARNESS

The modified harness will come attached to the engine, have a 4-way fuse block (all connections are fused) & 2 relays. 1 relay for Ignition, and 1 relay to run your Fuel Pump. Depending on options, not all of the following wires will be included. **The first four are the only ones needed to actually start & run the engine.**



Battery 12V+ (mandatory)

This is a positive, full time, 12V+ source. It is separately fused. Avoid routing this connection through a “master” kill switch. The ECM goes through a learning process every time this connection is lost.

Ignition 12V+ (mandatory)

Generally from the crank/run side of keyed source. It is separately fused.

Fuel Pump 12V+ (mandatory)

This is the 12V+ from the fuel pump relay. The relay is controlled by the ECM and is separately fused. When the ignition is turned on, the fuel pump will cycle approximately 3 seconds and turn off until cranking begins.

Run directly to fuel pump.

Starter Solenoid 12V+ (mandatory)

This generally comes from the “crank” position of the key and what engages the starter to actually crank the engine over for starting. 12ga. Wire recommended.

MIL (Check Engine Light) 12V- (highly recommended)

We supply a primary check engine light on the fuse block (June 2019+) but recommend having a check engine like in the cab as well. This is a ground wire. Power the MIL with a keyed 12V+, then run this ground wire to the other terminal of the light. This is a very useful tool in engine diagnosis. Mount it in a location that you will immediately notice from the drivers seat.

OBDII Port / ALDL

This is the standard OBDII diagnostic port. It is used to “scan” the ECM for problems if the MIL (Check Engine Light) comes on. It is also used for advanced engine tuning.

Tach output signal

This is the tach signal from the ECM. Most tachs can be calibrated to read this signal. See tach wiring diagram on last page for more info.

A/C Compressor 12V+

This will activate the onboard a/c compressor clutch. I have been very successfully using this type of compressor to make compressed air. I add about an ounce of good synthetic Royal Purple gear oil every few runs.

Cooling Fan Control HIGH / LOW 12V- Low, on=202, off=195 High, on=210, off=203

This is a GROUND source from the ECM to control engine-cooling fans. It needs to be routed through an appropriate sized relay. Connect to negative side of relay coil to activate. Use the “Low” if only one fan will be utilized AND for dual fans. Use both High & Low for dual speed single fan only is recommended. See “FAN” above.

VSS Signal - OUT

This is the signal coming out of the ECM to run a speedometer. The signal is calculated from the “in” signal & based on tire diameter, & ring/pinion ratios. Most modern electronic speedometers can read this signal and be easily calibrated. *Only available with transmission package.*

4x4 Low Range 12V-

This is a wire that needs to be grounded when in 4x4 Low Range. It tells the ECM to recalibrate the VSS Signal for proper transmission control. *Only available with transmission package.*

TCC Brake- (mandatory when using 4L60e or 4L80e Transmission)

TCC Brake Switch Signal is 12V+ when brakes are NOT pressed, and the switch OPENS when you hit the brakes – it is used to unlock the torque converter when brakes are pressed. *Only available with transmission package.*

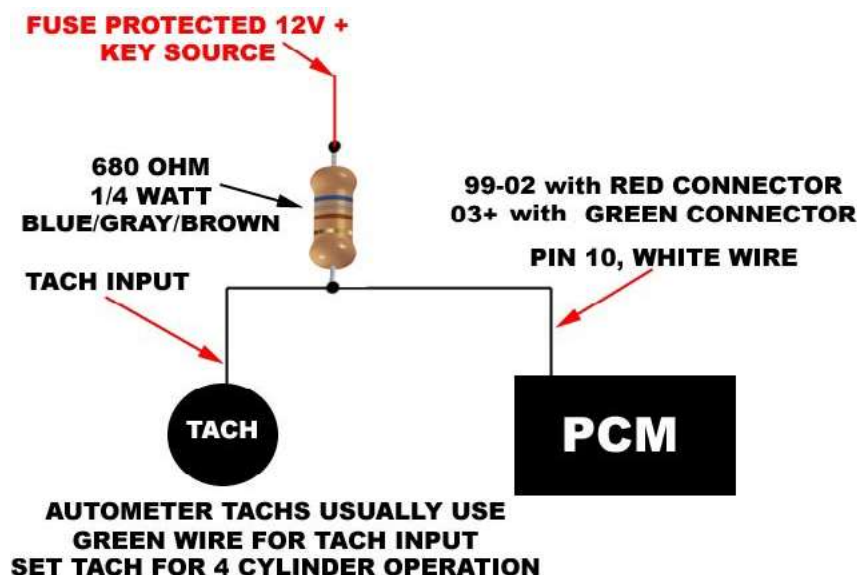
TOW / HAUL / PERFORMANCE 12V(-) supplied as option with 4L60/80 automatic transmissions only

This is an input signal, 12V (-) GROUND, that when applied the ECM with switch to an alternate Tow / Haul / Performance shift table. These tables generally hold a gear and throttle longer (increased speed) before shifting.

TACH WIRING

Some ECM's tach signal is not strong enough for some aftermarket tach's. This method can be used to "boost" the signal from the ECM. All you do is hook one end of a 680 ohm resistor (**SUPPLIED BELOW**) to the tach wire, and other end of the resistor to a keyed 12V+. This may not be needed with all tachs and all ECM's. The pre 2002 ECM's and tach combinations seem to be hit-and-miss. So far, all 2003+ have had to have it.

If you want to use an older factory tach in a retrofit swap let me know. I can program the ECM for various 4, 6, or 8 cylinder outputs on this signal if your factory tach does not allow you to select 4 cylinders.



Note: Your tach's power supply should be a keyed 12V+ source. So simply use the resistor as a "jumper" between the main 12V+ supply to the tach and the incoming tach signal wire. Make sure the leads on the resistor aren't allowed to short to ground as they are unshielded wire and "hot" when the key is on. Make the connections then cover them and the resistor in shrink tubing works well.

Supplied 680ohm, 1/4 Watt Resistor

CRUISE CONTROL OPTION

One advantage to DBW engines is the "Cruise Control" option is available, and relatively easy to hook up. Since the throttle blade is controlled electrically and ultimately by the ECM, only a few properly wired switches are required to have a full functioning "Cruise Control" feature. **Note: Use of the 4L60e or 4L80e transmission is also required.**

DK BLUE - Cruise Set/Coast Signal

GRAY - Cruise On Signal

GRAY/BLK - Cruise Resume/Accel Signal

LT BLUE - Stop Lamp Supply Voltage/CHMSL (center high mounted stop lamp)

Cruise Set/Coast Signal - This is a momentary switch signal which sends 12v+ down this wire. Momentary meaning, it only sends 12v+ when the switch is pressed, when you release the switch, it should turn off. Pressing this switch quickly will set the current speed and it will be maintained. Holding it on will let vehicle coast, when you release, that will be the new set speed to be maintained. After set, each quick press of the switch will lower set speed 1 mph.

Cruise On Signal - This is simply an on / off switch that enables or disables the cruise function. This needs to be switched 12v+ to this wire.

Cruise Resume/Accel Signal - This is a momentary switch signal which sends 12v+ down this wire. Momentary meaning, it only sends 12v+ when the switch is pressed, when you release the switch, it should turn off. This switch ONLY functions after you have previously pressed the SET/COAST switch. Resume will resume vehicle speed after hitting the brakes. Holding this switch will make vehicle accelerate until you release it. Each quick press of the switch will increase set speed 1 mph.

Stop Lamp Supply Voltage - This wire should be hooked to the same wire that feeds you're brake lights 12v+ when you press on the brake pedal. **THIS IS NOT THE SAME WIRE AS TCC BRAKE SWITCH THAT THE ECM USES TO UNLOCK TORQUE CONVERTER.**

After those are wired, you also MUST have the TCC brake switch signal to the ECM. **If this signal is not received by the ECM, cruise will not function.** TCC Brake Switch Signal is 12v+ when brakes are NOT pressed, and the switch OPENS when you hit the brakes. This signal wire is located with the VSS Signal, Tach, MIL, etc. in the harness and labeled "TCC Brake" - Purple wire.

LONG TERM STORAGE - FIRST TIME STARTING

Special care needs to be taken if starting a new engine or any engine after long term storage. IMO, long-term storage is anything over 6 months or so. But the following practices are good for any engine project.

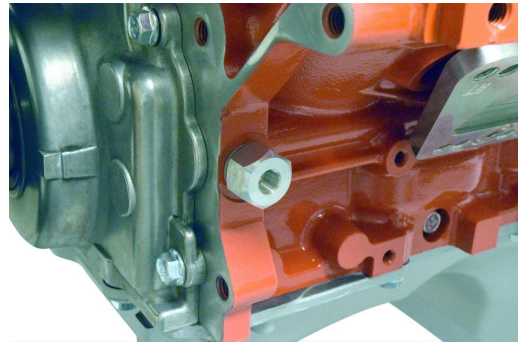
PRE LUBE ENGINE AFTER LONG TERM STORAGE or NEW BUILD

Most modern engines like the Vortec / LS have an oil pump driven by the crank. To prelube a Vortec / LS engine requires a special procedure and tool but it is well worth the effort and cost to protect your investment. When a previously ran engine is put in storage for over 6 months the initial startup will be pretty dry as only traditional engine oil is in the engine. Gravity takes over and some parts, particularly cam, lifters, pushrods, rocker-arms, etc. get pretty dry. This is why its not unusual to hear moderate valve-train noise at first startup. Main & Rod Bearings aren't too bad as they are encapsulated holding oil.

You can Google or Youtube some "homebrew" solutions but there are over the counter solutions as well. Either way, the concept is simple and with a bit of patience you can prelube your engine and increase your potential for a long lasting engine and eliminate any initial dry start damage.



Sealed Power and others make a pressurized system. It is available through Summit Racing, Jegs, Amazon, and many others. The tank is filled with oil, pressurized with air, and then oil is forced into the oil galleys of the engine. Vortec / LS engines will require a special M16-1.5mm adapter. I prefer to use the port on the drivers lower front side. Behind the power steering pump on the Vortecs, behind the alternator on the LS engines.



NEW ENGINE ASSEMBLY

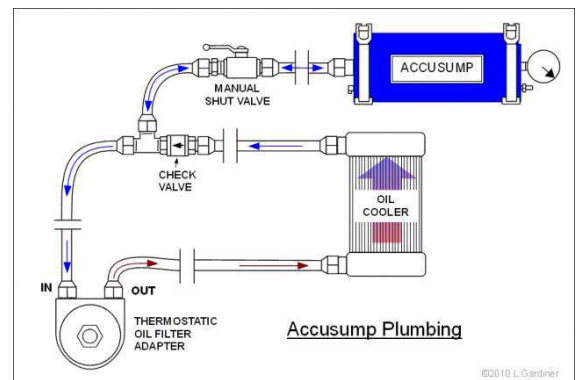
90% of engine wear occurs during startup on ANY engine. A freshly built engine should be assembled with special "assembly lube". Redline is my product of choice. Assembly lube protects the bearing surfaces and wear parts during storage as it is thick and clings to surfaces. But most importantly is protects these parts during the first few moments of startup until adequate oil pressure is achieved by the oil pump. Assembly lube will be in place on wear parts on engines during long-term storage for that first start-up.



ACCUMULATORS

For engines that are only used on occasion or seasonally the use and installation of an oil accumulator is HIGHLY recommended. I first started using an accumulator for rock-crawling applications as it is a simple, passive, cheap system that will maintain oil pressure when the engine driven oil pump loses suction or flow of oil.

BUT in addition to these features is allows an engine to be easily prelubed prior to EVERY start, and most importantly prelubed after long periods of storage or seasonal use.



GEN-4 (2008+) SPECIFIC

GEN IV CRANKCASE GAS EVACUATION SPECIFIC

Incoming air for the crankcase evacuation needs to be plumbed to filtered fresh air. Run 3/8 hose from passenger side port on valve cover to a filtered air source. Generally anywhere in the intake tubing between the air filter and throttle body.



WIRING

BRAKE (L-BLU / WHITE)

This is hooked to the brake switch. Is 12V+ when brakes are NOT applied

VSS OUT (YELLOW / BLACK)

This is a 4000k PPM signal. This signal is calculated based on VSS input PPR, Tire Size, & Ring Pinion Ratio.

VSS INPUT (2 Prong Plug on rear / trans portion of harness)

If equipped, the VSS sensor is typically positioned on the output shaft of the transmission or transfer case. It must be calibrated to the specific reluctor wheel count of your application. GM automatics are commonly 40 tooth but others and manuals can be different.