This is a brief and concise guide to those who are interested in installing the new generation of LT crate engines offered by GM Performance.

**Engine mounting plates**

The LT block shares little with the previous generation of LS engines and requires a unique set of engine mounting plates. I used a pair of sliding engine mounts from Dirty Dingo called LT adjustable conversion mounts. They list for $154.95. They also make a single mounting bracket with four adjustable holes that runs $69.95.

ICT Billet also makes an LT engine swap bracket that retails for $64.95.
Both systems use conventional small black Chevy Gen 1 engine mounting pads that will adapt to existing engine mounting locations in classic cars such as Chevelles, Novas and Camaros. The stock engine cradle may be a problem with a stock pan.

Art Morrison has just released their LT motor mounting plates – Poly is $285 and rubber is $240.

Engine Pan

Since both engines are available in dry sump or wet sump you must anticipate and design where your oil reservoir will be if you’re going with the dry sump version. I went with the wet sump version and had to modify my sump by cutting 1” off the front of the sump, but Moroso just came out with a new pan that should solve most of the subframe issues.

Moroso part # 20155
Holley just released their new LT1/4 pan under part number 301-20.

GM’s new Gen V LT direct injected engines are starting to find their way into a large variety of vehicles. They make great power, plus they’re very durable and reliable. Unfortunately, the factory oil pans don’t always fit or they hang too low for today’s hot rods. Holley’s new LT Retro-fit Engine Oil Pan is designed to help! It provides maximum clearance to the chassis and ground, plus provides an OEM fitment for durability and proper sealing. These oil pans are perfect for: 1967-'02 Camaro/Firebird, 1968-'74 Nova/Apollo/Ventura/Omega, 1978-'87 G-body, 1964-'72 A-body, and 1973-'87 Chevy/GMC Full Size Trucks

**Features:**
- Designed for LT Engine Retro-Fit Installations in Classic Car and Truck Chassis Requiring More Oil Pan to Chassis Clearance Around the Front Half of the Oil Pan
- Allows for up to 4.00” Crankshaft Stroke
- Can Be Used Anywhere a GM F-Body Oil Pan Can Be Used
- Provides OEM fitment - Oil filter mounting, OEM Engine NVH Suppression, OEM Flange Sealing, Proper Structural Rigidity and OEM Bell-Housing Attachments.
- Traditional High-Quality Cast Aluminum Appearance With Clean Exterior Styling
- Provides Maximum Clearance for Vehicles Where the Steering Linkage is Behind the Engine cross-member
- Traditional high-quality cast aluminum appearance with clean exterior styling.
- Provides maximum clearance for vehicles where the steering linkage is behind the engine crossmember.
- Cast and machined aluminum
- Oil Cooler Port Provision
- 1/2” NPT port – Ideal for Turbo Oil Return or PCV Oil Return
- Hinge Door Baffles Available
- Complete Kit Includes: Windage Tray, Sump Baffle, OE Style Pick-Up Tube, Sump Port Plug, Oil Filter Stud, Billet Oil Passage Cover, etc

The LT1 has a different oil cooler than the LT4 and it may or may not be an issue with mounting. The LT4 oil cooler is larger and hit the tubing that triangulated the Morrison front clip that I was using. I removed the sump and designed an air-cooled oil cooler
rather than using the existing water cooled radiator design. I removed the sump and designed an air-cooled oil cooler rather than using the existing water cooled radiator design. There have been numerous posts over the last year (2016) that identifies a cooling issue with LT4 engines that are used on the track and pushed hard. Once the oil temperature reaches 280 degrees the engine will shut down and run in “limp mode.” The 2017 Z06 and the ZL1 Camaro have improved cooling designs that will help with this problem. I remotely mounted a stacked plate cooler to the side and in front of the radiator on my ’68 Camaro.

Hydraulic Power Steering
This is a big problem since all the automobiles that are produced now use electric power steering, both engines have no provision for hydraulic power steering. I saw the 1970 GM SEMA Camaro and thought I could copy and use the system the factory used to plumb in a GM type II power steering pump into the serpentine belt system. This was not easy, took a considerable amount of time, but if you know how to engineer and fabricate it’s not that bad.

The hydraulic power steering pulley simply replaces the idler pulley that was there. It’s a standard GM type II pump that was sourced from Detroit Speed. I used a 2007 Dodge RAM power steering pulley that is slightly undersized from stock. The factory actually took a stock 6 rib pulley, split it apart and welded two halves together and then remachined it because GM does not manufacture an 8 rib pulley that will fit on the Type II pump. I recently purchased an 8 rib pulley from Eddie Motorsports but the diameter is only 5” and it’s too small (shown below).
Eddie Motorsports does manufacture a power steering conversion for the LT1.

It’s buried deep in their catalog and for some reason is not listed on their website, it runs around $500 and requires a new harmonic damper and new front pulley.

Dirty Dingo also manufactures a power steering pump conversion for the LT1 and they run $469.99

Pace Performance offers an LT1 and an LT4 serpentine system that includes hydraulic power steering and runs around $3,000.00
Wiring and controller system

If you haven’t rewired a classic car for an LS or the LT series of engines, things have changed considerably since the 50’s and 60’s. The controller system that comes with these engines includes a complete fuse panel and ECM that controls every function of the engine. In the LS series of engines the ECM is relatively easy to mount because it’s not that large, but in the LT engines it’s large, about the size of an iPad.

My biggest issue was trying to find a place for it because it simply didn’t fit anywhere. GM buries these ECMs deep within the modern cars and it’s a challenge just to find where they put them. I chose to mount it as shown and modified my heater box, but I wouldn’t recommend it. Instead I should have installed a Vintage Air System and completely removed the existing heater system because then you end up with a simple cover plate that goes over where the old heater box used to be. It’s much cleaner and a simpler way to go, plus it then gives you plenty of room to install this massive ECM.

The fuse box is just like the LS3 and includes all the fuses and relays to run the engine and additional electrical demand, plus it controls the fuel pump and the dual fan relays. You only need to hook up one wire (ignition -pink) to your existing system to get things going. As for the body wiring harness, I suggest you dispense with whatever is there and use American Autowire. They are simply the best in terms of schematics and offer anything from the Route 9 to the Power Plus 20.
If you’ve got more than a simple street rod with power windows, 1500 watt amp or power seats, you’ll need something more than the Route 9. They also offer complete restoration harnesses for cars like 1956 Chevys, but they won’t work using the LT engines because the wiring theory is completely different than what was done 50 years ago. Do not try to adapt one of these original harnesses to the LT engine. We don’t use generators or ammeters anymore and we produce substantially more wattage than the older systems can handle. I’ve done it both ways and in the end, it’s much better to remove what’s there and start from scratch.

**VSS – Vehicle Speed Sensor**

The VSS signal is required for these engines and cannot be omitted! If the engine does not see the VSS signal it will go into “limp mode” and not allow anything more than 1/3 throttle. To wire in a digital tachometer use this schematic.
Radiator

Since the LT4 develops 650 HP you need to make sure whatever radiator you’re using is up to handling the job, and that means dual fans. There are lots of high-end radiators such as Ron Davis and AutoRad, but I ended up using a US built radiator from Entrophy. This picture shows the LS/LT option with both inlet and outlet on the same side. For those of you who have been running Gen 1/2 engines, these modern engines run much hotter, the first fan kicks in at 207d and the second at 221d, do not attempt to modify these parameters. I’ve talked with many old hot-rodders who do not understand this and attempt to lower the temperatures because they feel uncomfortable with an engine running at those temperatures, this is foolish and will cause problems, not to mention lower the overall performance of the engine.

![Radiator Image]

Gauges and Instrumentation

These modern engines use something known as a CAN Bus (Controller Automotive Network) and GM’s version is known as GMLINK. To get your gauges to work I suggest you read Autometer’s installation guides for LS engines, first before you do anything. The easiest approach is to use Dakota Digital’s VHX gauge system with the BIM-01-2 OBD2 interface. What this does is read the information from the OBD 2 diagnostic port and convert the signals into something that the VHX can understand.
The **BIM-01-2** OBD-II (J1850/CAN) Interface allows you to plug directly into the engine diagnostic port, extracting engine and transmission data from the vehicle's computer (ECM). The **BIM-01-2** will collect and output the following information to Dakota Digital Instrument Systems *:

**Always available:**
- Speed
- Tachometer
- Engine Temp
- Check Engine Indicator

**Vehicle specific:**
- Intake Air Temp
- Transmission Temp
- Ambient Air Temp
- Gear Position
- Oil Pressure

"Due to the various factory and modified ECM's, additional data including (Intake Temp, Transmission Temp, Ambient Air Temp, Oil Pressure, and Gear Position) may be available, but will vary from application to application. Dakota Digital cannot guarantee the presence or accuracy of the Intake Temp, Transmission Temp, Ambient Air Temp, Oil Pressure, or Gear Position displays since this is a function of the ECM and matching OEM functional sensors."

For LS and LT engines which have a 2 wire oil pressure GMLAN reference sensor the VHX system cannot read this signal through the ODB connection. As shown above the LT4 already has an extra oil pressure sensor located right above the oil filter. You can install Dakota Digital’s 03-8 sender which is included in their gauge package with a 12mm x 1.5 adapter to read the oil pressure. To read the signal only requires changing the signal from BUS to Sender in the setup procedure.

Also, there are no blank plugs that are available to install a water temperature sender. Your options are limited here unless you want to install it in the water pump outlet (drill a hole), the radiator hose or the radiator itself.
I completely redesigned the oil cooling system, removed the oil cooler from the side of the pan and installed conventional oil coolers at the front of the radiator. I installed a conventional sender (DD 04-5) at the end of the water pump. This was my solution, but it may not be something you want to attempt. The existing water temperature sensor is shown on the top of the water pump, but you cannot share this connection because it’s part of the CAN bus and won’t give you a signal that you can use unless you install the Dakota Digital VHX with BIM-01-2.

**Fuel Pump**

GM recommends a Pulse Width Modulated returnless system.

This control system is a stand alone, fully-integrated kit designed to run Chevrolet Performance LT4 series crate engines with 58x crankshaft reluctor wheels, 4x camshaft indexing, and electronic throttle control (ETC). This engine control kit is designed to operate a “GEN 5” V8 only, it is not designed to operate any earlier engine configurations. Included in the kit are the engine control module (flashed with the appropriate calibration), fuel pump power module, engine harness, accelerator pedal, mass air flow (MAF) sensor, MAF sensor mounting boss, fuel line pressure sensor, oxygen sensors (2), and oxygen sensor mounting bosses (2). This control system is intended for use with a returnless fuel system and fuel pump that is capable of being pulse width modulated (PWM) at 25 kHz to control fuel pressure. A fuel flow rate of 65.6 G/H at 58 psi (400) kPa is needed. Because this is a dead headed system, a pressure relief set at 84 psi (580 KPa) must be included in the fuel line between the tank pump and the engine mounted high pressure pump.

Chevrolet Performance Part Number 19303293 is one example of a compatible fuel pump and it includes an internal pressure relief system. If using this pump, the lower port on the module may be left open or used to connect a remote pick up system. P/N 13587174 is connector pigtail for this pump and is available from your local dealer.

A pump with excessive capacity may result in cavitation at low flow due to the pump repeatedly stopping and starting instead of controlling to a speed/pressure. Alternatively, a fuel system operating at a fixed 500 kPa could be used and a fuel pump relay may be triggered by the Green/Gray wire in cavity 2 of the Fuel Pump Power Module (FPPM). Note that excessive fuel heating and potential startability/drivability issues may result from a constant high pressure.

The only vendor that I could find that would accept and use a conventional GM fuel pump 19303293 was [Rick’s Tanks in Texas](https://www.rickstanks.com). They manufacture both an adaptor plate and complete tanks.

They also offer specific fittings and the wiring adapter plugs for the fuel pump.
GM has decided that they no longer want to recycle unused gas from conventional pumps, so they've come up with this new system to satisfy the demands of the new generation of Direct Injection Engines. Since the fuel pressures can be upwards of 2,500 psi, the FPPM (Fuel Pump Pressure Module) monitors the fuel pressure sensor (inline on the fuel hose) and communicates back and forth between the ECM and the fuel pump to deliver sufficient pressure. It’s also recommended that you “do not use a fuel line filter” anywhere along the system because the fuel pump itself has filters to take care of any issues. On a final note, there is no conventional fuel pump relay in the system. It appears that the fuel pump relay is electronic and housed within the FPPM module. As of this date GM has not addressed how the Fuel pump is fused. I suspect that it’s the 30 amp fuse in the PT (Powertrain) relay No. 2 in the fuse panel but they haven’t responded yet.

For questions or additional information you can contact me at:

davidcwhite@comast.net
(206) 999-8138

David White

rev c - 02/03/2017