

**NOTE:** These kits are not legal for use on pollution controlled vehicles



## Ultimate LS System

### Instruction manual for the Ultimate LS Induction System

This quick start manual is designed to get you up and running with your Ultimate LS Induction System. This system is ready to go with everything needed to complete the induction system of your LS engine and get you on the road easier and faster than any system on the market today. Suitable for your new or pull-out LS engines to ensure you are up and running in a flash.

**Warning:** Caution must be observed when installing any product involving fuel system parts or gas tank modifications. Work in a well ventilated area with an approved fire extinguisher readily available. Eye protection and other safety apparel should be worn to protect against debris and sprayed gasoline. Ensure to disconnect the negative terminal of the battery before beginning. We recommend having this installation performed by an experienced, qualified, and FiTech approved automotive technician. The finished installation must be thoroughly checked for any fuel system leaks. All safety precautions must be observed when working with fuel. Lastly, ensure the engine has had sufficient time to cool! The coolant may still be hot. Disregarding any of this information can result in serious injury or death.

#### **EMISSIONS EQUIPMENT:**

Not legal for use on pollution controlled vehicles: FiTech's Ultimate LS System is not CARB approved for use on emission controlled vehicles. This system is designed to control the EFI and ignition on LS based engines being retrofit into older vehicles that do not require emission controls.

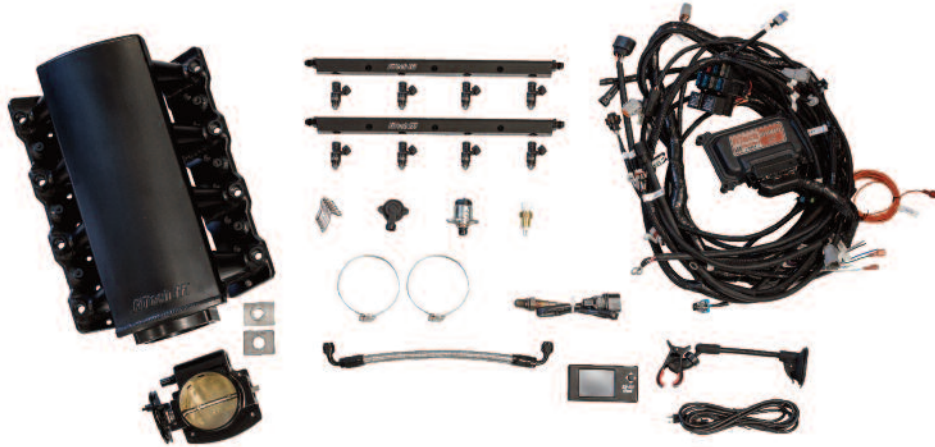
#### **Dimension**

- Intake manifold is 6.5"
- Throttle body will clear any stock truck accessories depending on the type of water pump, if there is truck water pump accessory clearance interference you will need to get a new water pump bracket
- Throttle body sits at 7 degrees
- Before installing your FiTech Intake manifold it is recommended to check hood clearance. this can be done in a few simple steps.
  - First, using modeling clay or putty, not included, make a small cone about 2-3 inches high. Position the cones on the top of the throttle body.
  - Close the hood to locked position and re-open. The height of the cones indicate the amount of clearance between the hood and the air cleaner. Record these measurements. We recommend An inch of clearance.
  - lay a meter stick across the fenders over the engine bay to ensure the throttle body sits below the fenders.
  - Modification of the hood might be necessary to ensure there is no damage to any components.

### Kit contents 500HP

92MM Billet Aluminum Throttle Body  
Hand-held Controller with color touch screen and cable  
Windshield mount for touch screen controller  
36 lb/hr Injectors  
LS ECU  
High volume fuel rails  
Fabricated Aluminum Intake Manifold and bolts  
Plug and Play Primary Wiring Harness  
3 BAR MAP Sensor  
Throttle Position Sensor

Idle Air Control Motor  
Idle Air Temperature Sensor  
Wide band O2 Sensor  
Stainless Oxygen Sensor bung Kit  
AN fittings and fuel crossover  
Fuel rail contents:  
Mounting bracket  
-6 AN fittings  
Rails  
Screws to mount brackets  
AN fittings and fuel crossover



### Kit contents 750 Hp

102MM Billet Aluminum Throttle Body  
Handheld Controller with color touch screen  
55 lb/hr Injectors  
High volume fuel rails  
Fabricated Aluminum Intake Manifold and bolts  
Plug and Play Wiring Harness  
3-BAR MAP Sensor  
Throttle Position Sensor  
Idle Air Control Sensor

Idle Air Temperature Sensor  
Two Wide band O2 Sensor  
Stainless Oxygen Sensor bung  
Two programmable fan control outputs  
Fuel rail contents:  
Mounting bracket  
-6 AN fittings  
Rails  
Screws to mount brackets  
AN fittings and fuel crossover



### Parts required, not included:

- Coil packs
- Supported Fuel System
- Optional throttle cable mounting bracket (FiTech part number 67001)

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## Modified Engines

The Ultimate LS intake manifolds are designed to provide maximum performance for street/performance engine applications. The intake manifold will have the best fitment when the engine block and cylinder heads are machined to standard OE dimensions. If the engine block or cylinder head deck surfaces have been milled significantly, the alignment of the mounting bolt holes and the port flange openings to the cylinder head may be shifted and not match-up satisfactorily. If your engine has had the cylinder head or engine block deck surfaces milled, the following may be necessary for proper intake manifold installation. The bolt holes in the intake manifold would have to be slotted to allow the fastener to properly pass through the manifold mounting holes. The mounting fasteners must freely thread into the cylinder head while passing through the mounting holes or the manifold may not seat properly onto the cylinder head surfaces when the fasteners are tightened. As the o-ring grooves are located in the intake manifold mounting flanges, material may not be removed from the intake manifold mounting flanges without jeopardizing the sealing of the manifold. Any material removal required to align the port flange openings should be removed from the cylinder head not the intake manifold. When port matching the intake manifold port openings to the cylinder head openings, care should be taken not to break into or damage the o-ring groove or o-ring seal will not be effective. The intake manifold mounting surfaces on the cylinder heads should be in good condition, free of nicks or scratches, where the sealing o-rings will seat to ensure proper sealing.

## Features

FiTech Ultimate LS Induction System is designed for street and performance engine applications with a 1500-6500 rpm power-band. The Ultimate LS kits are designed to support either 500 hp or 750 hp to the flywheel and contains a 3 BAR MAP sensor for power adder applications that supports up to 30 PSI of boost. It has a high flow cable operated 92mm or 102MM inlet throttle body and 36lb or 55 lb flow-matched injectors. The 92mm or the 102 mm throttle body has parabolic inlet machining for smooth throttle transitions same as OE. The throttle body features progressive linkage pulley with a double return spring and an adjustable stop. The 750 hp and the 500hp kits are both available with the transmission control option. The manifolds are designed with a 3mm construction tig welded, black anodized with embossed FiTech logo and CNC machined with o-ring gasket and either cathedral or square port applications. The kit comes with a self learning ECU with touch screen controller for easy setup and configuration and a programmable color touch screen handheld controller with a data logging feature. The Ultimate LS kit has a sequential fuel and spark control with individual cylinder trim. The system also comes with stainless oxygen sensor bung, target AFR and timing control if desired, two fan control outputs, 5V tach output driver for most tachometers and a speedometer output driver for most electric speedometers. The system is compatible with 24X and 58X crank sensors, LS1-LS3 cam sensors, and compatible with car and truck coils. Wiring the system is made easy with a custom wiring harness that uses existing factory coil packs and sub harness. FiTech's Ultimate LS kit comes with a knock sensor control and is custom cam friendly. Included are several timing curves that are each tailored for different camshafts, final drive gearing, and vehicle weight. The Ultimate LS system will allow for both EV, EV6, and truck injectors with interchangeable injector harnesses.

## Engine Protection Feature

The FiTech Ultimate LS Induction System is programmed with a limp home mode. Our features differ from competitors because it will not shut down your system, instead the ECU will compensate if a sensor fails. This means, that if for any reason a sensor fails, that sensor will receive either a default value or a simulated value. This is to ensure that the engine remains running in a safe and controlled manner so that you can get to a repair facility, or to your home to resolve the issue. Due to the compensation features of the ECU, the way to check if something is going wrong with your system is by the fault codes option on the main menu of your hand-held controller. The fault code comes up under OBD-II, diagnostic standard, but to the right of the code it will state which sensor is having the problem. Check our troubleshooting guide to solve the fault codes errors. A new feature programmed into our hand-held is a rev offset. This feature will protect the engine from long term abuse because it lowers your built in rev limiter to prevent over rev and possible engine damage during warm up. It will automatically turn the feature off once your engine reaches operating temperature.

## Special Instructions

- We recommend using the fuel command center, G-surge, and Hy-Fuel In-tank Retrofit Kit setup for all installations. A submerged pump is quieter and lasts longer.
- If using the Frame Mount Inline Fuel Pump, it should be mounted at or below the bottom level of the fuel tank and as close to the tank as possible, no more than three feet away from the tank. This type of pump is designed to pump, not draw, and works best when gravity fed.
- Only use hard fuel lines when using proper EFI rated flared fittings.
- Do not use solid core ignition wires
- Make sure that you remove ALL low pressure flex joints on factory fuel lines and replace them with EFI rated fuel hose and use proper flared connections and clamps. Be careful not to mix 45° and 37° AN fittings, they look similar but will not work together. 45° fittings usually come from a hardware store or auto parts store while 37° AN fittings that are supplied by FiTech and most speed shops.
- Inline fuel pump return line must be  $\frac{3}{8}$ "
- Only the steady state fuel "learns". Cranking and hard throttle hits will not learn, but they can be tuned in Go-EFI Tuning. Selecting the right "cam" and engine CID (cubic inch) will get the learning closer. The Accel Pump will often need tuning for your particular engine combination.
- Your system will be running at 58 PSI so consult an FiTech approved professional if you are not certain about this portion of your installation.
- FiTech does not recommend aluminum fuel lines EVER! Use the supplied EFI high pressure fuel hose supplied in your Fuel Delivery Kit.
- Use the supplied push lock style hose ends only with the supplied hose and vice versa. Interchanging hose ends and hose with other brands could cause leaks
- The Ultimate LS systems are intended for use with unleaded pump gas up to 15% ethanol content.
- Tach output driver for most tachometer (5V).
- The fuel rails are machined to receive an adapter fitting for -6ORB to -6AN male o-ring port.
- When installing fuel rails hardware and brackets it is important to only hand tighten a couple threads in place, then once all bolts and hardware are in place tighten bracket to the rail before tightening the rail to the manifold.
- Ensure the engine has had sufficient time to cool before starting!
- It is recommended to use unleaded fuel to ensure a longer lasting oxygen sensor. Leaded fuel will lead to improper exhaust gas oxygen readings. before starting the install ensure the RTV silicone sealer is sensor compatible. This information can be found on the RTV package.
- Ensure to disconnect the negative terminal of the battery before beginning.

**Very important note: Your fuel tank must have a vent to prevent pressure building up inside the tank**

## Install The Intake Manifold

- 1 Before starting the install Disconnect the negative battery terminal.
- 2 Before installing the intake manifold, set the intake on the heads to test fit the intake manifold without the o-rings installed. Ensure that the mounting bolts supplied can thread freely into the cylinder heads through the intake manifold mounting holes and that the mounting flange seats properly. Check the port opening alignment and Test fit the throttle bodies, fuel and vacuum plumbing, throttle linkage, wiring, etc to ensure there are not any fit issues before performing the final intake manifold installation.



- 3 Now install the eight o-rings provided in the mounting flange o-ring grooves. Apply a small amount of grease to the o-rings to ensure proper seal.



- 3 Next, Place the intake manifold on the mounting flanges, be mindful of the o-rings that they remain in the grooves and are not being crushed between the flanges.
- 4 Apply a small amount of engine oil to the threads of the bolts before installing them into the intake.



- 5 Then install the bolts and washers and tighten until the o-ring is compressed in sequence.
- 6 Install the MAP sensor into the back of the manifold. Then thread the air temperature sensor into the front of the manifold and tighten.



### Install Throttle Body

- 1 Attach the IAC and TPS to the new throttle body. Make sure each o-ring is in the groove and does not slip out while installing.



- 2 Torque bolts to 18 in/lbs (1.5 ft/lbs). Make certain the gasket-mating surface on the intake manifold is clean and free of debris.
- 3 Using the included bolts, attach the throttle body to the intake manifold. Torque nuts and bolts down to 89 in/lbs (7ft/lbs).



- 4 Slip the throttle cable on the linkage arm.
- 5 Observe the throttle body (while an assistant presses and releases the gas pedal) to ensure that the throttle blade opens and closes while also operating smoothly.

## Install Fuel Rails

- 1 Before installing the fuel rails apply silicone lubricant to the o-ring on the inlet end of fuel injectors and insert the fuel injectors into the ports in the fuel rail.



- 2 To insert the injector without tearing the o-ring, gently rock the injector in the inlet of the port while applying pressure to insert the injector.
- 3 Apply a dab of engine oil to the o-ring seals of the injectors. Insert the injector with its connector facing towards the outside of engine into the fuel rail.



- 4 Install the injector retainer securely and check that it is properly installed and sealed to the rail.
- 5 Continue with the other three injectors. With the injectors installed, it is time to install the fuel rail assembly to the engine.
- 6 Position the rail assembly over the intake manifold with the injectors aligning with their mounting pockets on the intake
- 7 With the injectors lined up, lightly press down on the fuel rail using caution not to bind any of the injectors or connectors. The fuel rail assembly should come close to contacting the manifold brackets with very little pressure. Use caution not to bind or tear any injector O-rings. Check and ensure the injector is floating on the o-rings; rotate the injector back and forth to confirm that there is no load on the injector body.

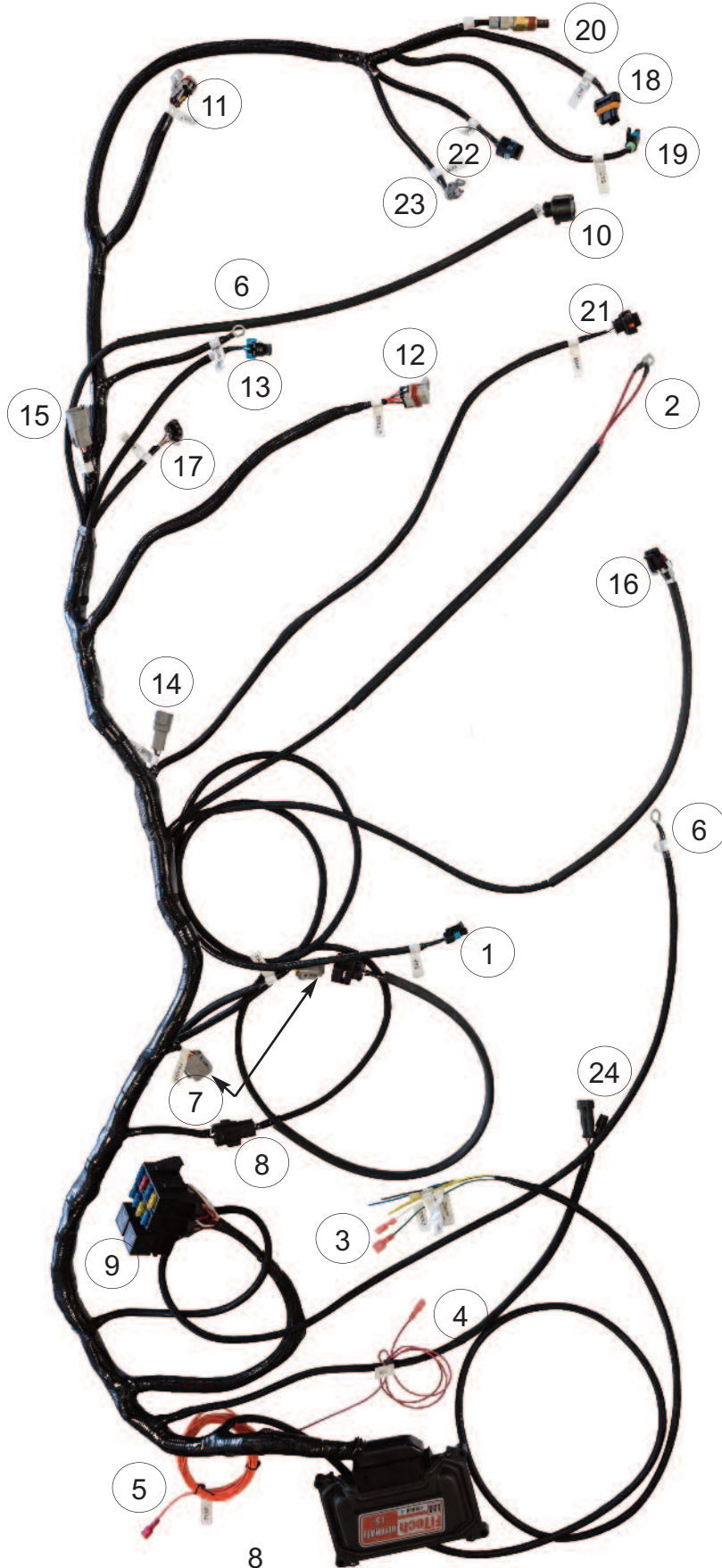


- 8 Attach the fuel inlet fittings to the front nipples of the fuel rails



## Wiring The System

The Ultimate LS kit makes wiring the harness very simple. Every connection in the harness is labeled for where it goes. The various wires will need to be extended to make required connections. See the wire chart on page 7 which lists each wire used in the system and what it connects to. It is strongly suggested that any wire extensions are made with the same gauge and color wire as is used in the supplied harness. Make connections as a soldered joint rather than a crimped connection. Utilize a shrink wrapped sleeve covering all connections. All modifications to wiring must be made on harness "A" (the vehicle side wiring) such as extensions or cuts. Any modification of the ECU side harness will result in a VOID of warranty.





Wire	Location
① VSS	Vehicle speed sensor connects to back of transmission output
② POS (red)	Main Power: positive 12V goes to starter. This circuit needs to be live even when the switch is off so that the self-learning files are saved. This is fused with a 25 amp fuse
③ Accessory Wires	Dashboard odometers bunch: can be taken out of wire sheathing to be relayed to different places
④ Red Wire: key	cranking power On/Off - Connect this wire to a switched 12V circuit. Must be on during both "Key On" and "Cranking."
⑤ Orange wire	Fuel Pump circuit. This wire provides 12V to the fuel pump and connects to the positive (+) terminal on the pump. No relay is required.
⑥ Grounds	2 one grounds out ignition and one grounds ECU low current
⑦ Two trans connectors	not used if not using transmission control
⑧ O2 Harness	second O2: passenger side: Yellow 6-pin connector
⑨ Fuse box	one is fuel pump relay and one is main relay
⑩ DRV.02	O2 sensor: driver side
⑪ Coil P	passenger, ignition coil pack: coils not in kit
⑫ Coil D	coil driver side connects to the universal connector on pre existing coil pack
⑬ K knock	sub harness extension to reach to LS3 LS2 on side LS1 back of block
⑭ Inj P	injector passenger side harness
⑮ inj D	injector Driver side harness
⑯ CKP	crank position sensor, in between the block and the starter
⑰ CAM: cam sensor	available with extensions for LS3 and LS2 where cam connects to front (not included) LS1 connects to back
⑱ ALT	Connects directly to the alternator
⑲ CTS	This wire connects to the Engine Coolant Temperature Sensor on the driver side front cylinder head
⑳ IAT	Idle air temperature: Connects to the front driver side of the manifold Thread into the manifold
㉑ MAP	Connects to the back of the manifold Install with the bolt
㉒ IAC	Idle Air Control: Connects on the throttle body
㉓ TPS	Throttle Position sensor: on throttle body
㉔ Hand-held connection	Connect the two female ends to the hand-held harness male connectors

**VSS:** Vehicle speed sensor connects to back of transmission output

**POS (red) Main Power:** positive 12 v goes to starter. This circuit needs to be live even when the switch is off so that the self-learning files are saved. This is fused with a 25 amp fuse

**Accessory Wires :**Dashboard odometers bunch: can be taken out of wire sheathing to be relayed to different places

**Red wire:** key cranking power

On/Off - Connect this wire to a switched 12V circuit. Must be on during both "Key On" and "Cranking." DO NOT connect to the coil terminal when using an external CDI box such as an MSD 6A or any other CD ignition.

**Orange Wire Fuel Pump Circuit:** This wire provides 12V to the fuel pump and connects to the positive (+) terminal on the pump. No relay is required.

**Grounds:** 2 one grounds out ignition and one grounds ECU low current



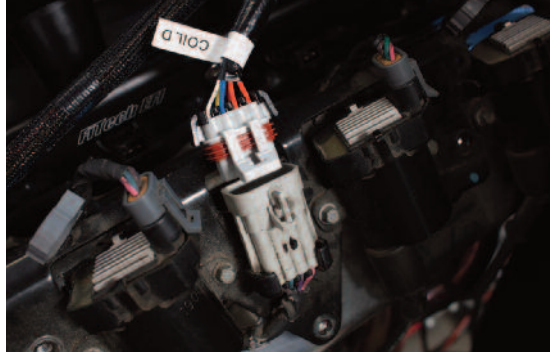
**Two trans connectors:** not used if not using transmission control

**O2 Harness:** Yellow 6-pin connector. The second O2 connector goes to the passenger side.

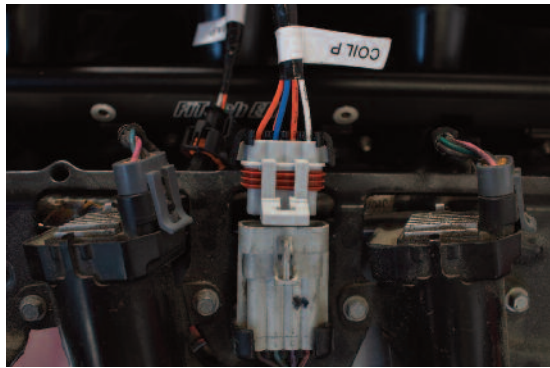


**Fuse box:** one is fuel pump relay and one is main relay

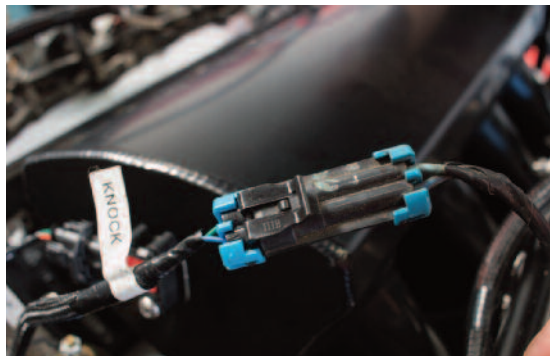
**Coil D:** coil driver side connects to the universal connector on pre existing coil pack



**Coil P:** passenger, ignition coil pack: coils not in kit



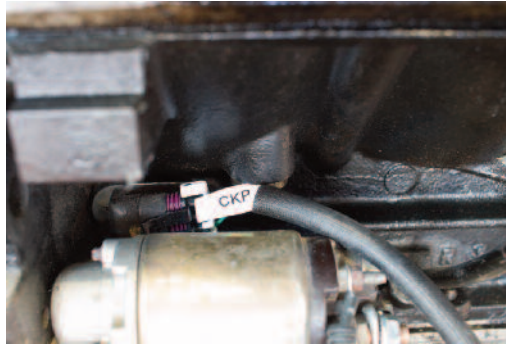
**Knock:** knock sensor: sub harness extension to reach to LS3 LS2 on side LS1 back of block



**Inj P:** injector passenger side harness



**CKP:** crank position sensor, in between the block and the starter



**CAM:** cam sensor: available with extensions for LS3 and LS2 where cam connects to front (not included) LS1 connects to back



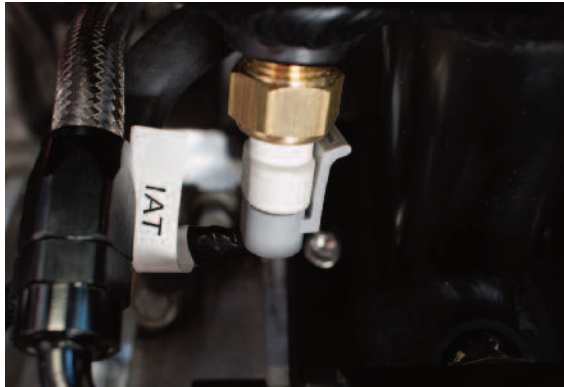
**ALT:** Connects directly to the alternator



**CTS:** This wire connects to the Engine Coolant Temperature Sensor on the driver side front cylinder head



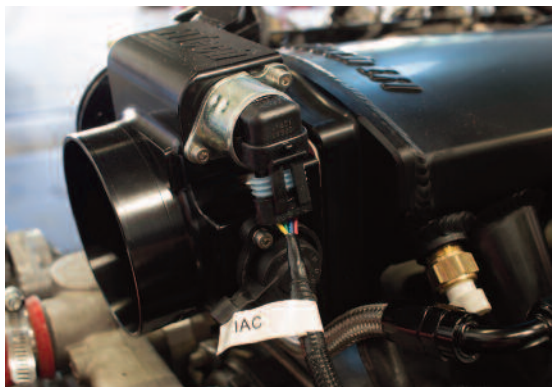
**IAT:** Idle air temperature: Connects to the front driver side of the manifold and thread into the manifold. This sensor is supplied and must be inserted in the manifold. A 3/4" hole is required for the sensor.



**MAP:** Connects to the back of the manifold; Install with the bolt



**IAC:** Idle Air Control: Connects on the throttle body



**TPS:** Throttle Position sensor: on throttle body



## Final Steps

- 1 Re-attach the air inlet tube, all vacuum hoses, and electrical connectors on the new throttle body.
- 2 Reconnect the negative battery terminal.
- 3 Turn key but do not crank, pressurize system and check for any fuel leaks
- 4 Start the engine and check for loose connections or vacuum leaks, etc.
- 5 After the engine is warmed up, check the idle speed (refer to owner's manual). Double-check all fasteners clamps, and electrical connections to ensure they are all secure.

## Initial Programming

This simple procedure is performed using the hand-held controller. A laptop computer is **not** required.

- 1 This unit plugs into the throttle body ECU.
- 2 Input Cubic Inch Displacement, cam size, target idle speed warm, RPM limit, ignition selection( varying on unit), crankshaft sensor, injector flow rate, and max rev limit
- 3 go to transmission control:
- 4 If you are not running a electronically controlled automatic transmission such as a 4L60 or 4L80, go to transmission option number 4: "option 4LXOe" and select other and click the joy-stick to send to ECU
- 5 If running a electronic controlled automatic transmission such as a 4L60 or 4L80, go to option 5 "4L6xe 4L8xe" and select you transmission, click joy-stick to send to ECU.
- 6 The hand-held controller can be removed or left connected. When connected, there is a dashboard and gauges screen that will show engine parameters in real time.

## Hand-held Controller

There are two ways to navigate the hand-held controller; you can use the touchscreen with your finger or move the joystick up, down, left, and right. The joystick is the black button on the right hand side of your controller, it can be used to view the displays on the controller by moving the button up and down or side to side, pressing the joystick=enter.

- 1 When making changes to the ECU through the hand-held make sure that the key is on.
- 2 Once the changes are made turn the key off, wait 15 to 20 seconds until the values disappear under the "dashboard" feature. Doing this will ensure that your changes have received a hard save.
- 3 Once the hard save is completed if desired the battery can be disconnected without interference with the calibrations.

## Timing Control

The Ultimate LS System has a preset timing curve based on your engine calibration selected. If you desire to change timing control it is in advanced setting, under Go EFI tuning. The spark map can be adjusted based on engine RPM, throttle position, and vaccuume reading.

## Rev Limiter

The Ultimate LS System provides a fuel controlled rev limiter. When the engine attains the programmed RPM limit, fuel will be cut off to maintain the desired limit. Any external ignition related RPM limiter is independent of the Ultimate LS System and you should set the EFI related RPM limiter higher than your external rev limiter to prevent a crossover of the two happening at the same time.

## On-Engine Adjustments

Start the engine and observe idle. If idle is high, confirm the throttle cable is adjusted to allow the lever arm to rest on the blade idle screw (Figure 8) and the cable is not holding the blade open. If idle is acceptable, bring the engine to running temperature and check the idle again. If idle is not desirable, turn the key to the off position for 30 seconds. This allows the ECU to learn the IAC's new position. Restart engine and reevaluate idle.

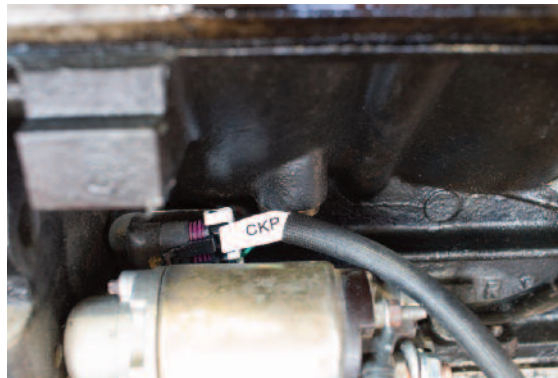
**IMPORTANT!** The ECU takes time to learn after engine components have been changed. It is recommended that the vehicle be driven for one to two hours to allow the computer to adjust to this throttle body before moving to the following adjustments. Making adjustments before the computer has gone through a learn cycle can yield inconclusive and inconsistent results. If idle is low or rough, adjust the bleed screw (Figure 6) counter-clockwise. This will increase idle RPM.

## Power Adder

Power Adder units are designed to operate in conjunction with wet nitrous systems as well as draw-through or blow-through superchargers or turbochargers. The hand-held controller includes a program for nitrous that allows you to set a target air/fuel ratio when the nitrous is activated plus you can retard the timing (when timing control is active). Nitrous systems require their own fuel pump to supply the added fuel required with nitrous. There is a target air/fuel ratio setting when operating under boost with forced induction applications. The purpose of having a power adder versus a non-power adder is that a power adder has a 10 pin harness, air conditioning input, and a second fan relay driver. The purpose of the air condition input is to kick up the idle speed automatically. The benefit of having a second fan relay is to induce more total air flow without installing a large loud fan. While the non-power adders have a 2x4 pin harness, single fan relay drive, and no air conditioning input. All Ultimate LS kits come with a 3 BAR MAP sensor which automatically detects up to 30 PSI boost. Instal MAP sensor to the back of the manifold using the provided bolt Plug the sensor labeled MAP into the sensor on the back of the manifold.

## Crank Sensor

The LS engine platform has used two different crank position sensors through the years. There is a 24-tooth wheel or a 58-tooth wheel on the crankshaft. The sensor has always been located behind the starter. The 24-tooth sensor has a black connector whereas the 58-tooth sensor has a gray connector. The Master Kits are supplied with connectors for both the 24x and 58x trigger sensors. Connect the sensor in between the block and the starter



## Cam Sensor

The Cam Sensor of LS engines has changed throughout the years. Not only it's location, but its wiring as well. Early models have the cam sensor located at the back of the block near the deck surface. During 2005, as a running change, the location changed to the front of the block between the cam and crankshaft.

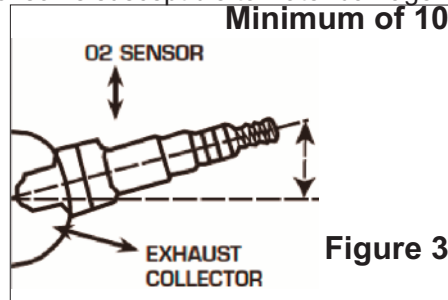
**Note:** The Ultimate LS System can function with both designs.



## Wide Band O<sub>2</sub> Sensor

This is the key component of any EFI system. Only one sensor is required, but on the 750 Hp kit we have included two, or a second can be purchased upon request. This sensor continuously monitors the exhaust gas mixture and sends the information to the ECU where adjustments are constantly made to maintain the air/fuel targets. The benefits of having the wide band O<sub>2</sub> sensor is that it provides real time accurate feedback of the amount of fuel the motor needs to reach desired air/fuel ratio directly to the ECU. the 750 HP kits come with two O<sub>2</sub> sensors. If a second O<sub>2</sub> sensor is desired one can be purchased separately. The O<sub>2</sub> sensor will connect to the sensor on the headers. Caution must be taken before touching the headers. Ensure the engine is full cooled!

- 1 The supplied O<sub>2</sub> Sensor can be installed in either exhaust bank.
- 2 The Sensor cable connects to one of the cables coming out of the ECU on the throttle body.
  - a. The ideal location for the Sensor is in the exhaust collector or within 8 inches of the collector itself. It must always be at least 18-inches from the exhaust tip, to prevent reversion and false lean conditions.
- 3 The sensor should be between 10° to 14° above horizontal (see figure 3) to allow condensation to run off. If this is not adhered to, the sensor is susceptible to water damage.



- 4 Never position the sensor on the outside of a bend in the tubing.
- 5 The sensor must always be mounted ahead of any catalytic converter if so equipped.
- 6 Drill a 7/8" diameter hole in the desired location.
- 7 The supplied bung kit can either be welded in place or clamped onto the pipe. The clamp-on style works well and will not leak. If welded, make sure the bung is welded completely all the way around and does not leak.
- 8 Install the sensor into the bung.

Note: It will not work on "Zoomie" style headers.

**WARNING: Do not start the engine without the sensor cable connected to the throttle body and the EFI system is fully operational or damage will occur to the sensor**





## Transmission Control

The FiTech LS kit is available with electronic transmission control. This option is used when operating a GM electronically controlled automatic transmission. The Ultimate LS ECU has the ability to control the shift point, shift firmness, when to downshift properly, and all other features involved when controlling the transmission. This feature is suitable for 4L60, 4L65, 4L80 or 4L85 GM transmissions. This feature can be purchased with the kit or as an addition at a later time. If using transmission control connect the two sides of the trans connector to the sub-harness and connect this to the connector on the transmission. once connected to the transmission you are ready. If not using transmission control leave the connectors untouched.

## Fuel Pump Pulse Width Modulation

The fuel pump pulse width modulation or better known as PWM controls the speed of your pump from your hand-held. It can be set with four basic steps.

- 1 To start plug your handheld controller into the ECU on the FiTech Throttle Body, turn your key to the power system, but do not crank.
- 2 Next, go to main menu, scroll down to option 4: Go EFI Initial set-up, click the joystick to enter.
- 3 Now, go under option 1: Engine Setup.
- 4 Then, scroll down to option 6 (pump PWM/FCC) and select edit, press clear (CLR) and enter a new value. The lower the number the slower the pump will run. If you have a Fuel Command Center the best value to set this feature to is 40. If you are using the other three fuel delivery options keep the PWM value at 74.9. Once you enter the value you would like be sure to send to ECU by hitting enter on the joystick.

## Air Fuel Ratio (AFR)

An approximate value for gasoline's "stoichiometric" value is 14.7. A value of 12.5-13.0 is a "rich" value for near best power. For boost conditions (superchargers and turbochargers) 11.8 is a little richer than best power to keep combustion chambers a little cooler. 14.7-15.5 are lean and can sometimes be used for better cruise fuel economy. Idle AFR should be set to give a decently stable idle. Many engines prefer between 13.2 and 14.0 stoichiometric value.