



WARNING: Cancer and Reproductive Harm www.P65Warnings.ca.gov

This instruction manual is designed to get you up and running with your Retro LS Port 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 other system on the market today. Suitable for your new or pull-out LS engines to ensure you are up and running in a flash. For technical assistance with your Retro LS Port System, call 951-340-2624 or go online to www.fitechefi.com under "Support".

Emissions Status: FiTech's Retro LS Port System is not CARB (California Air Resources Board) 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 (pre-1976). Check your particular state regulations for clarity to ensure no emission laws are being violated with the install of this system.

Warning: We recommend having the installation performed by an experienced, qualified, and FiTech approved automotive technician. Caution must be observed when installing any product involving fuel system parts or gas tank modifications. All safety precautions must be observed when working with fuel. Ensure the engine has had sufficient time to cool before performing any work as the coolant may still be hot! 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. Be sure to disconnect the negative terminal of the battery before beginning. The finished installation must be thoroughly checked for any fuel system leaks. Disregarding any of this information can result in serious injury or death.

Dimensions and Hood Clearance

- The intake manifold height as measured from the top surface of the block to throttle body mounting flange on the is 5.00".
- The throttle body height is 3.125" from base mounting flange to air cleaner resting flange.
- Before installing your FiTech Intake manifold it is recommended to check hood clearance. This can be done in a few simple steps:
 - Mock install intake onto engine
 - Install desired air cleaner assembly without air cleaner stud
 - Using modeling clay or putty, (not included), make several small cones about 2-3 inches high. Position the cones on various areas of the air cleaner where you think clearance might be tight.
 - Close the hood to locked position and re-open. The height of the cone indicates the space between the hood and the air cleaner. Record these measurements. We recommend 1" of clearance.

NOTE: Keep in mind to leave room for required air cleaner hold down stud/nut. This will have to be installed, height checked with air cleaner and cut to required length.

- Modification of the hood might be necessary to ensure there is no damage to any components.

Parts **NOT** included in the system:

1. Coil Packs
2. Coil Pack Sub-harnesses
3. Fuel Delivery System able to support required HP
4. Throttle Cable and Cable Brackets
5. CAM Sensor Extension Cable (Only Included in LS3 Kit)
6. Coolant Sensor
7. Air Cleaner Assembly

Fuel System Requirements

- Fuel Filtration:** System must have 30 microns or better fuel filtration to injectors. Recommendation is a 100 micron (course filter) between tank and pump and a 10 micron (fine filter) between pump and injectors.
- Fuel Pressure:** Must be capable of supplying 58 PSI of fuel pressure to the injectors under full load. Must use 37° AN flare fittings on all fuel line connections.
- Venting:** Fuel tank must have a vent to prevent pressure building up inside the tank.

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Figure 1



LS1 Kit Contents

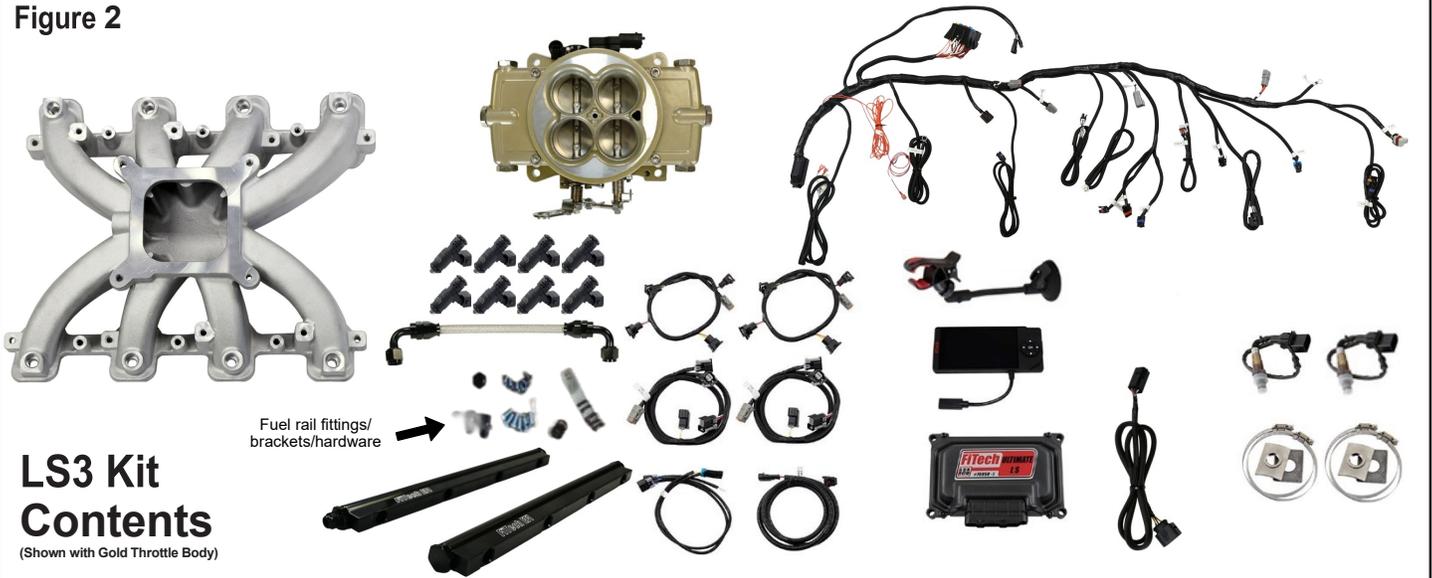
(Shown with Gold Throttle Body)

Contents for Retro LS Port Kit LS1 Kit

- LS1 Cast Aluminum Intake Manifold with hardware and o-rings
- Classic Gold or Matte Black Throttle Body
- LS Retro Port ECU
- (8) 55 lb/hr Injectors
- (2) -8 ORB Fuel Rails with mounting brackets and hardware
- Hand Held Controller
- Primary Wiring Harness
- 3 Bar MAP Sensor
- Throttle Position Sensor (TPS)

- Idle Air Control Motor (IAC)
- Inlet Air Temperature Sensor (IAT)
- (2) Wide band Oxygen Sensor
- (2) Stainless Steel Oxygen Sensor Bung Kit
- Windshield mount for Hand Held controller
- (3) -8 AN to -8 ORB fittings
- (1) -8 AN ORB plug
- (1) -6 AN to -8 ORB fitting
- (2) Fuel Rails
- 8 AN Fuel Crossover Hose Assembly

Figure 2



LS3 Kit Contents

(Shown with Gold Throttle Body)

Contents for Retro LS Port Kit LS3 Kit

- LS3 Cast Aluminum Intake Manifold with hardware and o-rings
- Classic Gold or Matte Black Throttle Body
- LS Retro Port ECU
- (8) 55 lb/hr Injectors
- (2) -8 ORB Fuel Rails with mounting brackets and hardware
- Hand Held Controller
- Primary Wiring Harness
- 3 Bar MAP Sensor
- Throttle Position Sensor (TPS)

- Idle Air Control Motor (IAC)
- Inlet Air Temperature Sensor (IAT)
- (2) Wide band Oxygen Sensor
- (2) Stainless Steel Oxygen Sensor Bung Kit
- Windshield mount for Hand Held controller
- (3) -8 AN to -8 ORB fittings
- (1) -8 AN ORB plug
- (1) -6 AN to -8 ORB fitting
- (2) Fuel Rails
- 8 AN Fuel Crossover Hose Assembly

Features

FiTech Retro LS Port systems are designed for street and performance engine applications with a 1500-6500 RPM powerband. They are designed to support 750 hp to the flywheel and all systems include a 3 BAR TMAP sensor for power adder applications that support up to 30 PSI of boost (3 BAR). The throttle body features a progressive linkage with a double return spring and an adjustable stop.

The manifolds are designed for LS1 (#37005/#37006 Cathedral ports) and LS3 (#37002/#37003 Rectangle ports) applications. CNC machined with o-ring gaskets and including all required mounting hardware. The system comes with a self learning ECU with touch screen controller for easy setup and configuration. The programmable color touch screen Hand Held Controller includes a data logging feature. The system has a sequential fuel and spark control with individual cylinder trim.

The system also comes with stainless steel oxygen sensor bungs, target AFR and timing control, two fan control outputs, 12 volt square-wave tach output driver for most tachometers and a speedometer output driver for most electric speedometers. The system is compatible with LS1-LS3 24X or 58X crank sensors, 1X or 4X cam sensors, and compatible with both car and truck ignition coils.

Wiring the system is made easy with a custom wiring harness that uses existing factory coil packs and sub harnesses. FiTech's Retro LS Port system comes with a knock sensor control and is custom cam friendly. Included are several preset timing curves that are each tailored for different camshafts, final drive gearing, and vehicle weight. The Retro LS Port system will allow for both EV1 and EV6 injectors with interchangeable injector harnesses. (Not included)

Modified Engines

The Retro LS Port 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 heads 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.

Transmission Control

The FiTech Retro LS Port system is available with electronic transmission control. This option is used when operating a GM electrotronically controlled automatic transmission. The FiTech Retro LS Port 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 4L60E, 4L65E, 4L80E or 4L85E GM transmissions. This feature can be purchased with the system or as an addition at a later time. If using transmission control, the included sub-harness will connect to the connector on the transmission. If not using transmission control leave the connectors on the main harness untouched and set the included sub-harness aside for future upgrades if desired.

Engine Protection Feature

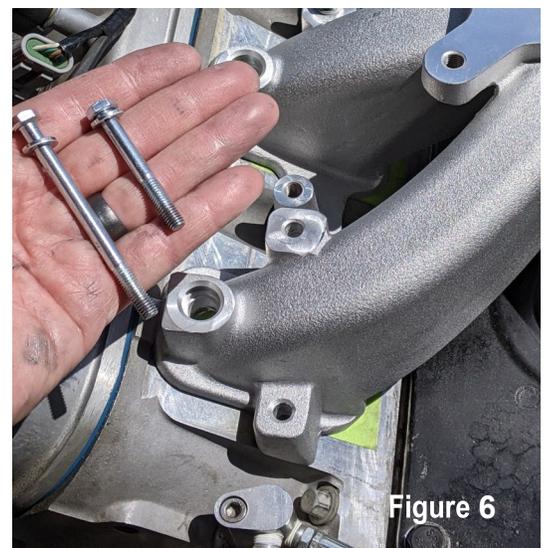
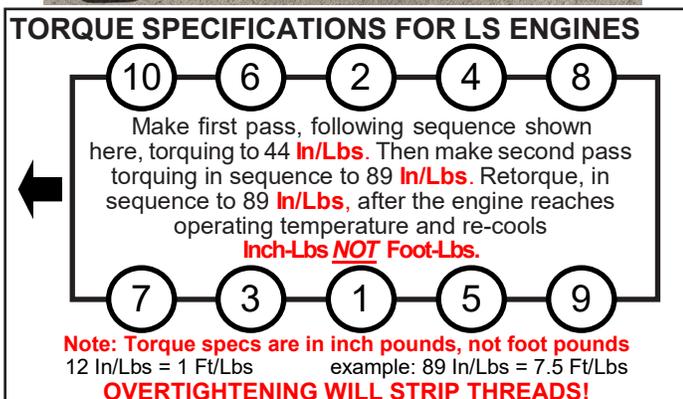
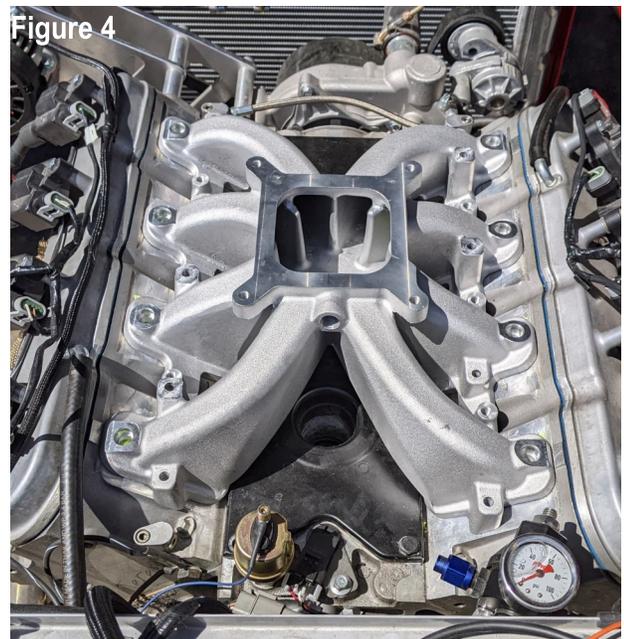
The FiTech Retro LS Port system is programmed with a limp home features. Our features differ from competitors because the FiTech unit will not shut down your system. Instead the ECU will compensate if a sensor fails. This means, that if for any reason a sensor fails, that sensor will receive either a default value or a simulated/calculated value during which time a fault code will be set. 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 exactly what is wrong with your system is by way of the fault codes option on the main menu of your hand-held controller. The fault code comes up under the OBD-II style diagnostic standard (P codes) which to the right of the code it will state which sensor is having the problem. Check our troubleshooting guide to solve any fault codes errors. A new feature programmed into our hand-held is a rev offset for warm-up rpm limiting as well as a user adjustable high temperature rev limiter. This feature will protect the engine because it changes your built in rev limiter setting to prevent over rev and possible engine damage during both ends of the spectrum (warm up and high temperatures areas). It will automatically turn the feature off once your engine is back into normal operating temperature range.

Special Considerations/Notes/Cautions

- Be sure the engine has had sufficient time to cool before starting work on the installation.
- Be sure to disconnect the negative terminal of the battery before beginning.
- We recommend using either the FiTech Force Fuel, or the FiTech Go Fuel In-tank Retrofit Kit setup for optimum fuel delivery 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 3-feet away from the tank. This type of pump is designed to pump, not draw. Works best when gravity fed.
- Only use hard fuel lines or EFI pressure rated hose along with being sure to use proper EFI rated flared fittings.
- FiTech does not recommend aluminum fuel lines EVER!
- 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. Although they look similar they typically will not seal properly together at higher fuel pressures. 45° fittings usually come from a hardware stores while most auto performance parts stores/speed shops carry the required 37° AN fittings which are what is supplied by FiTech for the fuel rails in this system.
- The fuel rails are machined to receive the supplied -8 ORB (O-Ring Boss port) fitting. **Both** a -8 ORB to -8 AN male fitting **AND** a -8 ORB to -6 AN male fitting are included in the system to connect to your fuel system.
- Your system needs to run at 58 PSI so consult a FiTech approved professional if you are not certain about this portion of your installation.
- The use of push lock style hose ends is only recommended when used with same supplier of hose. Interchanging hose ends and hose with other brands could cause leaks.
- The Retro LS Port systems are intended for use with unleaded pump gas.
- It is recommended to use unleaded fuel to ensure the oxygen sensors last longer and do not fail prematurely.
- Leaded fuel will lead to improper exhaust gas oxygen readings.
- Do not use solid core ignition wires.
- 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.
- Tach output driver provides a 12 volt square wave output signal compatible with most aftermarket tachometers.
- Before starting the install, ensure any RTV silicone sealer that may be used on the header’s gaskets/ seal are oxygen sensor compatible. This information can be found on the RTV package. Failure to utilize proper RTV can cause premature wear of the oxygen sensors.
- When installing the fuel rails hardware and brackets, it is important to only hand tighten a couple of threads in place, then once all bolts and hardware are in place, tighten the brackets to the rail before tightening the rail to the manifold.
- Your fuel tank must have a vent to prevent pressure building up inside the tank.

Installing the Intake Manifold

1. Before starting the installation, disconnect the negative battery terminal (ground).
2. If a manifold, that you are replacing with the Retro LS Port system, is currently installed, remove all items that will be replaced.
3. Ensure the mating surface on the cylinder heads are clean, free from debris. If engine has been without a manifold, remove any tape or rags that you may have used to cover intake ports on cylinder heads.
4. It is recommended to install tape over injector ports on the new manifold as well as throttle body flange on intake manifold to prevent any items from falling into ports/cylinder head ports during the manifold installation.
5. As shown in figure 4, with the vacuum port near flange pointed towards the rear of engine, temporarily set the intake on the cylinder heads to test fit the intake manifold **without** the o-rings installed. Make sure 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 body, fuel and vacuum plumbing, throttle linkage, wiring, etc to ensure there are not any fitment issues before performing the final intake manifold installation.
6. As shown in figure 5, install the O-rings into the sealing grooves on the intake flange. You can use a slight amount of grease if needed to hold them in place during the install procedure.
7. Next, place the intake manifold onto the cylinder heads, being careful that the o-rings remain in the grooves and are not being crushed between the manifold and the cylinder heads (moved outside of grooves).
8. Apply a small amount of engine oil to the threads of the bolts before installing them into the intake. **Note: There are two different length bolts (see Figure 6). Ensure you install bolts in current locations.**
9. Then install the bolts and washers and tighten following the torque values and sequence shown in the chart below.



5

Installing injectors and rails

1. Loosely install supplied appropriate length fuel rail brackets onto fuel rail.
2. Before installing the fuel rails, apply light grease to the o-rings on both ends of the fuel injectors (Figure 7) and insert the fuel injectors into the ports in the fuel rail (Figure 8).
3. 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.
4. Insert the injector with its connector facing towards the outside of engine into the fuel rail and the electrical connector pins pointed upwards.
5. Continue with the other three injectors. With the injectors installed, it is time to install the fuel rail assembly to the manifold.
6. Remove any tape installed over injector ports on the new manifold that was used to prevent items from falling into ports during manifold installation.
7. Position the rail assembly over the intake manifold with the injectors aligning with their mounting pockets on the intake.
8. With the injectors lined up, lightly press down on the fuel rail.
Use 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 injectors can rotate back and forth to confirm that there is no bind on the injector body.
9. Repeat steps 1-7 for other side.
10. Install fuel rail bracket to manifold hardware.
11. Tighten all rail mounting hardware to 20 **Ft/Lbs** or 240 **In/Lbs**
12. The fuel rails are machined to receive the supplied -8 ORB (O Ring Boss port) fittings. Both a -8 ORB to -8 AN male fitting AND a -8 ORB to -6 AN male fitting are included in the system to connect to your fuel system.
13. Install the supplied O-rings onto the appropriate fuel inlet fittings that will be used for your application. Typically this will be one plug, two -8 ORB to -8 AN male (for cross over), and either a -8 ORB to -8 AN male fitting **OR** a -8 ORB to -6 AN male fitting depending on your fuel system of choice. The O-rings install on the non-tapered end of the fitting that will be threaded into the fuel rail..
14. Attach the fuel inlet fittings to the front ports of the fuel rails. Make sure O-ring is on the end of the fitting that threads into the fuel rail. Hold the rail with a wrench to avoid twisting and tighten the fitting. See Figure 11. **Do Not Overtighten.**
15. Install supplied crossover hose either in back or front depending on your preference of fuel supply hose routing. Fuel supply can be fed into rails by either end, front or rear or either side right or left.

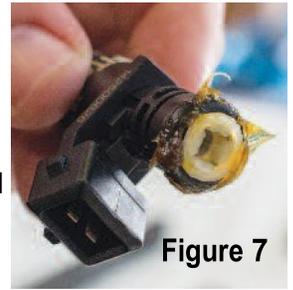


Figure 7

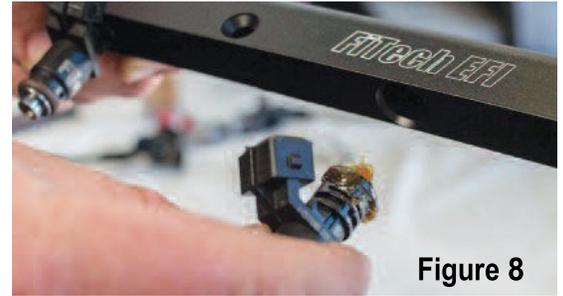


Figure 8

Fuel System Requirements:

Fuel Filtration: System must have 10 microns or better fuel filtration. Recommendation is a 100 micron (course filter) between tank and pump and a 10 micron (fine filter) between pump and injectors.

Fuel Pressure: Must be capable of supplying 58 PSI of fuel pressure to the injectors under full load. Must use 37° flare fittings on all fuel line connections.



Figure 9



Figure 10

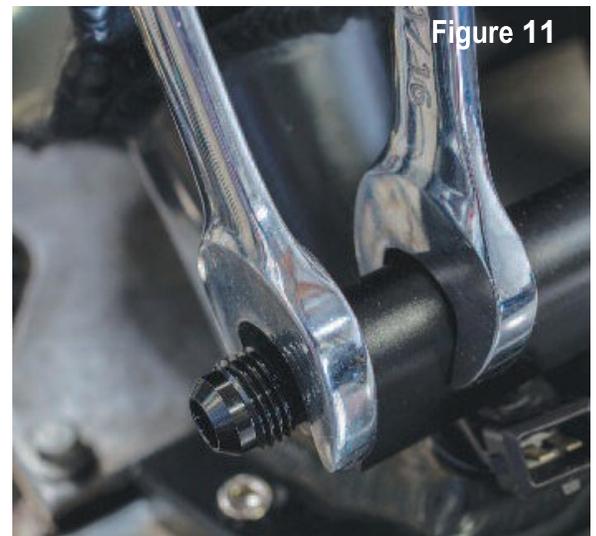


Figure 11

Fuel System Plumbing and Requirements



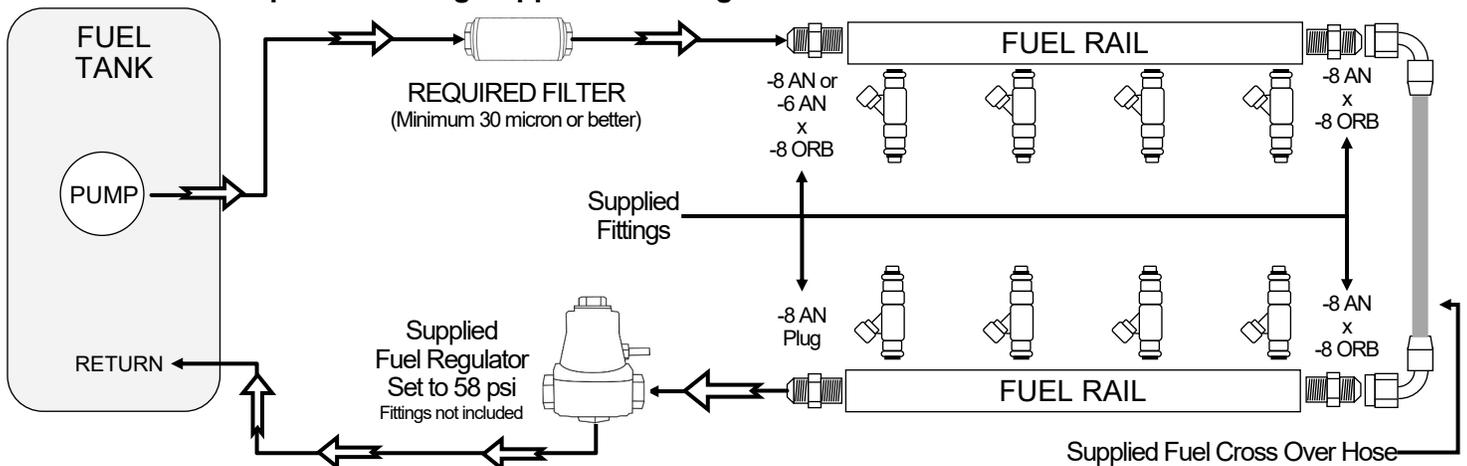
The installation of fuel related components should be done in a well ventilated area free of any possible fire hazards. Gasoline fumes are toxic and highly inflammable. Always relieve the pressure from within the system before working/ opening any fuel system. Take precautions to ensure that all fuel components are away from heat sources, such as the engine or exhaust pipe. A fire or explosion hazard could cause serious injury or death! Before disconnecting or removing fuel lines, ensure the engine is cold. Do not smoke. Extinguish all open flames. An open flame, spark, or extreme heat near gasoline or fumes can result in a fire or explosion causing damage, serious injury, and/or death. Never get under a vehicle supported by only one jack. Serious injury or death can result from vehicles falling off of jacks. Before working underneath a vehicle, support it solidly with jack stands.

- Your fuel tank must have a vent or use a vented cap to prevent pressure building up inside the tank!
- The Retro LS Port systems includes a fuel pressure regulator and must have a return line.
- **Fittings are NOT included with the fuel regulator.**
- **Ports in fuel regulator are -6 ORB ports. DO NOT USE NPT Pipe fittings.**
- After installation, the fuel pressure regulator must be set to 58 psi.
- Recommendation is a 100 micron (course filter) between tank and pump and a 10 micron (fine filter) between pump and injectors.
- At minimum a 30 micron or better filter must be installed in the fuel line before any fuel enters the fuel rails.
- Plan the routing of the fuel hose so there is a convenient place to install the filter for easy servicing.
- Make sure you choose a position where the fuel hose can be routed without getting too close to the exhaust manifolds or any moving parts

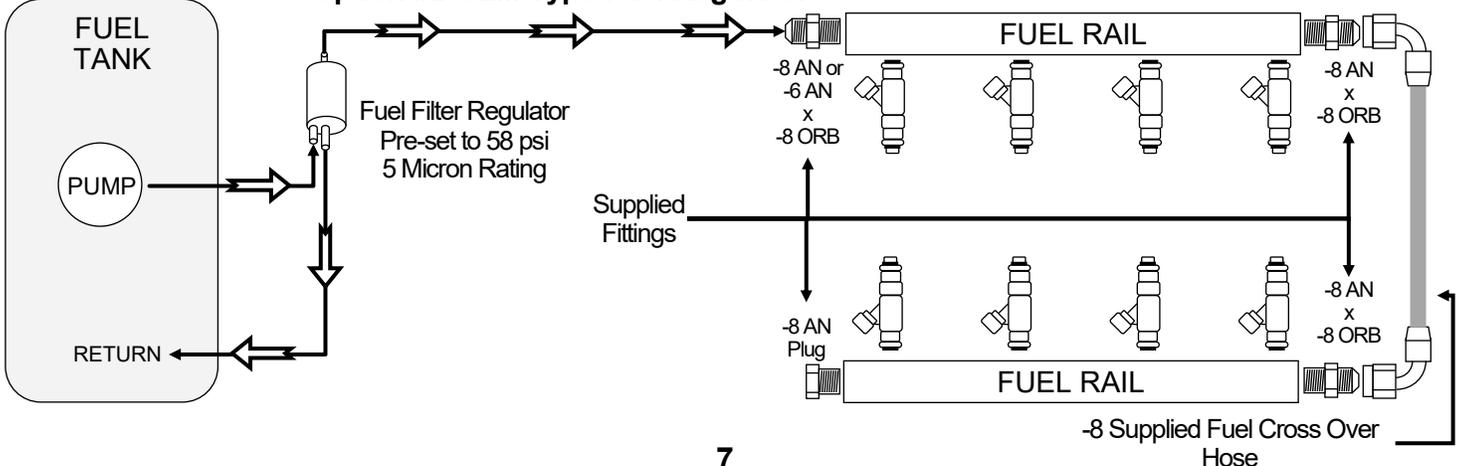
Note: FiTech offers multiple different fuel delivery options if needed. If you choose to use some other fuel delivery system other than FiTech, it is important to make sure that you confirm its compatibility with the FiTech EFI system. Contact the FiTech technical staff to check compatibility. Failure to do so can void your warranty (951-340-2624).

| Supplied Fittings | Qty |
|---------------------------------|-----|
| -8 AN to -8 ORB Straight | 3 |
| -6AN to -8 ORB Straight | 1 |
| -8 ORB Plug | 1 |
| -8 Fuel Crossover Hose Assembly | 1 |

Option #1 Using Supplied Fuel Regulator



Option #2 OEM Type Fuel Regulator



Installing the Throttle Body

1. Install the supplied mounting studs for the throttle body into the manifold finger-tight only. **DO NOT** double-nut the studs and tighten severely.
2. Remove any tape installed on throttle body port opening on the new manifold that was used to prevent items from falling into ports during manifold installation.
3. Place the supplied gasket on the manifold (see figure 12) and place the throttle body onto the gasket ensuring careful placement over the studs. **Note:** Keep in mind the throttle body linkage must be on the driver's side of the engine.
4. Install the supplied nuts and washers onto the four throttle body studs. See figure 13 (Depending on style used, some throttle cable/spring brackets may need to be installed before nuts and washers) .
5. Using several steps in a criss-cross pattern, tighten to a final 89 **In/Lbs** of torque.
6. Connect up throttle linkage and any required vacuum hoses.



Figure 12

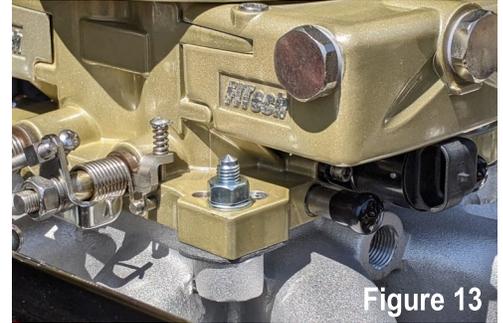


Figure 13

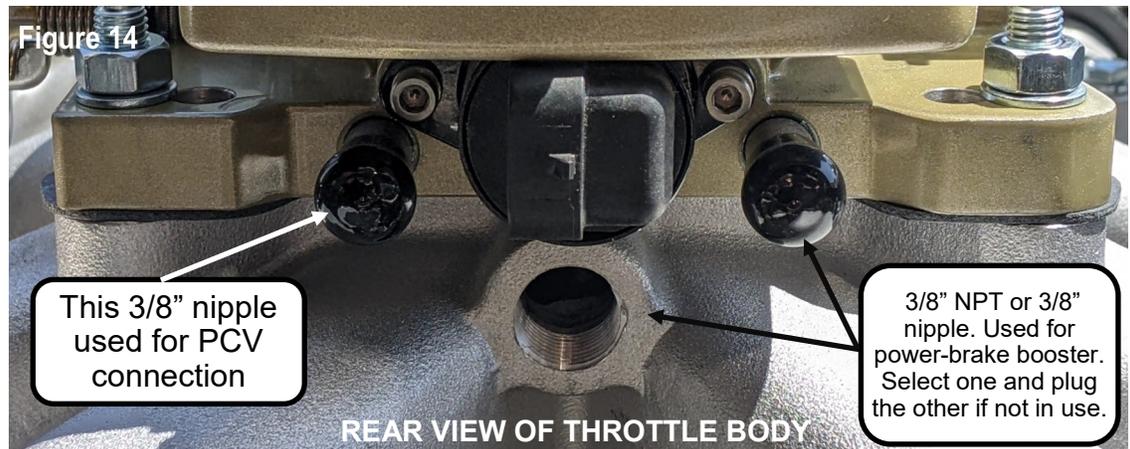


Determining Use of Vacuum Ports

Determine the engine's need for vacuum ports including ported and manifold vacuum. These ports cover accessories such as power brakes, vacuum advance, transmission modulator, PCV and possibly more.

There are two 3/8" male nipples on Throttle body rear. There is a 3/8" NPT on rear of manifold. (Figure 14)

There are two 3/16" and one 3/8" male nipple on Throttle body front. (Figure 15)



Wide Band O2 Sensor

This is the key component of any EFI system. The included dual sensors 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 O2 sensor is that it provides real time accurate feedback of the amount of fuel the engine needs to reach desired air/fuel ratio directly to the ECU.

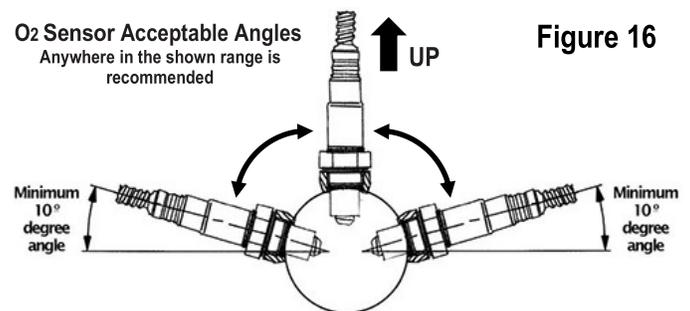
Air Fuel Ratio (AFR)

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. Settings of 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 AFR value.

Caution must be taken before touching the headers and exhaust. The supplied bung system can either be welded in place or clamped onto the pipe. If installed correctly, the clamp-on method works well and will not leak. If welded, make sure the bung is welded completely all the way around and does not leak. Thread an M18-1.5 bolt into the bung to prevent distortion. Be sure to allow bung to cool completely before removing bolt and installing oxygen sensor.

Note:

- The supplied O2 Sensors should be installed with one in each exhaust bank.
- The sensor should be between 10° to 90° above horizontal (see figure 16) to allow condensation to run off. If this is not adhered to, the sensor is susceptible to water damage and premature failure.
- The O2 Sensor cable connects to one of the cables coming off the main harness. See Figure 33.



To Install;

1. 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 valve port, to prevent reversion and false lean conditions.
2. Never position the sensor on the outside of a bend in the exhaust tubing as excessive heat pushed directly into sensor can cause premature failure.
3. Utilizing eye protection, drill a 7/8" diameter hole in the desired location.
4. The supplied bung system can either be welded in place or clamped onto the pipe. If installed correctly, 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. It is recommended to install a M18-1.5 bolt into the bung to prevent distortion during welding. **Do not weld with sensor in place.**
5. Once the bung has been allowed to cool completely, prepare to install the sensor.
6. Sensor threads come with anti-seize preinstalled. **Do not let the anti-seize come in contact with the head of the sensor.**
7. Start to thread the sensor into the bung by hand, and tighten to specifications (often 35 ft lbs), approximately three-quarters turn past finger-tight.
8. Plug sensor pigtail lead into appropriate main harness connector. Drivers side into drivers side main harness connector, passenger side into passenger side connector.

Note: Oxygen sensors will not work on "Zoomie" style headers unless balance tubes is used (connection between all pipes on bank)

WARNING: Do not start the engine without the sensor cable connected to the wire harness and the EFI system is fully operational or damage will occur to the sensor.

AIR LEAKS: It is important that no air leaks exist anywhere in the exhaust system, before or after the sensor, as this will cause false readings. This will lead to poor engine performance, including misfires, and the inability to properly auto-tune the EFI. Continued running of the system with an exhaust leak can create detonation and possible severe engine damage. Incorrect installation of the sensor, exhaust leaks, and any resulting damage is not covered by the FiTech manufacturer's warranty. It is very important to ensure your exhaust is leak-free. For optimum EFI operation and function, your exhaust between the engine and the sensor must be totally secure, free of any leaks.

General Wiring Practices:

The Retro LS Port Induction System highly depends on a clean and constant voltage source. Please ensure when grounding the system it is a clean ground, the ground is just as important as the power side for any electrical system. The Retro LS Port Induction System contains many processing devices. These devices require clean power and secure grounds. The wiring of these devices must be separated from “noisy” power and ground sources. This includes not clumping wires together.

Do's

- Do install the main power directly to the battery post terminals and connect the ground rings to the engine block, head, or battery. **DO NOT CONNECT GROUNDS TO THE VEHICLE BODY OR CHASSIS. DO NOT CONNECT THE MAIN POWER TO ANY OTHER SOURCE. ALTHOUGH NOT RECOMMENDED, IF CONNECTING TO MAIN STARTER BATTERY CABLE ENSURE BATTERY CABLE AND CONNECTIONS ARE OF HIGH QUALITY, CORRECTLY SIZED, CORRECTLY TERMINATED. THIS CONNECTION POINT MUST MAINTAIN NO LESS THAN 9.5 VOLTS DURING CRANKING. IF THE BATTERY IS IN THE TRUNK, THESE WIRES NEED TO BE EXTENDED TO REACH THE BATTERY, AS THE VOLTAGE DROP FROM THE BATTERY TO THE FRONT OF THE VEHICLE CAN STILL BE EXCESSIVE WHEN CRANKING.**
- Do ensure that when extending wires, properly upsize the wire (larger wire gauge) per length and load of the circuit.
- Do ensure proper grounding is performed as is imperative for reliable EFI operation and to avoid damage to the ECU & other components. Confirm proper ground connection from the battery to the chassis is installed, and the from battery ground to the engine block/heads.
- Do not let any EFI wires contact any plug wires because noise can be induced into the EFI system. Wires can act as “antennas” so ensure wires are properly loomed away from high noise wires such as spark plug wires.
- Do make sure to properly crimp or solder any wire connections. Apply quality heat shrink over any of these connections.
- Do Make sure battery is fully charged

DON'TS

- DO NOT run high voltage or “noisy/dirty” wires in parallel (bundle/loom together) with any EFI sensor wiring. If wires need to cross, try to do so at an right angle to reduce chances of critical wires picking up/inducing noise into them.
- DO NOT use the electric fan outputs to directly power a fan. They must only be used to trigger a relay ground.
- DO NOT use improper crimping tools.
- DO NOT use anything like “t-taps” etc. Use proper crimper/solder and heat shrink.
- DO NOT splice/share signal wires between different electronic control units (i.e “piggyback”).
- DO NOT connect the Red battery +12V wires (in sheathing) to “noisy” sources. It should ONLY be connected to the battery positive terminal.
- NEVER start an engine with a battery charger attached.

Warning! Any modifications of the supplied FiTech wiring harness can result in a possible void of warranty.



ATTENTION! VERY IMPORTANT!



DO NOT resort to any of these “wiring” methods!

- DO NOT SHORTEN OR LENGTHEN ECU HARNESS
- DO NOT Twist Wires Together
- DO NOT use Wire Nuts
- DO NOT use Mismatched Connectors
- DO NOT use T-Taps!
- DO NOT Jam Wires into a Fuse
- DO NOT use Broken Butt Connectors
- DO NOT use Bare Wires!
- DO NOT use Electrical Tape on Bare wires
- DO NOT get the cheapest crimpers available
- DO NOT USE ROMEX

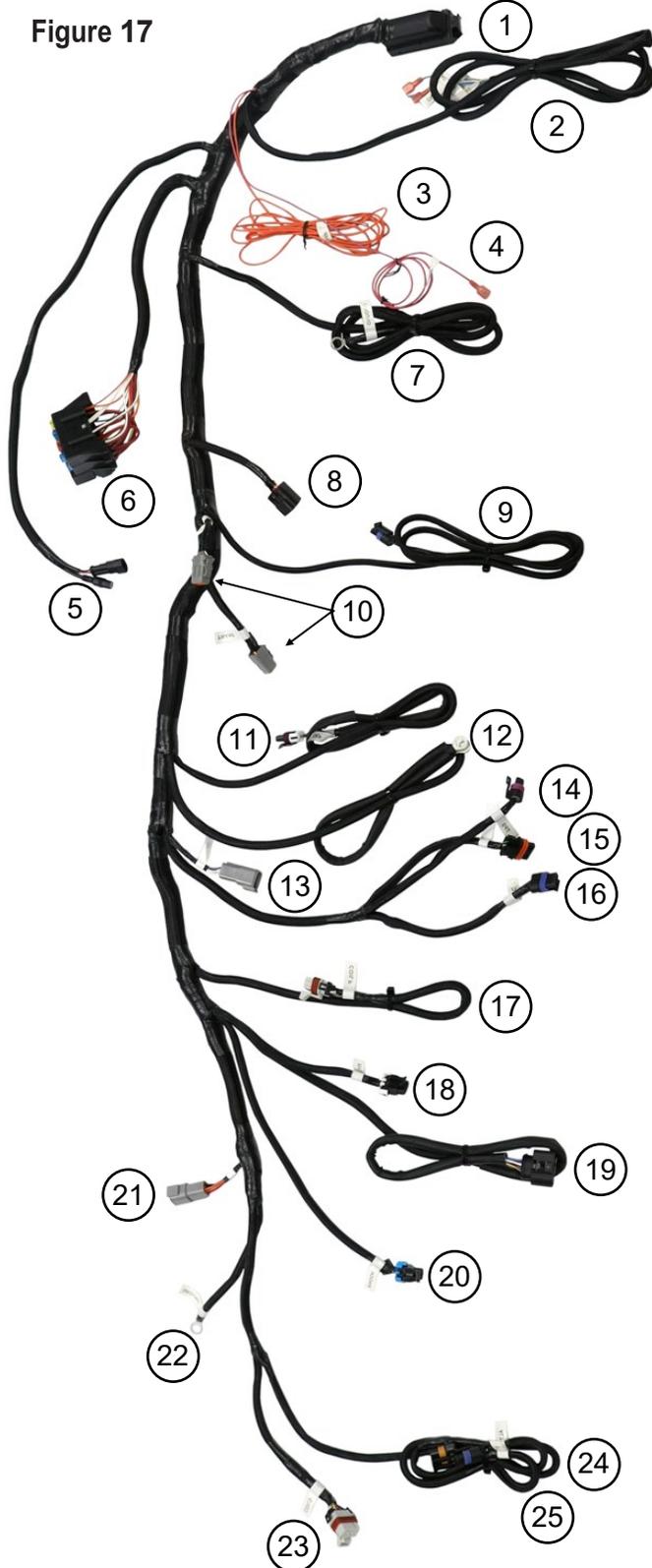
99% OF ISSUES WITH FITECH SYSTEMS ARE TYPICALLY FROM POOR QUALITY POWER AND GROUND SIGNALS.

NOTE: Improper wiring modifications will void warranty. If any extensions are necessary install terminals to the desired wire.

Main Wiring Harness Outline

The Retro LS Port system makes wiring the harness very simple. Every connection in the harness is labeled for where it goes. The only wires that may be cut or extended are the wires labeled in as #3 Accessory Wires Loom (Loose wires individually labeled). See the wire chart below 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. A quality crimped connection is best for all around connection. If a quality crimp is not able to be achieved, proper soldering with a quality heat shrink covering can be used. Any/All modifications to wiring should only be made on Item 3 "Accessory Wires," (the vehicle side wiring) such as extensions or cuts. Any modification of the ECU main harness will result in a VOIDED warranty.

Figure 17



| # | Connector/Label | Location | (Figure 18) |
|----|-------------------------------|--|-------------|
| 1 | ECU Main Connector | Plugs into main ECU | |
| 2 | Accessory Wires (Loose wires) | These wires go to Fan1 (Green), Fan2 (Blue), Tach Out (White), A/C Request/Kickup (Small Yellow), Speedometer (Black), Torque Converter Brake Switch (Big Yellow). These are the only wires that can be modified (cut, shorten or extended) | |
| 3 | Orange Wire | Fuel Pump circuit. Wire provides 12V to fuel pump. Connect to (+) terminal on pump. | |
| 4 | Red Wire (Key) | On/Off - Connect to switched 12V circuit. Must be on (hot) during "Key On" and "Cranking." | |
| 5 | Handheld Controller | Connect the two female connectors to the two male connectors on the Handheld harness. | |
| 6 | Fuse Box | Fuse Box with Relays. | |
| 7 | Grounds | One grounds the ignition and one grounds to the engine block. This typically installs to rear of drivers cylinder head. | |
| 8 | O2 Harness connector. | Passenger side second O2 sensor, Yellow 6-pin. Requires included extension/adaptor harness. | |
| 9 | VSS | Vehicle speed sensor connects to back of transmission output. | |
| 10 | Two Trans Connectors | Only used when using transmission control. | |
| 11 | CKP | Crank position sensor. Located between starter and engine block. | |
| 12 | POS (Red) | Main Power: Positive 12volts. Prefer as direct battery connection as possible for best results. Can connect to starter if high quality battery cable/connections are utilized. Needs to be live (hot) even with key power off. | |
| 13 | INJ P | Connects to Passenger side injector sub-harness. | |
| 14 | TPS | Connects to throttle position sensor mounted on the throttle body. | |
| 15 | TMAP | Connects to TMAP sensor (Inlet Air Temperature/Manifold Absolute Sensor) on side of throttle body | |
| 16 | IAC | Idle Air Control. Connects to IAC mounted on the throttle body | |
| 17 | Coil P | Connects to Passenger side coil pack sub-harness. Coils and coil pack sub harnesses not supplied. | |
| 18 | CAM | Use extension for LS2, LS3 where cam connects to front. LS1 connects in rear of engine. | |
| 19 | O2 Harness connector. | O2 Sensor connection for driver's side. Sensor will plug directly into connector | |
| 20 | Knock | Connects to sub-harness extension to reach to LS2, LS3 on side of block. LS1 is on back of block. | |
| 21 | INJ D | Connects to Drivers side injector sub-harness. | |
| 22 | Grounds | One grounds the ignition and one grounds to the engine block. This typically installs to rear of drivers cylinder head. | |
| 23 | Coil D | Connects to Drivers side coil pack sub-harness. Coils and coil pack sub harnesses not supplied. | |
| 24 | CTS | Connects to engine coolant temperature sensor on driver's side front of cylinder head. | |
| 25 | ALT | Connects directly to the alternator | |

Main Wiring Harness Connection Details

Accessory Wires: These wires are labeled and go to Fan1, Fan2, Tach Out, the A/C Request/Kickup, Speedometer, and the Brake Switch for the torque converter.

- **Fan1 (Green) and Fan2 (Blue)** These wires are used to control coolant fan operation. They apply ground when activated and must connect to fan relays that are used to control the operation of the fans. **DO NOT CONNECT DIRECTLY TO FAN(S) AS DAMAGE TO ECU WILL OCCUR.**
- **Tach Output (White)** This wire provides a 12 volt square-wave 50% duty cycle tach output driver for most tachometers. If needed for other tachometer types, this output is adjustable within the Handheld “**Tach and Speedo**” menu.
- **Speedometer (Black)** This wire provides a speed signal output for most electric speedometers. From the factory the unit is programmed to output 4000 pulses per mile. This setting is adjustable within the Handheld “**Tach and Speedo**” menu.
- **Torque Converter Brake Switch (Large Yellow)** This wire is optional and used for the trans controller to deactivate the torque converter lockup during braking. The Torque Converter Brake Switch wire is setup for a typical LS style brake switch in which supplies 12 volts when the brakes are off and goes “open” when the brakes are applied.
 - If using this input wire is to be used with a different type of brake pedal switch, a relay must be used to “flip” the 12 volts signal so that when the brake are not pressed it senses 12 volts, and no voltage is sensed when the brakes are pressed. See **Relay Operation** on how to achieve this.
 - You can disable the above feature, and need for wire connection, within the software. In this case the system will now lock/unlock the torque convertor based on user entry of load/mph/tps settings.
- **AC Request Kickup (Small Yellow)** When connected to the AC compressor wire, senses 12 volt and activates strategies within the ECU. This normally includes activation of fans, idle RPM changes via IAC and fuel injector control.

Main Power: (Large Red Wires on eyelet terminal) POS These eyelets connect to 12 volt battery positive. It is recommended to connect as direct to battery as possible. If going to starter battery lug, ensure battery cable and connections are of high quality, correctly sized and correctly terminated. This connection point must maintain no less than 9.5v in all situations (during cranking, in all driving conditions, and daily vehicle use). If the battery is in the trunk, these wires will need to be extended to reach the battery, as the voltage drop from the battery to the front of the vehicle can still be excessive when cranking. This circuit needs to be live (hot) even when the ignition key switch is off so that the self-learning files are saved. This is fused with a 25 amp fuse in the supplied fuse box. **DO NOT CONNECT TO ALTERNATOR OUTPUT.**

Ground: The wiring harness contains two ground wires (Ignition and ECU low current). They can be attached to existing threaded holes in the back end of either/both cylinder heads. One ground to the driver's side and one to the passenger's side. Scrape head clean of paint if needed. (Figure 18)

Key (Small Red Loose Wire): Ignition “Key” switch On/Off power. Wire must be hot in both “Run” (Key On) position AND “Start” (Cranking) position.

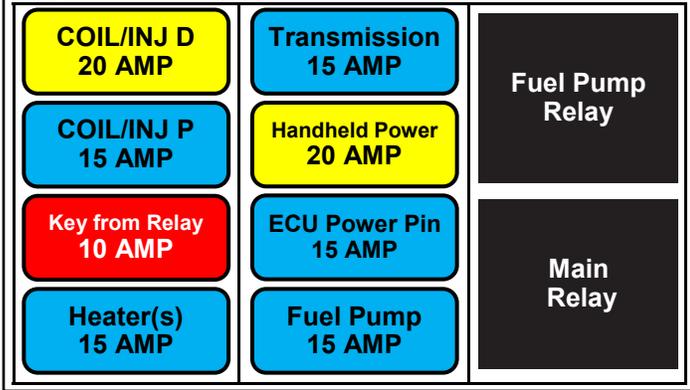
Fuel Pump (Orange Loose Wire): This wire provides 12 volt to the fuel pump and connects to the positive (+) terminal on the pump. No relay is required as one is included in the harness. 15amp current capacity. If the fuel pump being used requires more current, it is recommended to use this use this wire to trigger a larger relay that would be required for a larger current drawing fuel pump.

Two Trans Connectors: These two connectors plug into the supplied sub-harness. The other end of the harness is connected to the connection on your transmission. (See Figure 19)

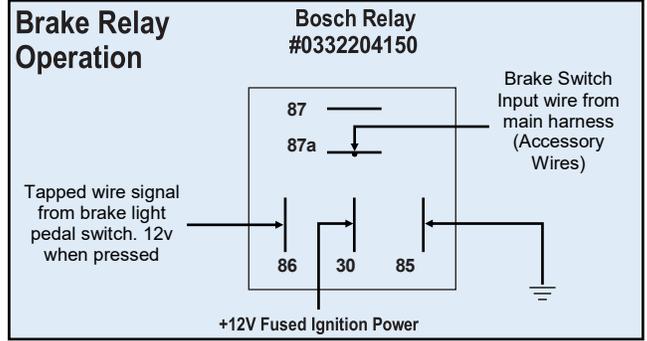
VSS: Adapter is offered by Casper Electronics for first-gen 4L60E (similar case to 700R4) that has a different VSS connector than the 2nd or 3rd gen transmissions.

More information on the connections in the harness are as listed on the following pages.

Figure 19



Fuse Box: Above is a graphic showing the location of the various fuses in the supplied Fuse Box which is item 6 in Figure 17.



Brake Switch Relay: For use on brake pedal circuit if switch supplies 12 volts when the brakes are activated. ECU requires 12 volts when brakes are not activated. Wire as shown to achieve this.

Fan Circuit Connection(s) Outline

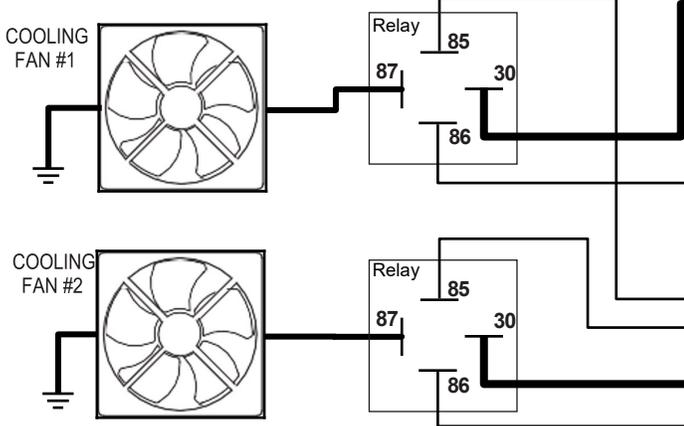
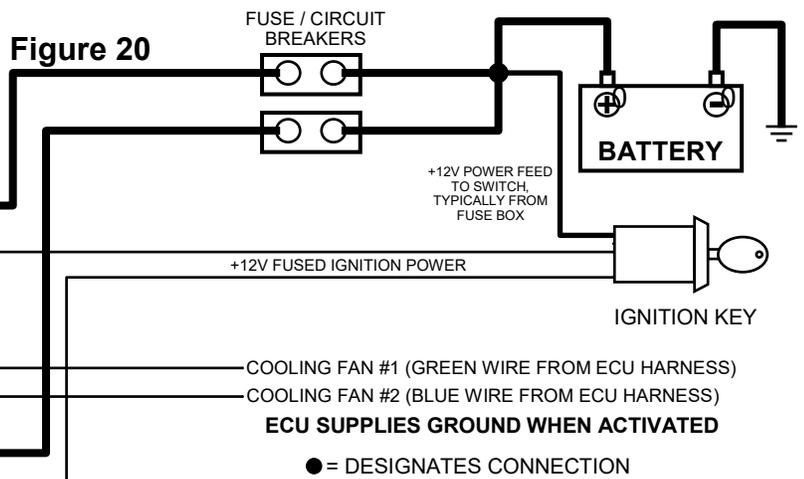
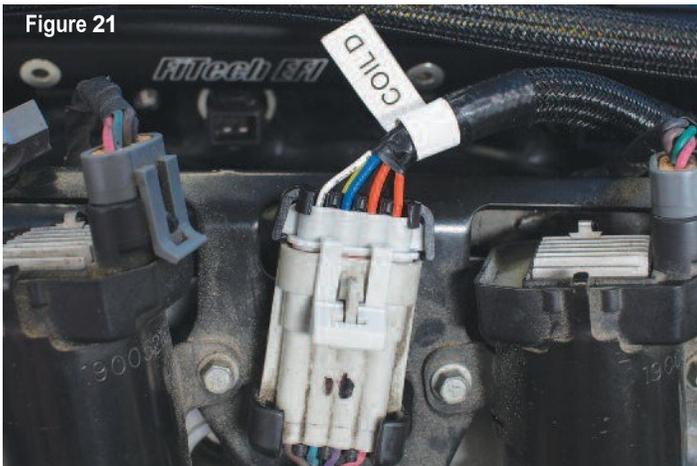


Figure 20



The Fan 1 (Green) and Fan 2 (Blue) wires are relay control wires – they should be connected to Pin 85 of the relay(s) that power(s) the fan(s). Pin 86 should be connected to a KEY Switched ignition source so that the fans turn off with the ignition key. Relay Pin 30 should be fuse or circuit breaker connected to the battery. Pin 87 should go to the cooling fans, and the other wire of the cooling fan should be grounded. Ensure the fan blows towards the engine. Each fan will require a relay.

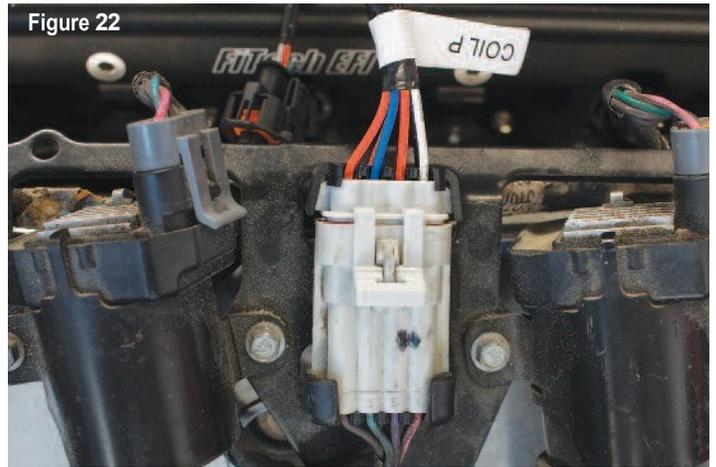
Figure 21



Coil D: The Coil D connector is connected to the existing connector on the driver's side coil pack.

Note: Coils and coil sub harnesses are not included in system.

Figure 22



Coil P: The Coil P connector is connected to the existing connector on the passenger's side coil pack.

Note: Coils and coil sub harnesses are not included in system.

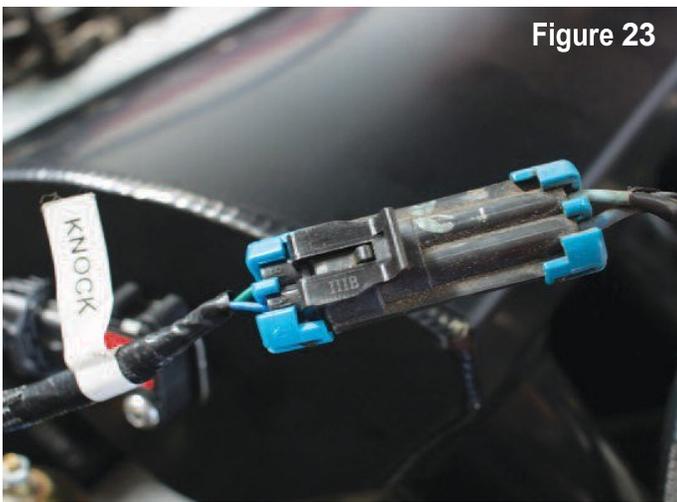


Figure 23

KNOCK: This sub-harness attaches to the Knock Sensor connector located on the side of the block on the LS2, LS3, and on the back of the block on the LS1, LS6.

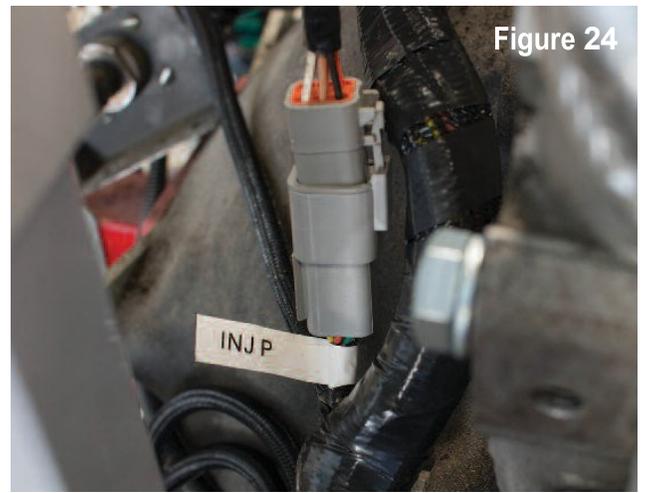


Figure 24

Injector P/Injector D: (Passenger side connector shown): Each of these connectors mate with the included injector sub-harness on the for each side of the intake manifold.

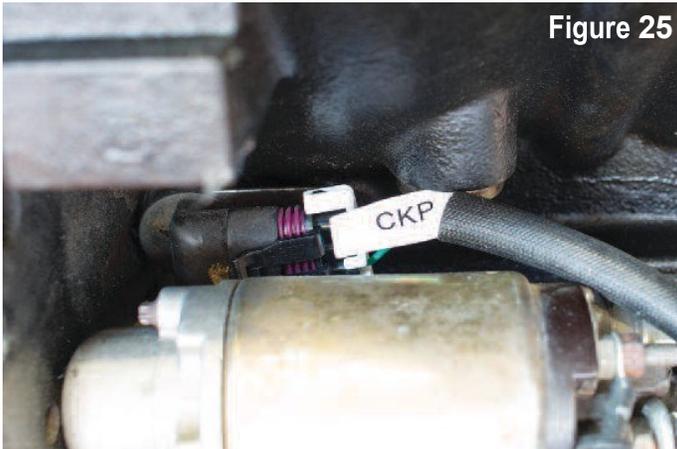


Figure 25

CKP Crank Position 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.

Note: The Retro LS Port System can function with either design.

Connect the mating crank position sensor connector in between the block and the starter to the crank position sensor.

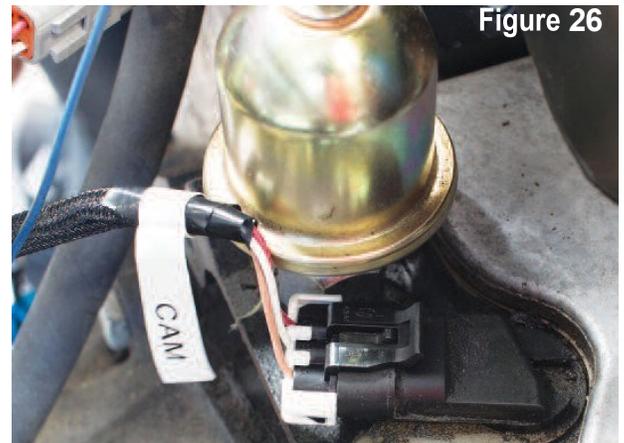


Figure 26

CAM Cam Position Sensor:

(LS1/LS6 shown) The cam position 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 Retro LS Port System can function with either design but does require the use of a factory sub-harness for front cam locations.

Connect to mating cam sync sensor connector from main harness to the cam sync sensor located at the rear of the engine for LS1 system applications.

For LS3 system applications, the factory sub-harness is required to orient the pinout correctly. This sub harness is GM part number 12627501. The sub-harness is not included in this system.

As an alternative, you can modify and re-pin the extension harness for direct connection. Contact the FiTech technical department for details.

Use supplied extension harness to connect to the cam sync sensor sub-harness as it located in the front timing cover.

For LS1 applications that may need extension harness for a few certain applications, it can be purchased using part# 70050-11.

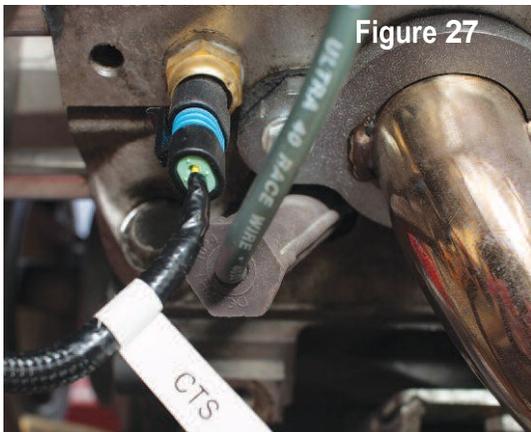


Figure 27

CTS: This wire connects to the coolant temperature sensor located in the front side of the driver's side cylinder head. **The CTS is not provided in system.**



Figure 28

O2 Sensor Harness: There are two connectors on the main harness for the dual oxygen sensors. The connections are different types. The connection for the drivers side sensor allows the oxygen sensor to plug directly in. The connection for the passengers side is a 6-pin connector (yellow insert in black housing). This connection requires the use of the extension/adapter harness (shown right) that is included in system. Reference Figure 16 on page 8 for sensor installation instructions.



Handheld Controller Cable: Connects the ECU to the Handheld. The 2-wire connection on the harness supplies constant battery 12 Volts and ground to the Handheld. The stereo jack connector has the K-Line CAN communication line. The USB-C connection of the Handheld harness can be inserted into either the bottom of the Handheld or Handheld dongle.



Figure 29

ALT: This wire directly connects to the alternator.



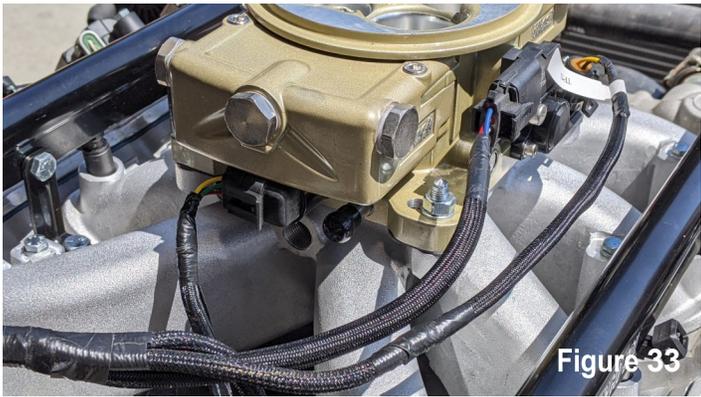
Transmission Connection: (4L60E, 4L65E, 4L80E or 4L85E GM transmissions) (sub-harness shown left, 4L60E shown right) Plug in both connectors on sub-harness into the two designated mating plugs on the main harness. Other end of sub harness connection must be inserted properly into transmission. Although the connection at the transmission can be "pushed" in improperly 180° out , the correct way is for the arrow on the connector to point outwards/away from the transmission on the 4L60E application or upwards on the 4L80E transmission application. Use a mirror if needed to confirm correct install orientation. Remember to select the proper transmission type in the Initial Setup on the Handheld.



Figure 30



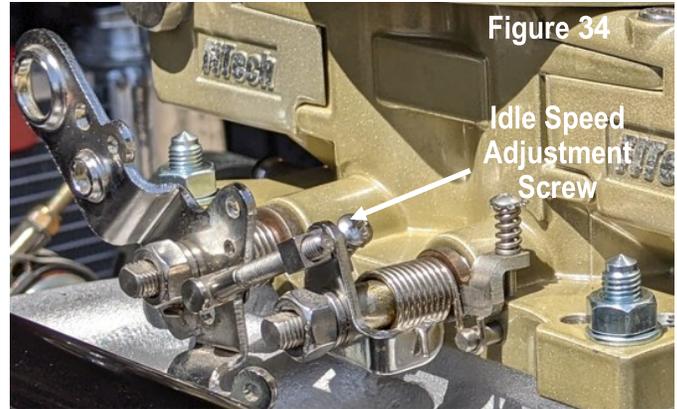
TMAP: Connects to the temperature/manifold absolute pressure (TMAP) sensor mounted on the side of throttle body. Sensor is pre-assembled onto throttle body from factory.



IAC: This harness connects to the idle air control motor that is mounted on the rear of the throttle body.



TPS: This connector connects onto the throttle position sensor mounted on the driver's side of the throttle body.



Idle Speed Adjustment Screw: Use only to adjust idle during IAC step settings. ECU must be put into correct settings mode before any adjustment is made on this screw or the ECU will continually adjust the IAC to maintain the previous idle speed setting. See Idle Screw Set TPS settings within hand held programming.

Finalizing Hardware Installation:

1. Attach the air inlet tube, all vacuum hoses, and electrical connectors on the new throttle body.
2. Reconnect the negative battery terminal.
3. Turn the key to "On" but do not crank, allow fuel system to pressurize and then check for any fuel leaks. Do this several times.
4. With engine off and with key in on position, perform the steps below outlined in the "Initial Programming" section.

Key Notes for during/after engine start up:

1. Check for loose connections or vacuum leaks, fuel leaks, etc.
2. Once engine is running and warmed up, set the idle speed. Double-check all fasteners, clamps, and electrical connections to ensure they are all secure.
3. After warmup, after cooling down, with engine off, re-torque intake manifold per specifications given on Page 5.

Handheld Controller Navigation

There are two ways to navigate the Handheld Controller; you can use the touchscreen with your finger or move via the directional pads up, down, left, right, OK buttons. The on-screen buttons and directional pad buttons are used to navigate through the display pages/settings on the controller by moving the button up and down or side to side, or pressing the OK button in the center of the directional pad to save changes.

1. When making changes to the ECU through the Handheld make sure that the ignition key is on.
2. Once the changes are made turn the key off, wait 15-20 seconds until the values disappear under the "dashboard" feature. Doing this will ensure that your changes have hard saved into ECU.
3. Once the hard save is completed, if desired, the Handheld and/or the battery can be disconnected without interference with the calibrations. For Handheld Controller definitions visit: www.fitechefi.com under "support-> instructions-> Handheld Controller Feature Definitions". These definitions are also available on the Handheld Controller when plugged in.

Initial Programming/Setup:

This simple procedure is performed using the Handheld Controller. A laptop computer is not required.

1. Plug the Handheld controller into the harness connector #5 shown on page 10.
2. Without starting the engine, turn ignition key to the **ON** position. **Do not start engine yet.**
3. Using the directional pad found on the right side of the controller, scroll down (down arrow) to 09 **"Write Cal to ECU"** and press the **OK** button.
4. In this list, there are files listed starting with **"Backup"**. These files are for use later for backing up user tuned calibrations. Disregard and scroll down past these and locate the listings starting with **"default"**. Located and select the file that best fits the application, crank tooth count/transmission option being used and press the OK button to send that base file to the ECU. If utilizing a manual trans, select either trans options that contains the correct crank tooth count for your application. For reference, the base file installed from factory is preconfigured for a 24x crank signal baseline if no calibration is uploaded.
5. Wait for it to finish loading as noted on the screen, then turn key **OFF**, Screen will remain lit while changes are saved. Wait at least 15 seconds and then turn key back **ON**.
6. The proper base calibration has been loaded and we are now ready setup the remaining settings.
7. Scroll, locate and enter into **"FiTech Initial Setup"** menu by pressing the **OK** Button.
8. Scroll, locate and enter into **"Engine Setup"**. Using the up/down arrow directional pad buttons to change between settings, input your Engine's CID (Cubic Inch Displacement), Cam profile type (Mild-Wild 1-4, see below note for details), desired Rev Limit RPM, and desired Idle RPM when warm using the left/right arrow directional pad buttons to change the values of each selection. Make sure to press the **OK** button after every selection to save the parameter.
9. Back out of the **"Engine Setup"** and scroll, locate and enter **"Auto Transmission"**
10. Enter your rear tire diameter and rear gear ratio. Make sure to press the **OK** button after every selection to save the parameter.
11. Skip 03 **"Force Upshift RPM"**, unless you have a automatic transmission. This will be set later if needed.
12. If you are running a manual transmission, you will leave option number 04 **"4LX0e Trans"** as **"Off"**. **Note:** Off indicates that there is no transmission being controlled by the ECU. If you **ARE** running an electronically controlled automatic transmission such as a 4L60 or 4L80, ensure option number 04 **"4LX0e Trans"** is set to **"4LX0e"** to enable electronic control settings. You will also need to select which automatic transmission such as a 4L60 or 4L80, by going to option 05: **"4L6xe 4L8xe"** and select your exact transmission. Make sure to press the **OK** button after every selection to save the parameter.
13. If an automatic trans is selected, go to option 03 **"Force Upshift RPM"**, and now set to a appropriately desired value. This is the maximum RPM reached before a **"Forced"** shift is commanded regardless of other transmission settings.
14. Initial Programming is complete. The Handheld Controller can now be removed or left connected. When connected, there is a dashboard and gauges screen that will show engine parameters in real time.

After initial setting considerations:

Cam Selection

Cam selection is based on vacuum load of the engine. Cam-1 is for 15Hg or above, Cam-2 is for 10Hg to 15hg, Cam-3 is 8Hg to 10Hg, and Cam-4 is 8Hg to 6Hg. These are estimates, and you may need to switch between them if the vacuum load is between two different cam settings, to get the engine to run better for your application.

Timing Control

The Retro LS Port System has a preset timing curve based on the 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 vacuum reading. Use caution. Too much timing (total advance) can cause engine damage.

Rev Limiter

The Retro LS Port 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 Retro LS Port 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. This also applies to the rev offset for warm-up rpm limiting as well as a user adjustable high temperature rev limiter.

Transmission Control

The preconfigured transmission settings should be enough to get the vehicle up and running without major issues. These settings are tuned to cover 80% of the applications during normal use. The system has enough adjustability to custom tailor the performance to suit the most applications as well as allow plenty of tuneability to cover the remaining 20% applications. For any further technical assistance with your transmission control, go online to www.fitechefi.com under "tech center", or email us at techmail@fitechefi.com or call (951)-340-2624.

Preparing to start the engine



Read below process completely first to understand before starting the engine



At this point you should have already confirmed no fuel leaks are occurring but should you have not confirmed, turn the key to "On" but do not crank, allow fuel system to pressurize and check for any fuel leaks around any of the fittings. This includes fittings are fuel filters and fuel regulators. Do this several times to ensure any leaks do not exist. It is also a good time to confirm you have the proper fuel pressures of 58 psi supplying the injectors.

During the next few steps, you will initially attempt to start the engine and observe for any major issues. While running, be observant and handle immediately any safety concerns that require attention. You may notice some new sounds. The first is ticking from the injectors and it is normal. You may also hear air "whooshing" or "whistling" at idle. Barring any major vacuum leak, this is likely the bypassed air from the Idle Air Control (IAC valve) and this is normal. The IAC valve maintains the desired idle speed as well as modifies the idle speed in cases such as when the AC compressor and/or electric fans turn on by varying a valve to control bypassed air around the throttle blades.

If nothing major distracts or takes attention away from allowing the engine to continuing running, next concern will be continuing running of the engine while reviewing coolant temperature readings via the handheld controller looking for temperatures of above 180°F. The Fan1 temperature for activation is factory set to come on at 192°F with Fan2 temperature set at 196°F. You will want to confirm fan activation or observe for extremely high temperatures (excess of 200°F) as this would be caused by improper connection of the ECU to the fans. Shut the engine off if temperatures exceed 220°F and review and fix any fan and/or coolant temperature connections.

Keep in mind proper setting of the idle rpm speed will be set after the engine is warmed up to normal operating temperature, so don't be too concern with a slightly high/increased idle rpm speed at this point. If the initial idle is extremely too high, confirm the throttle cable is adjusted to allow the lever arm to rest on the blade idle screw and the cable is not holding the blade open. If the idle is too low, and/or does not allow the engine to stay running, you can adjust the idle speed screw on the throttle body to increase slightly. A slightly higher idle is preferred initially to allow the engine to warm up, bring to a running temperature. If idle is excessive and/or not in a any desirable range, turn the key to the off position for 30 seconds. This allows the ECU to learn the IAC's new position. Restart engine and re-evaluate idle. The goal here is to get the engine warmed up to operating temperature for final adjustment to be performed.

With the previous information in mind, start the engine bring up to operating temperature.

Starting and Running Idle Speed Adjustment

With the engine now in a warmed up state, the idle screw on the throttle body will need to be adjusted properly. This needs to be set so that the IAC is nearly closed, in the recommended target area of 3-10 IAC Steps for a fully warm engine, out of gear, at idle. For reference, 0 steps indicates valve is fully closed, 255 indicates the valve is fully open.

In normal operation, when the engine is at idle, the IAC will move to adjust and learn the necessary position to maintain the RPM at the Target Idle RPM. When loads are placed on the engine or when the throttle is open, the IAC steps will move around to try and maintain the Target Idle RPM, this is normal.

Typically it is best to adjust this screw from a more open position to start with. This will allow the engine to start at a high idle, which will make adjusting the IAC easier.

Use the following procedure:

1. Prepare your Handheld controller by locating it to a location that is easily accessible and viewable as you will be working between the Handheld controller and the idle speed screw on the throttle body. You will want viewing access to the Handheld controller **while** adjusting the idle speed screw.
2. Start the engine and using your Handheld controller scroll, locate and enter into "**FiTech Initial Setup**"
3. Scroll, locate and enter into "**Idle Setup**"
4. Scroll, and locate "**Idle screw set TPS**" and using the right arrow button, switch to "**AllZero**" and press the OK button after to save the parameter.
5. Navigate back to the initial main page, located and enter into "**Dashboard**"
6. Scroll down, and locate "**IAC Steps**". This number will move around slightly and indicate the current Idle Air Controller position in terms of steps. 0 steps indicates valve is fully closed, 255 indicates the valve is fully open. The desired position/ number needs to be within the range of 3-10 at normal operating temperature. To adjust this, turn the idle speed screw in or out. If started out at a high idle, the number will typically be zero. If the number reads zero then slowly turn the screw OUT (counter clock-wise) until the IAC Steps starts to read between 3-10. If the number reads higher than 10, slowly turn the screw IN (clock-wise) until the IAC Steps starts to read between 3-10.

7. Once the throttle screw is in the correct position where as the IAC Steps read between 3-10 at the desired idle RPM, shut the engine off by (key position to off).
8. By turning the key off, the Handheld controller defaults the **“Idle screw set TPS”** setting back to normal.
9. Your idle should be set correctly at this point. Confirm idle remains steady at the desired idle speed/RPM in and out of gear. The ECU will use the IAC to control the engine idle RPM to the meet the desired idle RPM the user set during the initial setup.
10. Should the user desire to change idle speed in the future, you can do so through the handheld and the ECU will adjust the IAC to raise the idle to meet the new desired RPM. IF this new idle RPM is to become a long standing setting, the above procedure should be repeated

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 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 34) clockwise. This will increase idle RPM.

As with any engine, especially with EFI controlled ones, any vacuum leaks will cause problems. In the case of EFI controlled, with minor leaks, this typically causes a increased idle RPM

For technical assistance with your Retro LS Port System contact us (951)-340-2624, email us at techmail@fitechefi.com or go online to www.fitechefi.com under “support”.



3-Year Limited Warranty on FiTech EFI Systems

FiTech extends the following limited warranty to the original purchaser of a FiTech EFI system purchased after November 1, 2022. FiTech warrants its products against defects in materials and workmanship, under normal use and service for 3 years from the date of original purchase. This applies only to the original purchaser and the parts must remain installed on the original vehicle for which they were purchased. This warranty is void if the product was improperly installed, was installed on a vehicle for which it was not designed, if it was modified in any manner, or was removed from the original vehicle and reinstalled on another vehicle. Coolant temperature sensors and oxygen sensors are not covered under this warranty.

This warranty shall not apply to any product installed improperly, or contrary to FiTech's instructions, altered, misused, repaired or damaged from an accident, collision, or willful or negligent act. To make a claim under the terms of this Warranty, the original purchaser must contact FiTech tech support. If FiTech tech support deems the product in need of warranty service, proof of original purchase will be required. Purchaser must **call FiTech Technical Support (951-340-2624) option 2 or email: Techmail@fitechefi.com**, to obtain a Returned Material Authorization (RMA). Proof of purchase must clearly show the place of purchase, purchase price, product purchased, and date of purchase. Purchaser needs to register their product here: <https://fitechefi.com/warranty-registration> or using the mail-in registration form found in the product box.

FiTech's 3-Year Limited Warranty does not cover factory refurbished parts, this warranty is only valid for new purchases from an authorized dealer.

FiTech's liability is expressly limited to replacing or repairing the defective part or parts (refunds are not covered under FiTech's 3-year Limited Warranty). FiTech will have no liability for the cost of installation or removal of the defective product or for the cost of labor or any additional parts required to complete the installation of the replacement product. FiTech is not responsible for any shipping charges accrued during the warranty process/claim.

In no event will FiTech be liable for any indirect, special, incidental, or consequential losses or damages (including but not limited to

interruption of business or loss of business or profit) resulting from the use or inability to use the product, any breach of warranty, or any defect in the product, even if FiTech shall have been advised of the possibility of such potential damages or losses. Some states do not allow the exclusion or limitations of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

If the product is in the FiTech facility for repair, the amount of time the product is in repair will be added to the existing warranty period.

In the event that your EFI System that is under warranty is in for repair and FiTech has authorized a replacement, and if that EFI System has been discontinued, FiTech will replace it with a similar product for the same application. The replacement EFI System will maintain the existing warranty period of the original EFI System.

What is not covered under FiTech's 3-Year Limited Warranty:

- Offboard Sensors (oxygen sensors, and temperature sensors, are subjected to a 1-year limited warranty).
- Fuel pumps (Fuel pumps are subjected to a 1-year limited warranty. The customer must send photos of filters used in application. If the filter is completely clogged or contaminated, the fuel pump will not be covered under any FiTech warranty).
- Fire Damage.
- Cracked footings or flanges on the base of EFI units due to over-tightening or improper installation.
- Removal or replacement costs.
- Shipping costs.
- Damage to related components.
- Costs incurred due to downtime of a vehicle.
- Vehicle transport or storage costs.
- Any product used in marine applications unless specifically stated for marine usage.
- Any product purchased from an unauthorized third party (for example: Amazon, eBay, Craigslist, etc.)



WARNING: This product can expose you to chemicals including Chromium, Lead, Lead Compounds, Nickel (Metallic), Nickel Compounds, Diisonyl and Di(2-ethylhexyl) Phthalates (DEHP)(DINP) which are known to the State of California to cause cancer or birth defects or other reproductive harm. For more information, visit www.P65warnings.ca.gov.

INSTALLATION INSTRUCTIONS Retro LS Port Systems PN #37002,#37003,#37005,#37006 RevA0723

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