



# ULTRA RAM

## Installation Guide



ULTRA RAM 600HP System 38301 Small Block Chevy  
3/18/19

Congratulations on your purchase of the new ULTRA RAM 600HP System. Every FiTech system is meticulously tested for functionality before it leaves our Riverside, California facility.

If you experience any technical difficulties or need assistance, please feel free to contact our technical support department at (951) 340-2624 Monday-Friday 7:00am-12:00pm and 1:00pm-5:00pm PST and Saturday at 8:00am-12:00pm PST or email us at [techmail@fitechefi.com](mailto:techmail@fitechefi.com).



WARNING: Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

## FiTech Fuel Injection ULTRA RAM System Installation Guide

### WARNING!

**This installation guide must be read and fully understood before beginning installation.**

If the installation guide is not fully understood, do not attempt to start this installation. Failure to follow this installation guide can possibly result in system failure and potentially serious personal injury and/or property damage. Please keep this installation guide. For the safety and protection of you, your vehicle, and others, only a trained and FiTech approved mechanic with adequate fuel system experience should perform the installation, adjustment, and repair.

**Caution must be observed when installing any product. 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, a list can be found on <https://fitechefi.com/support/distributors/>. Lastly, ensure the engine has had sufficient time to cool! Engine may still be hot. Disregarding any of this information can result in serious property damage, injury, and/or death.**

If this installation guide is not followed, any component damaged will not be covered by FiTech's warranty. Should any one component fail, it will not constitute or justify a warranty of the entire FiTech EFI system. Replacement and accessory items are available for purchase from FiTech EFI. If assistance is required or if you need further warranty clarification, please call FiTech EFI (951) 340-2624 or email [warranty@fitechefi.com](mailto:warranty@fitechefi.com).

## Table of Contents for Installation Guide:

Introduction.....	1
Warning.....	2
Table of Contents.....	3
Introduction and System Requirements.....	4
Emission Equipment.....	4
Engine Requirements.....	4
Tools Required.....	4
Manifold Dimensions.....	4
Before You Get Started.....	4
Suggested Pumps and Accessories.....	5
Fuel System Requirements.....	5
Special Notes.....	6
Features.....	6
Engine Protection Feature.....	7
Kit Contents.....	7
Parts Identification.....	7-9
Preparing The Manifold.....	10
Removing the intake.....	10
Installing the Manifold.....	11
Installing the Distributor.....	12
Vacuum Ports.....	13
Installing the Fuel Rails.....	13
Installing the Throttle Body.....	14
Coolant Temperature Sensor Installation.....	14
Oxygen Sensor Installation.....	15-16
Air Leaks.....	16
Fuel System Connection.....	17
Fan Circuit Diagram.....	17
Fuel System Diagrams.....	18
General Wiring .....	19
Wiring Descriptions.....	20-21
Wiring Figures.....	22-23
Timing Control.....	24-25
Wiring Diagrams.....	25
Wiring Diagram for Ready-To-Run Distributor.....	26
Wiring Diagram for HEI Distributor.....	27
Wiring Diagram for External CDI Box.....	28
Wiring Diagram for External CDI Box w/ Timing Control.....	29
Wiring Diagram for External CDI Box and Crank Trigger Wheel w/ Timing Control.....	30
Final Steps.....	31
Initial Programming.....	31
Handheld Controller.....	32
Fan 1 Setup.....	32
Starting your Engine.....	33
On Engine Adjustments.....	33
Resetting your Stock Calibration.....	33
Reset Learn.....	33
IAC Setup.....	34
Data Logging.....	34
Save your Current Tune.....	34
Cranking Fuel Adjustments.....	34
Decel Fuel Cut Off.....	34
Accel Pump.....	35
Rev Limiter.....	35
Choosing a Cam.....	35
Idle Return.....	35
Warranty.....	36

## Introduction and System Requirements

This installation guide is designed to get you up and running with your ULTRA RAM. This System is the industry's most advanced EFI system and also the easiest to install. It includes a very advanced handheld controller but it is also capable of being far more tunable than any competitors product that utilizes a handheld controller. **Please read the full installation guide before beginning your installation.** For technical assistance with your ULTRA RAM, call (951) 340-2624, go online to [www.fitechefi.com](http://www.fitechefi.com) under "tech center", or email us at [techmail@fitechefi.com](mailto:techmail@fitechefi.com).

## Emissions Equipment:

Not legal for use on pollution controlled vehicles. FiTech's ULTRA RAM System is not CARB approved for use on emission controlled vehicles. This system is designed to retrofit into older vehicles that do not require emission controls.

## Unleaded Fuel use Only:

DO NOT use leaded fuel as it will degrade the O<sub>2</sub> sensor and void your warranty.

## Engine Requirements

Before starting your installation, please confirm that your vehicle meets the conditions stated below:

- Engine is in sound mechanical condition
- Engine horsepower is minimum 200 and maximum 600, naturally aspirated
- Unleaded fuel only

## Tools required for Installation

- Standard and Metric wrench set
- Factory service manual for your vehicle
- #2 Phillips screwdriver
- Terminal crimping tool
- Digital Voltmeter
- Any RTV silicone sealants used on the engine are sensor safe

## Manifold Dimensions

- 21" long
- 10" wide
- 9.5" tall
- 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.

## Before you get started!

FiTech highly recommends that the following items are checked and/or corrected before beginning the installation. For optimal performance out of your FiTech ULTRA RAM System please verify the condition of the complete engine system. FiTech highly recommends checking and ensuring that the **engine and ignition system is mechanically sound.** If your engine has preexisting underlying issues, converting to EFI will NOT cure them.

## Suggested Pumps and Accessories

Part number	Image	Description
40004		Fuel Command Center 2: Submerged pump runs quieter and lasts longer than inline fuel pumps. Can be mounted anywhere in the vehicle.
40009		G-SURGE: This style of the G-SURGE is a single pump and returnless style from the throttle body. A submerged pump is quieter and longer lasting. It can be mounted anywhere in the vehicle and up to a 45° angle. For more styles please visit the website, email us, or call.
87201-87205		Stainless steel hose kit w/ full flow fittings: 20' and 40' hose length options. Also comes in black and steel finish with the option of a check valve filter or a billet filter.
44020-44120		FiTech Fuel Pressure regulators: a bypass style fuel pressure regulator.
80117		0-100 Oil Filled Pressure Gauge
86606		-6AN M to -6AN M Union with 1/8" NPT Gauge Port
46084		3.5" - 8 ORB 100 Micro Filter
46064		40 micron check valve filter
80806		-8 ORB to - AN Male Fitting
40015		hy-fuel In-tank Retrofit Kit. There is also a regulated hy-fuel In-tank Retrofit Kit option available, P/N 40019

### Fuel System Requirements

The FiTech ULTRA RAM System requires a fuel pump operating at 58 psi. Ensure the pump and hose are EFI rated when selecting the fuel delivery system. FiTech EFI offers a plethora of fuel delivery systems including fuel pumps, hoses and accessories. For optimal performance, FiTech strongly recommends an in-tank pump, because the pump will run quieter, cooler, and have less chance of cavitation. If an inline pump is the only option due to not being able to install a pump in the tank then it must be as close as and below the tank as possible. Fuel pressure needs to be at 58 psi from the inlet side of the FiTech ULTRA RAM System once the fuel system is installed.

## Special Notes

- 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.
- Ensure the engine has had sufficient time to cool before starting your installation!
- An assistant is necessary for some installation and adjustment procedures and should be present for safety reasons.
- Cranking and hard throttle hits will not learn, but they can be tuned under Go-EFI Tuning in the handheld controller.
- Only the steady state fuel “learns”.
- Selecting the right “cam” and engine CID (cubic inch) will get the learning closer.
- Do not use solid core ignition wires, racing coils or 7 and 8 series boxes!
- Only use unleaded fuel to ensure a longer lasting oxygen sensor. Leaded fuel will lead to improper exhaust gas oxygen readings, potentially damage the sensor, and could possibly void your warranty.
- The ULTRA RAM is intended for use with unleaded pump gas up to 15% ethanol content.
- If using a Frame Mount Inline Fuel Pump, it should be mounted below the bottom level of the fuel tank and as close to the tank as possible, no more than two feet away from the tank. This type of pump is designed to push fuel, not draw, and works best when gravity fed.
- Make sure that you remove ALL low pressure flex joints on factory fuel lines and replace them with EFI rates fuel hose, and use proper flared connections and clamps.
- Fuel return line must be minimum 3/8” or -6.
- Only use EFI rated **psi fuel hose or hard fuel lines, NO ALUMINUM LINES!**
- FiTech does not recommend aluminum fuel lines EVER! Use the supplied EFI high pressure fuel hose supplied in your Fuel Delivery Kit or purchase our stainless steel braided hose kit, such as the 87201.
- The Accel Pump will often need tuning depending on your engine combination.
- Your system will be running at 58 psi so consult a FiTech approved professional if you are not certain about this portion of your installation.
- Leaving the handheld plugged in while the vehicle is off will drain the battery because the handheld will enter a sleep mode but does not turn off.
- The throttle body may cause a clearance issue with your thermostat housing. If a shorter thermostat housing is required, use part number 10108470 or a similar product.
- **VERY IMPORTANT NOTE: Your fuel tank must have a vent to prevent pressure building up inside the tank.**
- **An external regulator must be used; such as the Tightfit regulator P/N 44120.**

## Features

FiTech's ULTRA RAM System is designed for street and performance engine applications with a 200-600 rpm power band. The ULTRA RAM System is designed to support 600HP to the flywheel and contains a 3 BAR TMAP sensor. It has a high flow cable operated 92mm and 39lb/hr flow-matched injectors. The 92mm throttle body has a parabolic inlet machining for smooth throttle transitions same as OE. The kit comes with a self learning ECU, a programmable color touch screen handheld controller with a data logging feature for easy setup and configuration. The ULTRA RAM System has a fuel and spark control. The system also comes with stainless oxygen sensor bung, target AFR and timing control if desired, and one fan control output. Wiring the system is made easy with a custom wiring harness.

## Engine Protection Feature

The FiTech ULTRA RAM is programmed with a limp home mode. Our features differ from competition 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 feature 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 handheld 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 code errors. A new feature programmed into your handheld 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 off the feature once your engine reaches operating temperature.

### Kit Contents

- |                                |                                    |
|--------------------------------|------------------------------------|
| (1) ULTRA RAM Manifold         | (1) O <sub>2</sub> Sensor Bung Kit |
| (1) ULTRA RAM Main Harness     | (1) Handheld Controller            |
| (1) ULTRA RAM Rail Kit         | (1) Handheld Control Cable         |
| (1) 3 BAR TMAP Sensor          | (1) Mini USB Cable                 |
| (1) Coolant Temperature Sensor | (1) Windshield Mount               |
| (1) CTS Adapter                | (1) O <sub>2</sub> Sensor          |
| (8) -5 39lb Injectors          | (1) Throttle Cable Bracket         |
| (1) 92mm Cast Throttle Body    | (1) Roll of Teflon Tape            |
| (1) External ECU               | (1) Water Bypass Tube Fitting      |

### Parts Identification

Service P/N	Image	Description	Quantity	Note
38301-1		ULTRA RAM Harness	1	<ul style="list-style-type: none"> <li>• Plug and play harness</li> <li>• Concise for minimal wiring and a clean finish</li> </ul>
38301-2		ULTRA RAM Manifold	1	<ul style="list-style-type: none"> <li>• SBC Manifold</li> </ul>
38301-3		ULTRA RAM Fuel Rail Kit	1	<ul style="list-style-type: none"> <li>• Fuel rails</li> <li>• Fittings</li> <li>• Hold down bolts</li> <li>• O-rings</li> </ul>

Service P/N	Image	Description	Quantity	Note
70001-8		92 mm Throttle Body	1	<ul style="list-style-type: none"> <li>• 92mm Throttle Body</li> <li>• TPS and IAC Pre-installed</li> <li>• Vacuum port is located at the bottom</li> </ul>
60017		Bosh Wide Band O <sub>2</sub> Sensor	1	<ul style="list-style-type: none"> <li>• Use of leaded fuel will degrade sensor. Prolonged use will require periodic replacement</li> <li>• Mounting procedure on page 16 is critical for system performance</li> </ul>
60012-1		Bung Kit	1	<ul style="list-style-type: none"> <li>• Requires a 3/4" Hole to be drilled</li> <li>• Mounting procedure on page 16 is critical for system performance</li> <li>• In order to help prevent condensation in exhaust from damaging the sensor, ensure that the sensor is installed with at least 10° of vertical angle</li> </ul>
60014		Handheld Control Cable	1	<ul style="list-style-type: none"> <li>• Cable connects handheld to system</li> </ul>
60015		Mini USB Cable	1	<ul style="list-style-type: none"> <li>• Cable connects the Handheld to a computer if additional tuning is desired</li> </ul>
60016		Windshield Mount	1	<ul style="list-style-type: none"> <li>• Used to mount the handheld on the dashboard or windshield so the system can be monitored while driving.</li> </ul>
70063		Throttle Cable Bracket	1	<ul style="list-style-type: none"> <li>• Throttle Cable Bracket</li> </ul>
38301-6		Fitting for Water Bypass Tube	2	<ul style="list-style-type: none"> <li>• Used to adapt the Water bypass tubing to the Throttle Body</li> </ul>
38301-7		Teflon Tape	1	<ul style="list-style-type: none"> <li>• Teflon Tape used for CTS and Fitting for the water bypass tube</li> </ul>

Service P/N	Image	Description	Quantity	Note
38301-4		3 BAR TMAP Sensor	1	<ul style="list-style-type: none"> <li>3 BAR TMAP sensor</li> <li>Attaches to the back of the manifold</li> </ul>
60013-38301		Handheld Controller	1	<ul style="list-style-type: none"> <li>Highly advanced, joy stick and touch screen controller</li> <li>Do not leave connected when the car is off or it will drain the vehicles battery</li> </ul>
60021		Coolant Temperature Sensor	1	<ul style="list-style-type: none"> <li>3/8" NPT threads</li> <li>Must be installed in a coolant passage in either the intake manifold or cylinder head. Do not install in thermostat housing!</li> </ul>
60018		CTS Adapter	1	<ul style="list-style-type: none"> <li>Used to reduce a 3/8" NPT thread to a 1/2" NPT thread.</li> </ul>
10036		-5 39lb injectors	8	<ul style="list-style-type: none"> <li>A set of 8 injectors come with every kit.</li> <li>Rated depending on horsepower of the system</li> </ul>
30020-1		External ECU	1	<ul style="list-style-type: none"> <li>Self learning advanced ECU.</li> <li>Externally mounted</li> <li>Mount with the connector facing down so condensation does not build up</li> </ul>
70050-13		IAC Motor	1	<ul style="list-style-type: none"> <li>Pre-installed on throttle body. Can be installed on any Throttle Body as long as the empty hole is plugged.</li> </ul>
60022		TPS	1	<ul style="list-style-type: none"> <li>Pre-installed on throttle body</li> </ul>

**Warning:** Before starting any installation, disconnect the ground connection on the battery. Be very careful when disconnecting any fuel lines to let the fuel drain into a receptacle or a dry cloth. Do not allow raw fuel to collect in the engine as this is a fire hazard. Please observe extreme caution when working with the fuel system.

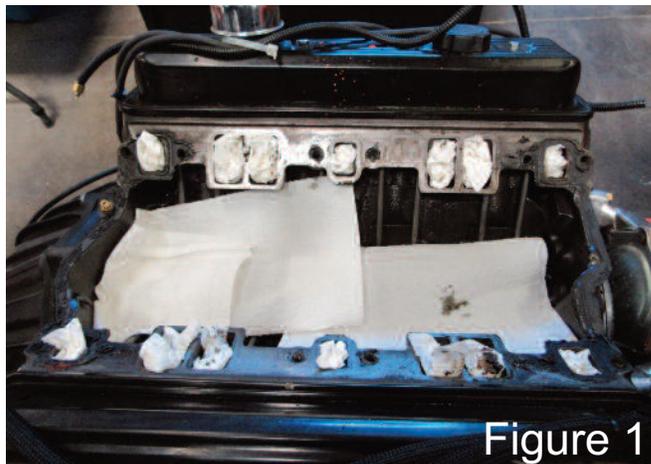
### Preparing the Manifold for installation

1. Before starting the install disconnect the negative terminal
2. Before attempting to remove the manifold make sure the engine has had sufficient time to cool down.
3. Then, disconnect the battery ground wire and tag the vacuum and crankcase ventilation hoses leading to the air cleaner and remove the assembly.
4. Before draining the radiator, ensure the engine is cool! The coolant may still be hot. Drain the radiator fluid by opening the port at the bottom corner of the radiator. If a port does not exist, then carefully drain the fluid by removing the lower radiator hose.
5. Disconnect the existing throttle linkage set up.
6. Now remove the gas cap to relieve any built up pressure.
7. Disconnect the fuel line from the throttle body and plug the fuel line to prevent spillage and remove the existing carburetor/throttle body. Block the carburetor flange with tape to ensure nothing falls through the intake into the lifter galley.
8. Now tag and disconnect the ignition coil and sensors. Remove all water hose fittings and all of the vacuum fittings.

### Removing the Intake

**NOTE:** Removal of the valve covers may be required on some applications. If valve covers are removed, replace the valve cover gaskets as needed.

1. Remove all of the bolts holding the intake to the cylinder head. Depending on the type of sealant used when installing the intake, it might be hard to remove. If this is the case, in the back two corners, jimmy a flat head screwdriver cautiously under the intake and try to lift it.
2. Once removed block all port holes with paper towels. We recommend paper towels verses a shop rag because if for any reason a bit of the paper towel falls through into the engine, it will not be hard for the motor to pass, where if a piece of a shop rag falls into the engine it can jam something and cause further complications. Using a paper towel will also ensure that no lint or anything from the shop rag is then being passed along through the motor.



3. Then, lay extra paper towels across the lifters to catch any falling gasket debris through the cleaning process.
4. Once the ports are blocked clean all of the mating surfaces first with a gasket scraper than a razor blade to ensure that the mating surfaces go back to clean metal.
5. Now clean the leftover residue by spraying brake cleaner onto a clean shop rag and wipe down any mating surfaces. Any alcohol based or lacquer thinner will work, the main objective is to remove any existing oil to ensure a proper gasket seal.
6. Now remove the paper towels and use a shop vac to pick up any leftover debris. Also ensure to clean the threads on the bolts before reinstalling.

## Install the Intake Manifold

1. 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, vacuum plumbing, throttle linkage, wiring, etc to ensure there are not any fit issues before performing the final intake manifold installation. Ensure there are no clearance issues with the water pump, valley pan, and alternator. If a clearance issue occurs an extension, new valley pan, or shaving the water pump may be required.
2. Now install the provided gasket.
3. Next, set your FiTech ULTRA RAM intake onto the gaskets on the engine and ensure it seats properly. If the intake fits properly in between the heads check the sealant distance. This is to ensure that when applying the silicone the proper amount is applied. If too little silicone is applied there will be a oil leak, if too much silicon is applied there is a possibility it could get into the engine oil pump.  
**NOTE:** Ensure to check the clearance between the intake and the head. If you are using vortec heads you may need to grind down a part of the side wall to ensure in intake seeds properly. Also adapters might be needed for the center 4 bolts
4. First apply silicone to the water ports under the gasket to make sure the gasket can be held into place, on both passenger and driver side, then install the gaskets.



Figure 2

5. Next, lay the intake onto the block and gauge how much silicon will be needed. Apply the proper amount of silicon, proper according to best judgment, to the corners of the valley.
6. Be sure that the corners of the valley have the most coverage and the silicone is applied all the way, overlapping the gasket. The corner is where the leaks are most likely to occur. Make sure to be using sensor compatible RTV!

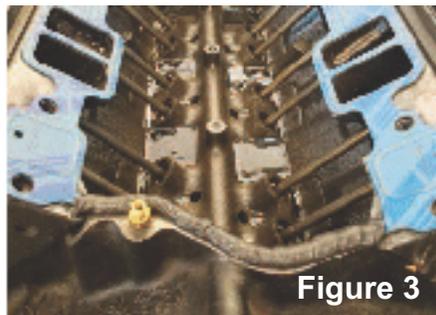


Figure 3

Cover the bridge between the gaskets with silicon to ensure there are no oil leaks.

7. Set the intake on the heads, aligning all of the holes and ports. Verify that the silicone squishes evenly with no gaps. We recommend not wiping excess silicone that protrudes off the edge.
8. Then, apply a small amount of RTV silicone to the bottom threads of all of the bolts that are not going into blind holes. This will ensure that excess oil does not run the threads.



Figure 4

9. Apply the bolts according to illustrations and engine spec. This is to ensure the intake will lay evenly on the heads when the bolts are being torqued. Run down and torque the bolts in illustrations figure 5.

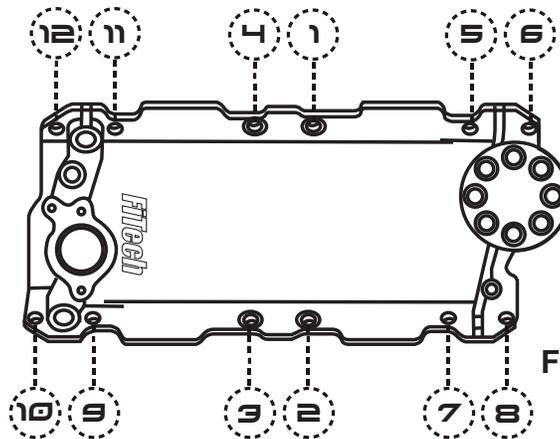


Figure 5

10. Install the TMAP sensor into the back of the manifold.



Figure 6



Figure 7

11. Re-install oil pressure sender and tighten water block off plugs to engine manufacturer's recommendation.
12. Apply teflon tape onto the provided EFI CTS adapter and install into the intake and tighten as required.
13. Install the EFI CTS into the adapter, and tighten as required with a  $\frac{3}{4}$ " wrench. Connect the Yellow/Black wire lead from the throttle body to the sensor. Snap the connector into the sensor. Now remove the engine temperature gauge adapter from the previous intake and clean the threads.

### Installing the Distributor

Follow the manufacturer's recommended procedures for the following steps:

1. Drop in the distributor making sure that the rotor aligns with marks made during disassembly. If you are installing a new distributor, you will have to make sure it is properly timed.
2. Then, align the distributor housing with marks made on block during disassembly. Ensure the distributor seats properly against manifold and that the distributor shaft is fully engaged in the oil pump.

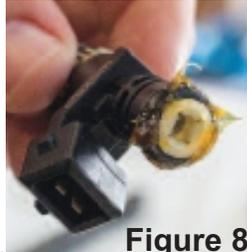
3. Bolt the distributor hold down clamp to the manifold.
4. Replace the distributor cap.
5. Replace the spark plug wires and check that they are in the correct firing order.

### Vacuum Ports

Before installing the throttle body determine the engine's need for vacuum ports including ported and manifold. These ports cover accessories such as power brakes. The vacuum port is on the bottom of the throttle body. If you need more vacuum connections than this, you can purchase vacuum tees and vacuum hose at your local auto parts store.

### Install Fuel Rails

1. Lubricate the fuel injector top and bottom o-rings. Do not use synthetic, animal or vegetable oils. Use of an o-ring specific lubricant is recommended. Use motor oil if you do not have a good o-ring lubricant. Be careful not to damage the o-rings.



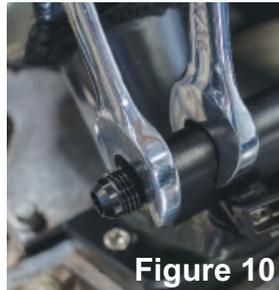
**Figure 8**

2. Carefully install the injectors into the rails and then install the injectors and both rails into the manifold.



**Figure 9**

3. Install the rails onto the intake and tighten until secure. Make sure that the four end fittings in the fuel rails are threaded into an adequate depth.



**Figure 10**

4. Plug in injectors in the order of the illustration (driver side 1357 passenger side 2468) **WARNING!** Damage of the o-ring can cause fuel leakage. A fuel leak may result in a fire or an explosions hazard, which could cause serious injury or death.
5. Position the rail assembly over the intake manifold with the injectors aligning with their mounting pockets on the intake.
6. 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.
7. Apply blue thread locker on the provided screws and install.
8. Attach the fuel crossover hose.

### Installing the Throttle Body

1. Attach the throttle linkage kit to the manifold
2. Using the included bolts, attach the throttle body too the intake manifold. Torque nuts and bolts down to 89in/lb (7ft/lbs).
3. Install the throttle linkage cable
4. 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
5. Install the water bypass fittings with Teflon tape. Then reconnect the water bypass tube.

## Coolant Temperature Sensor Installation

The Coolant Temperature Sensor should be threaded into one of the ports in the intake manifold. The sensor threads are 3/8-NPT. The manifold has 1/2-NPT part so, use the supplied pipe reducer. Connect the Yellow/Black wire lead from the throttle body to the sensor. Snap the connector into the sensor. Use Teflon tape or a quality pipe sealant on both the pipe reducer (if used) and on the temperature sensor. Do not over tighten or damage to the intake manifold may occur. It is best to drain some of the coolant before the sensor is installed. Do not install the sensor in the thermostat housing, or in an area that will not see a constant flow of coolant.



## Oxygen Sensor Installation

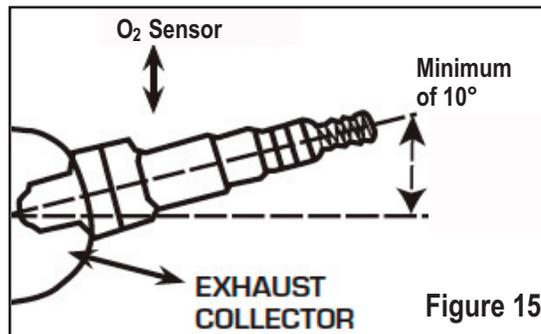
Your vehicle may already have an O<sub>2</sub> sensor bung welded into the exhaust. This bung location needs to be verified before using it with the oxygen sensor included in the ULTRA RAM kit. Ideally the bung will be 2-4 inches after the collector or in the collector for a true reading of all cylinders. You must have a minimum of 18" length of exhaust pipe past the sensor location. The bung also must be on the top side of the tube so moisture cannot collect on the oxygen sensor.

The O<sub>2</sub> Sensor must be at least 18-inches from the exhaust tip and port. It will not work on "zoomie" style headers. The supplied O<sub>2</sub> Sensor can be installed in either exhaust bank. The sensor cable connects to the O<sub>2</sub> cable on the harness. Before starting this installation please verify that the harness will reach the sensor or an extension harness (Part number 70050-7) can be purchased by calling FiTech EFI at (951) 340-2624.

- A. The ideal location for the sensor is 2-4 inches after the exhaust collector or inside the collector. Locate a position for the oxygen sensor as close to the engine as possible. The oxygen sensor should be mounted at a point where it can read a good average of all the cylinders on one bank. This would be slightly after all the cylinders merge. You must have at least 18" of exhaust pipe after the sensor.
- B. The clamp-on kit installation requires a 3/4" hole to be drilled in the exhaust system.

**NOTE:** Verify that the O<sub>2</sub> cable is supported correctly and away from heat sources such as the exhaust. If the O<sub>2</sub> cable has melted it is not fixed under warranty and will require the harness to be replaced at the customer's cost.

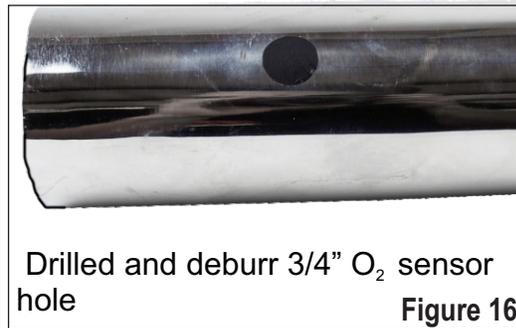
- C. The sensor should be at least 10° above horizontal (see figure 15) to allow condensation to run off. If this is not adhered to, the sensor is susceptible to water damage and will lead to a premature life of the sensor. Improper installation will void warranty.



- D. Never position the sensor on the outside of a bend in the tubing.

E. Mark the center of the casting on the exhaust tube and drill a 3/4" diameter hole in the desired location.

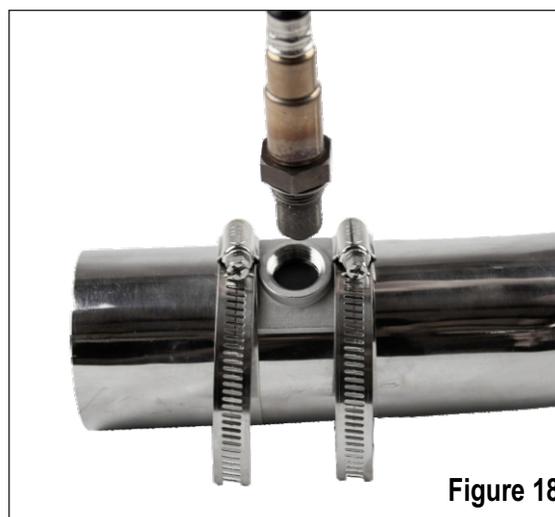
F. Deburr the hole after drilling.



G. The supplied bung kit can either be welded in place or clamped onto the pipe, see figure 17. 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. Place the gasket on the tube, then the casting on the tube. Slip a clamp on one side and lightly tighten. Slip the second clamp on and lightly tighten on the opposing side. It might be necessary to use a small amount of anti-seize on the threads of the T bolt clamps to prevent thread damage.



H. Install the sensor into the bung, see figure 18. Apply a small amount of anti-seize on the threads of the O<sub>2</sub> sensor. Be very careful not to get any anti-seize on the tip of the sensor itself because it will cause it to prematurely fail.



**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.

**NOTE:** Never run the engine without the oxygen sensor installed if it is not plugged in and powered by the ECU, or it will be damaged. If you need to plug the hole temporarily, use an O<sub>2</sub> sensor plug or a spark plug with an 18mm thread.

## Air Leaks

It is important that no air leaks exist anywhere in the exhaust system between the sensor and the engine. Any exhaust leaks will cause the unit to receive 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 FiTech's warranty. Make sure your exhaust is leak free. **THIS IS VERY IMPORTANT.**

## Fuel System Connections

Connect fuel feed and return hose. It is mandatory that a bypass regulator and a regulated fuel delivery system is used as seen in figure 20-22. There is no return fitting so the three inlet fittings, see figure 8 and 9, will have to be connected to a bypass regulator if using an external regulator, such as a Tight Fit Fuel Pressure Regulator, part number 44120 as seen in figure 20, or to a regulated fuel delivery system like the FiTech Regulated G-SURGE (40009) as seen in figure 22 or the Command Center 2 (40004) in figure 21.

**NOTE:** Fuel pressure should be checked on the inlet fuel line before initial start up during the fuel pump prime. We recommend using a 0-100 psi oil filled gauge, part number 80117, and a -6AN Gauge Adapter, part number 86606, to check fuel pressure.

### DANGER!

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.

## Fan Circuit Connection

The fan wire is a ground side trigger and must go to a relay to trigger the fans on. This replaces the thermal switch from a fan controller. The trigger circuit (86) connects to the 12 v "key" (peach wire). The "grey" wire from the EFI system connects to the relay (85). The red wire covered in sheathing labeled Battery from the FiTech harness goes from the (30) relay to the positive terminal of the battery. Lastly, the (87) on the relay goes to the fan. It is crucial that the battery and the fan are grounded. See figure 19.

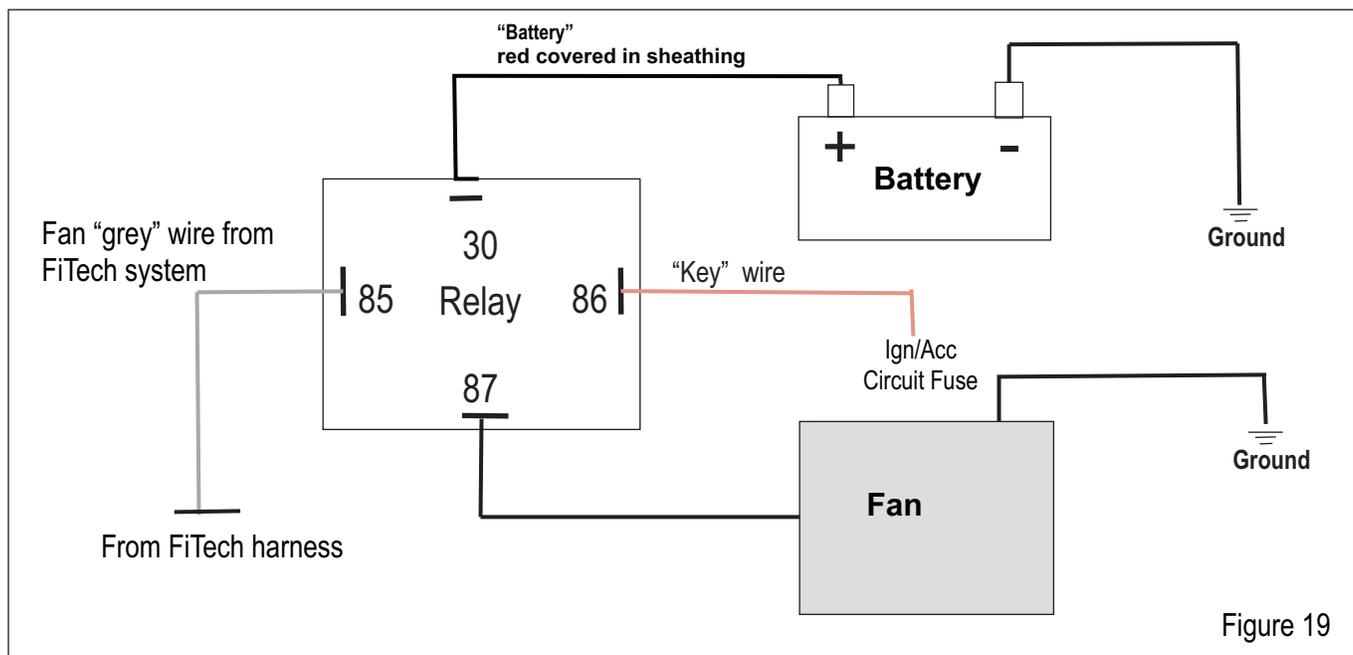
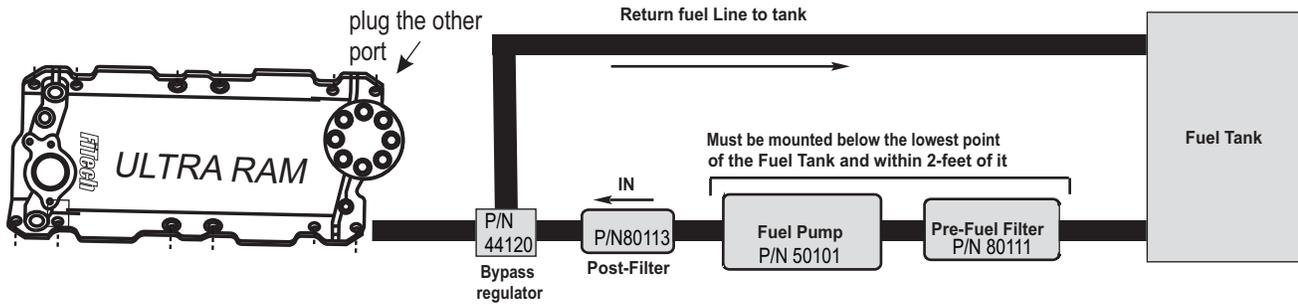


Figure 19

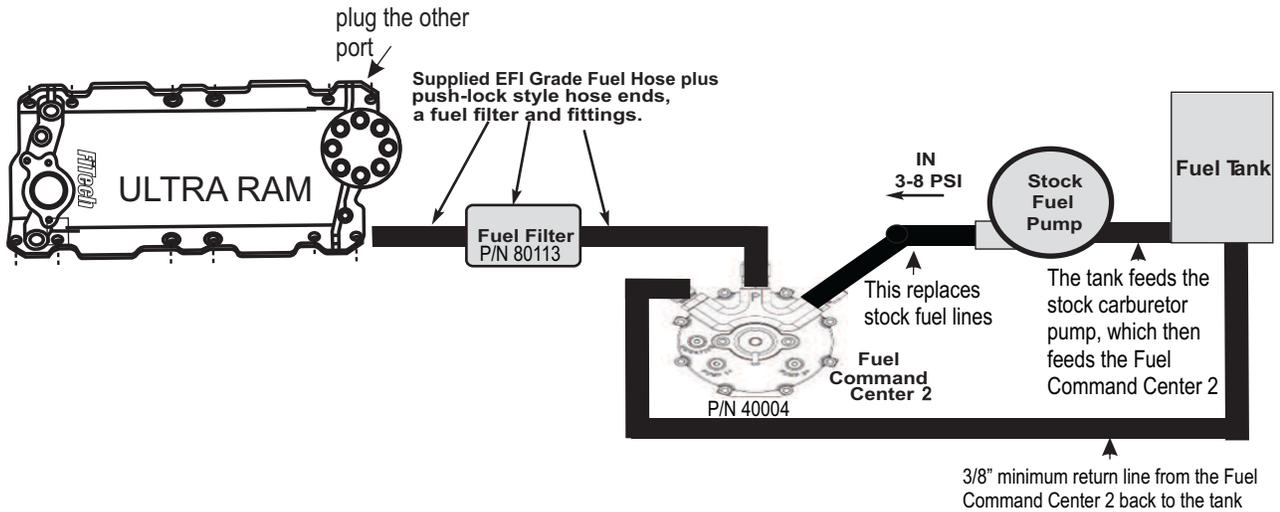
**Plumbing Schematic for External Inline Pump - Fuel Delivery Kit #50001**  
 See separate Instruction Sheets that were provided with this pump kit for complete details

**Figure 20**



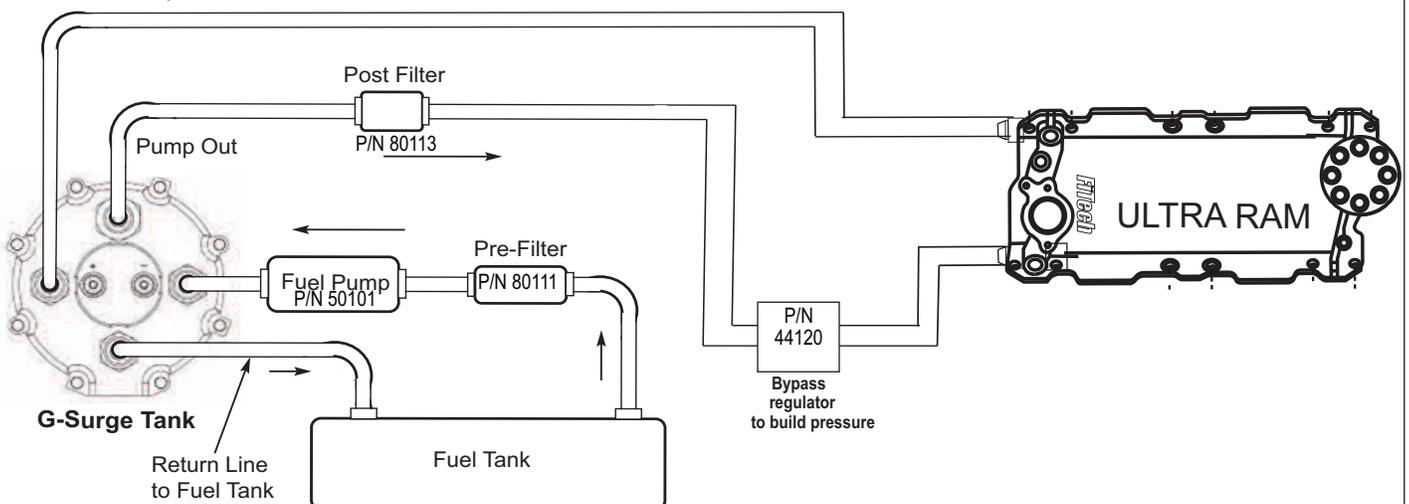
**Plumbing Schematic for Fuel Command Center 2 - Fuel Delivery Kit #40004**  
 See separate Instruction Sheets that were provided with this pump kit

**Figure 21**



**G-SURGE #40007 Tank Plumbing Schematic**

**Figure 22**



## General Wiring Reference

### VERY IMPORTANT!

The ULTRA RAM 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 ULTRA RAM 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; especially the brown tach in wire from the FiTech unit because it will result in noise interruptions and noise interference. This wire must not be loomed with the main harness or any other wires because false RPM noise and other interference will occur.

#### Do's

- Install the main power directly to the battery post terminals and connect the ground ring to the engine block, head, or battery. **DO NOT CONNECT TO THE VEHICLE BODY OR CHASSIS. DO NOT CONNECT THE MAIN POWER TO ANY OTHER SOURCE.**
- Keep brown tach in wire and crank signal (distributor) wiring away from high voltage or “noisy/dirty” components and wiring, especially secondary ignition wiring (plug wires), ignition boxes, fans and other associated wiring. Do not let any EFI wires contact any plug wires because noise will be created.
- Properly crimp or crimp and solder any wire connections. Apply quality heat shrink over any of these connections.
- A proper ground connection from the battery to the chassis, and the battery to the engine is crucial
- Make sure battery is fully charged

#### DON'TS

- **NEVER** 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 angle. This is crucial especially for the tach wire (brown wire off the FiTech harness)
- **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.
- It is **never** recommended to splice/share signal wires between different electronic control units (i.e “piggyback”).
- **DO NOT** connect the Red in sheathing battery switched +12V wire to “noisy” sources. It can **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**

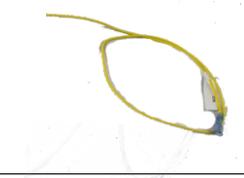
#### **ONLY THESE APPLICATIONS ARE ACCEPTABLE**

- OEM Automotive Quality Connectors and wires
- Soldered Connection w/ adhesive heat shrink

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

## Wiring Chart

The chart below lists all of the wires in the FiTech ULTRA RAM. The wires are color coded and labeled.

Required/Optional	Wire Color	Label Name	Image	Description
Required	Red	Fuel Pump		This wire provides 12V to the fuel pump and connects to the positive (+) terminal on the pump. No relay is required when using a FiTech pump.
Required when using timing control	Yellow	Coil		This wire is the trigger wire. It is where the tach signal comes from. Only used for timing control with an CDI. It is connected to the negative side of the coil or tach output in an CDI distributor.
Optional	Blue	Accessory		Air Conditioning.
Required when using TACH signal for RPM	Brown	Tach in		This tach input wire triggers the system. This is how the system receives RPM signal from the ignition system. Isolation of this wire is crucial. DO NOT loom with harness or any other wires. When using a CDI Box it connects to the tach output circuit on the ignition box. You never want to hook anything to the coil when using CDI ignitions.
Optional	Grey	Fan		This wire sends the ground signal to a relay to activate the fan. See figure 19.
Required	Peach	Key		This goes to the ignition switch. It is what will tell the system if it is on or off. It needs a clean 12V while cranking and key one. But, no voltage with key off.
Required	Red covered in sheathing	Battery +		This wire needs a clean power source. Connect it directly to positive side of battery. Do not connect to alternator, starter or any other source of positive power!
Required when using timing control	Blue and Yellow in sheathing	Crank		This is used only for timing control and plugs into the distributor 2-wire connector
Required	Black wire in sheathing	Not labeled (Battery -)		This wire needs a clean ground source. It must be grounded on negative side of battery, block, or heads. Do not ground to any other source on vehicle.

Required/Optional	Wire Color	Label Name	Image	Description
Required	Covered in black sheathing	CTS		This connects to the CTS on the manifold or the block. Crucial for optimal performance from the Fitech EFI System. Please ensure it has a secure connection.
Required	Covered in black sheathing	O <sub>2</sub>		Large 6 wire connector. Connects the O <sub>2</sub> sensor. Crucial for optimal performance from the FiTech EFI System. Please ensure it has a secure connection.
Required	Covered in black sheathing	ECU		Attach ECU to harness by applying gentle pressure. Once the ECU is secure you will hear a click. To remove the ECU ensure to push the tab then pull ECU off gently. Crucial for optimal performance from the Fitech EFI System. Please ensure it has a secure connection.
Required	Covered in black sheathing	Handheld		The handheld connector connects to the handheld. One cable is to supply power and one is a data cable. Ensure handheld is securely connected. The handheld can be removed once initial programming has had a hard save. If the handheld is removed ensure the cable is secure and not near any heat source. If there is heat damage to the wire it will void your warranty.
Required	Covered in black sheathing	Injector Harness		This cable connects the three throttle bodies together. Crucial for optimal performance from the ULTRA RAM. Please ensure it has a secure connection.
Required	Covered in black sheathing	TMAP		Connect to the TMAP sensor. Ensure it is fully connected and clipped in. Crucial for optimal performance from the ULTRA RAM. Please ensure it has a secure connection.
Required	Covered in black sheathing	IAC		Connects to the IAC. Crucial for optimal performance from the ULTRA RAM. Please ensure it has a secure connection.
Required	Covered in black sheathing	TPS		Connects to the TPS. Crucial for optimal performance from the Fitech EFI System. Please ensure it has a secure connection.

**POS (red) Main Power:** positive 12 v goes to the 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.

**Peach 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.

**Red Wire Fuel Pump Circuit:** This wire provides 12V to the fuel pump and connects to the positive (+) terminal on the pump. The relay is in the harness

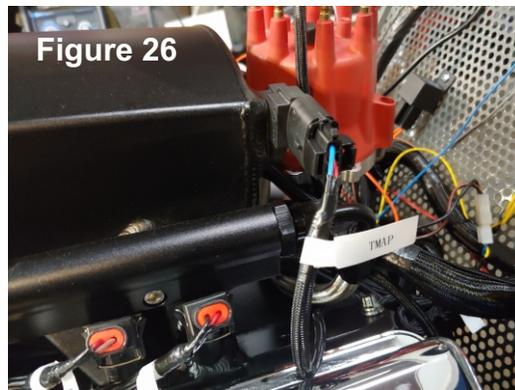
**Grounds:** 2 one grounds out ignition and one grounds ECU low current



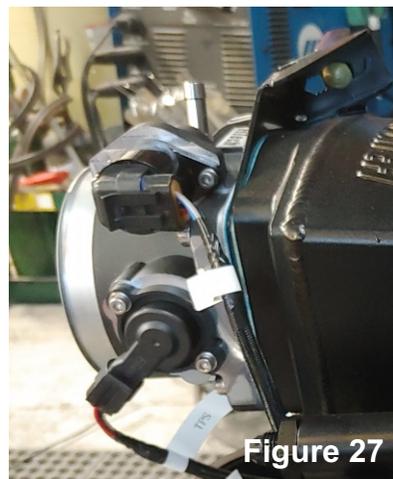
**O<sub>2</sub> Harness: welded style bung**



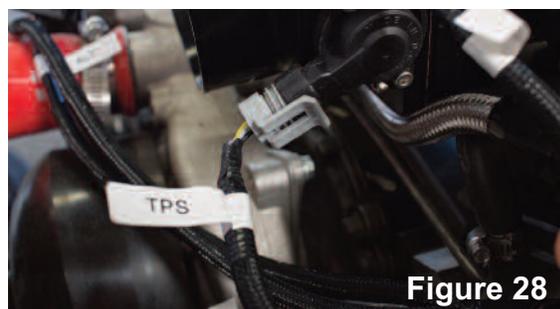
**TMAP:** Connects to the back of the manifold; Install with the bolt



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



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



## Timing Control with CDI Box

Timing control using a CDI box is a plug and play setup. Before beginning this installation ensure your CDI box is set up and running correctly according to your manufacturer's specification. All that needs to be done is plug the two pin connectors from the harness, labeled crank, into the distributor and then connect the yellow wire, labeled coil, to the points input wire from the CDI Box. The points input wire is usually a white wire but it can vary depending on the brand of your CDI box. To enable this feature in the handheld go to engine set up and enable VR input. Then go to ignition setup and select coil drive.

## Setting the Ignition Timing control with a CDI type box or a standalone two wire magnetic pickup

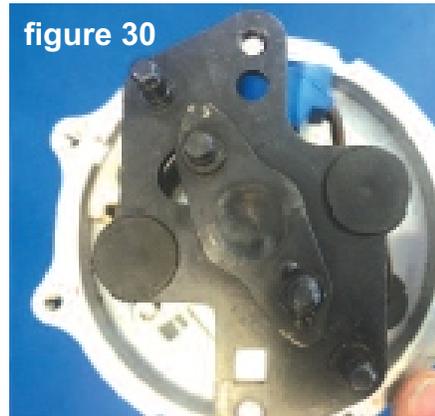
The Ignition timing control with an CDI type box, or standalone two wire magnetic pickup distributor is set up by the following steps:

- 1) Connect yellow "Coil" wire to the "Points" input wire on the CDI harness. The CDI output wires going to the coil need to be the only things going to the coil, and need to be kept very separated from all of the other wires.
- 2) Used LOCKED OUT distributor (some distributors can be locked out by their instructions –removing the drive gear and flipping the top side)
- 3) Connect the distributor 2-wire to the FiTech unit's 2-wire distributor input (blue and green wires with white connector)
- 4) Use handheld in ULTRA RAM Initial Setup with the key on, change "Tach or 2Wire+Coil" to "VRCoil"(VR means variable reluctor – i.e. magnetic pickup). Click the button / joystick to "Send to ECU" Turn the key off after doing this step, and wait 15 seconds for the system to save that into permanent memory – this is one of the few changes that needs to have the key turned off after performing in order for the software to initialize some things correctly.



Figure 29

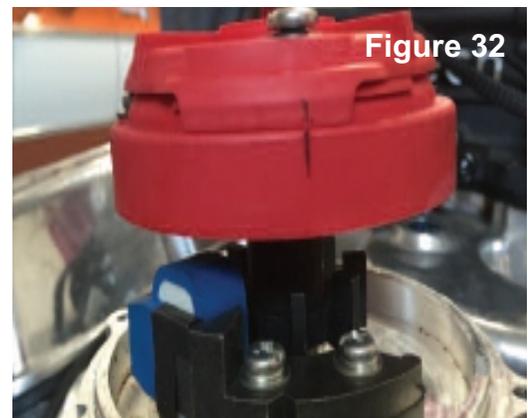
- 5)The “Distr Base Timing” is the spark timing that the engine will be cranking at, and also represents the minimum spark advance the system can allow. 10 degrees might be a good starting point.
- 6)With a phaseable rotor, advance it about  $\frac{3}{4}$  of the width of the brass tip. Use Loctite to keep the screw tight – it will back out if you don’t.



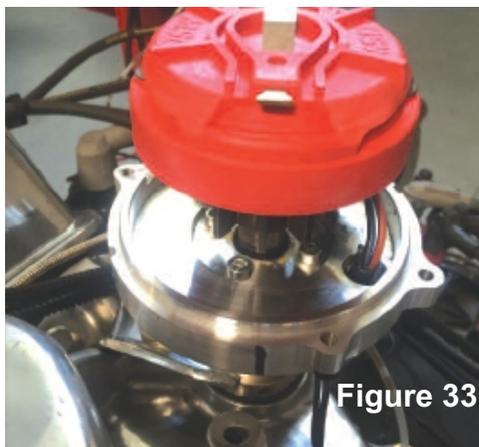
- 7) Put the engine at about 10 degrees BTDC, and move the distributor with the cap off to see that a tooth on the trigger lines up with the pickup sensor.



Timing Pointer at 10° before Top Dead Center



Aligning your rotor



Aligning your cap

- 8) Start the engine, with timing light connected, distributor clamp loose enough to adjust but not moving by itself.
- 9) With the handheld in view, to "Initial Setup" and then "Ignition Setup." Set "Lock Spark to Adjust" to LOCK. Hit send to ECU and the EFI will command 30 degrees. With the engine still running check timing at the balancer with a timing light. If the timing is not at 30 degrees turn the distributor until the engine is.
- 10) Key off on the vehicle. Tighten down the distributor clamp and now the engine is synced with the EFI. The system will automatically unlock.
- 11) Now you can use the handheld to put in other spark advance values in the "SPARK MAP" in Go-EFI Tuning.
- 12) If the engine needs more or less advance at cranking, you would need to change the "Distr Base Timing" and also repeat the above procedures for moving the distributor.
- 13) VR Advance 4000 is to compensate for some lag in the magnetic pickup. It's only useful if the spark advance matches at low RPM, but not high RPM. The default value is close enough in most cases.
- 14) Idle advance is the median spark advance at idle. There is a stability function in the software that automatically adds or subtracts timing JUST AT IDLE to try to keep the RPM stable at the Target Idle RPM.
- 15) WOT means full throttle (wide open). 45kPa is a very light cruise load.

**MOST IMPORTANTLY** – Ignition timing has NO LEARNING. It will do what you tell it to do, and if the engine knocks, the computer DOES NOT KNOW – you need to reduce the timing with the handheld

SPARK MAP to make it go away. Most Engines are OK with 3000 45kPa Cruise spark advance in the high 30's to low 40's, and WOT timing at 1100 being around 10-15 (but listen for knock at these low RPMs and adjust accordingly), and WOT at 3000 to be around 28-32 degrees, and WOT 6000 at 30-36 degrees.

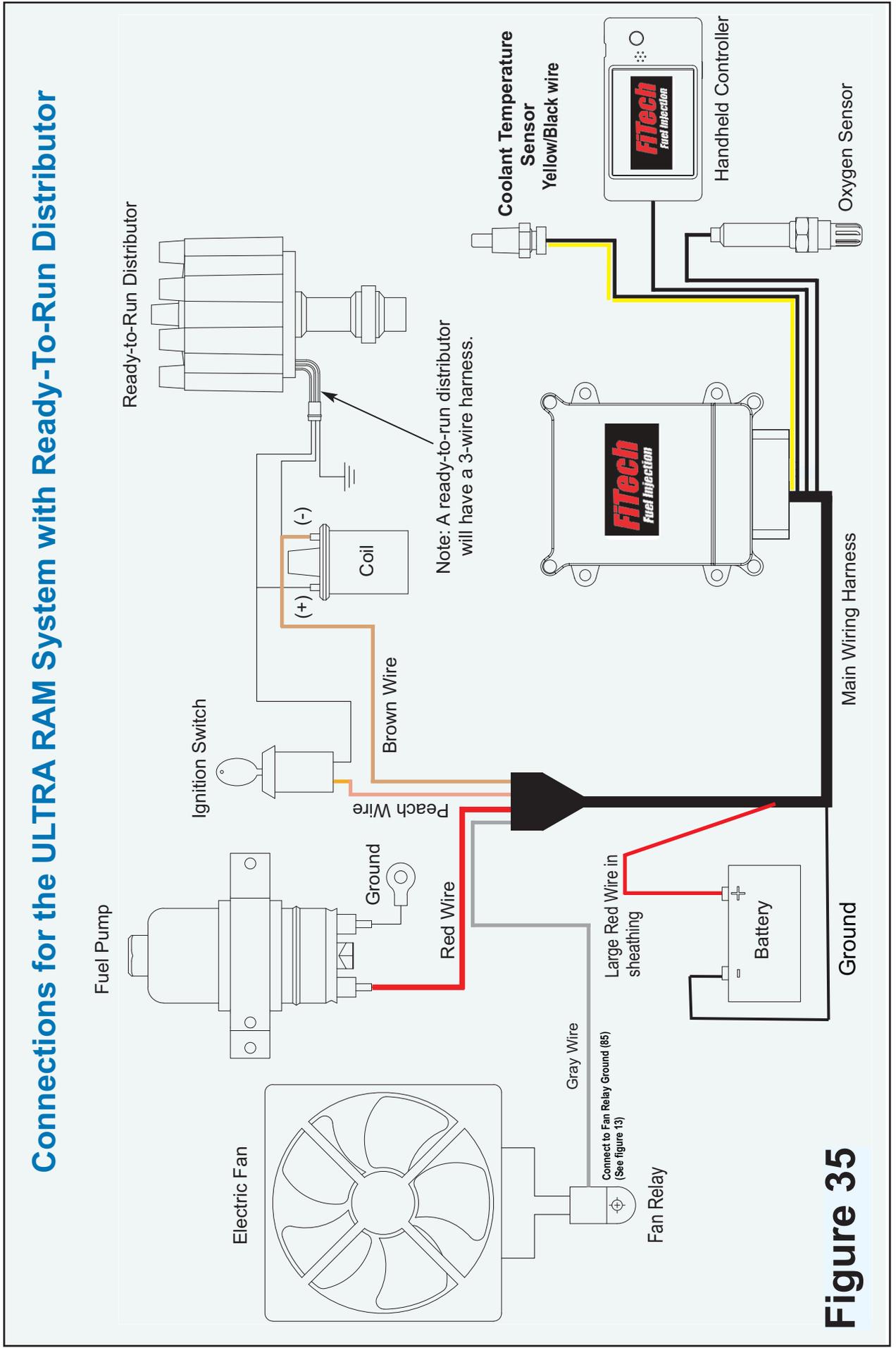
Surging is NOT common – make sure you're not misfiring – burned wires, etc... and maybe needs a touch richer AFR at 1100 45kPa (don't go richer than 12.9 in that area). Backfires on acceleration are not common – this may mean it's retarded, or that the ACCEL PUMP fueling needs some adjustment. Exhaust pops during deceleration are common – not much can be done.

## **Wiring Diagrams**

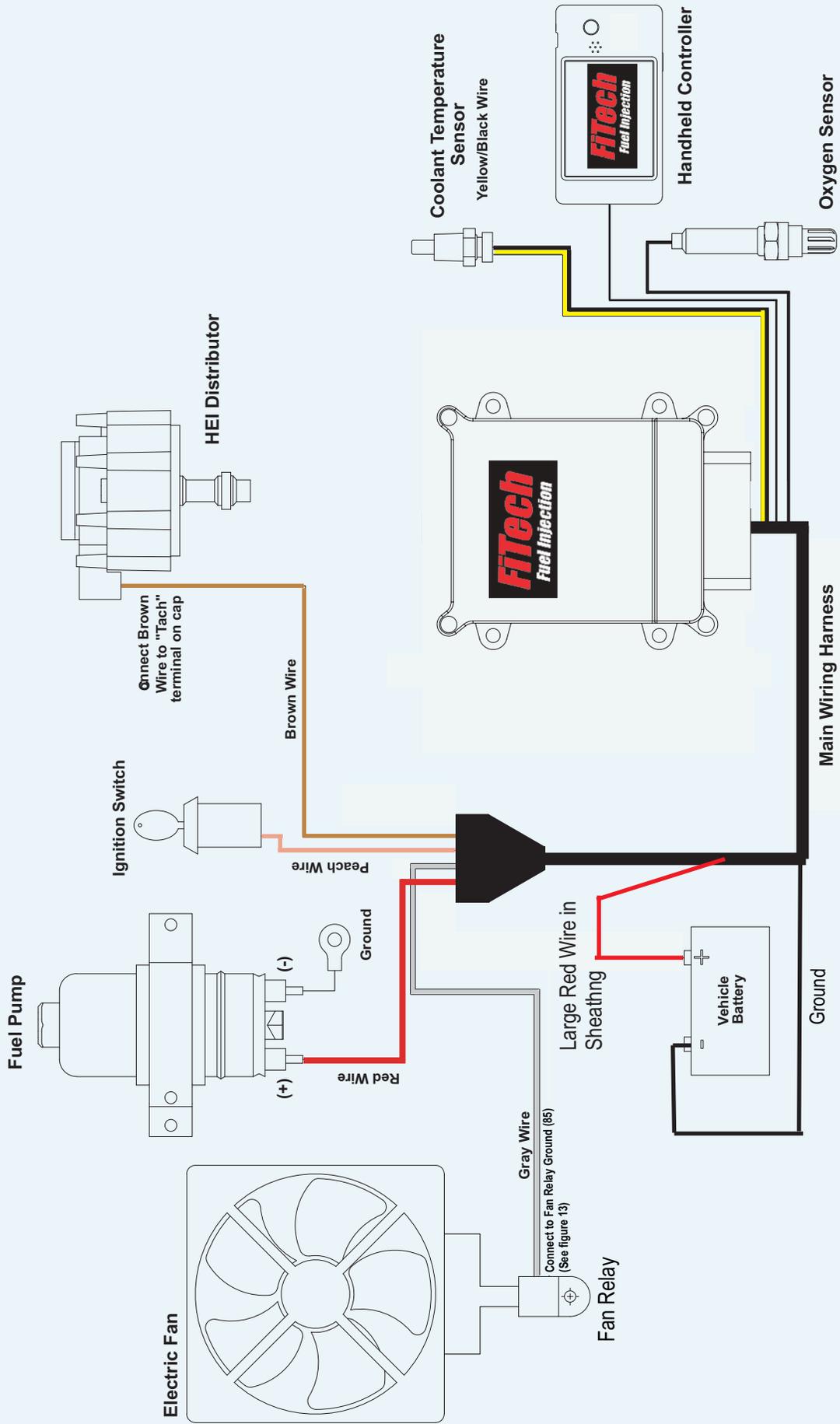
On the following pages are various wiring diagrams that address the most common ignition arrangements. Each diagram will show you the specifics of how to wire your ULTRA RAM for that particular ignition setup. Note that the FiTech GO EFI timing control feature cannot be utilized if you have a "ready-to-run" distributor or an HEI distributor. It will work with most other aftermarket or stock distributors but in every instance the advance mechanics in the distributor must be locked so it cannot function when using timing control. Most aftermarket distributor provide instructions on how to lock the advance mechanism.

**Selecting the correct wiring schematic:**

Review Figures 35 through 39 and select the schematic that suits your particular application. Figure 35 shows how to connect a ready-to-run distributor. Figure 36 is for an HEI distributor. Figure 37 is for a system with an external CDI box. Figure 38 is when an external CDI Box with timing control. Figure 39 is used with a CDI and a crank trigger wheel. One of these configurations will suit your vehicle.



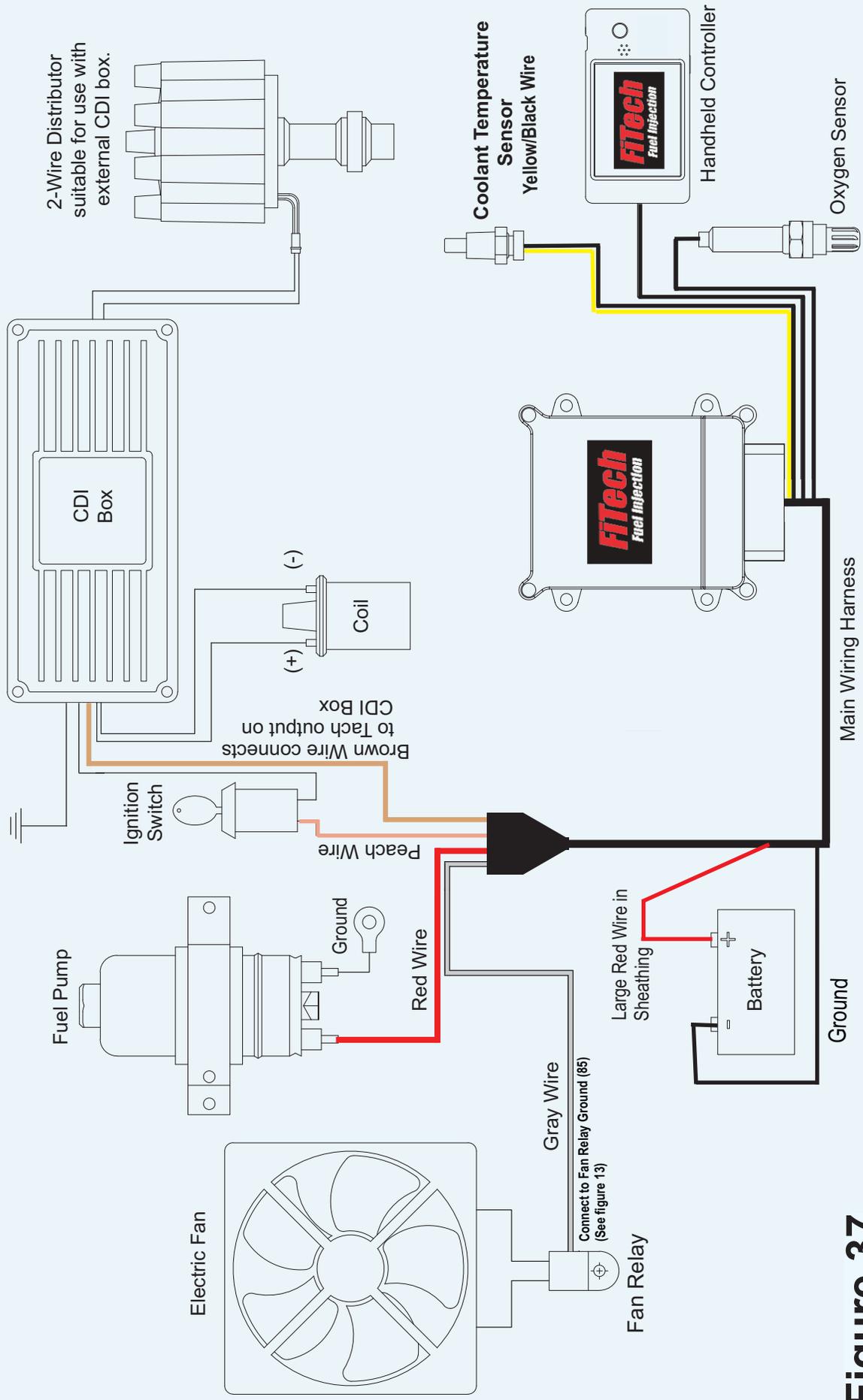
# Wiring Connections for the ULTRA RAM with HEI Distributor



**Figure 36**

Use this wiring schematic if you are utilizing an HEI distributor without an external CDI box.

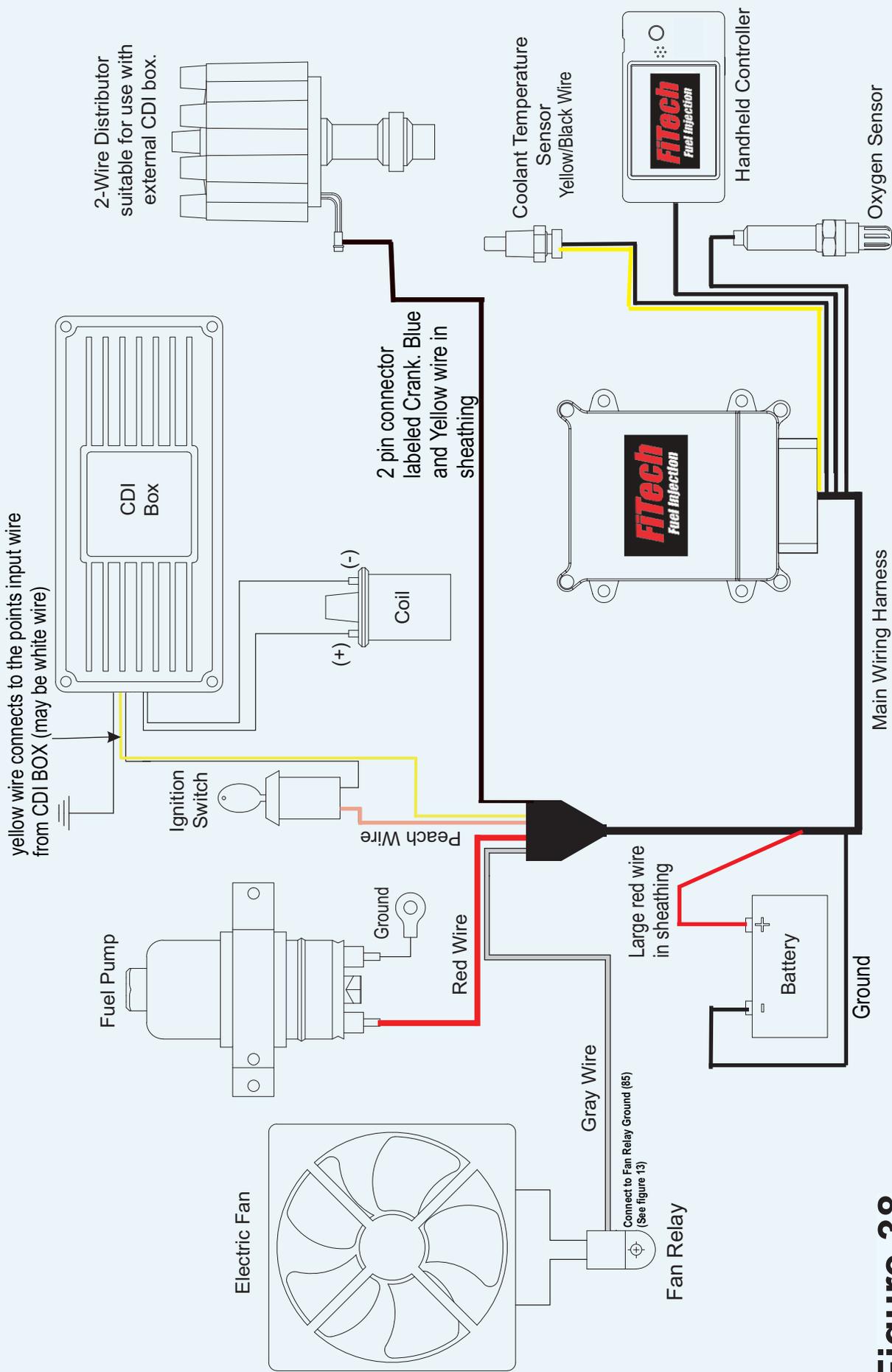
# Wiring Connections for the ULTRA RAM with External CDI Box



**Figure 37**

Use this wiring schematic if you are utilizing a conventional two-wire distributor with an external CDI box, such as a MSD 6AL or similar aftermarket Capacitive Discharge Ignition (CDI) box.

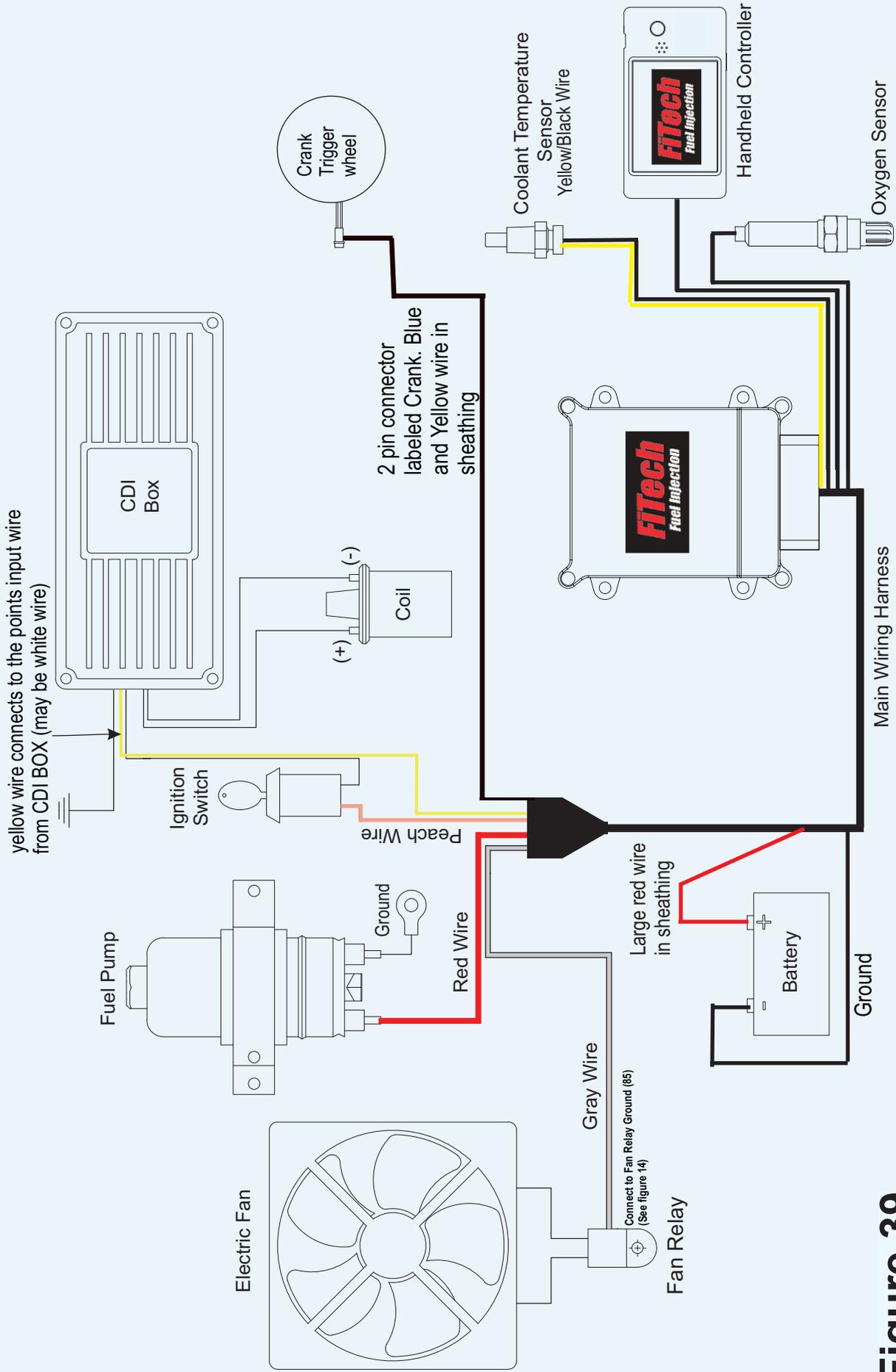
# Wiring Connections for ULTRA RAM System with External CDI Box with timing control



**Figure 38**

Use this schematic if you are utilizing a conventional two-wire distributor with an external CDI box, such as a MSD 6AL or similar aftermarket Capacitive Discharge ignition (CDI) Box with timing control. In the handheld under initial set up set tach or 2 wire +coil to "VRCoil"

# Wiring Connections for the ULTRA RAM with External CDI Box with timing control



**Figure 39**

Use this schematic if you are utilizing a conventional two-wire distributor with an external CDI box, such as a MSD 6AL or similar aftermarket Capacitive Discharge ignition (CDI) Box with timing control. In the handheld under initial set up set tach or 2 wire +coil to "VRCoil"

## Final Steps

- 1 Reattach 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 the 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.

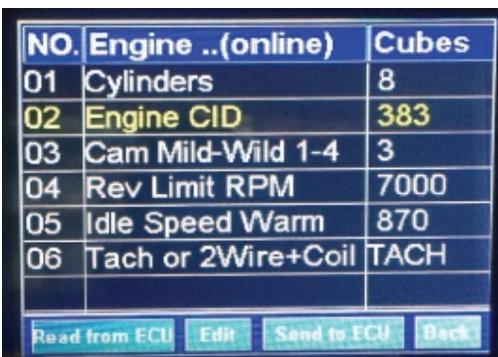
## Initial programming

This simple procedure is performed using the Handheld controller. A laptop computer is NOT required.

1. Connect the ECU to the main harness and supply power but do not crank.
2. Input Cubic Inch Displacement, Cam size, Target Idle speed warm, RPM limit, ignition selection.
3. The Handheld controller can be removed or left connected. When connected, there is a dashboard and gauges screen that will show the engine parameter in real time

## Handheld: Initial Setup

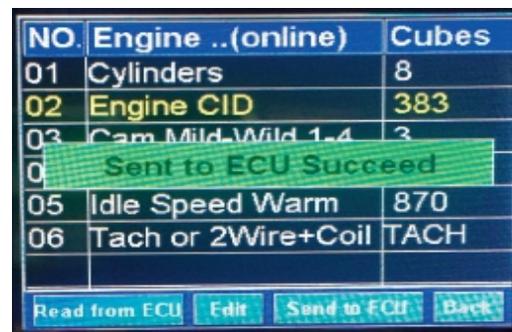
- 1 Cylinders - Factory preset is 8.
- 2 Engine CID – Factory preset is 350 CID. To change value you can use touchscreen buttons (Edit, CLR value from screen, Enter your number now, press OK, then depress joystick button to enter). Sent and Succeed message will appear. This entire step can also be performed using the joystick.
- 3 Cam Mild-Wild – 1-4 - While not everybody knows the exact specifications of their camshaft, you usually have a pretty good idea of whether your cam is a bone stock, (selection #1) or a full-on race cam (selection #4) or somewhere in between. The Go EFI system is a very powerful self-learning tool, so the exact information isn't necessarily required. A mild performance cam would be considered a #2, while a street strip cam would be a #3. Select the best for your engine, if you're not sure, pick # 2!
- 4 Rev limit RPM – This is a fuel and spark cut.



NO.	Engine ..(online)	Cubes
01	Cylinders	8
02	Engine CID	383
03	Cam Mild-Wild 1-4	3
04	Rev Limit RPM	7000
05	Idle Speed Warm	870
06	Tach or 2Wire+Coil	TACH

Read from ECU Edit Send to ECU Back

Figure 40



NO.	Engine ..(online)	Cubes
01	Cylinders	8
02	Engine CID	383
03	Cam Mild-Wild 1-4	3
04	Sent to ECU Succeed	
05	Idle Speed Warm	870
06	Tach or 2Wire+Coil	TACH

Read from ECU Edit Send to ECU Back

Figure 41

## Ignition set up

When done with Engine setup, only if using timing control hit the back button and return to the Calibration menu. (If you are NOT running Timing Control, skip this step.) If you are running Timing Control, select Ignition Setup from the Calibration screen and enter in the following: #01) Distributor Base timing. This is the timing you want your engine to idle at (For example, 15 degrees at 750 rpm). #02) Is redundant from the first page and will show the previously made selection. Select Back button and return to Calibration screen.

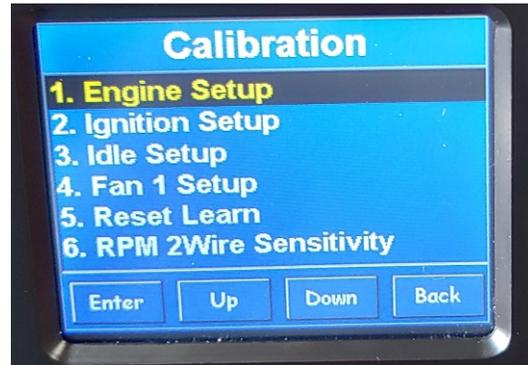
## Handheld controller

Here are two ways to navigate the handheld controller, you can use the touchscreen with your finger or move the joystick up, down, left, or 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 and side, pressing the joystick = enter

1. When making the changes to the ECU through the handheld make sure that the key is on.
2. Once the changes are made turn the key off, wait 12 to 20 seconds until the values disappear under the "dashboard" feature. Doing this will ensure that your changes were saved to the ECU and will be received as a hard save.
3. Once the hard save is completed if desired the battery can be disconnected without inference with the calibrations. For handheld controller definitions visit [www.fitechefi.com](http://www.fitechefi.com) under "support" subtab under tech center.



Figure 42



\*note: pictures may not represent your exact handheld

**(Note: When changing values on the handheld controller, you must press the joystick button to SEND your info to the ECU. You will then see 'Sent to ECU Succeed' message which is a confirmation (Note: When changing values on the Handheld Controller, you must depress the joystick button to SEND your info to the ECU. You will then see 'Sent to ECU Succeed' message which is a confirmation**

## Fan 1 Setup

On the Calibration screen, follow these steps:

If using an electric fan, go to option # 3 and select Enable, then press Enter or depress the joystick button to send info to the ECU. If not using an electric fan, select Disable and continue the Enter/Send steps above

**Note: This step is important to eliminate a fault code from appearing when not using an electric fan, and also eliminating the idle speed from increasing when the fan "ON" temperature is achieved and no fan is used.**

If fan is enabled, follow these next steps:

#1) Fan 1 ON Temp - Enter desired temperature, Enter/ depress to send to ECU. Idle speed will increase when fan is activated. Idle speed increase is not user programmable in basic calibration.

#2) Fan 1 OFF Temp - This is usually set approximately 5 degrees lower than Fan ON temperature, but is up to user preference.

Note: Setting must be lower than fan ON temperature for fans to shut off.

At this point you have made all of the selections you NEED to start your engine! BUT WAIT!!!!. Please turn your key to the OFF POSITION and wait for about 30 seconds for the ECU to store these changes. This is a one-time setup and the changes are permanently stored in the ECU even if you disconnect the battery! They can be changed at any time in the future but no battery power is needed for the ECU to keep these selections in its memory.

## Starting Your Engine:

You are now ready to start your engine for the first time!

(Remember that there is air in the fuel lines and you may need to purge that out so it may take a few extra cranks for the engine to start. Also if you have installed the Fuel Command Center 2 or the G-SURGE you must follow the priming instructions to properly fill your Command Center's fuel tank).

Turn your key to the "ON" position and listen for a CLICK, this is the injector squirting a small amount of fuel into the engine and getting the engine ready to go. Now crank the engine and look for an RPM signal on your Dashboard window on the Keypad.

Your engine should start right up and begin to run. If it does not, turn the key to the OFF position, wait a few seconds and repeat the process, as there is air



Figure 44

## 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 base 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.

## Resetting to stock calibration

From the main menu go to the very bottom and select Write Cal to ECU. Once in this menu scroll down to the second to last selection, it should say Default v8 T195. Once in this file select it and it will download to 100 percent. After this is done it will revert to the main menu. Now go to Go EFI Initial Setup, then Engine Setup, now input all of the parameters that are needed for your application, making sure to save each one individually. After you have entered your information and saved it go up and select Dashboard. Once in Dashboard turn the ignition key off and wait for all of the data to black out. Once this happens turn the ignition key to the on position and start the car.

## Reset Learn

All FiTech ECU systems have learning procedures that the system uses to adjust the active fuel table it is using for operation. Sometimes if there are outside problems such as bad misfires, exhaust leaks, or any other situation that could cause poor reading on the O<sub>2</sub> sensor, the system will try to compensate in order to keep the car running. If this happens it alters the fuel map in ways that may not be optimal for proper running the engine normally. To reset learn is a very easy procedure. Go into the Go EFI initial setup then find Reset Learn. Once in that menu find Reset All Learn, highlight this and push on the joy stick to go to #1, then save that to the ECU by pressing IN on the joystick. Once that is saved go back to the main menu, and then up to Dashboard and select it. Once on Dashboard turn the key off and wait for the numbers in the value side to go black. this means the system has saved. you have now reset the learn function.

## **IAC Setup**

The idle screw on the throttle body needs to be adjusted. This needs to be set so that the IAC value is nearly closed when fully warmed up and in idle 0-10 IAC Steps are recommended for a fully warm engine, out of gear, at idle. When the engine is at idle, the IAC will learn the necessary position to maintain the RPM at the Target Idle Speed. When loads are placed on the engine, or when the throttle is open, the IAC steps will move around, this is normal. It's 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.

1. Start engine and in your handheld go under initial set-up
2. Then go to idle setup and find idle set mode and turn on.
3. Now start the vehicle and find IAC steps in dashboard. This number needs to be within 3-10 at operating temperature. If the number reads zero then slowly turn the screw OUT (counterclockwise) until the IAC steps are between 3-10
4. If the number is above 10 then turn the screw IN as stated above and repeat the process until the IAC steps are between 3-10
5. When finished turn key off and allow the system to save (30 seconds of key off), the system will automatically shut off idle set mode.

## **Data Logging**

Data Logging is a useful tool for diagnoses and tuning. It allows you to check how the many functions the system can read and go through them point by point. This allows for exact adjustments to be made. When the vehicle is running go onto the dashboard screen and press the joystick on the right of the screen in and a message will pop up saying Data Log On. Now you will drive the car and get it to have the issue you are having. Once you finish the drive you will press the button again and this will save the data log. Then you can turn the vehicle off and wait 15 seconds for the data on the dashboard to go black. Once this happens you can take the handheld to your PC and plug in the USB cable and handheld. The handheld will light up with three menu options, USB mass storage is at the top, select this. You should see a prompt on your PS to open the handheld folder, if not go to My Computer and you should see a removable drive, select it. Once the handheld folders come up on screen find the folder labeled log\_file. Select this folder and inside you should see several files inside that say Dashboard, you can click on these and inside you should see several files inside that say Dashboard, you can click on these and they will bring up an Excel file showing the data you have recorded. You can also copy and paste these files and send them to our technicians to look at it as well.

## **Save your current setting and tune:**

To save a tune first turn the key to the On position, not running. Then find Read Cal from ECU on the main menu. Then select it, once in this menu highlight one of the backup files you wish to save to and then either press OK on the screen or push the joystick IN and it will save all your current settings and parameters.

## **Cranking Fuel Adjustments**

With the key on go to the Go EFI Tuning menu, find crank and Warm up. There you will see three cranking fuel selections. For cold starts add or subtract fuel from Crank fuel 65f, for hot starts add or subtract fuel from crank fuel 170f. Changing these settings should help with your start up issues along with setting the IAC. A good starting point is to change the setting in intervals to 10 to find which way you need to adjust the system to work better.

## **Decel Fuel Cut Off:**

When you let off throttle and decel with your vehicle the EFI will reduce fueling to prevent popping and an over rich condition that would occur if the fueling continued as it normally would. Depending on the size of your engine, camshaft specs, engine temp, gearing, and several other factors like environmental conditions, you may have either too much or too little fuel cut on decel.

In order to change the amount of fuel it applies you must go to Go EFI Tuning and then find Fuel Cut Control. Inside this menu you will see an option called DFCO Return fuel, this number represents the amount of fuel the system will inject when it you start to give the vehicle throttle again. If you are having a hesitation when getting back in the throttle then add to the DFCO Return fuel to give the engine more fuel when transitioning back to acceleration. You may also need to adjust your accel pump settings to help with this transition as well.

## **Accel pump / Fast Accel Adjustment**

If the system is having a hesitation or bogging issue, and your IAC steps are between 3-10 at warm idle, then your next step would be to adjust the accel pump function to increase or decrease the fuel added on acceleration. To start with turn the key to find the on position and then find Go EFI Tuning on the main menu and press enter. Then find Accel pump and press enter. You will see a menu with multiple different settings, you need to focus on the Accel pumps ( 20f, 65f, 170f) and Fast Accel (20f, 65f, 170f). These settings adjust how much fuel, at varying temperatures, the system injects when you accelerate. Accel pump is used for any normal throttle input, Fast Accel is for any fast throttle inputs or Wide Open Throttle.

**Hesitation:** If the vehicle has a hesitation (when you step on the throttle and the engine does hang and/or almost dies and then suddenly takes off) this is normally a lack of fuel so you would fix this by increasing the Accel Pump (for normal throttle input hesitation) or Fast Accel (for fast throttle or WOT inputs). You would make changes starting in increments of 10, to the temp range that you are finding the issue to reside in.

**Bogging/engine loads up/slow to respond:**

If the vehicle is bogging (when you step on the throttle and the engine is slower/slugging to come up to a higher rpm) this is normally caused by over fueling. To fix this you would need to reduce the amount of fuel it is injecting as an accel pump shot. To do this decrease the Accel Pump (for normal throttle input hesitations) or Fast Accel (for fast throttle WOT inputs). You would make changes starting in increments of 10, to the temp range that you are finding the issue in.

## **Rev Limiter**

The ULTRA RAM 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 ULTRA RAM 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.

## **Choosing a 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 12Hg to 8Hg, and Cam 4 6Hg to 8Hg. These are estimates and you may need to switch between the if the vacuum load is between two different cam settings to get the engine to run better for your application.

## **Idle Return**

If the engine is not returning to idle quick enough for your liking or is dropping too quickly and killing the engine then you may need to adjust the rate at which the system comes to an idle. To do so you need to go to Go EFI Tuning, then find and select Idle Control. Once in this menu you will see several settings, the only one we are going to work with is Decel open IAC. This number should be at zero as a base setting, by going negative you are reducing the amount of time it takes to return to idle, and by going positive you are increasing the time it takes. Normal procedure of adjustment is to add or subtract 10 to start with and then adjust it to your liking or what the engine needs. The once the setting is input save it to the ECU by pushing the joystick IN, the handheld will show Send To ECU Successful. Once this is done make sure to go back to the dashboard and turn the key off until the numbers clear out on the vehicle side. This shows that the system has saved.

***One Year Limited Warranty on  
FiTech EFI System***

FiTech extends the following limited warranty to the original purchaser of a FiTech EFI system. FiTech warrants its products against defects in materials and workmanship or one year from the date of original purchase. This applies only to the original purchaser and the parts must remain installed on the original vehicle of which they were purchased. This warranty is void if the product was improperly installed, was installed on a vehicle which it was not designed and reinstalled on another vehicle.

This warranty shall not apply to any product installed on a racing vehicle, property, or contrary to FiTech's instructions, altered, misused, repaired/damaged from an accident, collision, or willful or negligent act. To make a claim under the terms of this Warranty, the original purchaser must return the product to FiTech along with proof of original purchase. Purchaser must call FiTech (951-340-2624) or email to: [Warranty@fitechefi.com](mailto:Warranty@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.

If, upon inspection, FiTech determines a defect in materials or workmanship, FiTech will refund the returned goods and shipping expense, and replace the defective part or parts with a new part or parts.

FiTech's liability is expressly limited to the payment of shipping costs and replacing the defective part or parts. FiTech will have no liability for the cost of replacing the defective part or parts. FiTech will have no liability for the cost of installation, removal of defective product, for the cost of labor, or any additional parts required to complete the installation of the replacement product.

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 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.