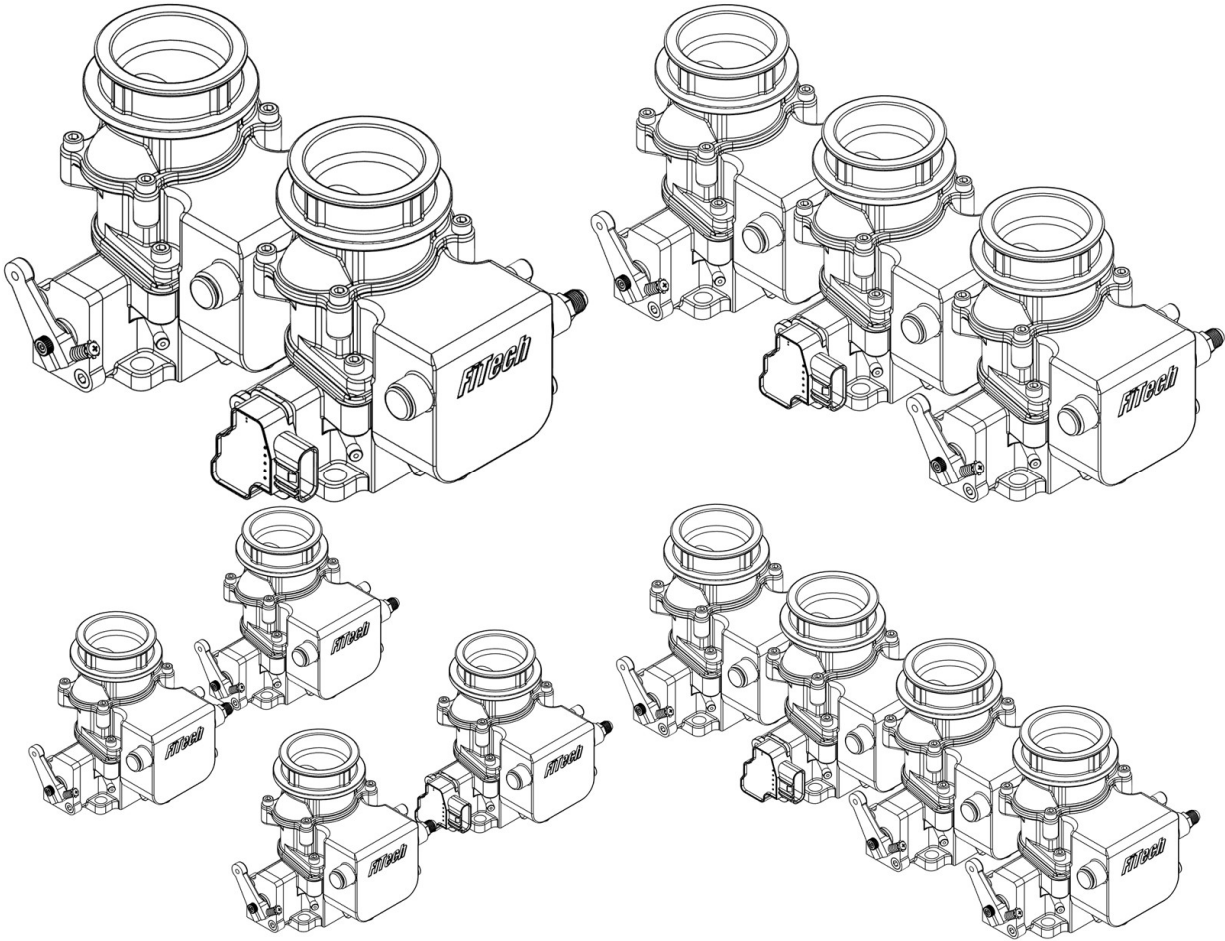




Vintage 97 Installation Guide



Congratulations on your purchase of the new Vintage 97 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 or email us at techmail@fitechefi.com.



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

FiTech Fuel Injection Vintage 97 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 possible debris and/or sprayed fuel when working with fuel systems. 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.

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Introduction and System Requirements

This installation guide is designed to get you up and running with your Vintage 97 System. 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 competitor's product that utilizes a handheld controller. **Please read the full installation guide before beginning your installation.** For technical assistance with your Vintage 97 System, call (951) 340-2624, go online to www.fitechefi.com under "tech center", or email us at techmail@fitechefi.com.

Additional Component Requirements:

Mounting hardware, throttle linkage components, air filters, Idle Air Control (IAC) hoses, fuel/vacuum hoses and fittings are not included with this system. Due to the wide variety of intake manifolds, throttle linkage configurations, and vehicle-specific customizations common to these applications, these components must be sourced separately by the installer. A complete fuel system (high pressure fuel pump, high pressure fuel regulator, 10 and 100 micron fuel filters, and EFI rated high pressure fuel hoses/fittings) are required.

NOTE: While threaded studs may be used to mount the throttle bodies to the intake manifold, FiTech strongly recommends using either jet nuts (reduced hex size) with studs or, preferably, button head Allen (hex socket) cap screws. Clearance around the mounting fasteners is extremely limited, making standard hex nuts difficult to access and tighten with conventional sockets or wrenches. Using jet nuts or button head cap screws will greatly simplify installation and help prevent damage to the throttle body.

Emissions Equipment:

Not legal for use on pollution controlled vehicles. FiTech's Vintage 97 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 O₂ 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
 - with 2 throttle bodies maximum 250HP, naturally aspirated on gasoline
 - with 3 throttle bodies maximum 375HP, naturally aspirated on gasoline
 - with 4 throttle bodies maximum 500HP, naturally aspirated on gasoline
 - with 5 throttle bodies maximum 625HP, naturally aspirated on gasoline
 - with 6 throttle bodies maximum 750HP, naturally aspirated on gasoline

Tools required for Installation

- Standard and Metric wrench set
- Factory service manual for your vehicle (or extreme mechanical knowledge of your vehicle)
- Straight blade/slotted screwdriver
- #2 Phillips screwdriver
- Terminal crimping tool / Wire Strippers / Heat Shrink
- Digital Voltmeter

Before you get started!

FiTech highly recommends that all items are inspected/checked and/or corrected before beginning the installation. For optimal performance out of your FiTech Vintage 97 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 pre-existing underlying issues, converting to EFI will NOT cure them.

Suggested Supporting Items

We know you want complete satisfaction with this experience. And nothing is more frustrating than getting a great kit like this and then finding out you need just a few more components. Or, worse yet, going through a difficult installation challenge only to find out that some item was available that would have made all of this so much easier. The below is a list of FiTech products that can be purchased to ease your installation of this system. Items are available from FiTech and are sold separately

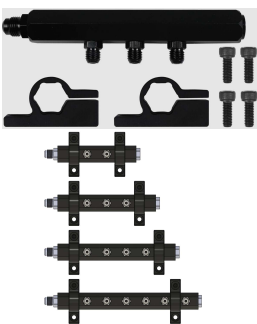
Part number	Image	Description
50004		Force Fuel: Submerged pump runs quieter and lasts longer than inline fuel pumps. Can be mounted anywhere in the vehicle. A Force Fuel Surge tank allows you to use an existing low-pressure carburetor fuel pump to feed the Force Fuel tank where the internal high pressure fuel pump can then increase the pressure to the required 58 psi to then feed the EFI system. Includes onboard 58psi fuel regulator build in.
51005-51008		PTFE Stainless steel hose kit w/ high flow fittings: 20' and 40' hose length options. Also comes in black and steel finish with the option of a check valve and a billet 10 micron filter. PTFE hoses are preferred because they offer unmatched chemical compatibility, zero vapor permeability, and extreme temperature resistance ranging from -94°F to 500°F. They do not degrade or swell when exposed to modern ethanol-blended fuels, harsh chemicals, or high heat that typically ruin standard rubber hoses
54001, 54002		FiTech Fuel Pressure regulators: a bypass style fuel pressure regulator. Required if using a high pressure fuel pump to properly set the fuel pressure to the required 58psi.
80117		0-100 Oil Filled Pressure Gauge
55001		Go Fuel One Way Check Valve.
80111		3.5" - 8AN 100 Micron Filter
55002		3.5" - 8 ORB 10 Micron Filter, Fittings sold separately can be used with -8 ORB to -8AN or to -8 ORB to -6AN fittings
50015		Go Fuel In-tank Retrofit Kit. Allows a high-pressure fuel pump to installed in most steel fuel tanks. Submerged fuel pump runs quieter and last longer than outside frame mounted fuel pumps.

Parts Identification

Kit Contents

(1) Main 2 bbl Throttle Body w/Tri-sensor
 (1-6) Auxiliary 2 bbl Throttle Body
 (1) Vintage Main Harness
 (1) Vintage Injector Sub-Harness for 1 to 4 throttle bodies
 (1) Coolant Temperature Sensor
 (1) CTS Adapter
 (1) O₂ Sensor

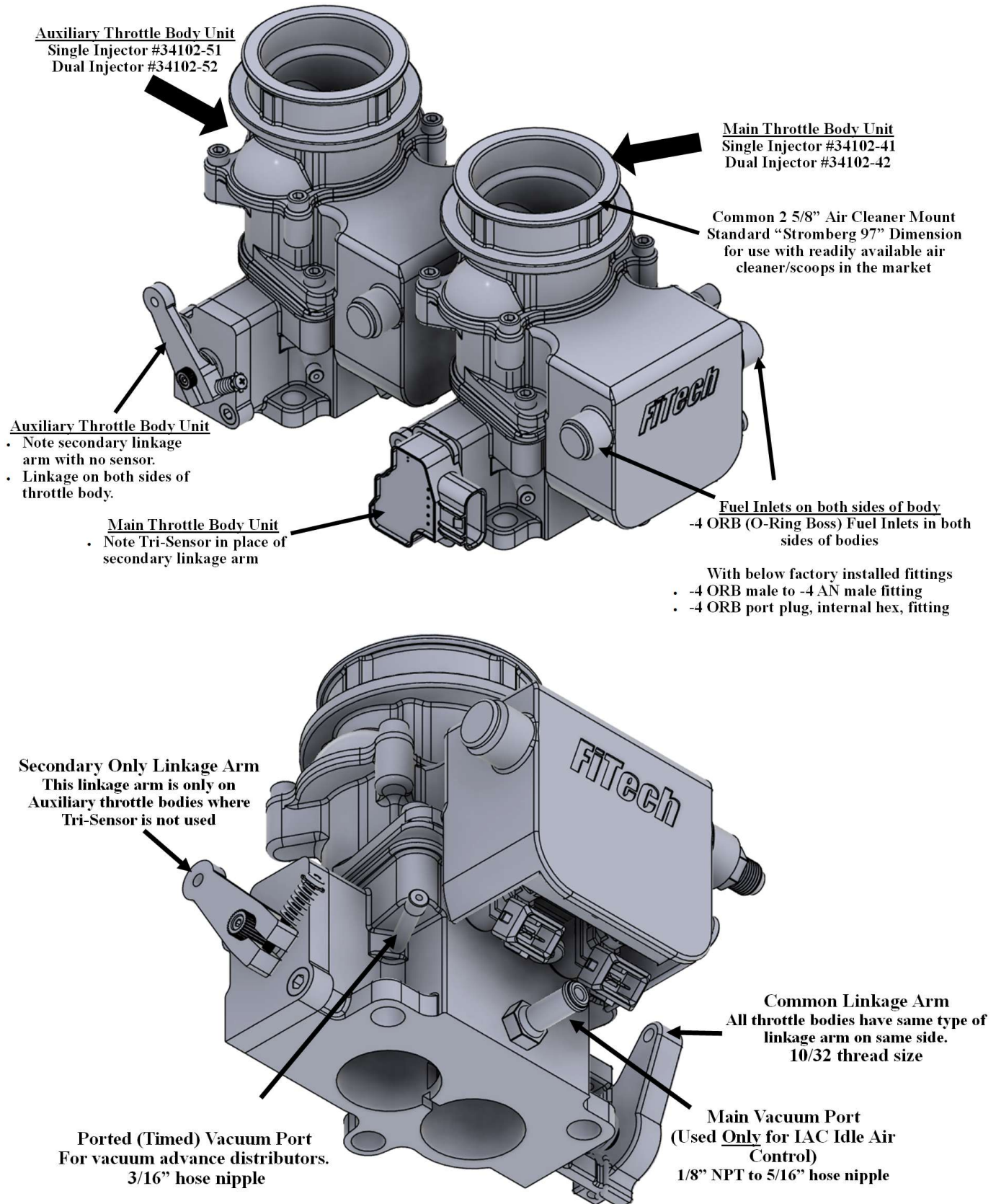
(1) O₂ Sensor Bung Kit
 (1) Handheld Controller
 (1) Handheld Control Cable
 (1) Mini USB Cable
 (1) Windshield Mount
 (1) Remote IAC Unit

Service P/N	Image	Description	Qty	Note
34102-41 (Single Inj) 34102-42 (Dual Inj)		Main Throttle Body	1	Includes Tri-Sensor on one end of throttle shaft Includes Injector(s)
34102-51 (Single Inj) 34102-52 (Dual Inj)		Auxiliary Throttle Body	0-6	Includes dual linkage - arms on each end of throttle shaft Includes Injector(s)
34102-12 (2 outlet) 34102-13 (3 outlet) 34102-14 (4 outlet) 34102-15 (5 outlet) 34102-16 (6 outlet)		Fuel Distribution Rail	1	Fuel Distribution Rail with 2, 3, 4, 5, 6 outlets Depending on exactly which system bought, will come with a single fuel rail for X number of throttle bodies. • Dual -6 ORB inlets (one each end) • -4 ORB outlets • 1x -6 ORB male to -6 AN male fitting • 1x -6 ORB port plug, hex, fitting • -4 ORB male to -4 AN male fittings • 2 hold down clamps
34102-2		Main Harness	1	Plug and play main system harness
34102-22 (2 TB) 34102-23 (3 TB) 34102-24 (4 TB) 34102-25 (5 TB) 34102-26 (6 TB)		Injector Sub-Harness	1	Injector sub-harness for 2, 3, 4 throttle bodies Depending on exactly which system bought, will come with this harness for X number of throttle bodies.

Service P/N	Image	Description	Qty	Note
34102-1		External ECU	1	- Self learning advanced ECU. - Externally mounted - Mount with the connector facing down so condensation does not build up
62013-34102		Handheld Controller	1	- Highly advanced, directional pad and touch screen controller - Do not leave connected when the car is off or it will drain the vehicles battery
60017		Bosch Wide Band O2 Sensor	1	- Use of leaded fuel will degrade sensor. Prolonged use will require periodic replacement - Mounting procedure on page 16 is critical for system performance
60012-1		Bung Kit	1	- Requires a 3/4" Hole to be drilled - Mounting procedure on page 16 is critical for system performance.
62014		Handheld Controller Cable	1	Cable connects handheld to system
62015		Mini USB Cable (10ft)	1	Cable connects the Handheld to a computer if additional tuning is desired
60016		Windshield Mount	1	Used to mount the handheld on the dashboard or windshield so the system can be monitored while driving.
60021		Coolant Temperature Sensor	1	3/8" NPT threads - Must be installed in a coolant passage in either the intake manifold or cylinder head. Do not install in thermostat housing!
60018		CTS Adapter	1	Used to reduce a 3/8" NPT thread to a 1/2" NPT thread.
60042		Remote IAC Motor Unit	1	- IAC Fitting Block - IAC Motor - Filter - Fittings

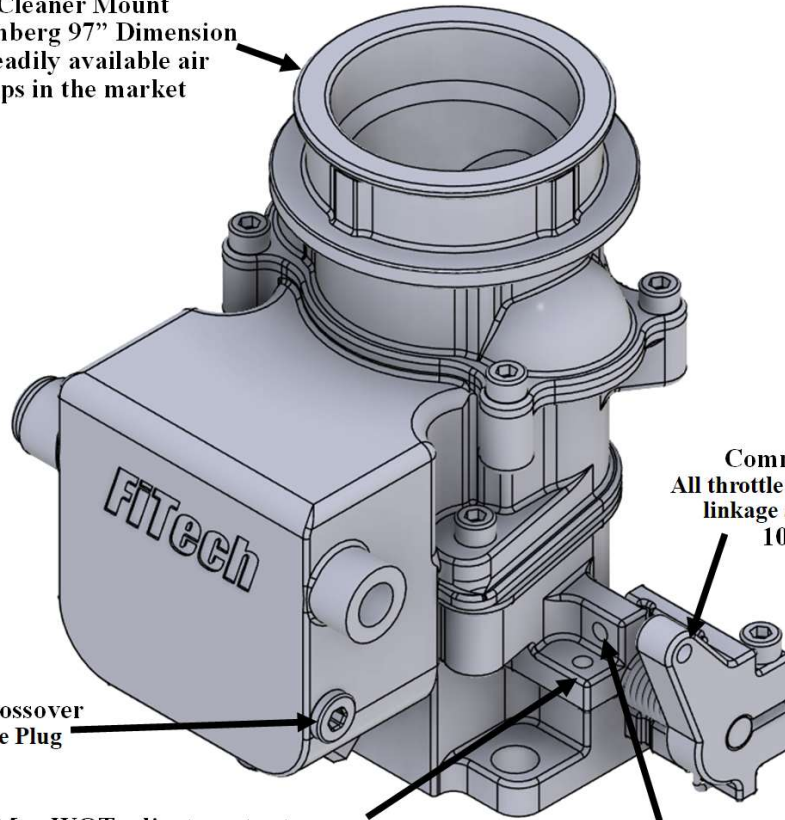
General System Overview

The Vintage 97 system is a modular system that can be used in many different arrangements for various engine demands. Units are sold in kits preassembled for popular combinations, but items can be purchased separately as needed. Below shows the main components and some key areas to note.



General System Overview (cont.)

2 5/8" Air Cleaner Mount
Standard "Stromberg 97" Dimension
for use with readily available air
cleaner/scoops in the market



Common Linkage Arm
All throttle bodies have same type of
linkage arm on this same side.
10/32 thread size

Internal fuel crossover
Do Not Remove Plug

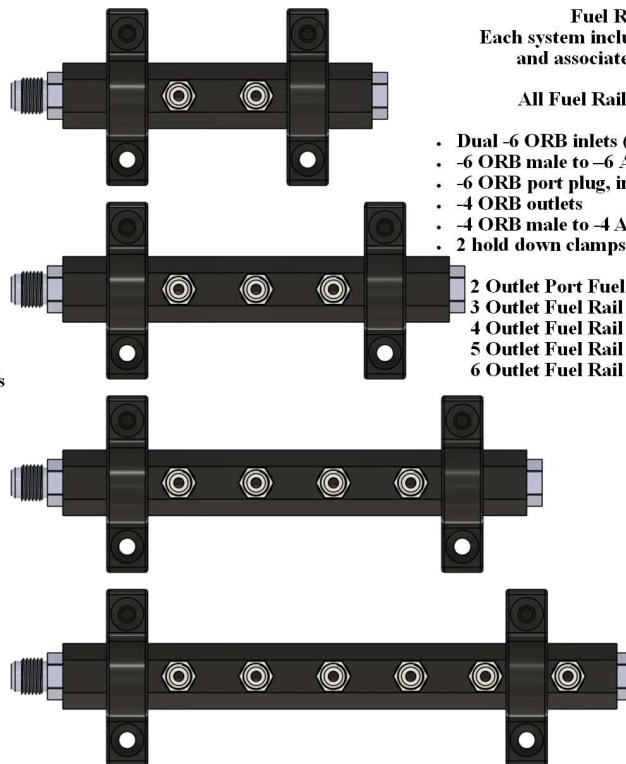
Max WOT adjustment set screw
Typically no adjustment required

Main Idle Speed adjustment screw
See Idle Speed Adjustment section for
proper procedure for changing idle
RPM



Remote IAC Block
#60042
All have include:

- Main Body with dual -8 ORB ports
- -8 ORB male to 3/4" male nipple fittings
- IAC motor
- Mounting hardware



Fuel Rails
Each system includes a fuel rail
and associated fittings.

All Fuel Rails include:

- Dual -6 ORB inlets (one each end)
- -6 ORB male to -6 AN male fitting
- -6 ORB port plug, internal hex, fitting
- -4 ORB outlets
- -4 ORB male to -4 AN male fittings
- 2 hold down clamps

- 2 Outlet Port Fuel Rail #34102-12
- 3 Outlet Fuel Rail Port #34102-13
- 4 Outlet Fuel Rail Port #34102-14
- 5 Outlet Fuel Rail Port #34102-15
- 6 Outlet Fuel Rail Port #34102-16

System Features

The Vintage 97 EFI System combines classic Stromberg-style appearance with modern electronic fuel injection technology and includes:

- Self-learning ECU
- Color touchscreen handheld controller with data logging
- Integrated TPS, 1 BAR MAP, and IAT sensors (Tri-Sensor)
- 28 lb/hr flow-matched injectors
- Fuel and ignition timing control
- Target AFR and timing adjustment
- One electric cooling fan output
- Accessory (Air Conditioner Request/Kickup)
- Supports approximately **125 flywheel horsepower per throttle body**
- OEM quality “Limp” Engine Protection Mode

Engine Protection Feature:

The FiTech Vintage 97 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.

Important Installation Notes

- Always ensure to disconnect the **negative battery cable** before beginning installation.
- Allow the engine to cool completely before servicing.
- Use **sensor-safe RTV silicone** where sealant is required.
- Do **not** use solid-core spark plug wires, racing ignition coils, or racing high energy 7/8-series ignition boxes.
- The accelerator pump settings may require tuning depending on the engine combination.
- Accurate engine displacement (CID) and camshaft selection during setup will improve self-learning performance.
- The handheld controller should be unplugged when the vehicle is not in use, for extended periods of time, to prevent battery drain.
- Some installations may require a shorter thermostat housing for throttle body clearance.
- Although throttle body spacing has been comparable to OEM carburetors, units may not fit together on every intake manifold.
- For fitment, the tightest throttle body spacing as measured on the center-to-center mounting flange hole is 4.500"

DANGER: Never work beneath a vehicle supported only by a hydraulic jack. Always support the vehicle securely with properly rated jack stands before working underneath.

Fuel System Requirements

The FiTech Vintage 97 EFI System requires a properly regulated **58 PSI EFI fuel system**. A bypass-style fuel pressure regulator is mandatory, and the system must maintain **58 PSI at the throttle body under full engine load**.

For best performance and reliability:

- An in-tank EFI fuel pump is strongly recommended for quieter operation, improved cooling, and reduced cavitation.
- If an inline fuel pump is used, it must be mounted below the fuel tank outlet, within 24 inches of the tank, and positioned so it is gravity-fed.
- Use EFI-rated fuel hose or steel/stainless hard lines only. Aluminum fuel lines are not recommended.
- If using AN fittings, all fuel line connections must use 37° AN flare fittings.
- A minimum 3/8 in. (-6 AN) fuel return line is required.
- Fuel filtration should include:
 - 100-micron filter "Pre-filter" between the fuel tank and pump.
 - 10-micron filter "Post-Filter" between the pump and the EFI system.
- The fuel tank must be properly vented to prevent pressure buildup.
- Before initial startup, verify fuel pressure during the pump prime cycle using a 0–100 PSI oil-filled pressure gauge.

Fuel Recommendations

- Leaded fuels will damage the oxygen sensor and may void the warranty.
- Use unleaded gasoline only, with a maximum of 15% ethanol (E15).

NOTE: If using ethanol blended fuel (any fuel with greater than 15% ethanol), horsepower capacity of system will be reduced. Larger fuel injectors and accompanying fuel systems will be required.

Safety Information

WARNING: Fuel systems operate at 58 PSI. Inspect all hoses, fittings, and connections carefully before operating the engine.

Keep all fuel system components away from exhaust components, headers, and other heat sources to reduce the risk of fire or explosion. If you are uncertain about any portion of the fuel system installation, consult a qualified EFI installer.

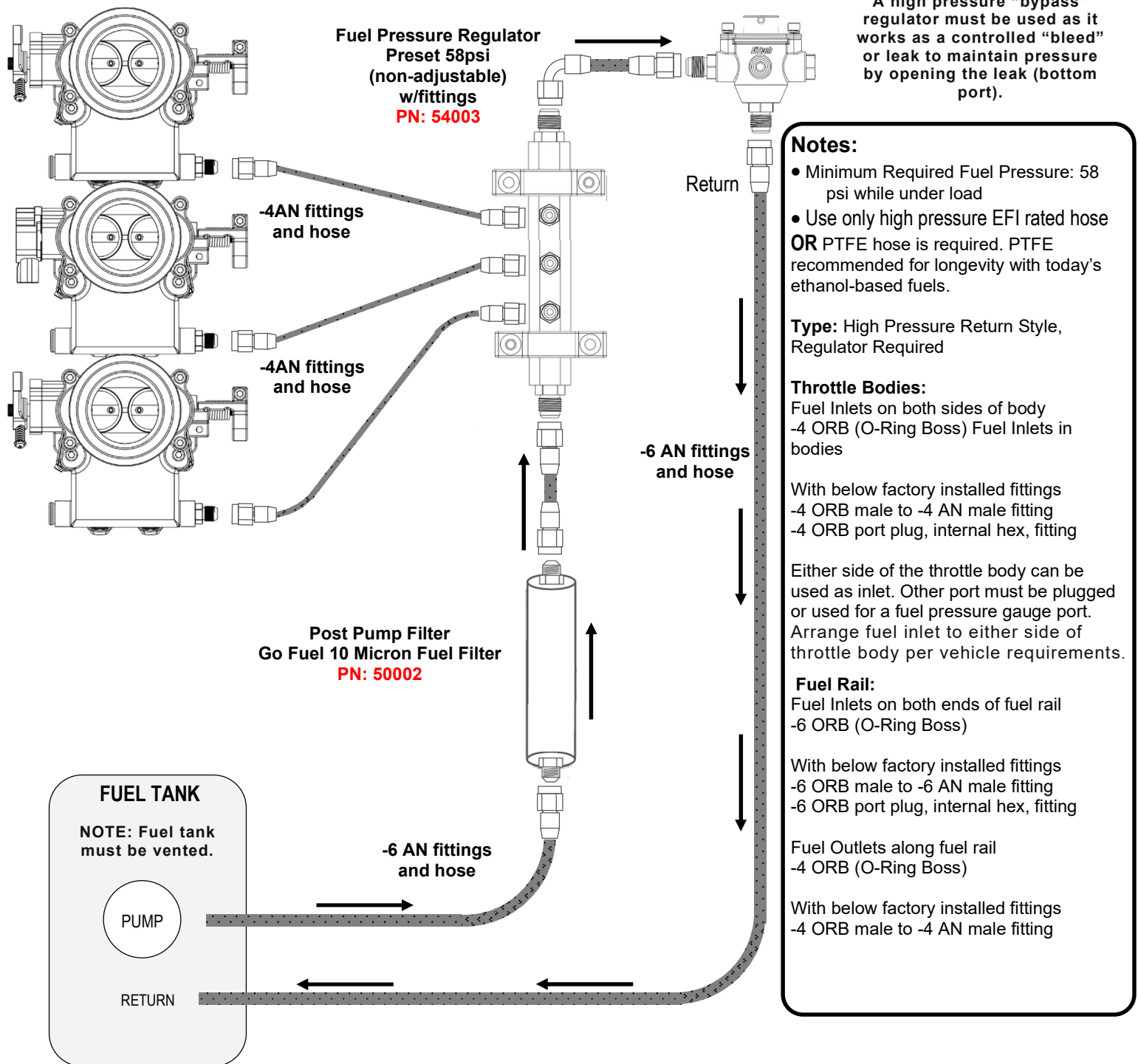
DANGER: Never work beneath a vehicle supported only by a hydraulic jack. Always support the vehicle securely with properly rated jack stands before working underneath.

General Fuel Plumbing Schematic Example #1 Flow through Return Bypass:

Shown with 3x2 bbl. system.

Your system may vary but below shows general guidelines for fuel system plumbing/routing.

Fuel systems components are not included and are sold separately.



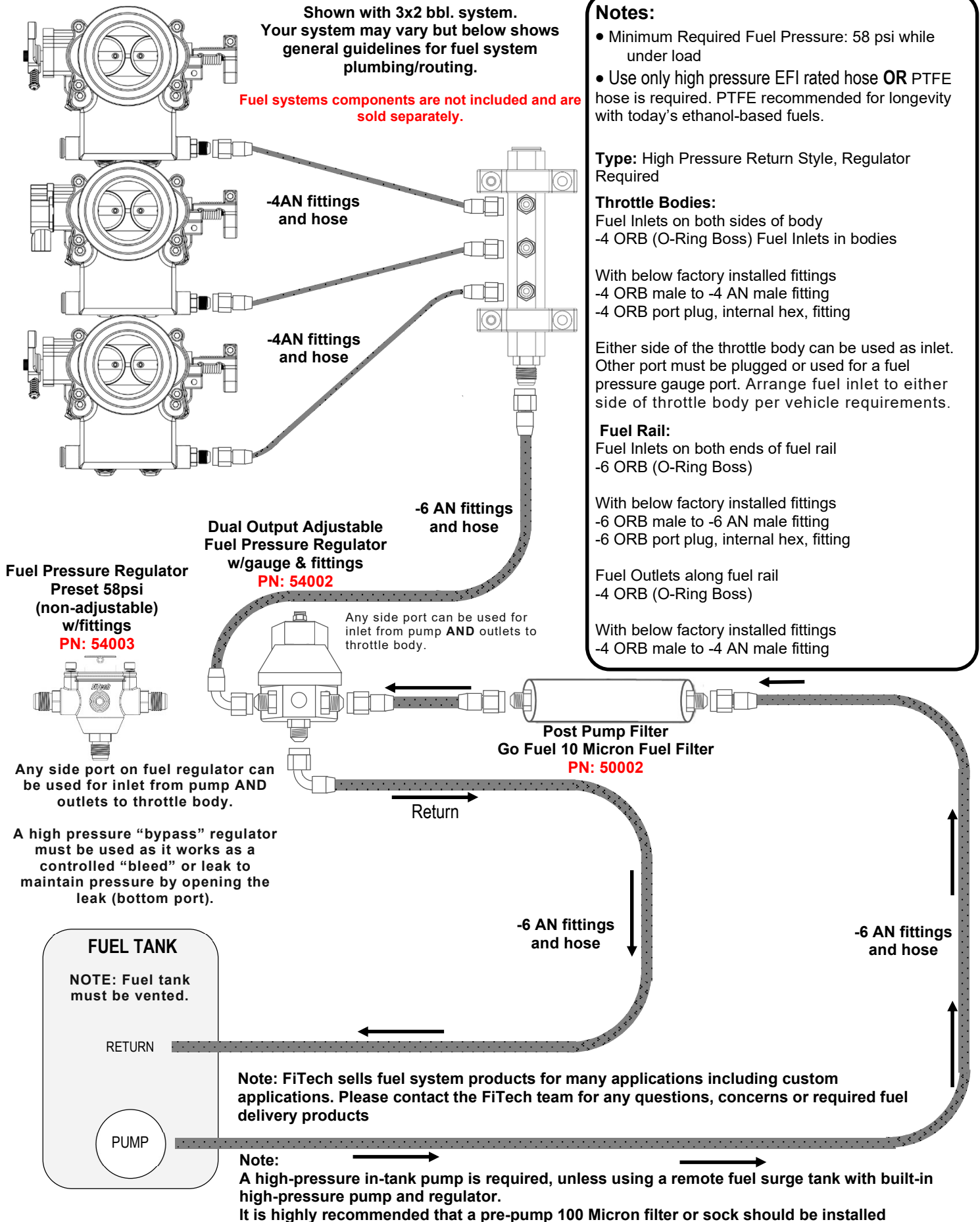
Note: FiTech sells fuel system products for many applications including custom applications. Please contact the FiTech team for any questions, concerns or required fuel delivery products

Note:

A high-pressure in-tank pump is required, unless using a remote fuel surge tank with built-in high-pressure pump and regulator.

It is highly recommended that a pre-pump 100 Micron filter or sock should be installed

General Fuel Plumbing Schematic Example #2 Dead Head:

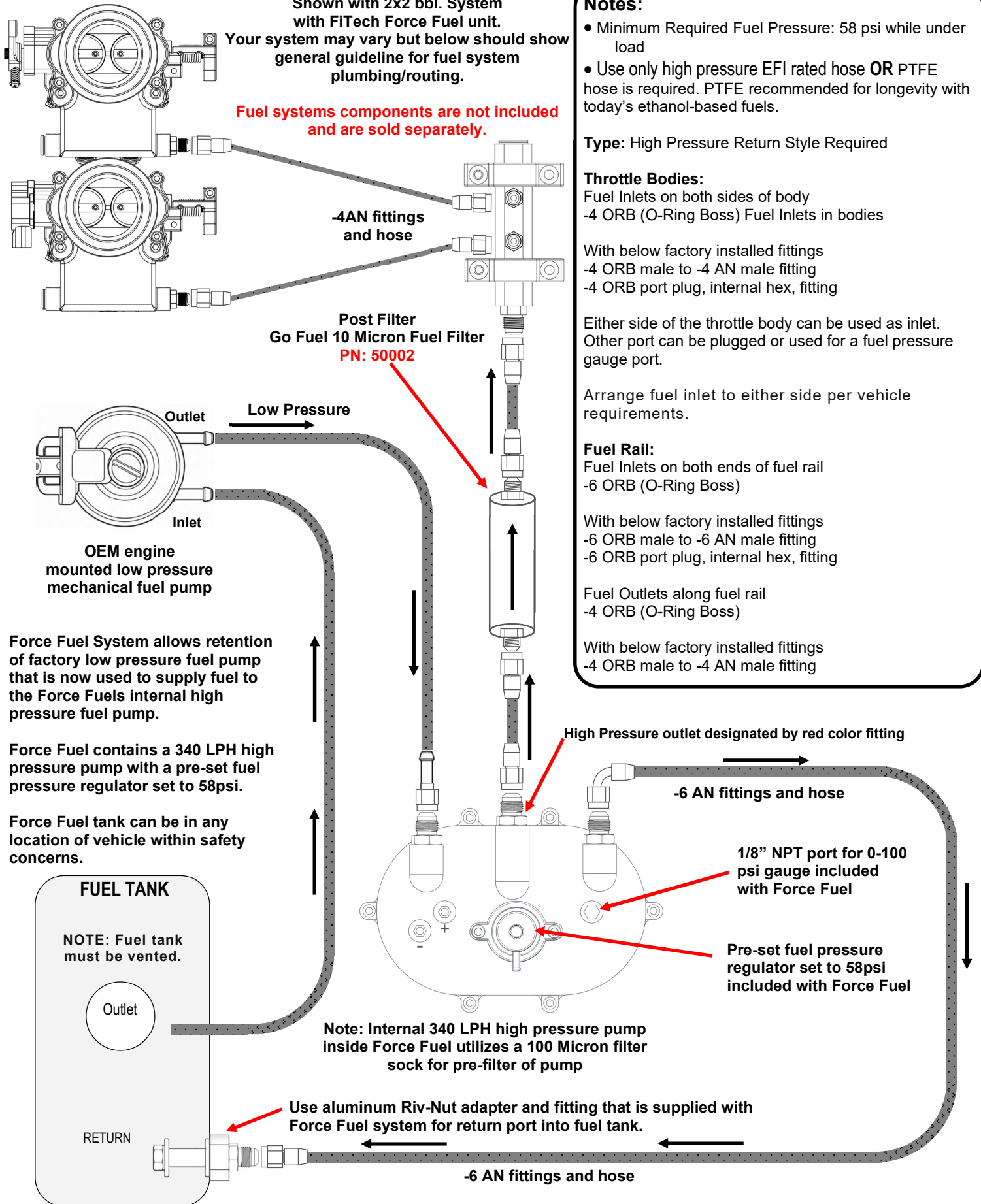


General Fuel Plumbing Schematic Example #3 utilizing a Force Fuel:

Example Plumbing Schematic: Shown with 2x2 bbl. System with FiTech Force Fuel unit.

Your system may vary but below should show
general guideline for fuel system
plumbing/routing.

**Fuel systems components are not included
and are sold separately.**



General Wiring Reference

VERY IMPORTANT!

The Vintage 97 highly depends on a clean and constant voltage source. Please ensure when grounding the system, that a clean ground is used as the ground is just as important as the power side for any electrical system.

The Vintage 97 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 Vintage 97 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 harness)
- **DO NOT** use the electric fan outputs directly to power or ground 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 heavy Red in sheathing main battery +12V wire 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 wiring harness can result in a possible void of warranty.

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

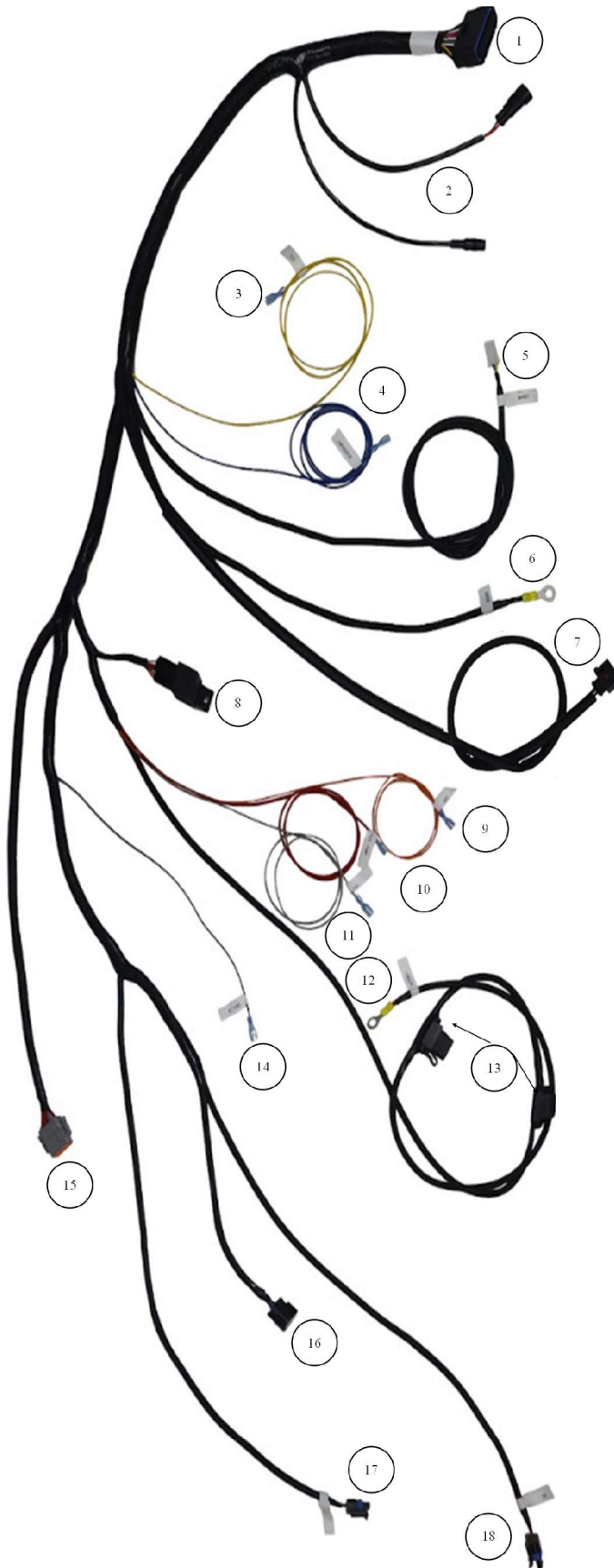
- DO NOT SHORTEN OR LENGTHEN ECU HARNESS
- DO NOT Twist Wires Together
- DO NOT use Wire Nuts
- DO NOT use Mismatched Connectors
- DO NOT use T-Taps!
- DO NOT Jam Wires into a Fuse
- DO NOT use Electrical Tape on Bare wires
- **DO NOT USE ROMEX**

ONLY THESE APPLICATIONS ARE ACCEPTABLE

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

NOTE: Improper wiring modifications will void warranty

Wiring Main Harness



#	Connector/Label	Location (Figure 1)
1	ECU Main Connector	Main ECU connector for main harness. Plugs into main ECU
2	Handheld Controller Connections	The handheld connector connects to the handheld. One cable is to supply power and one is a data cable. Ensure handheld is securely connected.
3	Yellow Loose Wire	This wire is the ignition output trigger wire from the ECU. Only used when utilizing timing control. With no CDI box , connect to negative side of coil. With a CDI , connect to the white points/trigger input wire on a CDI box to trigger the firing signal on the CDI box.
4	Blue Loose Wire	(Optional use) Accessory input wire for Air Conditioning.
5	2 pin twisted Blue/Yellow Wires	Crank/Distributor VR RPM Input This is used only for timing control and plugs into the distributor 2-wire connector. Not Required if <u>not using</u> timing control. Required only when using with timing control Blue= Mag Negative (-) Yellow= Mag Positive (+)
6	Black Ground Ring Terminal	Main electronics ground. This typically installs to rear of cylinder head, engine block or negative battery terminal.
7	O2 Harness connector.	O2 Sensor connection. Sensor will plug directly into this connector. Crucial for optimal performance.
8	Main Relay	Main Power relay for system
9	Large Red Loose Wire	Fuel Pump Power This wire provides 12V to the fuel pump and connects to the positive (+) terminal on the pump
10	Small Orange Loose Wire	Ignition Key Power On/Off - Connect to switched 12V ignition circuit. Must be on (hot) during both "Key On" and "Cranking."
11	Grey Loose Wire	Fan Trigger This wire sends the ground signal to your fan relay to activate the fan. See figure 19.
12	Large Red "POS" Positive Battery Ring Terminal	Main Battery Power: This wire needs a clean +12v power source. Connect it directly to positive side of battery. Best not to connect directly to alternator. 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 ignition key power off.
13	Fuses	25amp main fuse for ECU, 15amp fuse for fuel pump output
14	Brown Loose Wire	Tach RPM Input: This tach input wire supplies RPM signal to the system when timing control is not being used. 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 this wire will connector to the tach output circuit on the box. If using CDI box, ensure this wire is NOT connectors to the coil.
15	INJ (Injectors) connector 8-outputs	Main Injector Output Connector: This connector will connector to the injector sub-harnesses being used. The injector sub harness then splits to each of the throttle bodies for their injectors. Please ensure it has a secure connection
16	Tri-Sensor Connector	Plugs into the Tri-Sensor on the main master throttle body for TPS (Throttle Position), IAT (Intake Air Temperature), MAP (Manifold Absolute Pressure) sensors.
17	CTS Connector	Connects to engine coolant temperature sensor. Typically located near thermostat in intake or located on cylinder head.
18	IAC	Idle Air Control. Connects to the remote IAC motor.

Wiring Chart

The chart below lists all of the wires in the Vintage 97 System. The wires are color coded and labeled.

Required/ Optional	Wire Color	Label Name	Image	Description
Required	Heavy Red in sheathing	"POS" (Positive Battery +)		This wire needs a clean power source. Connect it directly to positive side of battery as possible. Do not connect to alternator, distribution lug or any other source of positive power! Direct to battery is best.
Required	Heavy Black in sheathing	"Ground" (Negative 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	Loose Orange	"Key" (Switched Ignition Key Power)		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 on but, no voltage with key off.
Required	Loose Red	"Fuel Pump" (Pump control/power wire)		This wire provides 12V output to the fuel pump and connects to the positive (+) terminal on the pump. This wire is fused at 15 amps. If using a pump that requires more current, it is required to install a relay triggered by this wire.
Required for RPM signal when NOT using timing control	Loose Brown	"Tach In" (Basic RPM input via tachometer signal)		This tach input wire triggers the EFI system when timing control is not used. This is how the system receives RPM signal from the ignition system. Isolation of this wire is crucial. With <u>no</u> CDI Box installed, connect to the negative side of ignition coil or tach output signal for ready-to-run distributor, or tach terminal on HEI distributor. With a CDI Box installed, connect to the tach output signal/circuit on the ignition box. DO NOT route near spark plug / coil wires. DO NOT loom with harness or any other wires. DO NOT hook to the coil when using CDI ignition as damage will occur to ECU.
Required only when using timing control	Blue/ Yellow wires	"Crank" (RPM input via Dist VR signal)		This is used only for timing control and plugs into the distributor 2-wire connector to provide the ECU with an RPM signal. Blue= Mag Negative (-) Yellow= Mag Positive (+)
Required only when using timing control	Loose Yellow	"Coil" (Points trigger output)		This wire is the output trigger wire from the ECU. Only used when 2 wire "Crank" signal is used for timing control. With <u>no</u> CDI box, connect to negative side of coil. With a CDI, connect to the white points/trigger input wire on a CDI box to trigger the firing signal on the CDI box.
Optional	Loose Blue	Accessory		(Optional use) Accessary input wire for Air Conditioning (A/C Request/Kickup). When active, idle RPM is increased and fan output is triggered run fan.
Optional	Loose Grey	Fan		This wire sends the ground signal to a relay to activate/control the fan. See figure 19.

Required/Optional	Wire Color	Label Name	Image	Description
Required	Covered in black sheathing	CTS (Coolant Temperature Sensor)		This connects to the supplied Coolant Temperature Sensor on the manifold or the block. Crucial for optimal performance from the EFI System. Please ensure it has a secure connection.
Required	Covered in black sheathing	O ₂ (Oxygen sensor)		Large 6 wire connector. Connects the O ₂ sensor. Crucial for optimal performance from the 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 EFI System. Please ensure it has a secure connection.
Required	Covered in black sheathing	Handheld Controller Connections		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	12pin Injector Main Connector		This connector connects to the throttle bodies injector leads sub-harness. Crucial for optimal performance from the Vintage 97 System. Please ensure it has a secure connection. Depending on how many TB units are being used, mating connector may not have all mating wires. This is fine as main harness is wired to support 1 to 8 throttle bodies.
Required	Covered in black sheathing	Tri-Sensor (TPS / MAP / IAT Sensor)		Connect to the Tri-sensor located on main throttle body unit. Ensure it is fully connected and clipped in. Crucial for optimal performance from the Vintage 97 System. Please ensure it has a secure connection.
Required	Covered in black sheathing	IAC (Idle Air Control)		Connects to the IAC motor located on the remote IAC block. Crucial for optimal performance from the Vintage 97 System. Please ensure it has a secure connection.

General Main Harness Wiring notes

Main Power (wire marked “POS” for Positive Battery): Positive main 12 volts lead, connects to battery or starter main power lug. This circuit is fused with a 25 amp fuse. Ensure all battery cables and connections are clean, secure and quality in their crimps/connections. This lead should be able to maintain 10 volts or more during cranking. Anything less than 10 volts can cause the vehicle not to start as issues with fuel injectors not operating correctly can occur. **DO NOT** connect to alternator, distribution lug or any other source of positive power! Direct to battery is best. This circuit needs to be live even when the ignition switch is off so that the self-learn files are saved.

NOTE: If using a master battery cutoff switch, ensure ignition switched key power is turned off first, and for at least 15 seconds before cutting main battery power with master cut off switch to allow self-learn files to save properly.

Main Ground: Main ground lead should be securely connected to clean ground such as the negative side of battery, engine block, or cylinder heads. Ensure connection is clean, secure and quality in their crimps/connections. Be sure to remove any paint, powder coat or anything that prevents direct metal contact to allow best direct grounding.

Ignition Switch Key Power (Loose Orange wire marked “Key”): This is the main “ignition” switched power for the ECU. Connect this wire to a ignition key switched 12V circuit. **Must be supplied with voltage during both “Key On” and “Cranking”**. Original coil positive wire can be used if ballast resistor is removed and/or a CDI box is not used.

DO NOT connect to the coil + terminal when using an external CDI box such as an MSD 6A or any other CD ignition. **DO NOT** use the carburetor choke +12v if EFI if replacing a carburetor system.

Loose 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 and is fused with a 15 amp fuse. If using a pump that requires more current, due to the wire size/length and its current carrying limited abilities, it is required to install a new separate fused relay with appropriate wire size for the length and current load that will then be triggered by this wire.

Loose RPM wires brown (tach in), yellow (coil), 2 wire blue/yellow connector (crank): For proper use and connections, review wiring diagrams figures 35-39 found later in this instruction manual as ignition system and exact use are critical for proper connection.

Loose Grey Fan Control Circuit

The fan wire is a low current ground side trigger and must go to a relay to trigger the fans on. This replaces the thermal switch from a fan controller. In the typical installation, the trigger circuit (86) connects to the 12 v “key” ignition source. The “grey” wire from the EFI system connects to the relay (85). The red wire covered in sheathing labeled Battery from the 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 below.**

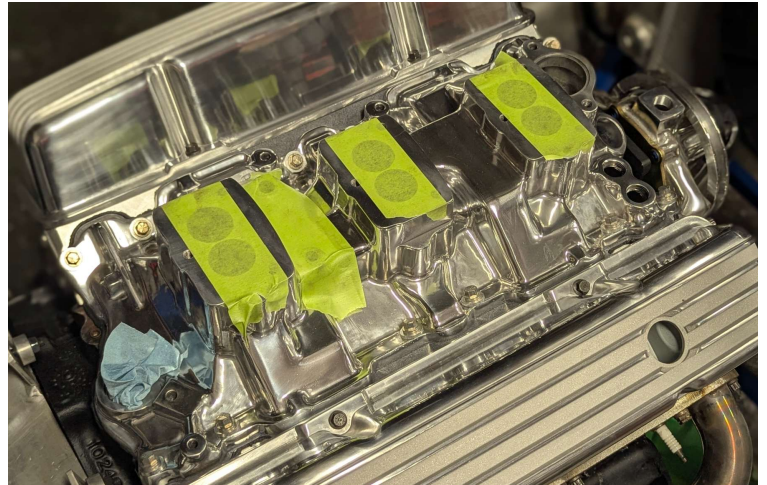
Loose Blue Accessory

The Accessory wire in this system is used as an Air Conditioning Request/Kickup signal input. When connected to the AC compressor wire, this wire senses 12 volt and activates strategies within the ECU. This normally includes activation of the fan regardless of temperature settings, idle RPM change/increase via IAC.

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

- Before attempting to remove existing carburetor(s) make sure the engine has had sufficient time to cool down.
- Before starting the install disconnect the negative wire from the battery.
- Then, remove and tag any vacuum and crankcase ventilation hoses leading to the air cleaner and/or carburetors.
- Tag and disconnect the ignition coil and sensors. Disconnect and remove the existing throttle linkage.
- Remove the gas cap to relieve any built-up pressure in fuel system.
- If required, properly drain the radiator.
- Carefully disconnect the fuel line from the carburetor(s) and plug fuel lines to prevent excess spillage of fuel spray.
- Remove the existing carburetor(s).
- Block the carburetor flange with tape to ensure nothing falls through the intake.



Installing the throttle bodies

1. Remove any covering and clean the gasket mating surface on intake.
2. Place the gaskets on top of the manifold
3. Place the throttle bodies on top of the new flange gaskets on the manifold. Ensure there are no clearance issues before proceeding and that planned linkage and fuel line routing can be achieved,
 - Main throttle body unit contains the Tri-Sensor should be located in central flange location if available
 - Auxiliary throttle body unit(s) contain linkage arms on each end of the throttle shaft
 - It is best to start throttle body install starting with the rear most throttle body for ease of tightening the bolts
4. Install mounting hardware (**see note below**), and snug down progressively in an even pattern (120 in/lb or 10 ft/lb). Depending on your application, this is also the time to install your throttle bracket and transmission kickdown brackets.

NOTE: Although studs can be used for mounting the throttle bodies to the intake, it is highly recommended to use either “jet” nuts (smaller hex head) for the studs or better yet allen head button head cap screws to mount the throttle bodies to the intake. This is due to the extremely tight tolerance surrounding the nut in this area on the throttle body. Regular size hex nuts will be extremely difficult to tighten with a wrench or socket.
5. Review/plan your fuel line installation. Each throttle body has a -4ORB (O-ring Boss) port on both sides of the body for fuel inlets. Either inlet can be used as a fuel inlet but only one inlet to each throttle body from the fuel system is required. Other inlet on throttle body must be plugged. A -4AN to -4ORB fuel fitting along with a -4ORB (O-ring Boss) plug for the other side are included and pre-installed in each throttle body but can be swapped if needed.
6. Linkage should also be installed at this time. Adjust throttle lever arms on throttle bodies as needed. Do not overly tighten completely at this time as later adjustment may be needed to better “sync” the throttle bodies throttles.

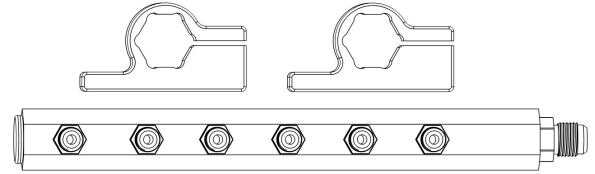
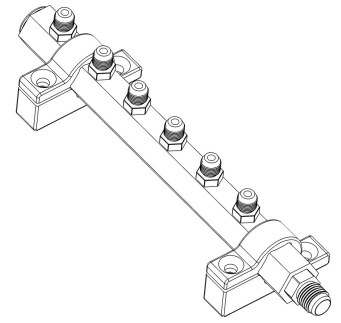
NOTE: Throttle linkage components are not included with this system. Due to the wide variety of intake manifolds, throttle linkage configurations, and vehicle-specific customizations common to these applications, these components must be sourced separately by the installer.



and

Installing the fuel distribution rail

1. Locate a suitable location for mounting the fuel distribution rail.
 - a. Either end of the rail can be used as an inlet and are -6 ORB (O-ring Boss) fittings
 - b. Outlets along the rail are -4 ORB (O-ring Boss) fittings
 - c. Take care not to mount extreme heat sources (headers, exhaust, etc.).
2. Install/mount using the supplied clamps and hardware.
3. Route the main fuel line from your pump/regulator to either end of the fuel distribution rail, plug the other end.
 - a. A 10 Micron filter is required prior to the fuel rail.
4. Route your fuel lines from each of the fuel distribution rail outlets to the fuel inlet fittings on each of the throttle bodies.



Fuel System Connections

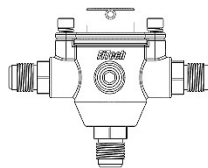
Connect fuel feed and return hoses as outlined. It is mandatory to use regulated fuel delivery system is used. A bypass regulator will have ports that are inlets AND outlets (not individual marked) as well as port designated as a “return” that will essentially “bleed” / controlled leak to bleed off the pressure and return it back to the fuel tank.

Any side port on fuel regulator can be used for inlet from pump AND/OR outlets to the distribution rail / throttle bodies.

NOTE: Fuel pressure should be checked on the inlet fuel line before initial startup during the fuel pump prime. We recommend using a 0-100 psi oil filled gauge, part number 80117. There must be 58psi of fuel pressure entering each of the throttle bodies for proper calibration of fuel flow.

NOTE: After completion of all hardware installation, before initial engine startup, turn key but do not crank, to pressurize the system and check for any fuel leaks.

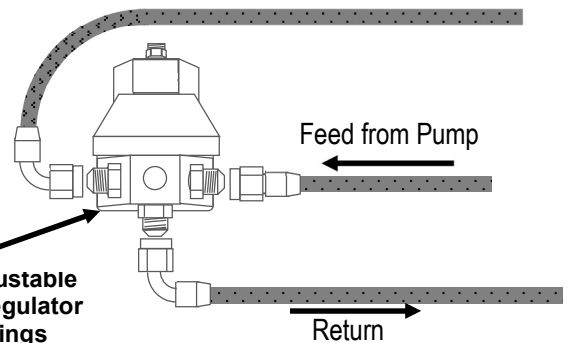
**Fuel Pressure Regulator
Preset 58psi
(non-adjustable)
w/fittings
PN: 54003**



Depending on install method, see previous examples earlier in this manual

- Flow Through: in from fuel rail,
- Dead Head: Out to Fuel Distribution Block or Throttle Bodies

**Dual Output Adjustable
Fuel Pressure Regulator
w/gauge & fittings
PN: 54002**



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 hydraulic jack. Serious injury or death can result from vehicles falling off of jacks. Before working underneath a vehicle, properly support it solidly with jack stands.

IAC Idle Air Controller - General Overview

The Idle Air Control (IAC) valve is a crucial component in controlling your engine's idle speed by regulating airflow into the engine when the throttle plates are closed. It is a electric solenoid that controls air bypassing the throttle plates to keep the engine running when the throttle is closed. As the case with the Vintage 97, when using multiple throttle bodies, the remote IAC kit is required to ensure all intake runners received proper airflow from a single point for optimal idle control.

This guide explains how the IAC valve functions, its role in cold starts and regular driving, and provides instructions for installing and setting up your custom machined aluminum IAC body.

NOTE: Additional fittings may be required for connection to engine, intake, or throttle bodies. Hose is not supplied and will be required for installation. For best performance, use a hose with a diameter no smaller than 3/8" (0.375") for single throttle body, 5/16" for dual throttle bodies or more. Larger ID hose ensures the unit has the proper airflow capacity for use of the entire range of the IAC motor.

How the IAC Valve Works

Stepper Motor: The IAC valve uses a four-pin, computer-driven stepper motor, operating in 0 to 256 steps. The motor controls a pintle valve to manage the air bypassing the throttle plates.

Pintle Valve: The pintle valve, attached to a worm gear, moves in and out as the stepper motor rotates. This adjusts the amount of air entering the engine.

Idle Speed Control:

Increase Idle Speed: The pintle is moved away from its seat, allowing more air to bypass the throttle plates.

Decrease Idle Speed: The pintle is moved closer to its seat, reducing the airflow.

Roles and Functions of the IAC Valve

Cold Starts:

During cold starts, the engine needs to warm up by increased/higher RPM for several reasons. The ECU increases idle speed by allowing more air through the IAC valve.

Regular Driving:

The IAC valve maintains stable idle speed during driving, helping the engine run smoothly and preventing stalling, especially when coming to a stop or sudden closing of the throttle.

NOTE: VACUUM PORTS ON BASEPLATE OF THROTTLE BODIES ARE FOR IAC USE AND SHOULD NOT BE USED FOR POWER BRAKE BOOSTER OR PCV SOURCE. POWER BRAKE BOOSTER OR PCV SHOULD BE CONNECTED DIRECTLY TO THE INTAKE MANIFOLD.



Installing the IAC Idle Air Controller

1. Prepare the IAC Body by assembling the components. Ensure the O-ring is properly installed on the IAC motor between the motor and the aluminum main body. Locate the supplied mounting screws, washers, locking nuts. Consider the following during this time:
 - a. Both ports on unit are -8ORB (O-ring Boss) fittings
 - b. One port (opposite the IAC motor) is for incoming air.
 - c. The side port is for routing air to the engine/throttle bodies.
2. Select an appropriate location to mount the remote IAC unit.
 - a. Ensure that the connector from the main harness reaches the remote IAC motor's connector.
 - b. Using the integrated mounting tabs as a guide, mark hole locations and drill holes for mounting.
 - c. The unit should be mounted so that the main body sits flat on surface by installing the screws, washers, and nuts.
3. Determine the correct fittings needed to connect the IAC unit to the vacuum port(s) on the throttle bodies. **Additional fittings may be required for connection to throttle bodies.** Once selected, install all necessary fittings into the remote IAC body, throttle body, and intake manifold. Connect the vacuum lines to the remote IAC adapter A vacuum hose from each throttle body to the IAC module is required.



Note: Due to the wide variety of intake manifolds, throttle linkage configurations, and vehicle-specific customizations common to these applications, these components must be sourced separately by the installer.

NOTE: DO NOT "TEE" INLINE WITH POWER BRAKE BOOSTER HOSE CONNECTION. BRAKE BOOSTER AND PCV SOURCE CONNECT DIRECTLY INAKE MANIFOLD, NOT THROTTLE BODIES.

Note: For best performance, use a hose with a diameter no smaller than 3/8" (0.375") for single throttle body, 5/16" for dual throttle bodies or more. If hose is to be installed between any distribution block and the remote IAC block, the main hose between the two should be the largest size possible (3/8" or larger) to ensure no flow restriction.

Notes:

- The air filter can be removed if connecting the inlet directly to an engine inlet/air filter before the throttle body.
- Secure the vacuum lines with appropriately sized hose clamps.
- Double-check all connections for tightness and leaks. Ensure the IAC valve is securely mounted and operational.
- One example (shown right) of installation using additional fuel rail (available for purchase separately)

Performance Tips:

- **Airflow:** Use large-diameter hoses to avoid restricting airflow. This ensures the IAC has a full range of control, especially during cold starts and driving.
- **Unfiltered Air:** If routing air from the inlet to the engine, always ensure that it is filtered. Do not run unfiltered air through the IAC unit.
- Follow the proper procedure for setting the idle IAC control settings and engine idle speed on the handheld controller.
- To keep that "Vintage" look, you can use transparent red fuel tubing. The only concern would be to make sure it does not collapse as standard thin-walled clear fuel or vent tubing can collapse under high engine vacuum (especially large inner diameters hooked directly to manifold vacuum). Ensure the wall thickness is rigid enough (95A durometer or greater hardness) to handle suction without pinching shut.
- **DO NOT USE GENERAL FUEL HOSE AS IT CAN COLLAPSE CLOSE.**



Coolant Temperature Sensor Installation

The Coolant Temperature Sensor should be threaded into one of the ports in the intake manifold closest to the thermostat. The sensor threads are 3/8"-NPT. In some cases, the intake manifold may have a 1/2"-NPT so the supplied pipe reducer may be used. 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. **Do not** install the sensor in the thermostat housing, or in an area that will not see a constant flow of coolant. Once installed, route the Yellow/Black CST wire lead from the main harness to the sensor. Snap the connector onto the sensor.



Oxygen Sensor Installation

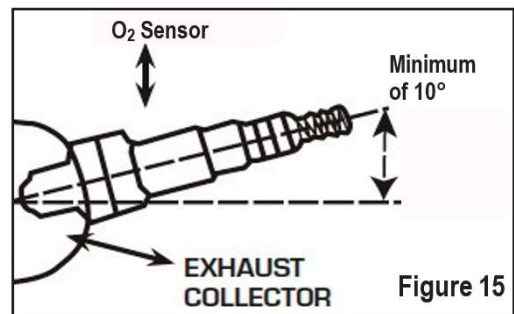
Your vehicle may already have an O₂ sensor bung welded into the exhaust. This bung location needs to be verified before using it with the oxygen sensor included in the Vintage 97 kit. Ideally the bung will be 2-4 inches after the collector or in the collector for a true reading of all cylinders. You 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 exhaust pipe so moisture cannot be collected into the oxygen sensor.

The O₂ Sensor must be at least 18-inches from the exhaust tip and port. It will not work on "zoomie" style headers. The supplied O₂ Sensor can be installed in either exhaust bank. The sensor cable connects to the O₂ 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. 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 before any opening (if installed on open headers).
- B. The clamp-on kit installation requires a 3/4" hole to be drilled in the exhaust system.
- 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.

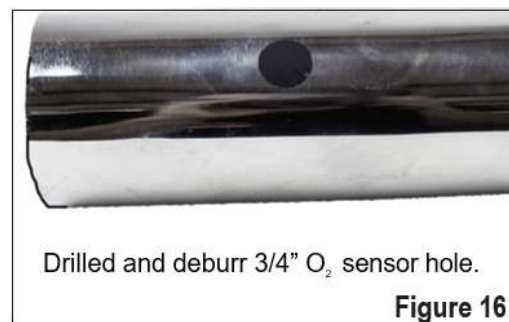
NOTE: Verify that the O₂ cable is supported correctly and away from heat sources such as exhaust. If the O₂ cable has melted it is not covered under warranty and will require the harness to be replaced at the customer's cost.

Never position the sensor on the outside of a bend in the tubing as this can cause premature failure of the sensor due to increased constant heat.



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

F. The supplied bung kit can either be welded in place or clamped onto the pipe, see figure 17. **NOTE: DO NOT WELD WITH SENSOR IN PLACE.** The clamp-on style works well and will not leak. Place the gasket on the exhaust pipe, then the threaded bung casting on the gasket. 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. If welding a bung on, make sure the bung is welded completely all the way around and does not leak.



G. Install the sensor into the bung, see figure 18. The sensor comes with a small amount of anti-seize on the threads of the O₂ 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: Never start or run the engine without the oxygen sensor connected to the O₂ connector on the main harness and the EFI system is fully operational or damage will occur to the sensor. If it is not plugged in and powered by the ECU, it may be damaged due to excessive carbon build up (i.e. not powered on to be able to "burn" off the carbon from the sensor element). Never run the engine with the O₂ sensor in open air, outside the exhaust. If you need to plug the hole temporarily, use an O₂ sensor plug or a spark plug with an 18mm thread.

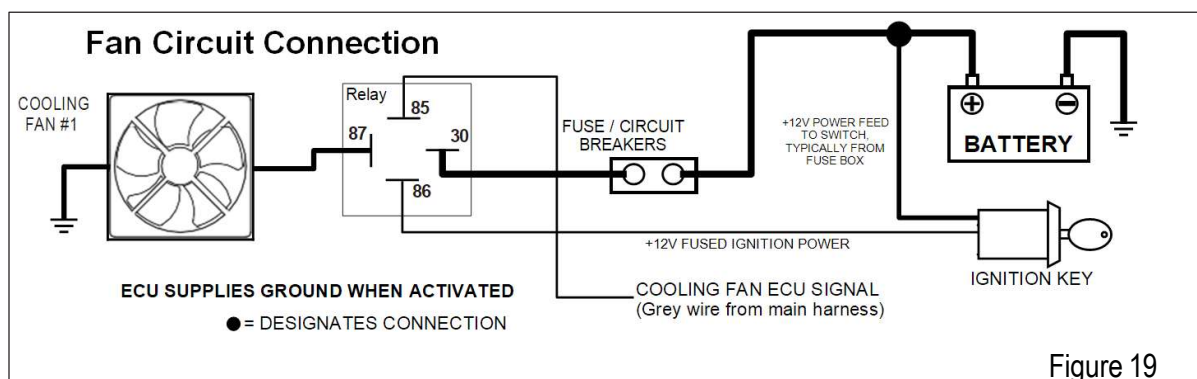
Air Leaks

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.**



Fan Circuit Wiring Connection

The fan wire is a low current ground side trigger and must go to a relay to trigger the fans on. This replaces the thermal switch from a fan controller. In the typical installation sample below, the trigger circuit (86) connects to the 12 v "key" ignition source. The "grey" wire from the EFI system connects to the relay (85). The red wire covered in sheathing labeled Battery from the 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 below. See "Fan Setup" later in this manual for proper instructions on setting up the fan on/off settings in the handheld controller.



Ignition System Overview

The Vintage 97 systems are designed to be highly versatile, supporting nearly all traditional ignition systems, including standard points, electronic ignitions, HEI distributors and applications where a CDI box is installed. The level of integration depends on whether you want the Vintage 97 ECU to control your ignition timing **and** fuel **or** just manage the fuel.

- **Fuel-Only Control:** If you want to keep your current distributor's mechanical and vacuum advance systems, the Vintage 97 system only needs an RPM signal (Tach Signal) to the Loose Brown "Tach In" wire on the main harness. In this setup, you will get a tachometer signal from the negative side of the ignition coil (when no CDI is used), from your distributor (HEI or Ready-to-Run units), or from the tach output terminal/wire on a CDI box. Settings in the handheld controller will then need to be setup to match this requirement.
- **Fuel Control AND Timing Control:** For the best choice for better performance, idle stability, cruising efficiency, and overall system use, it is recommended to allow the Vintage 97 system manage your timing curve. When using with timing control, the Vintage system will control the ignition timing per the settings within the ECU programming. In this case, the ECU needs an RPM signal via the 2 pin "Crank" connector on the main harness and will use the Loose Yellow "Coil" wire on the main harness to trigger either a coil (when no CDI is used) or to trigger a CDI box via the CDI box points input wire. In this setup, RPM given to the ECU by the distributor and the ECU will trigger the coil or CDI box based on the ECUs timing map. Settings in the handheld controller will need to be setup to match this requirement.

When Timing control is desired, it requires specific distributor setups:

- **Two-Wire Distributors:** The Vintage 97 system can read a 2-wire VR (Variable Reluctance Magnetic Pickup) signal directly, using the 2 pin "Crank" VR connector on the main harness. It is required to lock out the distributor's mechanical and vacuum advance as the ECU along with the installed MAP sensor will control all timing aspects through the entire RPM and vacuum range.
- **HEI Distributors:** Vintage 97 supports HEI systems, though the installation and wiring details depend heavily on the specific model.
- **CDI Boxes:** If you run an external CDI (Capacitive Discharge Ignition) box, the Vintage 97 unit can still control the timing, sending the signal directly to the CDI rather than the coil. In this case, a Two-Wire Distributor is used and plugged directly into the Vintage 97 main harness
- **Ready-To-Run Distributors:** A 3 or 4 wire Ready-To-Run Distributors **are typically not recommended** for timing control use. Although it works fine, as typically wired, for fuel only control, wiring for timing control is slightly different than that of a non-timing control use.

Ignition Setup Considerations

Setting the ECU: You must correctly configure the handheld controller's "**Engine Setup**" to either **Tach** (for RPM signal from brown wire) or **VRCoil** (for 2-wire distributors using the two-pin crank connector lead **AND** yellow "**Coil**" wire for output trigger).

Interference (RFI): Because EFI systems are computer-controlled, it is critical to use quality radio-suppression spark plug wires (like the FiTech Go-Spark Ceramic Wires) to prevent electrical noise from corrupting the ECU.

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.

See "**Ignition / Distributor Setup and Installation**" later in this manual for proper instructions on wiring and setting up the desired ignition type in the handheld controller.

Handheld Controller Basics

The handheld is what is used to make changes to the calibration (settings, parameters, AFR targets, idle speed, spark tables, etc.) and for viewing what's going on in your system. It is not required for operation after you've performed the required initial setup and basic tuning. You can disconnect it and put it in the glove box after things are running well. Don't leave home without it, though - if you find a problem and want to see what's going on – you'll want to have it handy!

The handheld controller can be operated using either of the following methods:

- **Touchscreen** – Navigate menus and make selections directly using the touchscreen.
- **Directional Pad (D-Pad)** – Use the Up, Down, Left, and Right arrow buttons to navigate menus, then press the **OK** button to confirm selections.

Note: USB C Ports- 2 connection options (one directly in case and one on a dongle to avoid connector damage on controller).



Buttons/Navigating

The soft buttons on the right are for navigating menus, changing values, and sending values to the “ECU” (computer, brain, the thing that actually runs the engine). You'll see that there are left, up, right, down, (←↑→↓) and OK buttons.

If you want to use the arrow pad to navigate BACK, just hold the UP (↑) button for 2 seconds.

If you want to scroll down by ones, click DOWN (↓), and up is UP (↑).

To adjust calibration values, or to make a value be Large or Show or Hide (from various menus), use the LEFT (←) and RIGHT (→) arrows. On calibration values, holding LEFT (←) or RIGHT (→) will quickly adjust the values. Remember that the just-changed calibration values need to be “sent” to the ECU by clicking OK, or tapping “Send to ECU” on the screen (and receiving the “Sent to ECU Succeed” message – and the Ignition Key must be ON to allow this to occur – otherwise it will not send the changes. Most changes can be done on the fly. All changes are permanent after the key is turned off for about 15 seconds (the ECU goes through an IAC reset, and then does the memory rewrite. Some special modes are not saved – such as TPS Zero mode – they always reset to off after a power cycle.

Disconnect if Storing Vehicle

It is recommended that the handheld be disconnected if the vehicle is to be parked for more than a few days. There is a small current drain when connected (even with the screen blanked out). Disconnecting the vehicle battery is also an OK way of preventing such drain. The Vintage 97 ECU will retain its memory and learning, even with battery or handhelds disconnected, as long as its were allowed proper time to save the settings with the key off and battery connected.

Making changes (Tuning)

When trying to change parameters on a FiTech system, it's important to be connected to the vehicle with the ignition switch on. It is also important to send (**press OK**) on each parameter that is changed, individually. This method was chosen to avoid accidental changes made while scrolling menus, and to build the habit to be deliberate with the change.

Dashboard (View Live Data)

Dashboard will show the most common typical data of what's happening with the system. You can scroll down it to see all that is going on. You can even record what's happening by simply pressing the OK button, or Log On button. These log files are stored on the handheld, and can be retrieved by taking the handheld to a laptop, connecting it via the USB-C connectors and following the instructions in the "Retrieve Log Files" section.



LARGE Gauges (View a Mini-Dash Panel)

Large Gauges will allow up to 4 parameters to be viewed in a large font. To select which items are shown, just set the value on the right to be "Large". If you try to select more than 4 items, it won't allow it, so you'll need to set a Large item to "OFF" before you can select a new item to show.



Reading and Clearing Faults (Fault Code menu)

Entering this menu will show any LONG TERM SAVED CONFIRMED FAULTS. When fault conditions are first detected (maybe a sensor voltage is out of range), it may take a few moments before it is determined to be a long-term fault. Once detected as a long-term fault, it takes many power cycles before stored faults are automatically erased from the ECU memory. If you'd like to erase any recorded faults, click "OK" or tap "Clear" from within the Fault Code screen. If

the faults show up again, then you'll know there is something that needs to be addressed. Some faults, such as FAN Relay faults may show up if you haven't properly set up the system to tell it that you're not using the ECU to control the electric fans. Some systems will show a coil fault if connected to a CDI box (this is normal as CDI box doesn't have the same resistance as a coil).



Writing Calibrations (Write Cal to ECU)

When setting up a FiTech system or when going back to a backup calibration, you'll need to use the "Write Cal to ECU" function. This needs to be done with the ignition switch on, while connected to the system. If you've written a default calibration to the ECU, you WILL need to do the initial setup again as values will be set back to generic default factory settings. Key points in initial setup would be Engine size, cam selection, desired warm idle speed, and on some systems – which type of RPM input is being used (Tach or 2-wire) etc.

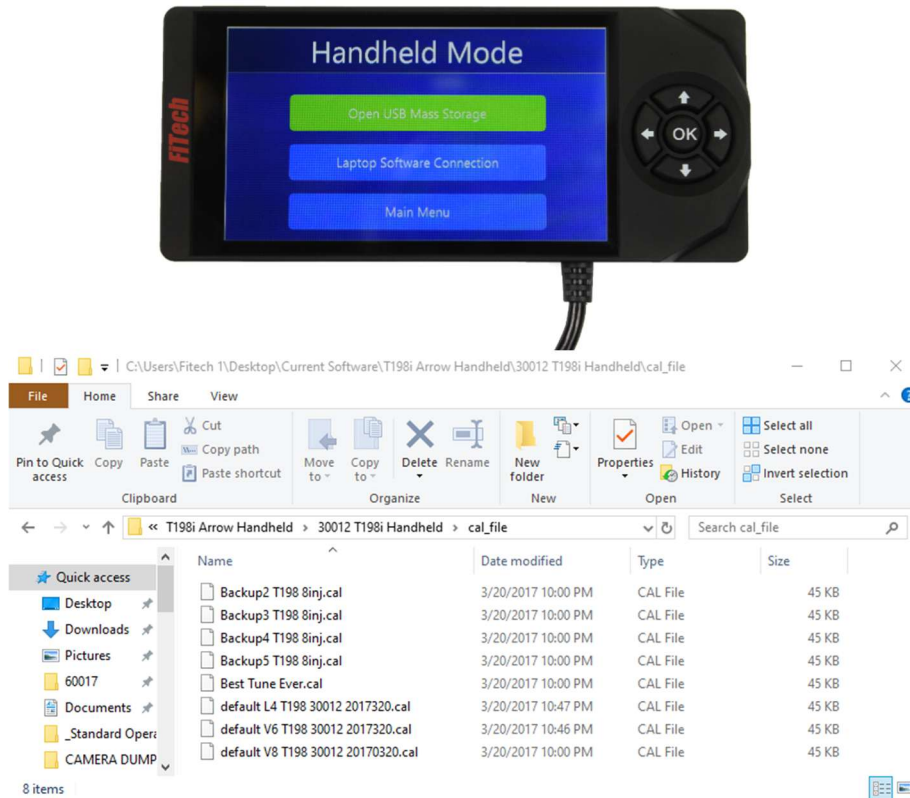
Reading Calibrations (Read Cal from ECU)

When you've made some changes to your calibration, and want to create a backup, it's a good idea to do a "Read Cal from ECU" to save the calibration to your handheld's memory card. It's recommended to do this every few months or after making an improvement that you want to keep.



Renaming Calibration Files on Laptop

The file names can be changed by connecting to a laptop, and manually changing the file name of the backup calibrations. They can also be copy and pasted and renamed (like if you want to switch between E85 and straight gasoline regularly, you might want separate tunes for things like starting, spark, accel pump, and target AFR). There is almost no limit to the number of calibration files that can be saved in this folder but pay attention to not make the file name too long. Using the word “default” at the beginning of a calibration file will prevent being able to READ cal from ECU to that file anymore, if you want to protect a particular file – but they can still be written.



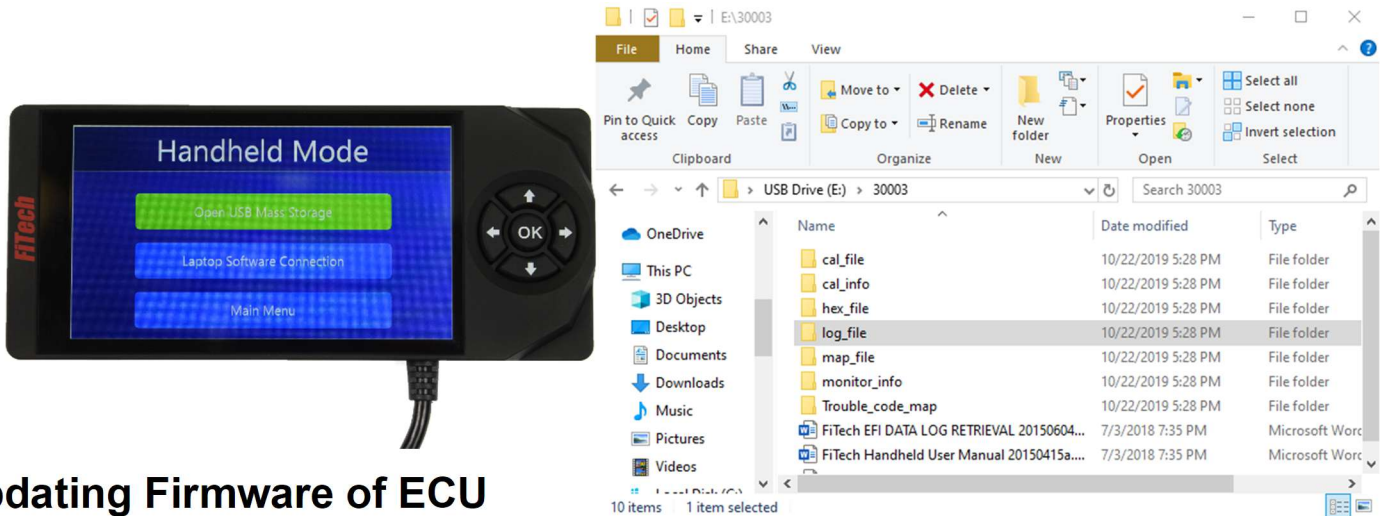
Making Log Files (Dashboard and Data Logging)

In order to record the telemetry data (the numbers that show up when communicating with the ECU) of an open menu such as Dashboard or any group in the Data Logging menu, just press OK or tap “Log On.”



Accessing Log Files (Connecting to a laptop)

Everything in the group will be recorded to a .csv (comma separated values) file that can be viewed in any spreadsheet software, or viewed by the FiTech laptop software. To get the files from the handheld onto a laptop, you'll need to first connect the handheld to a laptop with the provided USB C type cable, and from the bottom of the handheld menus – “Handheld Software mode Selection” there is “Open USB Mass Storage”, and from there – the folder for the handheld should appear on the screen of the laptop, or be accessible from the File Explorer on your laptop as something like drive D: or higher if you have other drives attached. In the part number folder (for example, 30004), you should be able to find the log_file folder, and in there another folder differentiating which menu the data was recorded from.



Updating Firmware of ECU

At any point, FiTech may release new, improved, or bug-fixed versions of handheld software (xxxx.bin file). This file will need to be placed in the handheld’s “sys_bin” folder that is inside the “share” folder on the handheld drive (connect handheld to a PC with the USB cable, and select “Handheld Software mode Selection” and “Open USB Mass Storage” to allow the PC/laptop to access the memory card on the handheld). Once the file is on the handheld, reset the handheld by pressing OK, or disconnecting and reconnecting the USB cable, and scroll down to “Display Setup” and make sure “Handheld Software Reboot” is set to “Show”. Then back out to the main menu and scroll down to “Handheld Software Reboot” and select it, and choose the new version of .bin file that you placed in the “sys_bin” folder. Confirm with yes that you want to update the software version, and the handheld will go through the reboot procedure. Please make sure to not disconnect the USB power to the handheld or press any buttons during this operation.

In the event that an ECU firmware is released, with more features or bug fixes, you can use the handheld to update the ECU. There are 2 types of updates:

For Bug Fixes Only

Bug fixes – which will KEEP THE SAME VERSION NUMBER, but UPDATE LETTER Version (such as T198i goes to T198L) – these DO NOT require updating the handheld configuration files, such as those in the “cal_info” “monitor_info” and “cal_file”. The calibration files in the ECU can be saved by the “Read Cal from ECU” function to a backup calibration file, and rewritten to the ECU after the firmware update, using the “Write Cal to ECU” function.

For Upgrades

Upgrade versions – these will have a NEW VERSION NUMBER but may have a lower Letter number (i.e. T198i is to be replaced by T199A). These upgrades will require a complete handheld configuration file replacement.

After obtaining the updated software (.hex file is what goes into the engine or transmission controller), and saving it to a known place on your laptop, you'll need to transfer it to the handheld with the supplied USB C cable. The target file location on the handheld will be the “hex_file” folder within the part number folder of your system. Place the “xxxxxx.hex” file into the hex_file folder, and return to the vehicle to program the ECU.

Sending/Saving Changes to the ECU

When making calibration or configuration changes through the handheld controller, follow the procedure below to ensure the changes are properly stored and saved in the ECU.

1. Turn the ignition key **ON**.

The ignition must be in the ON position whenever making changes to ECU settings through the handheld controller.

2. Sending/Saving each change to the ECU.

After modifying any parameter, press the OK button to transmit the new value to the ECU. A confirmation message, "**Sent to ECU Succeed**" will appear, indicating the value has been successfully received.

Important: Simply changing the value and navigating to another parameter **does not** save the change. Each individual parameter must be confirmed by pressing **OK** before moving on.

3. Cycle ignition power to permanently save changes.

Once all desired changes have been transmitted, the ignition must be cycled to permanently store the calibration within the ECU.

- Turn the ignition **OFF**.
- Wait approximately **15–20 seconds**.
- During this time, the handheld controller will remain powered while it completes the programming process.
- Verify the save process is complete by viewing the **Dashboard** screen. When all values in the Value column disappear and become blank, the **ECU** has completed the save process.
- **Do not** immediately turn the ignition back **ON** after switching it **OFF**. Allow the handheld sufficient time to complete the programming sequence.

4. Restart the system.

Once the Dashboard values have disappeared, turn the ignition back **ON**. All changes have now been permanently stored in the ECU.

5. Battery disconnect.

After the save process has been completed, the vehicle battery may be disconnected without affecting the stored calibration.

Note: Every parameter change requires pressing the "**OK**" button before it is transmitted to the **ECU**. **Failure** to confirm a change without using "**OK**" will result in that parameter remaining unchanged, even if you navigate away from the screen.

For additional information and complete handheld controller definitions, visit the Support > Tech Center section at www.fitechefi.com.

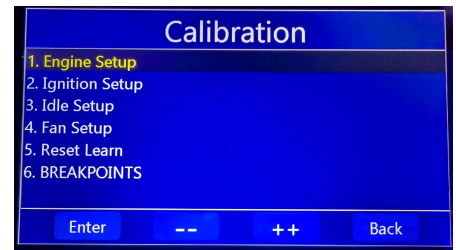
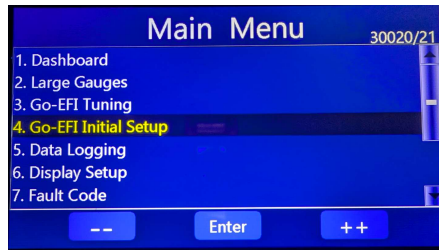
At this point you have made all of the selections you NEED to start your engine! BUT WAIT!!!!. Please turn your key to the OFF POSITION and wait for about 30 seconds for the ECU to store these changes. This is a one-time setup and the changes are permanently stored in the ECU even if you disconnect the 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.

Initial programming

This simple procedure is performed using the Handheld controller. A laptop computer is NOT required. the below steps will be performed;

1. Connect the ECU to the main harness and supply power but do not crank.
2. Input the basic engine parameters such as # of Cylinders, Cubic Inch Displacement, Cam size, Target Idle speed warm, RPM limit, and Ignition Selection (more detail on each of these over the next few pages).
3. Once done with all the steps, 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.

Home screen, always shown during initial power up of handheld. Press **"OK"** on D-Pad or touch the **"Home"** icon in top right corner to enter **"Main Menu"**. Once in Main Menu, press the down arrow on D-Pad and select **"Go-EFI Initial Setup"**, press **"OK"** on D-Pad. Press the down arrow on D-Pad and select **"Engine Setup"**. This will take you to the "Calibration" page to allow you to perform your **"Engine Setup"**



Handheld: Initial "Engine Setup"

The below settings will setup the appropriate VE fueling table to use as a base fuel map.

NOTE: As noted previously, after modifying any parameter, press the **OK** button to transmit the new value to the ECU. A confirmation message, "Sent to ECU Succeed" will appear, indicating the value has been successfully received. Important: Simply changing the value and navigating to another parameter does not save the change. Each individual parameter must be confirmed by pressing OK before moving on.

1. Tach or 2Wire+Coil - (see the following pages to setup your ignition system)
2. Cylinders - Factory preset is 8. This should be set to match the number of cylinders for the engine being used.
3. 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 button to enter). Sent and Succeed message will appear. This should be set to match the total engine displacement of the engine being used.
4. 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 as a good starting point!

IMPORTANT NOTE: Cam selection is based on vacuum load of the engine at idle. 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 only guideline estimates and it is not uncommon to have to switch between settings if the vacuum load is between two different cam settings to get the engine to run better for your application.

5. Rev limit RPM – This is a fuel cut (and spark cut if using timing control).

NO.	Engine Setup..(online)	Cyl
01	Tach or 2Wire+Coil	TACH
02	Cylinders	8
03	Engine CID	350
04	Cam Mild-Wild 1-4	2
05	Rev Limit RPM	7000
06	Idle RPM Warm	800

Read Edit Send Dash Help Back

NO.	Engine Setup..(online)	Cubes
01	Tach or 2Wire+Coil	TACH
02	Cylinders	8
03	Engine CID	350
04	Cam Mild-Wild 1-4	2
05	Rev Limit RPM	7000
06	Idle RPM Warm	800

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NO.	Engine Setup..(online)	Combo
01	Tach or 2Wire+Coil	TACH
02	Cylinders	8
03	Engine CID	350
04	Cam Mild-Wild 1-4	2
05	Rev Limit RPM	7000
06	Idle RPM Warm	800

Read Edit Send Dash Help Back

Ignition / Distributor Setup and Installation

Once Engine setup is completed, you will need to confirm/change settings for the ignition system type you will be using. If you are not planning on using timing control (i.e. using as standard vacuum/mechanical advance distributor and standard coil), hit the back button and return to the Calibration menu as the system is already defaulted and setup from the factory to this type of ignition system (Non-Timing Control use). For confirmation of these settings within the handheld along with proper wiring, see the below. **If you are running Timing Control skip to the next section on setting this type up.**

Ignition Setup/Wiring For Fuel Only Control, Non-Timing control use

This tach input wire supplies RPM signal to the system when timing control is not being used. This is how the system receives RPM signal from the ignition system. Isolation of this wire is crucial.

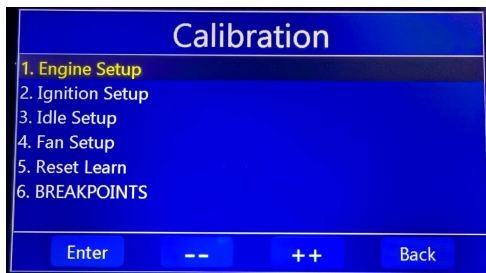
For typical use without timing control, the following wiring and settings will be used. This is the default method for the Vintage 97 systems so no changes are needed but can be reviewed for confirmation or for future reference.

1. **With no CDI Box** is installed, connect the brown “Tach In” wire to one of the below areas:
 - a. Negative side of ignition coil**WARNING: DO NOT** hook to the brown “Tach In” wire to the coil when using a CDI ignition
 - b. Tach output signal for ready-to-run distributor
 - c. Tach output terminal on HEI distributor.
2. **With CDI Box** is installed, connect the brown “Tach In” wire to the tach output circuit on the box.
3. In the Initial “Engine Setup” menu, the “Tach or 2Wire+Coil” setting should be set to **“TACH”**

WARNING: DO NOT hook to the brown “Tach In” wire to the coil when using a CDI ignition as damage will occur to ECU. 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. Isolation of this wire is crucial. **DO NOT** loom with harness or any other wires.

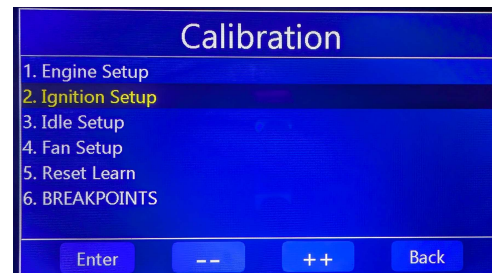
Below shows the two areas within the handheld for the above settings.

- Under 1. Engine Setup→ 01 Tach or 2wire+Coil – Needs to be set to **“TACH”**
- Under 2. Ignition Setup→ 02 RPM from TACH – Needs to be set to **“On”**



NO.	Engine Setup..(online)	Option
01	Tach or 2Wire+Coil	TACH
02	Cylinders	8
03	Engine CID	350
04	Cam Mild-Wild 1-4	2
05	Rev Limit RPM	7000
06	Idle RPM Warm	800
07	Ignition Flash #	36.0

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NO.	Ignition Set..(online)	val
01	Lock Timing to set	unlocked
02	RPM from TACH	On
03	Crank Edge Interrupt	Falling
04	COIL Driver	Off
05	Distr Base Timing	13.1
06	Locked Spark adjust to	30.0
07	Spark Timing	00.100.100

Read Edit Send Dash Help Back

Ignition Setup/Wiring For Timing control

The Ignition timing control can be used in two configurations, with a CDI type box, or standalone with a two wire magnetic pickup distributor. Setup is the same with both configurations, with the only change being where the **yellow “Coil”** wire is connected. In these configurations, the RPM is received via the use of a two wire magnetic pickup distributor. The **yellow “Coil”** wire then triggers the coil directly **OR** triggers the “Points” input wire on the CDI box that then fires the coil. In any case, for optimal use, the distributor needs to have **both** mechanical and vacuum advance features **LOCKED OUT**. This is to ensure the commanded timing is the actual timing the engine sees. Ensure this is done before installing the distributor. Some distributors can be locked out as noted by their instructions –removing the drive gear and flipping the top side. Be sure to follow manufacturers instructions.

WARNING: DO NOT hook to the yellow “Coil” wire to the coil when using a CDI ignition as damage will occur to ECU

With CDI type box or a standalone two wire magnetic pickup

1. Connect yellow “Coil” wire to:
 - a. With CDI Box, connect to the white “Points” input trigger wire (confirm color by CDI box manufacturer)
 - b. Without CDI Box connect to the negative coil terminal. This should be the only wire going to the coil other than any other wire being used for tachometer on vehicle.

WARNING: DO NOT hook to the yellow “Coil” wire to the coil when using a CDI ignition as damage will occur to ECU

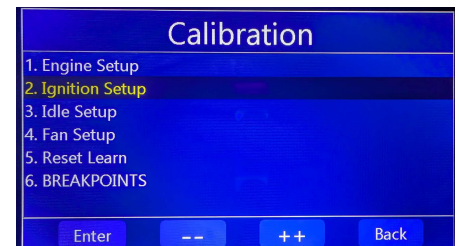
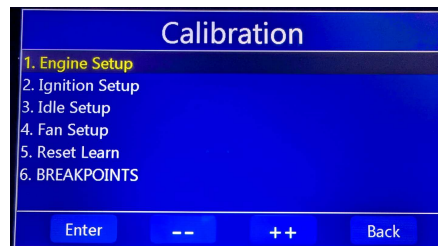
2. Install the distributor into the engine. Leave loose as you will setup per the following the process over the next few pages to properly “phase” the unit.
3. Connect the distributor 2-wire to the FiTech unit’s 2-wire distributor input (2 pin white connector labeled “Crank”. This contains both a Blue and a Yellow wire in sheathing and it located as a branch off the main harness.

NOTE: Expected polarity for ECU from distributor is **Blue= Mag Negative (-)** **Yellow= Mag Positive (+)**.

You may need to change/swap the terminals on the connectors to ensure the polarity that the distributor is set for matches the polarity that the ECU is expecting.

4. Change the settings in the ECU via the handheld to the following:

- Under 1. Engine Setup→ 01 Tach or 2wire+Coil – Needs to be set to “**VRCOIL**”
- Under 2. Ignition Setup→ 02 RPM from TACH – Needs to be set to “**OFF**”



NO.	Engine Setup..(online)	Option
01	Tach or 2Wire+Coil	TACH
02	Cylinders	8
03	Engine CID	350
04	Cam Mild-Wild 1-4	2
05	Rev Limit RPM	7000
06	Idle RPM Warm	800

Read Edit Send Dash Help Back

NO.	Ignition Set..(online)	val
01	Lock Timing to set	unlocked
02	RPM from TACH	On
03	Crank Edge Interrupt	Falling
04	COIL Driver	Off
05	Distr Base Timing	13.1
06	Locked Spark adjust to	30.0

Read Edit Send Dash Help Back

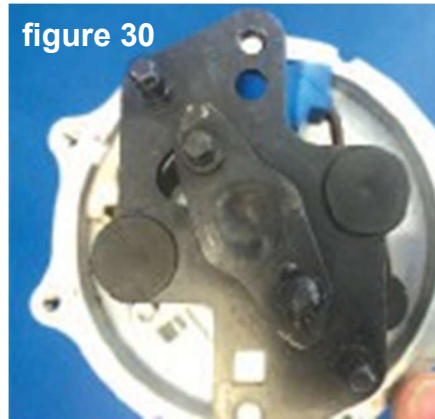
NOTE: In Ignition Setup, take note of #05 Distributor Base timing value. This is the timing you want your engine to idle at (For example, 13 degrees at 750 rpm). 13.1 is the default value. This typically does not need to be changed as it is a great starting point.

NO.	Ignition Set..(online)	val
01	Lock Timing to set	unlocked
02	RPM from TACH	On
03	Crank Edge Interrupt	Falling
04	COIL Driver	Off
05	Distr Base Timing	13.1
06	Locked Spark adjust to	30.0

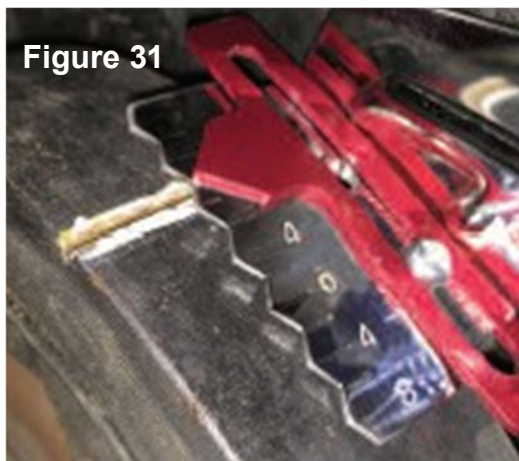
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Ignition Distributor Setup For Timing Control

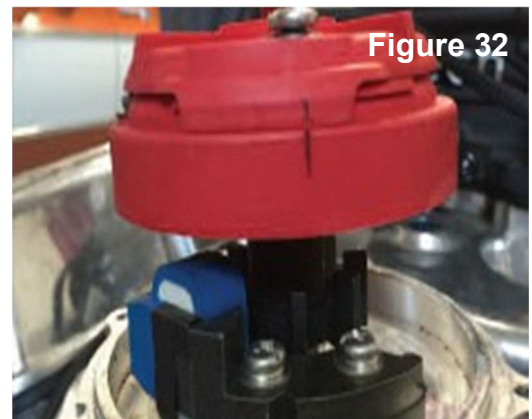
1. The “Distr Base Timing” mentioned in previous section is the spark timing that the engine will be cranking at, and also represents the minimum spark advance the system can allow. 13.1 degrees might be a good starting point
2. Using a phaseable rotor, advance it about $\frac{3}{4}$ of the width of the brass tip. Use Loctite to keep the screw tight – it will back out if you don’t.



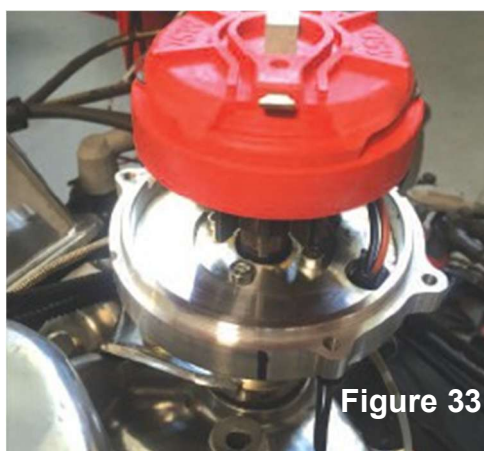
3. Put the engine at about 13 degrees BTDC, and move the distributor with the cap off to see that a tooth on the trigger lines up with the pickup sensor.



Timing Pointer at 13° before Top Dead Center



Aligning your rotor



Aligning your cap

4. **These next steps are assuming all other installation is complete. If your installation of the Vintage 97 system is not to the point of being able to start and run the engine, stop and complete all other processes before proceeding.**
5. Start the engine, with timing light connected, distributor clamp loose enough to adjust but not moving by itself.
6. With the handheld in view, to **"Initial Setup"** and then **"Ignition Setup."** Set **"Lock Spark to Adjust"** to **LOCK**. Press **"OK"** on D-Pad to 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 timing mark lines line up on balancer and timing pointer.
7. Key off on the vehicle. Tighten down the distributor clamp and now the engine is synced with the EFI. The system will automatically unlock.
8. Now you can use the handheld to put in other spark advance values in the **"SPARK MAP"** in Go-EFI Tuning section of the handheld.
9. 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.
10. 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.
11. 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.
12. 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 in the **"SPARK MAP"** section to make Knock/Ping go away. Most Engines are OK with 3000rpm 45kPa Cruise spark advance in the high 30's to low 40's, and WOT timing at 1100rpm being around 10-15 (but listen for knock at these low RPMs and adjust accordingly), and WOT at 3000rpm to be around 28-32 degrees, and WOT 6000rpm at 30-36 degrees.

Do not get overly aggressive with ignition timing as serious engine damage can occur.

Surging is NOT common – make sure you're not misfiring – burned wires, etc... and maybe needs a touch richer AFR at 1100rpm 45kPa (don't go richer than 12.9 in that area). Backfires on acceleration are not common – this may mean the ignition timing is too far retarded, or that the ACCEL PUMP fueling needs some adjustment. Exhaust pops during deceleration are common and typically not much can be done. One thing to look for is to insure you have no leaks upstream (between exhaust valve and o2 sensor) of the o2 sensor as this can cause false lean readings by the O2 sensor that can cause extreme popping during deceleration.

Fan Setup

The Vintage ECU has the ability to control one Cooling fan relay. The control settings are found under #4 Go-EFI Initial Setup-> #4 Fan Setup

On the Fan Setup page, the following are options:

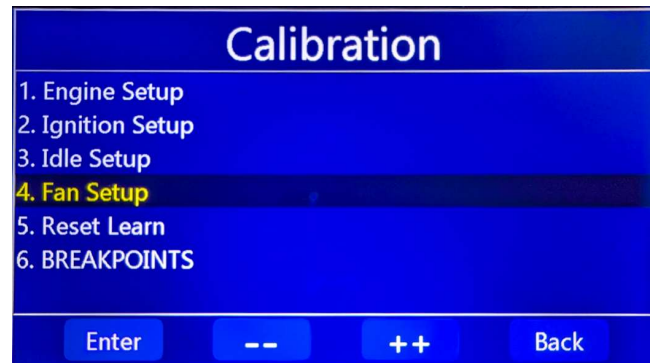
Fan Enable: If using an electric fan, select **Enabled**, if not using an electric fan, select **Disabled**. Be sure to press the “OK” button to send the change to the ECU

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 “ON” temperature, press the “OK” button send to ECU. Idle speed will increase slightly when fan is activated. Idle speed increase is not user programmable in basic calibration.

#2) **Fan 1 OFF Temp** - Enter desired “OFF” temperature, press the “OK” button send to ECU. 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.



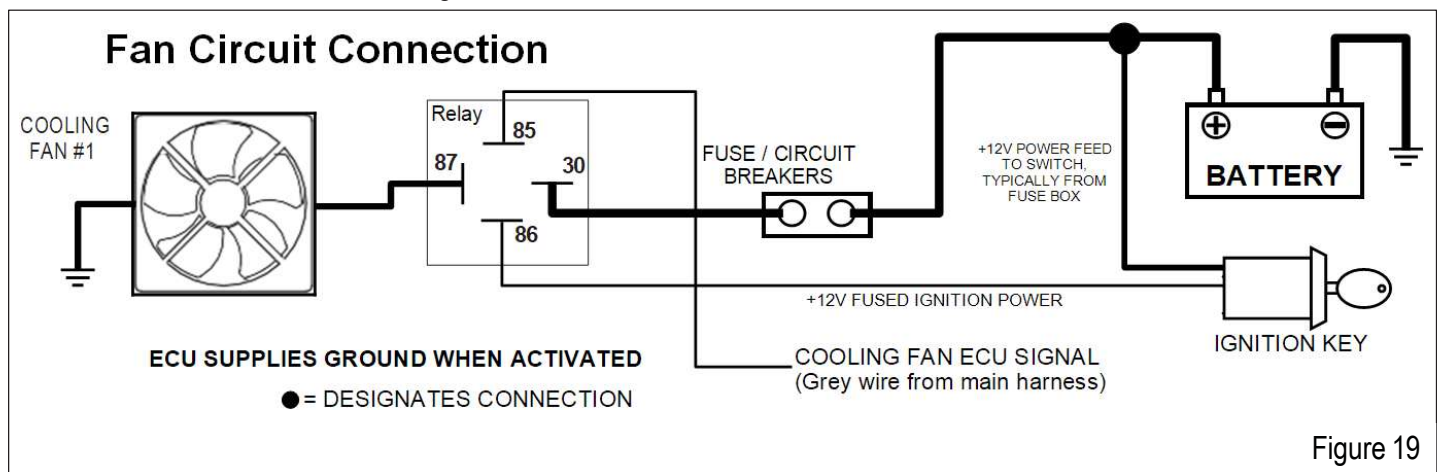
NO.	Fan Setup..(online)	Option
01	Option Fan Enable	enabled
02	Fan ON Temp	174
03	Fan OFF Temp	170

Read Edit Send Dash Help Back

Fan Circuit Connection

The fan wire is a low current ground side trigger and must go to a relay to trigger the fans on. When activated by the ECU settings, this wire supplies a ground to activate the relay. This replaces the thermal switch from a fan controller. In the typical installation sample below, the trigger circuit (86 terminal) connects to the 12 volt “key” ignition source. The “grey” wire from the EFI system connects to the relay (85 terminal). Typically, a large supply power wire will route from (30 terminal) relay to the positive terminal of the battery. Lastly, the (87 terminal) on the relay goes to the fan. It is crucial that the battery and the fan are grounded. See figure 19 below.

Note – Fan relay is not provided by FITech. You must select and use an appropriately sized relay to match the electric fan current draw. Circuit should be fused according to fan/circuit demand.



WARNING: DO NOT CONNECT GREY WIRE FROM MAIN HARNESS DIRECTLY TO FAN WIRES OR ECU DAMAGE WILL OCCUR. THIS IS DUE TO THE HIGH CURRENT DRAW FROM THE FAN. A RELAY MUST BE USED. THIS WIRE IS MEANT TO CONTROL THE FAN RELAY, NOT THE FAN.

Preparing to Start Your Engine:

IMPORTANT: Read the 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, fuel filters and fuel regulators. Do this several times to ensure that 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.

Remember that there is air in the fuel lines and you may need to purge that out so it may take a few extra key on cycles to "prime" the system completely. Also, if you have installed the surge tank (such as a FiTech Force Fuel System) you must follow the priming instructions to properly fill your surge fuel tank).

Turn your key to the **"ON"** position and listen for a CLICK coming from the throttle body injectors. This is the injector squirting a small amount of fuel into the engine and getting the engine ready to go. Although you can do this a few times, keep in mind that it will be squirting fuel into the engine.

Excessive amounts of key cycles in a short period of time can flood the engine similar to continuous pumping of the pedal as in a carbureted application. If nearing the opportunity to start the engine after this case, the end user can hold the gas pedal wide open and this will initiate a "Clear Flood" process in the ECU where during any additional ignition key cycles it will not perform the "prime" shot until the pedal is released.

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 the electric fan 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. 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 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 bodies 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 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, Running and Idle Speed Adjustment

Crank the engine over and look for an RPM signal on your Dashboard window on the handheld controller.

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 may be air still in the fuel lines/throttle bodies. Also take note if there is and isn't RPM values showing on the dashboard as this may indicate an incorrect Ignition setup/settings/wiring.

With the engine now running, once again check for leaks or anything of major concern. A slightly high idle is OK initially but may need to be adjusted later. Typically, it is best to adjust these screws to a slightly more open position to start with. This will allow the engine to start at a high idle, which will make adjusting the IAC easier.

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.

If idle is indeed still too high, confirm the throttle cable is adjusted to allow the lever arm to rest on the base idle screw of each throttle body and the cable is not holding the blades open.

Once the engine is in a warmed up state, it will be necessary to "sync" the throttle bodies so that each one open and close to the same amount. After which it will then be required to adjust the idle screws slightly to allow proper control by the IAC. This needs to be set so that the IAC valve 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.

IAC / Idle Speed Setup

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.

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 bodies. 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 screw 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 Vintage 97 EFI System contact us (951)-340-2624, email us at techmail@fitechefi.com or go online to www.fitechefi.com under "support".

Multiple Throttle Body Airflow Syncing

In most cases, with multiple throttle body units, there may be cases of slight popping through the exhaust or intake at idle or slightly off idle. This could be an indication that one or more throttle bodies are slightly off in regards to air flow / idle speed. This is especially compounding if using a intake manifold that is a dual or separate plenum per throttle body (is each throttle body only feeds certain cylinders, not all). In this case, the throttle bodies airflow/idle speed adjustments must be fairly close or in sync to each other. It will take a fair amount of back and forth to get them all matched as close as possible. Syncing can be accomplished best by using a simple #43-5712 EMPI Universal Pro-Sync Synchronizer although other methods can get you close.

First check your linkage that both sides are the exact same distance from rod end to rod end. When they are identical length, lock the nuts so they don't change

1. Loosen linkage but leave slightly snug so that adjustment doesn't change during running of engine but not tight enough to where tools are required as you will be making constant adjustments throughout the process.
2. Start with the center unit on the driver's side, inboard cylinder where the throttle linkage first connects from the bell crank. Check it with the air flow meter while idling to determine the base number.
3. Next check the mating throttle body on the same side. Adjust the linkage to get the air flow meter reading the same amount as the first.
4. Now switch to the other side of the engine. Start by adjusting the one that attaches to the cross linkage. Adjust the cross linkage to get the same reading - 1/2 adjust on the driver's side link 1/2 adjustment on the pass side link. Beware, a small change on the link is a lot of change, they are sensitive.
5. When the third one is close, then adjust the fourth using the interbody link on that side.
6. Repeat this around the circle for the last four cylinders, following the same path. It takes about five times around the entire circuit to get them all to match close. There is not much room for any tolerance so be sure to take your time and make incremental adjustments each time.

Note: As an indicator, a cylinder with a butterfly open too much will tend to pop through the intake while a cylinder with a butterfly open to far closed with tend to pop/burble through the exhaust on deceleration. It is imperative that the linkage does not introduce errors in the resting position of the butterflies or the work you completed above will be a waste of time

Fine Tuning Adjustments after running

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 hangs 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 on the plus side, 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 on the negative side, to the temp range that you are finding the issue in.

cases

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 of 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 help 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.

Idle Return

If the engine is not returning to idle quick enough for your liking or is dropping too quickly and stalling 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. 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 the channels.

WARNING: DO NOT ATTEMPT TO MAKE ANY ADJUSTMENT WHILE DRIVING.

Rev Limiter

The Vintage 97 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 Vintage 97 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. If using timing control, both fuel AND spark are cut.

Data Logging

Data Logging is a useful tool for diagnoses and tuning. It allows you to check how 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 PC 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 them 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.

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 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 O₂ 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. Correct running problems first! 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 joystick 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.

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 Vintage 97 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 mechanism 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.

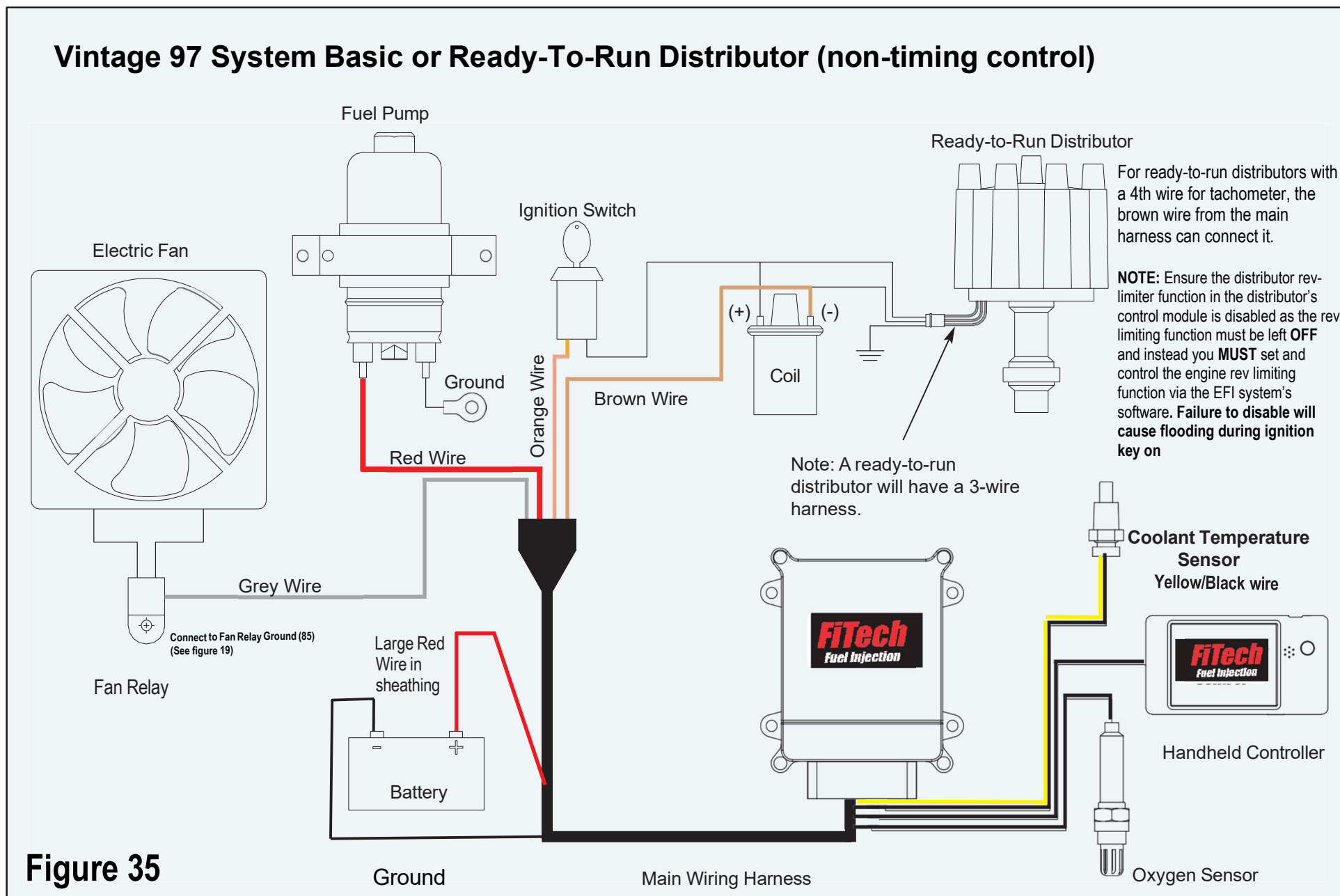


Figure 35

Vintage 97 System with HEI Distributor (non-timing control)

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

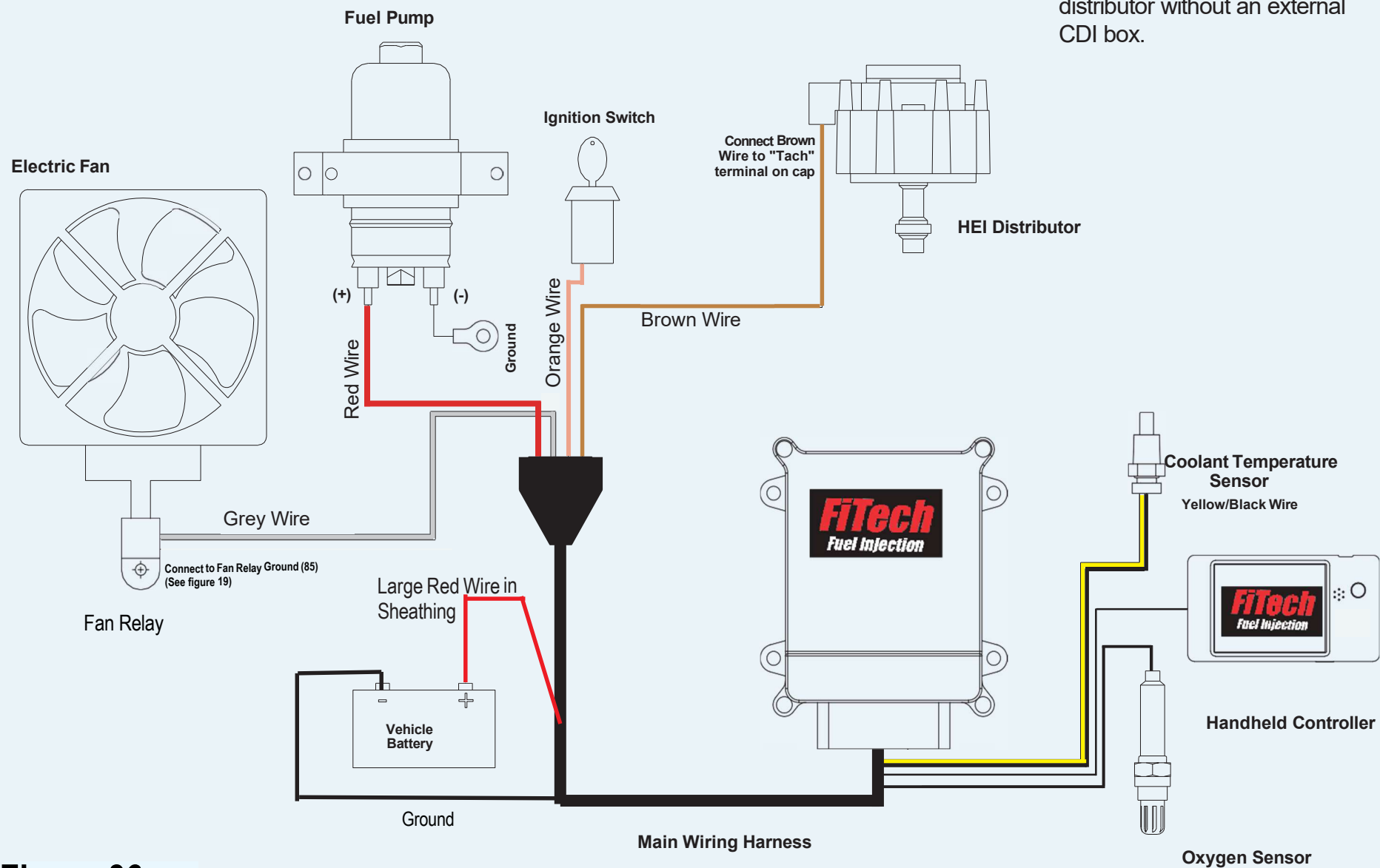


Figure 36

Vintage 97 System with External CDI Box (without timing control)

Note: For non-timing control, note where the Brown wire is connected and where the 2-wire connector on the distributor is connected to.

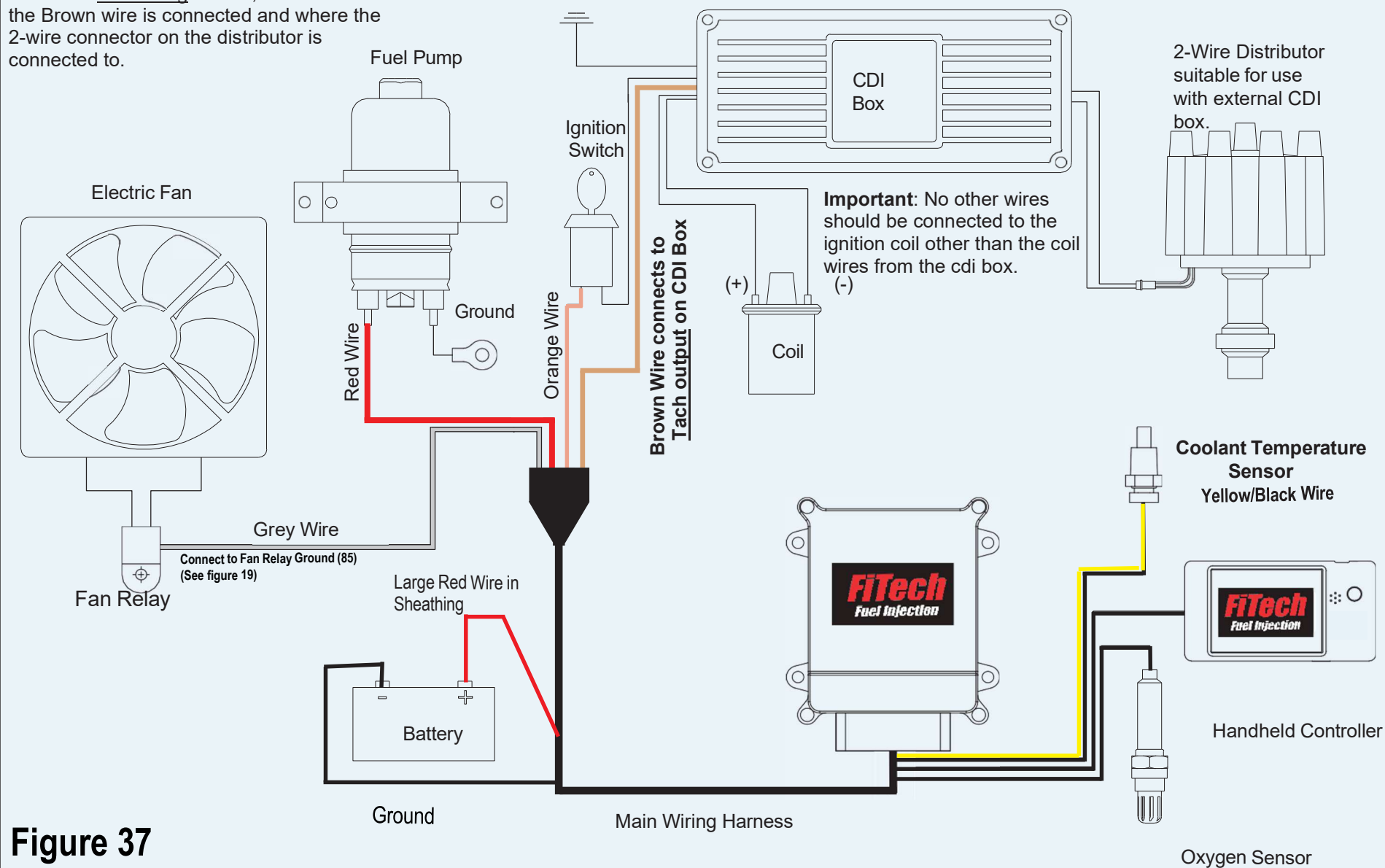


Figure 37

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

Vintage 97 System with External CDI Box (with timing control)

Note: For timing control, note where the Yellow wire is connected and where the 2-wire connector on the distributor is connected to.

Yellow wire connects to the points input wire from CDI BOX (in most cases a white wire)

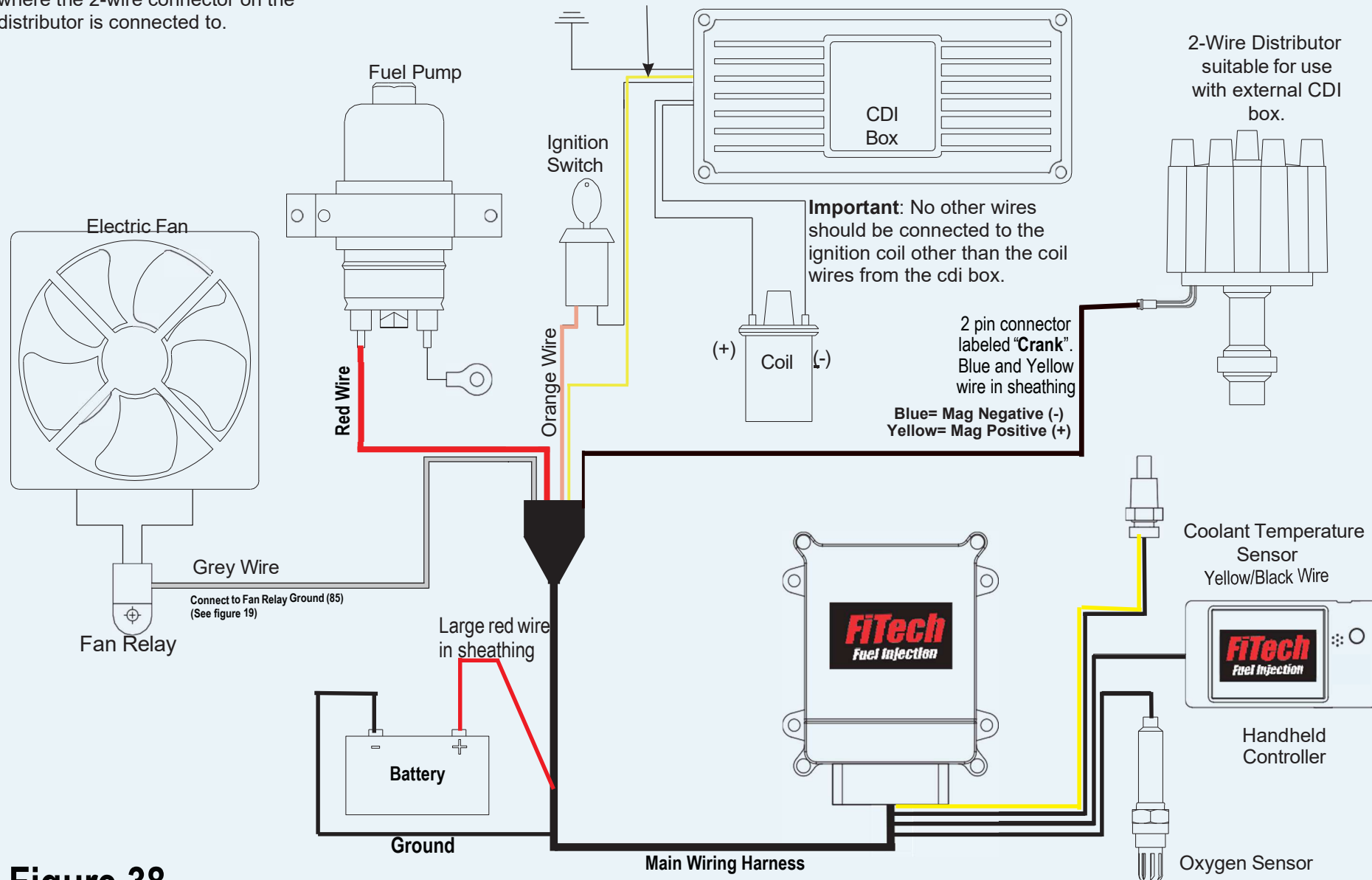


Figure 38

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.