About Us

ACES Fuel Injection specializes in developing and manufacturing state-of-the-art performance-engine management systems and ignition components geared toward do-it-yourself automotive enthusiasts. Our company was founded on an electromechanical engineering background, and our talented staff always keeps a grip on the newest technology available. We use our expertise to guarantee top-notch quality components and constant innovation of new products and services for car and truck enthusiasts around the world.

Our greatest advantage is the overall simplicity of our products. From a painless installation to real-time tuning in just hours, our fuel injection systems offer a great advantage over the competition. Our KILLSHOT™ Throttle Body EFI system features a built-in interface that allows users to have full control of the engine without the need of a PC. This allows you to install the system at home without the need of special tools or software. We also offer several other components to help seamlessly integrate our advanced technology into your vehicle.

Our craftsmanship and technology are built upon a foundation of extreme performance. With a history of producing winning results in a wide variety of applications, our pedigree offers proof of our commitment to attain the best results, wherever we compete. With more than 10 years of experience developing and designing high-performance products, ACES Fuel Injection has a product to fit your needs.

Mission

We are a customer driven company with a large focus on research and development to create superior and more efficient technology for the automotive aftermarket. Making engine management technology the key factor of success. And to bring pride and satisfaction to customers by integrating them into the ACES Fuel Injection Team.

Vision

Become the world’s leading company for engine management technology.

Values

Ethics, commitment, professionalism, teamwork, quality, pioneering spirit, creativity, continuous innovation, pursuit of results and customer satisfaction.

Table of Contents

KILLSHOT™ THROTTLE BODY EFI OVERVIEW

ACES EFI KILLSHOT™ Self-Tuning EFI system is the most advanced throttle body injection (TBI) system on the market. The KILLSHOT™ utilizes four 100 lb./hr. fuel injectors, giving the system the capability of supporting up to 650 horsepower. The system includes the throttle body (with integrated fuel injectors, TPS sensor, MAP sensor, IAT sensor, and stepper motors), wiring harness, Bosch O2 sensor, ECU, handheld programmer for easy tuning and monitoring of engine data.

ACES' KILLSHOT™ TBI system fits any 4150-flange 4-barrel intake manifold and is designed for easy installation and tuning. Installation is straightforward and easy, and the system includes everything you need to get on the road or track quickly. The calibration wizard and self-tuning features mean advanced tuning knowledge or experience is not required.

Whether you are building a budget beater or a boosted racing car, ACES EFI's KILLSHOT™ EFI kit has the technology and advanced features you need, in an easy-to-install, easy-to-tune package so you can take your ride to the next level!

KILLSHOT™ includes:

- 4150 flange throttle body for easy carburetor replacement
- Four integrated 100 lb./hr. fuel injectors
- Integrated TPS,3 Bar MAP, and IAT sensors
- System supports up to 650 horsepower
- Integrated ignition timing control and coil driver
- Advanced innovations make this system the most advanced TBI system
- Easy-to-install design, can easily be done by the average enthusiast
- Easy-to-use calibration wizard makes initial start-up simple and easy without the need for custom tuning
- Adaptive self-tuning strategy for idle control and fuel control
- High-quality Bosch 4.9 wideband sensor
- Dual electric fan control
- High-resolution 5-inch full color touchscreen handheld controller for initial setup, tuning, and gauge displays
- CAN communication for Handheld Controller-based calibration and display
- Available finishes: Black Ceramic, Classic Gold, Polished

Thank you for betting on ACES! We are proud to be your manufacturer of choice.

Parts List

Item	Description	QTY	Service Part
1	KILLSHOT™ ECU	1	AS2012
2	Handheld	1	AS2009
3	Throttle Body Assembly	1	AM1001
4	Main harness	1	AH2012
5	Wide band O_2 sensor	1	AE1060
6	Coolant Temperature Sensor	1	AE1052
7	Clamp-on Oxygen Sensor Bung	1	AE1061
8	Air Cleaner Gasket	1	
9	4150 Flange Gasket	1	
10	Breather Stud	1	
11	2” Grommet	1	

ADVANCED USER CAPABILITIES

The ACES KILLSHOT™ EFI software does allow for advanced tuning functionality. A laptop is required to access the advanced tuning functions. These functions are not recommended for enthusiasts without extensive EFI tuning knowledge and experience.

NOTE: Making changes to the calibration in the advanced tuning functions can lead to catastrophic engine damage if not done correctly. ACES is not responsible for any damage caused due to advanced tuning errors.

WARNINGS, NOTES, AND NOTICES

NOTE: This system does not contain fuel system components including the fuel pump, fuel filters, fuel pressure regulator, and lines. ACES fuel injection offers complete kits which can be purchased separately (coming soon!).

NOTE: This system is designed for stock and mild cam, naturally aspirated, boosted, and nitrous oxide engines.

WARNING! The KILLSHOT ™ TBI systems consist of several sophisticated components. The failure of any one component does not constitute, nor does it justify, warranty replacement of the complete system. Individual service items are available for replacement of components.

WARNING! To preserve the warranty, these instructions must be read and followed thoroughly and completely before and during installation. It is important that you become familiar with the parts and the installation of the KILLSHOT ™ TBI system before you begin. Failure to read and understand these instructions could result in damage to KILLSHOT ™ TBI components that are not covered by the warranty and could result in serious personal injury and property damage.

WARNING! The oxygen sensors in this kit are recommended for use with unleaded fuel ONLY. Use of leaded fuels will degrade the oxygen sensor and will result in incorrect exhaust gas oxygen readings and improper fuel delivery. Failure to follow these directions does not constitute the right to a warranty claim.

WARNING! Failure to follow these instructions will result in an improper installation, which may lead to personal injury, including death, and/or property damage. Improper installation and/or use of this or any ACES product will void all warranties.

WARNING! Use of some RTV silicone sealers will destroy the oxygen sensors used with this kit. Ensure the RTV

silicone sealant you use is compatible with oxygen sensor vehicles. This information should be found on the RTV package.

WARNING! For the safety and protection of you and others, only a trained mechanic having adequate fuel system experience should perform the installation, adjustment, and repair. It is particularly important to remember one of the basic principles of safety: fuel vapors are heavier than air and tend to collect in low places where an explosive fuel/air mixture may be ignited by any spark or flame resulting in property damage, personal injury, and/or death. Extreme caution must be exercised to prevent spillage and thus eliminate the formation of such fuel vapors.

WARNING! This type of work MUST be performed in a well-ventilated area. Do not smoke or have an open flame present near gasoline vapors or an explosion may result.

WARNING! This installation is not for the tuning novice! Use this system with EXTREME caution! The ACES KILLSHOT ™ EMS allows for total flexibility in engine tuning. Misuse or improper tuning of this product can destroy your engine! If you are not well versed in engine dynamics and the tuning of engine management systems DO NOT attempt the installation. Refer the installation to an ACES-trained tuning shop or call ACES for technical assistance.

NOTE: All supplied ACES FUEL INJECTION calibrations, wizards and other tuning information are offered as potential starting points only. IT IS THE RESPONSIBILITY OF THE ENGINE TUNER TO ULTIMATELY CONFIRM IF THE CALIBRATION IS SAFE FOR ITS INTENDED USE. ACES FUEL INJECTION holds no responsibility for any engine damage that results from the misuse or mistuning of this product!

1.0 Introduction and System Requirements

This manual has been written by ACES Fuel Injection for the installation of the EFI throttle body injection system. This basic manual contains the information necessary for the installation of the throttle body, wiring, and sensors. Please read all the WARNINGS and NOTES, as they contain valuable information that can save you time and money.

WARNING! Before disconnecting the battery, we recommend locating a clean switched 12-volt ignition source. This source needs to have 12 volts while cranking and with the key in the run position. Disconnect battery before proceeding with any work to the vehicle.

NOTE: An assistant is necessary for some installation and adjustment procedures and should be present for safety reasons.

1.1 Engine Requirements

Before the installation, please verify your vehicle meets the engine and fuel system requirements below:

- Engine is in sound mechanical condition
- Engine horsepower is between 200-650
- Engine is a 4-, 6-, or 8-cylinder
- Engine has a 4-barrel, 4150-style flange intake manifold
- Unleaded fuel only
- Any RTV silicone sealants used on the engine are sensor safe

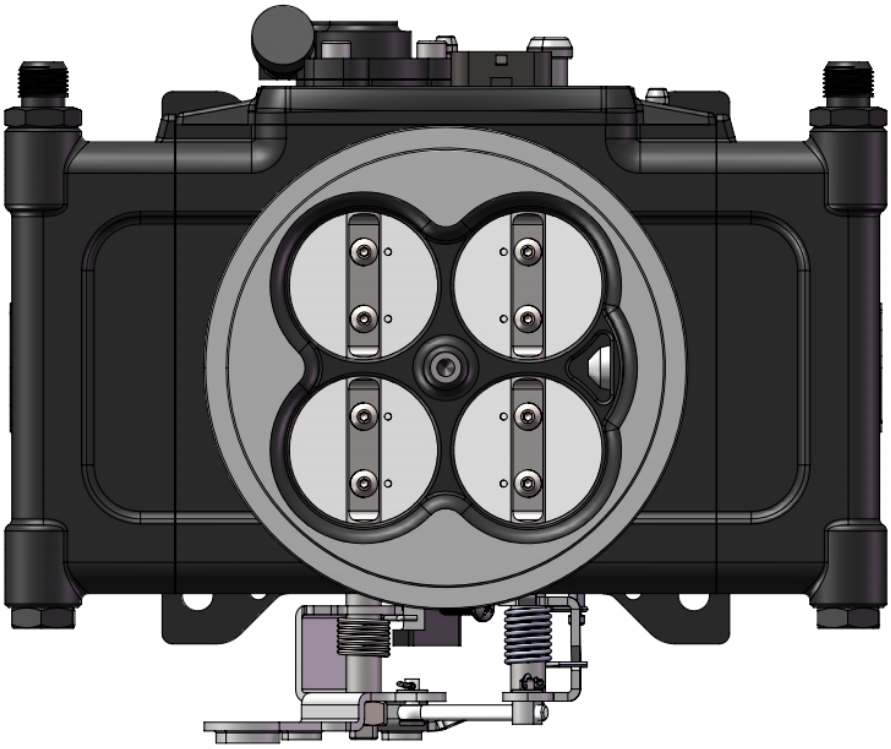
2.0 Installation

2.1 Throttle Body Installation

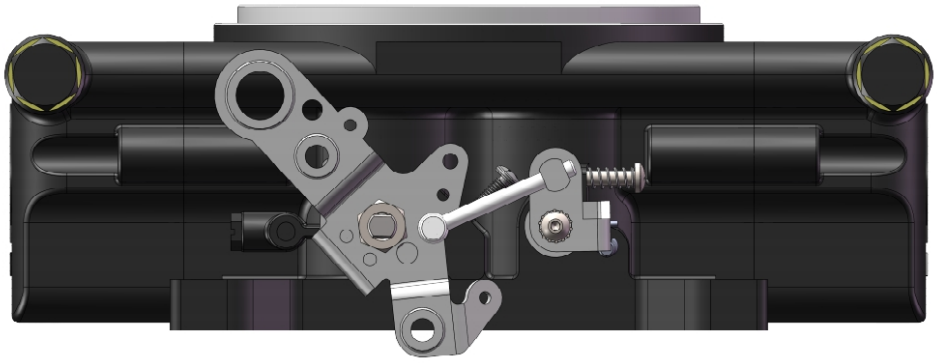
The throttle body has two connectors: one to control TPS and the other to control fuel injectors, IAC, and TMAP sensor.

The ACES throttle body design not only makes the throttle body structure clean and easy to install, but also the fuel injection controller is located externally. It is not affected by the high temperature and vibration of the engine, ensuring stability of performance.

NOTE: If you will be installing a new distributor, such as the ACES fuel injection BLACKJACK™ Pro Distributor, you may have more room to work if you complete the first part of that installation before bolting down the throttle body.

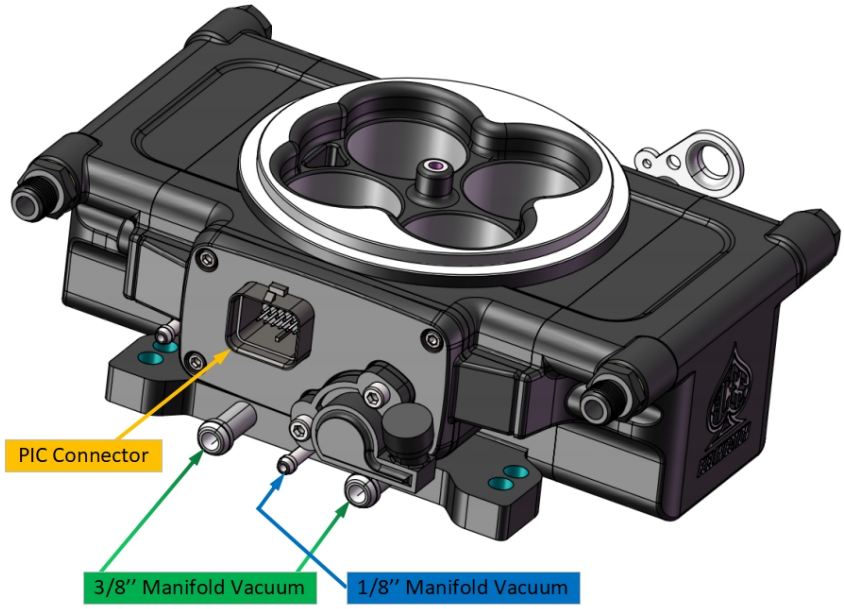


Throttle Body Aerial View



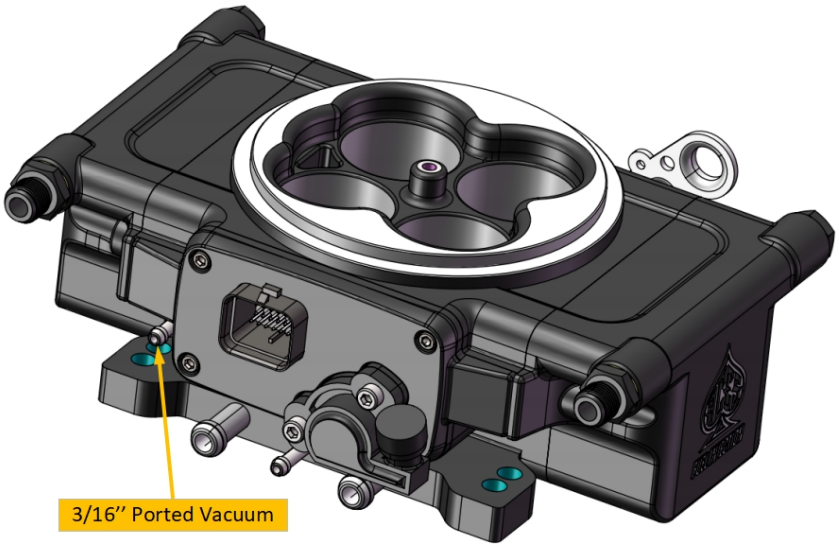
Throttle Body Side View

1) Begin by removing your carburetor. As you remove the carburetor, note which vacuum lines are running to ported or manifold vacuum. Determining if a vacuum port is “ported” or “manifold” vacuum varies on each carburetor; refer to the manufacturer’s specs for your specific carburetor.



NOTE: If you will have the carburetor removed for a length of time, be sure to plug your manifold with clean rags so that no foreign debris is allowed to enter the engine.

2) Install your new KILLSHOT™ throttle body using the provided gasket and fasten using the screws or studs that were used for your carburetor.

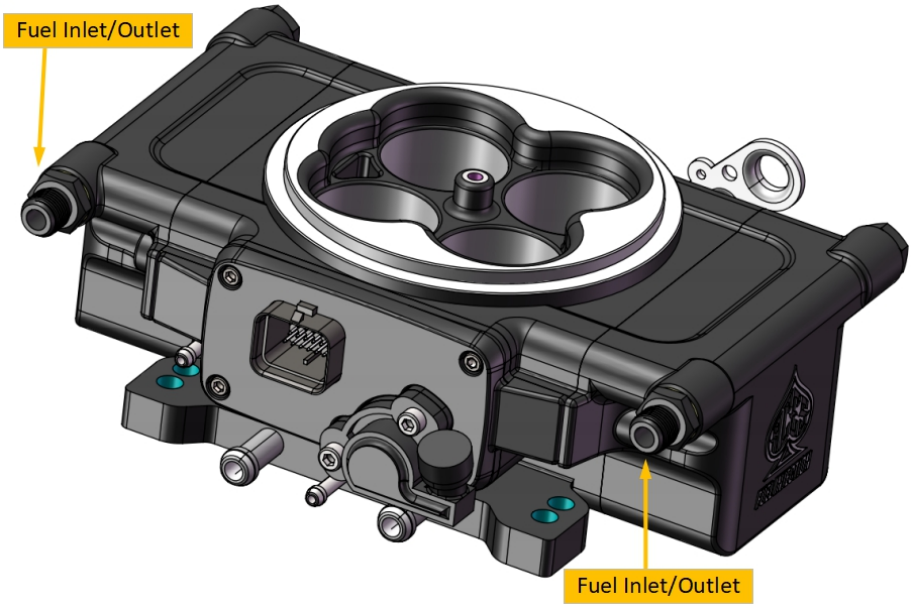


3) Reconnect all vacuum hoses, being sure to connect any ported vacuum systems to the correct 3/16" port as shown above. Leave any unused ports capped with the provided rubber caps.

4) When your entire installation is finished, be sure to install an air cleaner onto your throttle body.

2.2 Fuel System

A complete high pressure EFI fuel system must be installed for the KILLSHOT™ EFI system. The KILLSHOT™ EFI system requires a minimum of 43 PSI to operate. It is recommended to use a return style fuel system. When selecting a pump, regulator, and lines, be sure each component is designed to perform at high pressure. The following are some guidelines to help set up a fuel system for your KILLSHOT™ EFI system as well as components available separately from ACES Fuel Injection. If using an in-line fuel pump, there should be a coarse pre-filter before the pump.



All systems should contain a 10-micron post-fuel filter after the fuel pump. An EFI-rated high-pressure, vacuum-referenced, bypass fuel pressure regulator is required.

The fuel pump MUST be mounted lower than the lowest part of the fuel tank, and as close to the tank as possible. The fuel tank must also be properly vented.

1) Use the following diagram as a reference for the orientation and location of the fuel system components

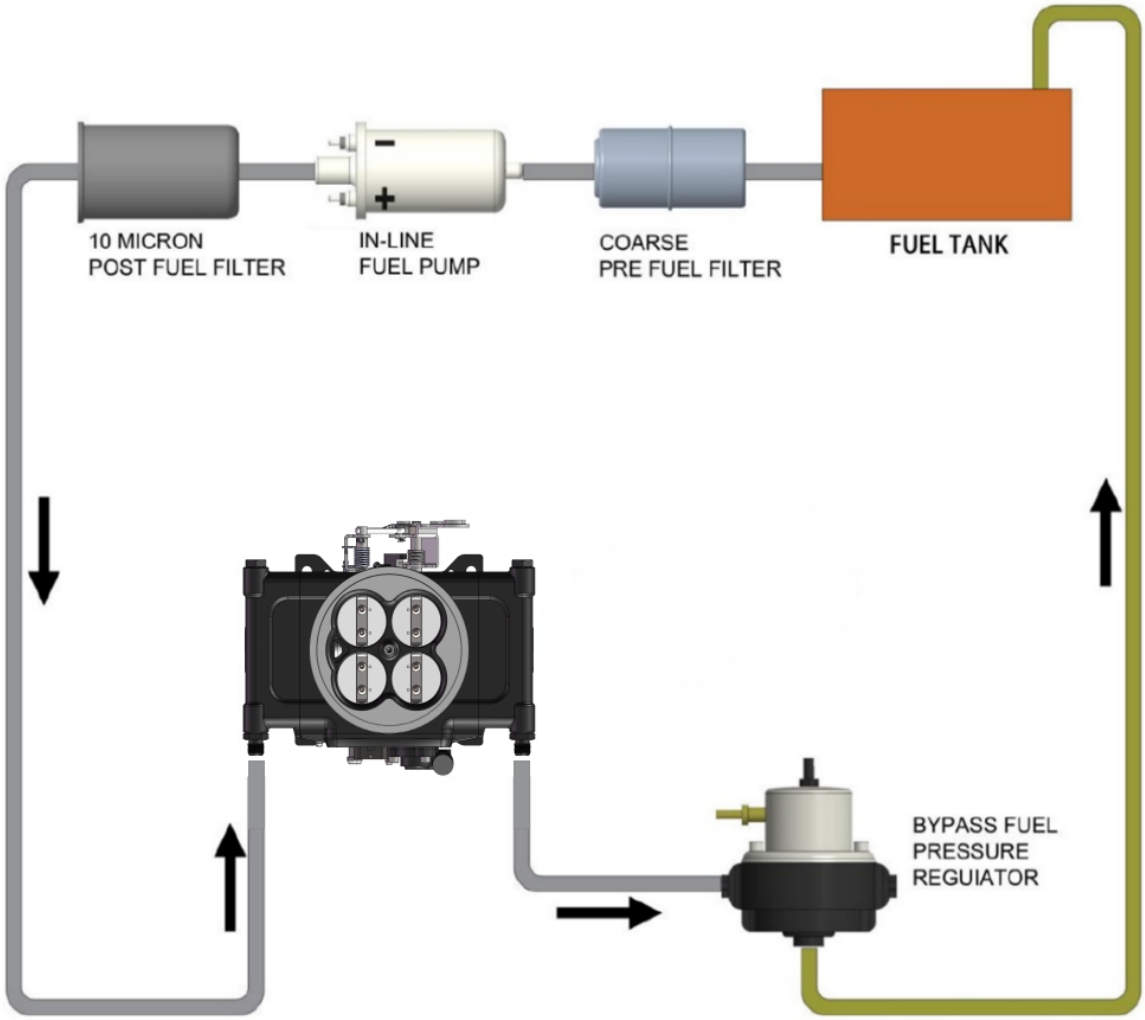
2) Mount the electric fuel pump as close to the fuel tank outlet as possible with the bracket provided. Mounting the fuel pump in this manner will ensure that the pump will prime easily to ensure faster starts.

3) The pre-filter MUST be installed between the fuel tank and the fuel pump inlet. The purpose of this filter is to protect the fuel pump from particles of dirt or other foreign material. The filter should be installed with the arrow on the filter pointing in the direction of the fuel flow.

4) The post-fuel filter should be installed between the electric pump outlet and TBI unit and should be a 10-micron EFI filter. Position the filter so the fuel hoses can be routed without kinks or sharp bends. The filter should be installed with the arrow on the filter pointing in the direction of the fuel flow.

WARNING! Ensure both filters are installed in the proper direction. A flow direction arrow is printed on the side of the filter to indicate the direction of fuel flow. Failure to do so will result in a system malfunction.

Some late model vehicles that were originally equipped with a throttle body injection system may already have a return line to the fuel tank that can be utilized. The return line must not present a pressure restriction to the return fuel flow. There should never be more than approximately 3 PSI of pressure in the return line. A line that is too small or has restrictions will cause tuning problems with the system.



DANGER! Do not use the vapor canister lines as a fuel return line. Possible fuel leaks may create a fire or explosion hazard, potentially causing serious injury or death.

DANGER! Proper installation of a fuel return line, if indicated, may necessitate complete removal of the fuel tank. This work should be done by a fuel tank specialist, who regularly does this work and is familiar with safety regulations and precautions necessary to do this work. If a person attempts this work, who is not familiar with the safety regulations and precautions, an explosion may result in causing serious injury or death.

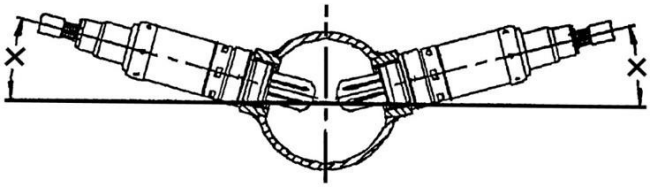
2.3 Oxygen Sensor Installation

IMPORTANT! Position and support your vehicle on a suitable surface. USE CAUTION AND WORK ONLY ON A LEVEL SURFACE USING JACKS AND JACK STANDS OF SUFFICIENT CAPACITY TO LIFT AND SUPPORT YOUR VEHICLE. NEVER WORK UNDER A VEHICLE SUPPORTED BY A FLOOR OR BUMPER JACK. Use of a two-post underarm lift or four-post drive-on lift will considerably reduce the time and effort required to complete the installation. MAKE SURE LIFT LOCKS ARE ENGAGED BEFORE WORKING UNDER THE VEHICLE.

WARNING! Failure to disconnect the AIR pump and/or locating the oxygen sensor downstream from AIR injection will result in an extremely rich mixture, which could cause drivability problems and severe engine damage. If disconnecting the AIR pump, check with local ordinances for the legality of this procedure in your area.

1) Locate a position for the oxygen sensor as close to the engine as possible. The oxygen sensor should be mounted

at a point where it can read a good average of all the cylinders on one bank. This would be slightly after all the cylinders merge. If you have long tube headers, mount the sensor approximately 6”-10” after the collector. You must have at least 18” of exhaust pipe after the sensor. If your vehicle has catalytic converters, the oxygen sensor MUST be located between the engine and the catalytic converters.



2) Ensure the sensor is located at the approximate angle shown above. This will help prevent condensation in the exhaust tubing from entering the sensor. The sensor can be mounted on either side of the tubing.

3) Drill a 7/8” hole in the intended location for the sensor. Weld an oxygen sensor weld ring into the 7/8” hole or use the clamp on bung system included. Weld all the way around the bung to ensure a leak-proof connection. Allow the bung to cool completely, install the oxygen sensor into the weld ring, and tighten securely. It is a good idea to add anti-seize to the threads to aid in removal. Do not get any anti-seize on the tip of the sensor.

***** The sensor should be installed in or after the collector. This gives the ECU an average reading across an entire bank instead of from just one cylinder.

***** The sensor should not be mounted near the open end of the exhaust system. At low engine speeds, free air may reverberate into the exhaust and cause false readings.

***** The system will not function properly if there are any exhaust leaks. Any fresh air that gets to the sensor will cause false lean readings. The ECU will respond by adding fuel that the engine does not need.

NOTE: Never run the engine with the oxygen sensor installed if it is not plugged in and powered by the ECU, or it will be damaged. If you need to plug the hole temporarily, use an O_2 sensor plug, or a spark plug with an 18mm thread.

2.4 Coolant Temperature Sensor Installation

Install the coolant temperature sensor into a 3/8” NPT coolant passage in either the intake manifold or cylinder head. Do not overtighten or damage to the cylinder head or intake may occur. It is best to drain some of the coolant before the sensor is installed. Use thread sealer or a small amount of thread tape. Do not install the sensor in the thermostat housing, or in an area that will not see a constant flow of coolant.

Coolant Temperature Sensor

2.5 Boost Reference Port (For Roots Style Supercharger Only)

1) Turn the throttle body upside down. Using a small drop of Loctite on the plug, install the plug into the threaded orifice next to the throttle blades.

2) Locate the boost reference port on the throttle body. It is located on the lower right corner of the throttle body on the same side as throttle cable linkage and remove the plug.

3) Install A 1/16 pipe to hose fitting into the boost reference port on the throttle body.

The boost reference port on the throttle body should be referenced below the supercharger directly off of the manifold or can be split off of the boost gauge reference line.

3.0 ECU Mounting and Wiring Overview

The KILLSHOT™ ECU can be mounted inside the passenger compartment (preferable location) or in the engine compartment. If mounted in the engine compartment, follow these guidelines:

- Mounting location should be as far from exhaust manifolds or headers as possible.
- Mount it as far away from spark plug wires, CD ignition boxes, or other “electrically noisy” devices as possible.

An EFI system depends heavily on being supplied with a clean, constant voltage source. The grounds of an electrical system are just as important as the power side.

KILLSHOT™ ECU's contain multiple processing devices that require clean power and ground sources. The wiring harnesses for them must be installed in such a manner that they are separated from "dirty" power and ground sources.

Keep sensor wiring away from high voltage or "noisy/dirty" components and wiring, especially secondary ignition wiring (plug wires), ignition boxes and associated wiring. It is best that the plug wires do not physically contact any EFI wires. 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.

The main power and ground source must be connected directly to the positive and negative battery terminals, not to any other place.

Properly crimp and solder any wire connections. Apply quality heat shrink over any of these connections.

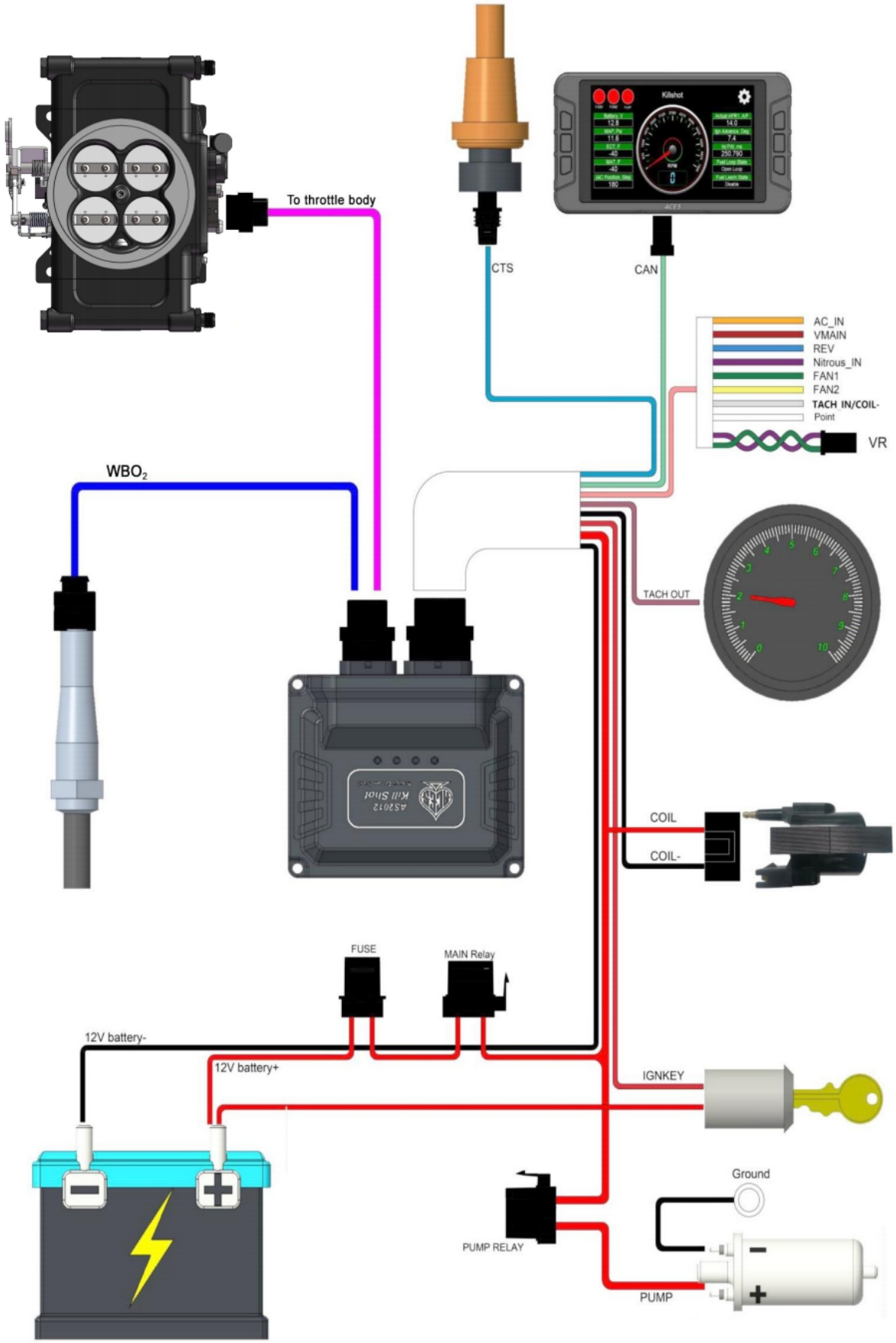
It is critical that the engine has a proper ground connection to the battery and chassis.

Do not use the electric fan outputs to directly power fans. They must only be used as a trigger source for a properly sized relay for the specific fan(s) used.

Don't use things like t-taps, etc. Use proper crimp connectors/solder and heat shrink.

It is never recommended to splice/share signal wires (such as TPS, etc.) between different electronic control units (i.e., "piggyback").

3.1 ECU Wiring Overview



4.0 Wiring Installation

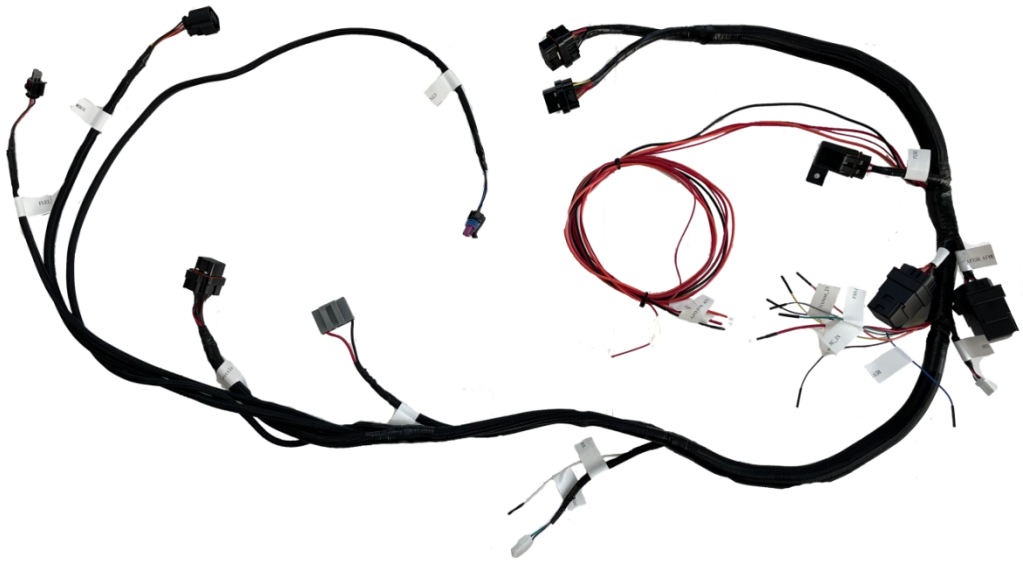
4.1 Harness Routing

If the ECU is mounted in the interior, the harness will have to be routed through the firewall into the engine compartment. Use a 2” hole saw to create a hole in a desired location if no other point of access is available and use the 2” grommet included to seal this area.

If the ECU is mounted in the engine compartment, the handheld tuning module cable will have to be routed to the “CAN” connector on the main harness (located near the ECU connector main connector). This is assuming you want to access the handheld module after startup. This will require routing the small CAN connector somewhere through the firewall.

Connect the PIA and PIB connectors of the main harness into the ECU.

About 22” from the ECU main connectors is a 40A relay. This powers the injectors and wideband O_2 sensor heating. There is also a fuel pump relay to control the fuel pump.



4.2 Sensor Connection

Connect the bulkhead, CTS, WBO_2, CAN, and throttle body connectors (PIC) to their dedicated sensors/connectors in the diagram.

The throttle body connector (PIC) integrates the injectors, TMAP, TPS, and IAC wires. Plug this PIC connector into the corresponding connector on the throttle body.

Connect the distributor coil connectors (if using KILLSHOT™ ignition control).

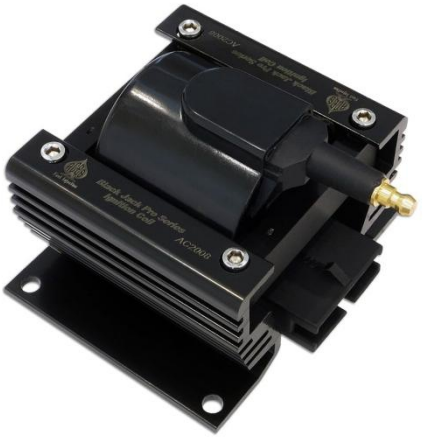
Throttle Body Connector (PIC)

4.3 Ignition Coil (With Timing Control)

The KILLSHOT™ ECU integrates an ignition coil driver that uses a high performance IGBT chip. ACES recommends using ACES BLACKJACK Pro Series Ignition Coil (PN AC2008, in the chart on the next page) to get 90mj with 3ms dwell time spark energy without a CDI box. It is beneficial to cold start, maintaining idling stability and improved fuel economy.

Connect coil connector to ignition coil AC2008 if you set harness connection and ECU configuration with timing control.

Ignition Coil Connector

– Primary Resistance: 0.273Ω – Primary Inductance: 2.63 MHz – Secondary Resistance: 3.42 kΩ – Secondary Inductance: 15.77 Hz – Output (50pF load): 47 kV – Output Energy: 150 mJ – Peak Secondary Current: 100 mA +/- 7% – Arc Duration: 200 µS – Turns Ratio 78:1	 **AC2008 BLACKJACK Pro Ignition Coil**

4.4 Loose Wires

The following loose wires in the main wiring harness should be connected as follows on all systems.

IGNSW (Red) Should be connected to a clean key-on/cranking +12V power source. Power source should only be active when the ignition is on (key-on power). Make sure the source has power when the engine is cranking as well (check with voltmeter). Not all sources apply power when the ignition switch is in “cranking” position. This wire is located approximately 20” from the ECU connectors. DO NOT connect to a “DIRTY” source like an ignition coil!

12V Battery + (Red) MUST be connected directly to the positive battery terminal. This powers the fuel pump and fuel injectors. This wire is protected by a fuse in a sealed fuse holder. The fuse holder is located about 8" from the ECU connector. A 20-amp (20A) fuse is pre-installed.

12V Battery - (Black) MUST be connected directly to the negative battery terminal. Using a traditional chassis ground can cause electrical issues with the KILLSHOT™ ECU. This wire is located approximately 20” from the ECU connectors.

Pump (Orange) Used to activate a fuel pump (+12 volt). Do not use this wire to power fuel pumps that require over 15 Amps. Refer to your fuel pump manufacturer for amperage ratings. For high current pumps, use this wire to trigger a separate relay and use larger gauge wire to feed the pump; we recommend 10 gauge. The fuel pump also requires a ground wire. Run a wire from the negative side of the fuel pump. Connect it to a solid chassis/frame ground.

4.5 Additional Wires

The following additional wire outputs in the main wiring harness should be connected as follows on all systems. These wires come out of the harness about 23” from the ECU connectors except **Point Out**.

Tach Out (Brown) This wire provides a 12V square-wave output and can be used to trigger a conventional

tachometer.

Tach_In/Coil- (Grey) A tach output from an ignition box or other source like coil-. This is the tach input for the ECU when it is not controlling ignition timing.

Point (White) Points output is used for controlling timing when using an ignition box.

Fan1 (Green) This output provides a ground output to trigger a relay used for a cooling fan. This output should never be directly connected to a fan but the relay that powers the fan. This wire is located approximately 32” from the ECU connectors.

Fan2 (Yellow) This output provides a ground output to trigger a relay used for a second cooling fan. This output should never be directly connected to a fan but the relay that powers the fan. This wire is located approximately 32” from the ECU connectors.

VMain (Red) This output will provide a 12V power supply from the main relay. This wire is located approximately 32” from the ECU connectors.

Nitrous_In (Purple) Nitrous oxide activation wire. Feeding 12V power to this wire tells the ECU that a nitrous oxide system has been activated.

AC_In (Orange) This is a 12V input that recognizes that the AC has been activated.

REV (Blue) Optional - Programmable ground output

Fuel Level (red) This is a fuel level sensor input resistance that can go from 0-250 or from 250-0, it can be represent the percentage of fuel in the tank.

4.6 Pressure sensor kit

ACES EFI pressure sensor kits are top-quality parts for use with ACES EFI systems. These kits include plastic/steel sensors that have 1/8 in.-27 NPT threads and include a -6 AN fuel pressure take-off adapter fitting and 2 sets of 45 push lock hose ends.

Pressure sensors are great for logging oil pressure, fuel pressure, boost pressure. displaying pressure on the Handheld or Dash screen and on your data log files.

5.0 Handheld Controller

The Handheld Controller is used to create an initial calibration for the system, allows for simple tuning changes to be performed, and is also used to view various real-time EFI system data. We recommend that it be installed in the passenger compartment. The handheld plugs directly into the main harness at the connector labeled “CAN”. This connector is located approximately 23” from the ECU connector. The handheld does not have to remain in the vehicle or be connected to the system once the vehicle is set up and running properly. (See Handheld controller section for more information)

6.0 Ignition Wiring - No Timing Control

In a “no timing control” state, the vehicle could be using an old mechanical points distributor or any number of more modern solutions for ignition on carbureted engines. In these instances, something else is driving the coil and determining when it should fire. The KILLSHOT™ ECU needs to know each time the coil fires. That will tell it engine RPM. If a CD ignition box is being used, KILLSHOT™ ECU will get its RPM signal from the ignition box’s “tach” output. If a traditional, dwell-controlled inductive coil ignition system is being used (no CD ignition box), the KILLSHOT™ will get its RPM signal by going through the RPM Module to the negative side of the coil.

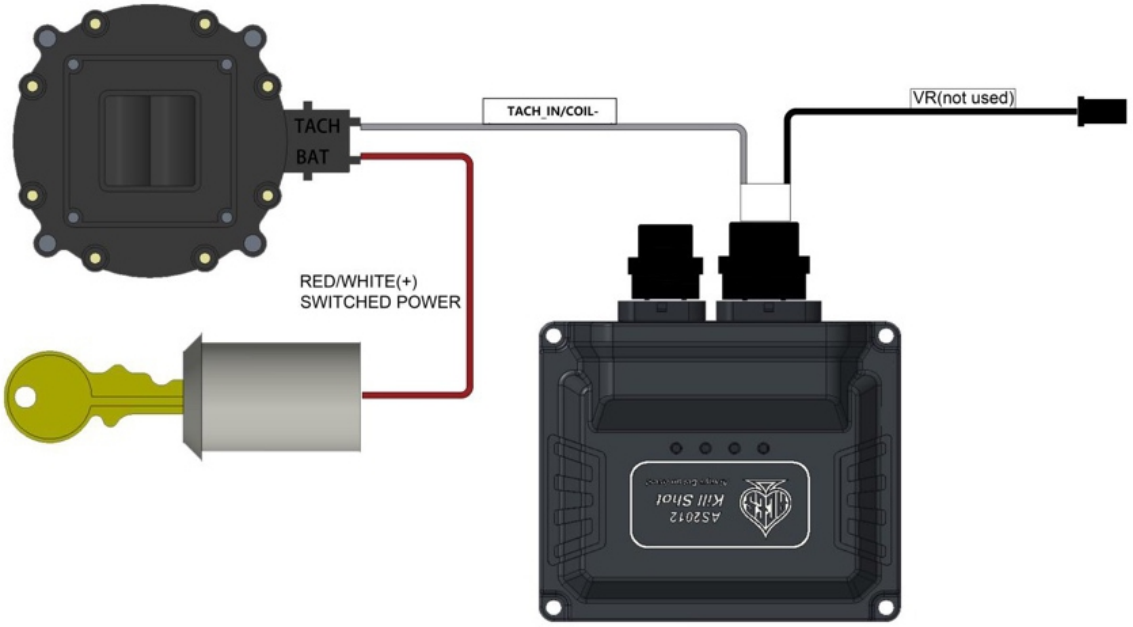
6.1 “Tach_In/Coil-” Connection

Option 1

The **“Tach_In/Coil-”** wire in the KILLSHOT™ harness gets its RPM signal from another module like a CDI box, ignition coil, etc. to the ECU.

NOTE: When using this input, the EFI will NOT control the ignition timing of the engine. The timing will be based on the distributor's initial, mechanical, and vacuum advance, just like it did with a carburetor.

Option 2



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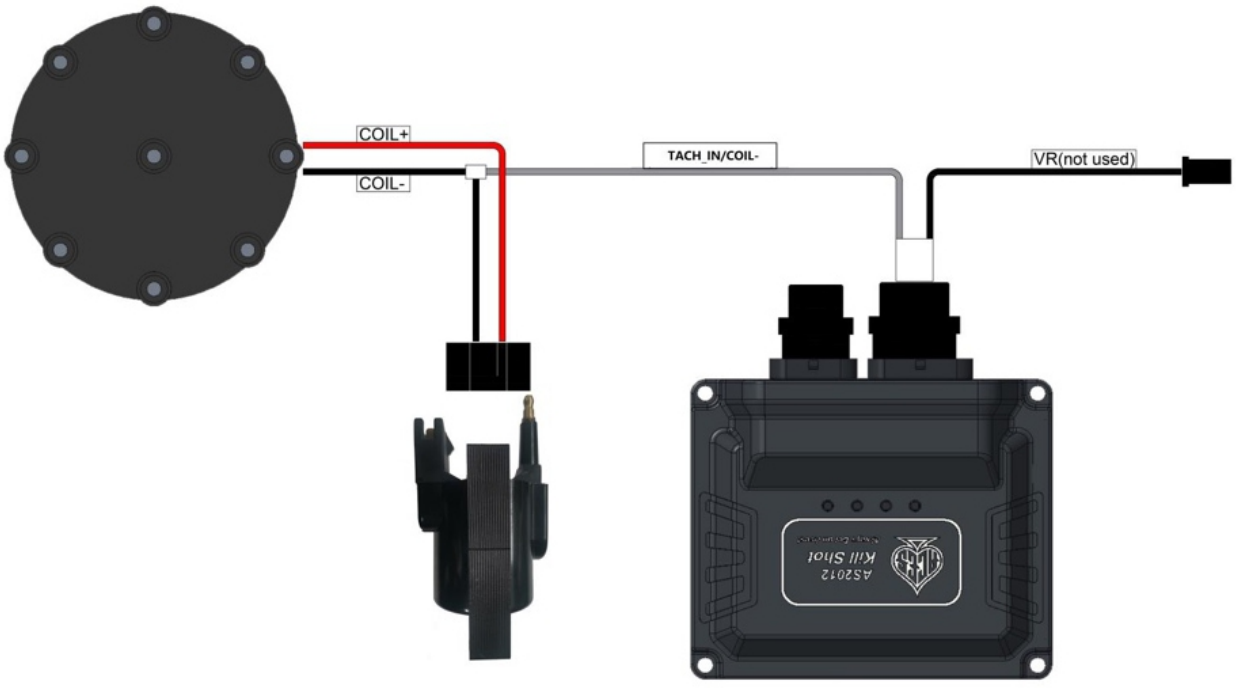
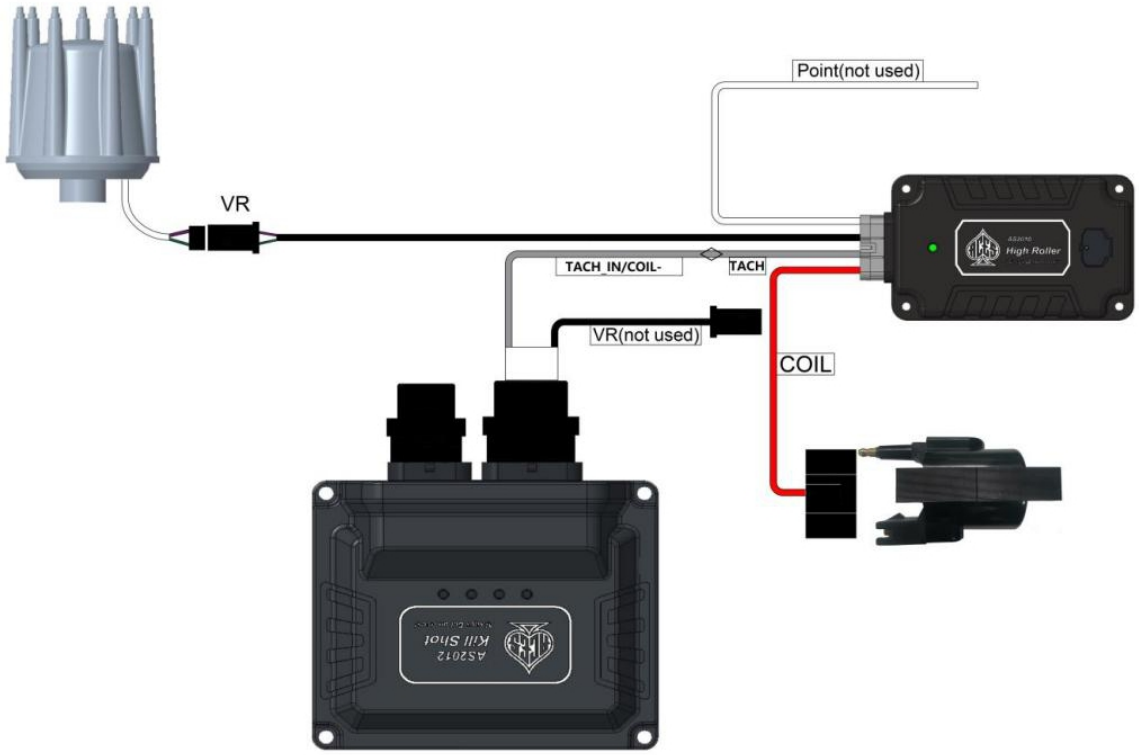
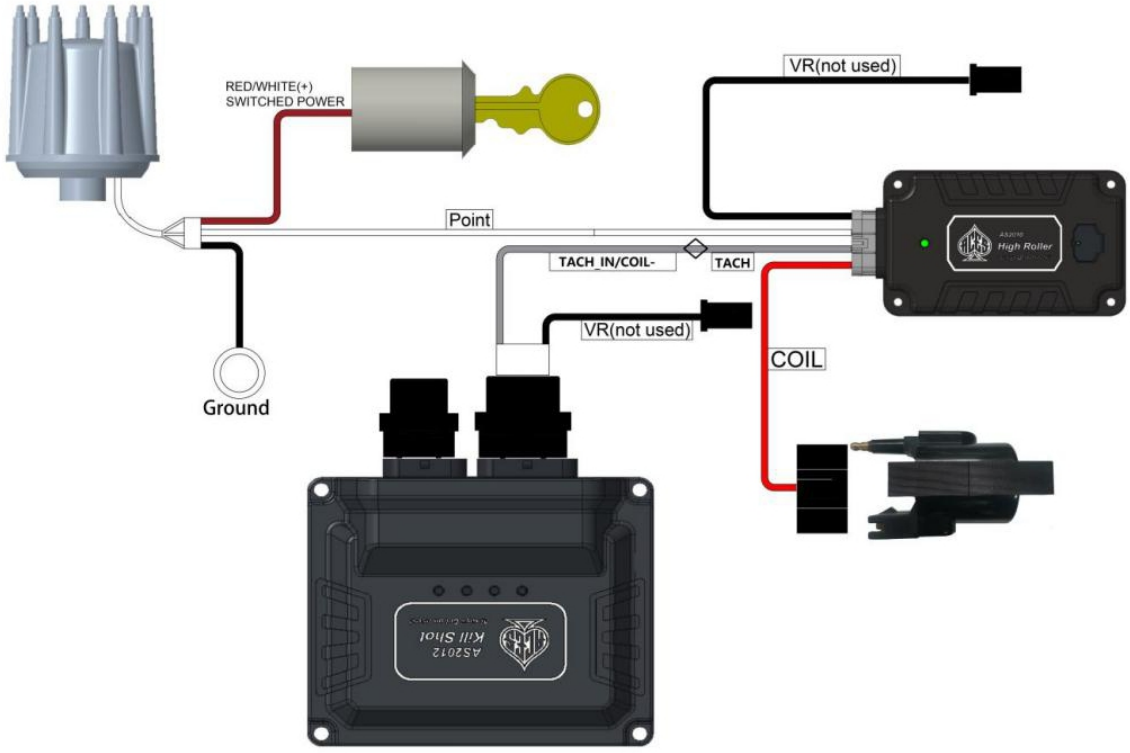



Point(not used)
VR
TACH_IN/COIL-
TACH
VR(not used)
COIL
High Roller
Kill Shot
AS2012

OR


RED/WHITE(+)
SWITCHED POWER
VR(not used)
Point
TACH_IN/COIL-
TACH
VR(not used)
COIL
Ground
High Roller
Kill Shot
AS2012

7.0 Ignition Wiring - Timing Control

The KILLSHOT™ EFI can control timing using most common magnetic pickup distributors like ACES BLACKJACK series or MSD's. However, you may need to make several very simple changes to the distributor which are outlined in the following section. It is very important that you "lock out" the advance built into the distributor and install an adjustable rotor. Not "locking out" the distributor and installing an adjustable rotor as outlined in these instructions can cause the engine to run poorly or even cause engine damage.

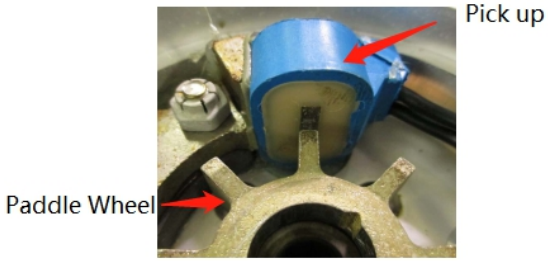
ACES recommends that those who wish to use the KILLSHOT™ timing control feature first get the engine to run without timing control. Splitting the timing control into a secondary process will add very little time to the total install, but could significantly help with trouble shooting, should it be needed.

The following is a list of items that are required to use the timing features of the KILLSHOT™ EFI system:

- A locked-out distributor
- A timing light
- An adjustable rotor may be required to achieve accurate rotor phasing. For specific questions regarding your ignition components and integration with ACES products, please contact our technical services department.
- It is recommended but not required to use an ACES BLACKJACK Pro Series Billet Distributor with a 2-pin mag pickup connector.
- The balancer must be degreed. Mark on the balancer at 15 degrees before top dead center (BTDC).

Follow this procedure:

1) Start by locking out the centrifugal advance on your distributor. The distributor must be physically "locked out" so that the relationship between the pickup and the paddle wheel does not change with engine speed or load. Refer to the manufacturer's instructions for the proper procedure to lock out the centrifugal advance for your distributor. (This is a very important step; please do not skip.)
2) Once your distributor is locked out, position the engine at 15 degrees before top dead center (BTDC).
3) Insert your distributor into the engine but do not clamp it down yet.
4) Rotate the distributor body so that the pickup is aligned with the closest paddle on the paddle wheel. It is important for this paddle to be as centered as possible. (There will be an opportunity to check the alignment and compensate for any misalignment with the Handheld later in this installation procedure.)

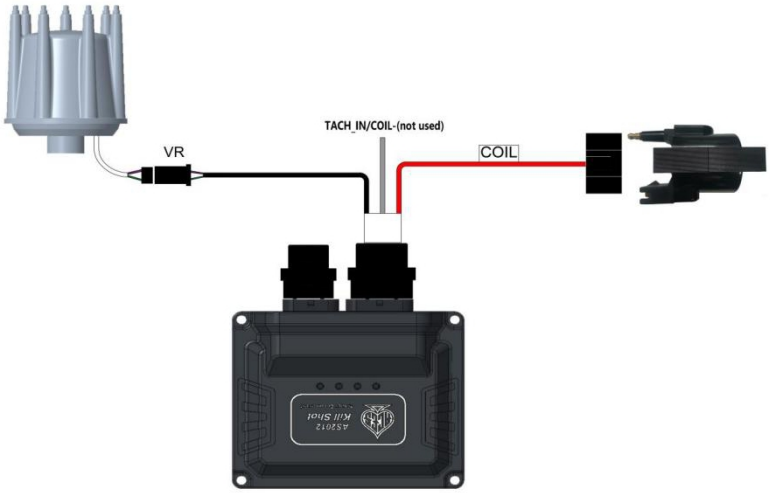


5) Clamp down the distributor.
6) Set the cap on the distributor and mark the middle of the #1 terminal on the distributor body.
7) Remove the cap and adjust the adjustable phase part of the rotor until the center of the rotor tip is lined up with

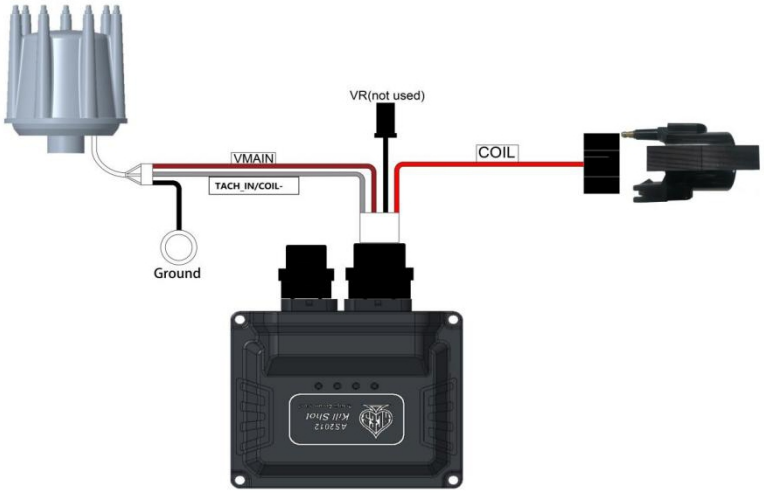
the center of the mark you made. Then tighten the rotor adjuster screw and install the cap.

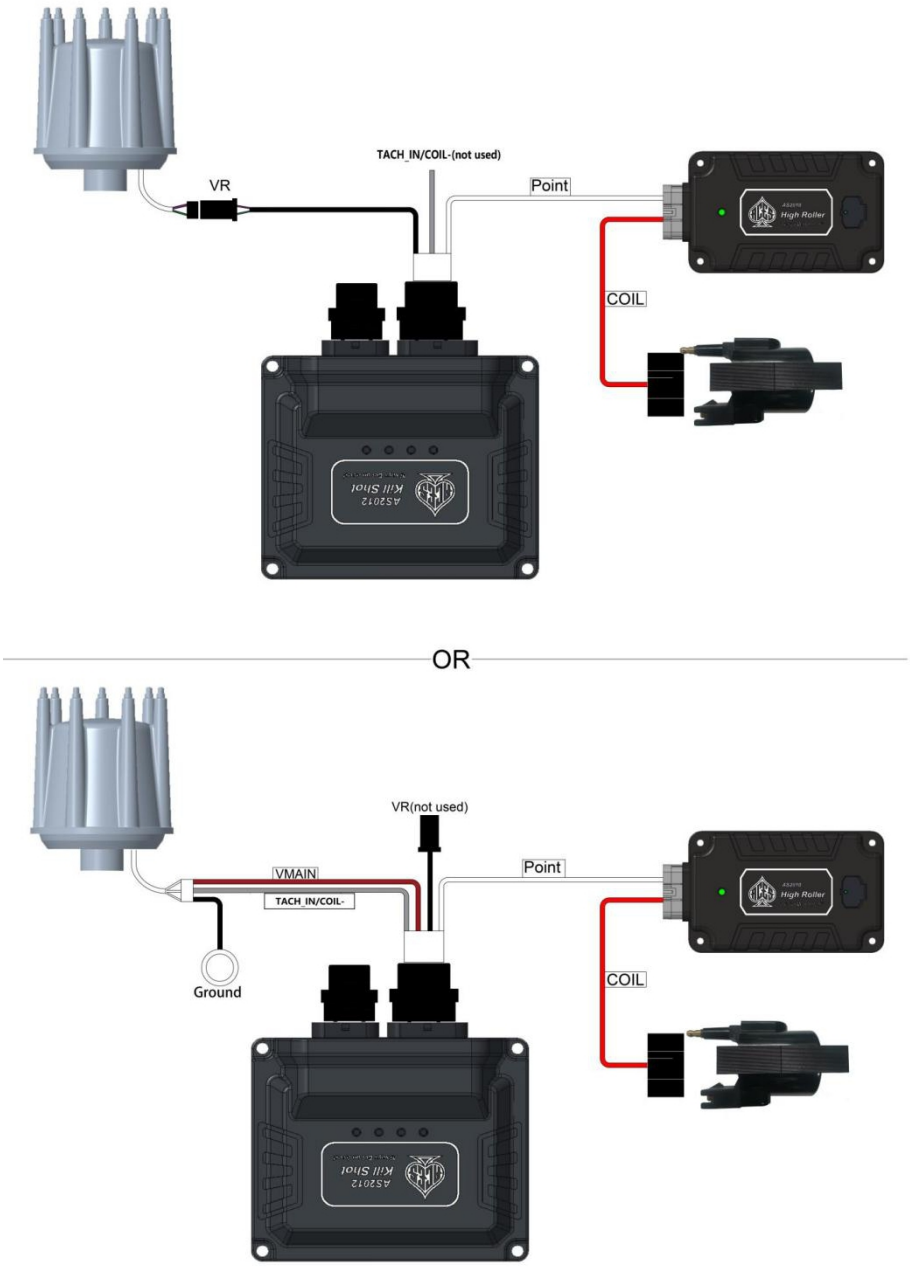
Option 1 - Direct Drive Coil

The KILLSHOT™ ECU integrates an ignition coil driver that uses a high performance IGBT chip. ACES recommends using AC2008 ACES BLACKJACK Pro Series Ignition Coil (in the chart on the next page) to get 90mj with 3ms dwell time spark energy without a CDI box. It is beneficial to cold start, maintaining idling stability and improved fuel economy.



OR





The loose wire “Point” provides an ignition signal from the KILLSHOT™ ECU to another module like the ACES HIGH ROLLER™ CDI box.

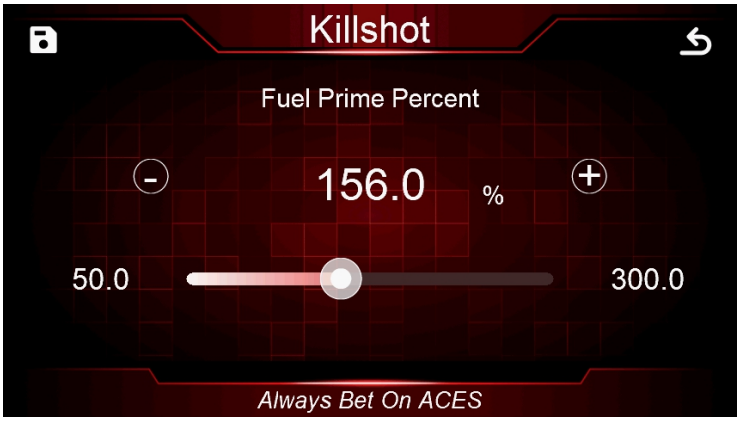
8.0 Handheld Controller Navigation and Use

The Aces EFI KILLSHOT™ Handheld Programmer utilizes a 5” capacitive touchscreen and six manual buttons. The LCD screen has a large, vividly colored display. The Handheld uses CAN bus communication to the ECU and has a type-C USB interface for programming and other operations. All operations are done by touching the screen or the manual buttons.

The handheld can be used for monitoring and calibrating the system (for example: idle speeds, AFR targets, fuel pump, etc.) after connecting it with the ECU. It is portable and convenient for tuning at any time.

8.1 Making Adjustments

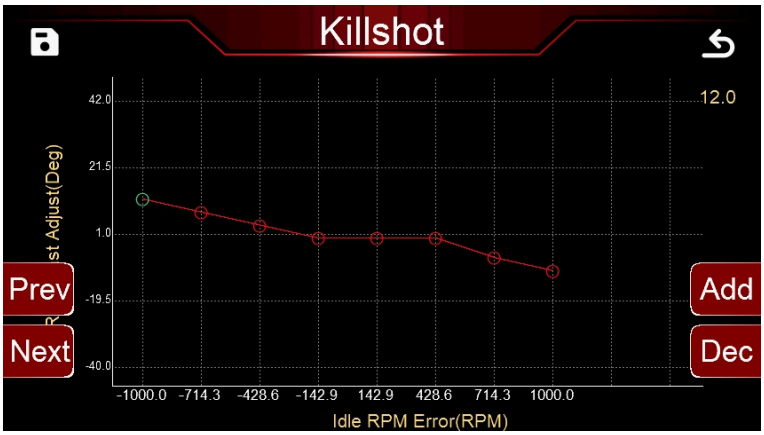
1) Slider Bar: Slide the bar or click "⊖" and "⊕" to adjust the parameters, click "💾" to save, and click "↩" to cancel.

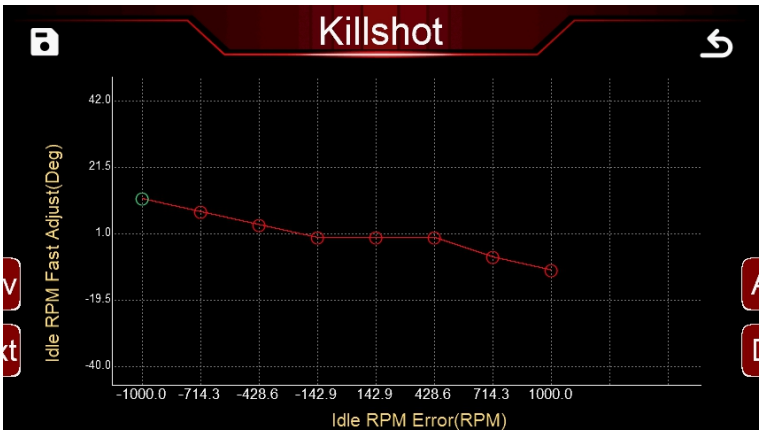


2) Numeric keyboard: Click the edit box "156.0%" above the sliding bar to pop up the numeric keyboard.

3) 2D Graph: Drag the red dot on the graph or click the mechanical buttons on both sides to adjust the parameters. When adjusting the parameter, the y-axis coordinate value of the currently adjusted parameter will be displayed in the upper right corner. The four buttons on both sides of the interface will disappear after a short display. Clicking the two mechanical buttons at the lower left corner can switch the position of the green dot, clicking the button at the right center can raise the position of the green dot, and clicking the mechanical button at the lower right corner can lower the position of the yellow dot. The y-axis coordinate value of the green dot is displayed in the upper right corner of the interface.

After the configuration is complete, click "" to download the calibration data to the ECU; click "" to cancel the modification.





8.2 Connection

The handheld is connected to the ECU through the CAN bus. Program upgrading can be done through the type-C USB interface.

8.3 Navigation buttons

The ACES Handheld is designed for reliable operation and use. There are buttons on both sides of the display. The handheld is operated by touching the screen or the buttons on the sides. (See figure on the next page.)

8.4 Main Menu

The Main Menu has six (6) selections: Monitor, Tuning, Logging, Files, Settings, and Wizards.

Monitor - A variety of gauge and dash displays.

Tuning - Allows for various parameters to be easily adjusted.

Logging - Users can freely choose the monitored object to write to the log file in order to better observe the ECU data.

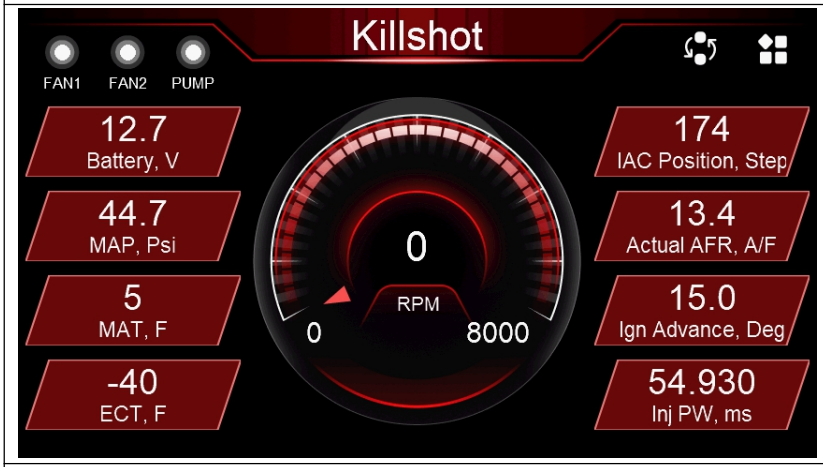
Files - Saves and loads tuning calibrations. Also shows information about the ECU and handheld controller.

Settings - Adjust the backlight brightness and volume for sound of buttons or touchscreen and see information about the handheld.

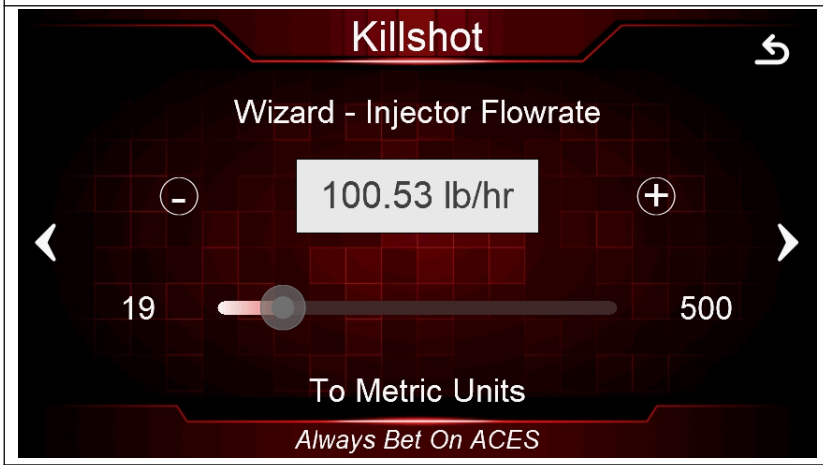
Wizards - Creates a base calibration and performs the TPS Zero Learn function.

The KILLSHOT™ EFI system will build a custom calibration for your engine based on a few easy to answer questions. To begin, Choose the Wizards icon from the main menu.

9.0 Calibration Wizard

	**Select System** Connect the Handheld to the wire harness and Power up the ECU. Select KILLSHOT.
	**Home Screen** Click the "" icon in the upper right corner to enter the Main Menu.
	**Main Menu** Click Wizards from the main menu.

	**Wizards** Click Start Wizard to configure your KILLSHOT™ EFI system.
	**Camshaft Type** Select your camshaft type: • Stock/Mild = This selection will work well on most applications equipped with stock or "street performance" camshafts. Choose Stock/Mild If you are unsure of your camshaft specs. • Street/Strip = Select this if your engine has between 8" and 13" of manifold vacuum. Press "›".
	**Dual WBOS** Select Only WBOS1 for your KILLSHOT. Press "›".
	**RPM To KILLSHOT/Ignition Type** Select your ignition type: • Magnetic (ECU-Controlled Timing) • Coil (-) (no timing control) • CD Ignition Box (no timing control) Press "›".

	**Number of Injectors** Select 4 injectors for your KILLSHOT. Press "›".
	**Injector Flowrate** The injectors of the KILLSHOT™ throttle body are 100 lb./hr. Press "›".
	**Engine Displacement** Use the slider bar to set your engine displacement. Press "›".
	**Hot Idle Speed** Use the slider bar to set your hot idle speed. This is the target RPM that will be enabled at coolant temperatures above 160 °F. Press "›".

Click "✓" to save the configuration to the ECU. Click "✗" to return to the wizard to modify configuration. Or click "↩" to return to the main menu.

10.0 Sensor Verification

Before starting the vehicle, verify that all the sensors are reading properly. Turn the key off and cycle it back on. At this time, you should hear the fuel pump come on and run for 5 seconds. Check for fuel leaks.

On the Home Screen, with the key on and the engine off, these sensors should read as follows:

- **Engine RPM** – Will show "0." (Will show RPM once the engine is cranking or running)
- **MAP** (Manifold Air Pressure Sensor) – Should read from 95-102kpa. At high elevations, it could read as low as 75kpa.
- **TPS** (Throttle Position Sensor) – Slowly depress the throttle to wide open. It should read 90-100 at wide open. Cable-operated throttle bodies should read 0 closed.
- **CTS** (Coolant Temperature Sensor) – Reads engine temperature. If the engine is "cold," it should read close to ambient temperature.
- **Battery** – Reads battery voltage. Should be 12.0 volts minimum.

If ANY of these sensors is not reading properly DO NOT attempt to start the engine.

11.0 Startup Engine

At this point, you're ready to start the engine. Before attempting to start your vehicle with a newly installed KILLSHOT™ EFI system, ACES recommends running through the following checklist to help ensure a safe and successful start:

1) Double-check all wiring, especially:

a) Power and Ground are run directly to the battery.

b) The small Red "IGNSW" wire from the KILLSHOT™ ECU has power during both Key-On and Cranking.

2) The KILLSHOT™ ECU, fuel pump, fuel lines, and wires are securely mounted away from heat sources and pinch points.

3) Wide Band Oxygen Sensor is installed in a proper location.
4) There are no exhaust leaks.
5) Throttle linkage is complete and operational from the pedal.
6) Handheld powers up during Key On.
a) Each step of the Initial Setup in the Handheld has been done.
7) At Key On the fuel pump primes.
8) There are no fuel leaks when the system is under pressure.
9) Wiring connection is for No Timing Control (unless using timing features, ACES recommends starting up your engine with no timing control at first start).

When ready to start the engine, watch for Engine RPM on the Handheld Dash to know that the KILLSHOT™ ECU is getting proper input RPM signal.

Crank the engine and look at the RPM parameter. It should indicate RPM. The engine should fire and run and come to an idle. Cold engines will have high RPM, around 1200-1500, depending on engine temperature.

If you do not get an RPM signal, there is an error in the wiring or system setup. Call ACES Fuel Injection service at (423) 590-ACES for advice.

12.0 After Startup

Once the vehicle has started, look for any fuel or coolant leaks. Let the vehicle warm up while you check the following to make sure everything is operating properly:

- **Fuel Loop State** – Indicates whether the engine is “Closed Loop” or “Open Loop”. Closed Loop indicates that the ECU is adding or subtracting fuel to maintain the target air/fuel ratio. The KILLSHOT™ calibrations are such that the system should be operating closed loop almost all the time.
- **Inj Percent** – This is the percentage compensation of fuel that the ECU is adding or subtracting to maintain the target air/fuel ratio at any specific moment. A value less than 100% indicates the ECU is removing fuel. A value more than 100% indicates the ECU is adding fuel. When in open loop operation, this will always stay at 100%.
- **Inj PW** – Indicates the injector pulse width. This will vary depending on the engine speed and load.
- **Target Air/Fuel Ratio** – This is the target AFR (air/fuel ratio) the ECU is trying to maintain. This will vary depending on the engine speed and load.
- **Actual AFR** – This will show the air/fuel ratio that the wideband oxygen sensor is reading. The Closed Loop Compensation should be adding or subtracting fuel all the time such that the AFR value should always be close to the Target AFR.
- **Fuel Learn State** – This indicates the state of the KILLSHOT™ “Self-Tuning” operation (Learn Status). The system will automatically tune itself as you drive around. There are several conditions that must met for self-tuning to occur. The engine temperature must exceed 160° F, the system must be operating in a closed-loop mode, and self-tuning must be enabled. The base KILLSHOT™ setup has self-tuning enabled. Once the engine reaches 160° F, self-tuning should be active.

13.0 Timing Verification

13.1 No Timing Control

With a timing light, verify that the timing is set to an appropriate value for your engine. Adjust as necessary. It is critical to have the timing set correctly before the car has been driven with the KILLSHOT™ EFI. Many drivability and idle issues can be avoided with a properly timed engine.

13.2 Timing Control

Have a timing light handy as the first step will be positioning the distributor.

1) Switch the ignition key ON to power the KILLSHOT™ system up and go to Handheld **Tuning >>Spark>>Basic >> Static Timing**. This screen allows you to set the distributor exactly where the KILLSHOT™ ECU needs it to be positioned to operate the timing.
2) Start the engine. Then, set the static timing to 15 degrees BTDC. Then go to Handheld **Tuning>>Spark>>Advanced>>Lock Ignition Timing.** Click **Enter** to select **Lock.** Then save. Now, ignition timing is locked at 15 degrees BTDC. Using the timing light, rotate the distributor until you see 15 degrees BTDC on the balancer. Then tighten the hold down clamp.
3) Set **Lock Ignition Timing** to "unlock." Set static timing to 15 degrees BTDC. Go back to the Home Screen, and the KILLSHOT™ ECU will now be controlling the ignition timing. Advancing or retarding ignition timing can make an engine want to speed up or slow down. KILLSHOT™ can use this principal as another way (in addition to the idle motor) to maintain the desired idle speed. Besides giving the ECU additional influence on engine speed, the idle timing adjust feature can also react very quickly with what we call "fast adjust" which utilizes timing control by advancing or retarding ignition timing. Conversely, "slow adjust" utilizes the IAC. The KILLSHOT™ ECU has two strategies of idle control. It is important to note that you will not see accurate timing at idle speed when viewing with a timing light. This is due to ECU calculations. If you rev the engine off idle, the timing will appear correctly.
4) Go to the Spark screen, **Tuning >>Spark>>Basic.** Here, you can adjust the idle, cruise, WOT, and cranking timing settings. It is HIGHLY recommended that you build a timing map using the KILLSHOT™ EFI PC Software for the engine on which the KILLSHOT™ EFI is controlling timing. The timing map built using the Handheld is very basic, and your engine will perform much more optimally with a timing curve built specifically for it.

★ Timing Offset

Use this value to sync timing at higher RPMs. These values are set to 0 in the base calibrations. Some ignition modules may need this number altered if the commanded timing does not match the commanded timing as engine speed increases. If the timing starts to retard as rpm increases, this number can be increased for the timing to match.

14.0 Idle Setting

Once the engine is warmed up, the idle speed can be set to what is desired.

Select the Tuning tab. Find the target hot idle speed. Move the button left and right to adjust it. Click the button to save the new value or select CANCEL at the bottom to move out of this screen.

Whether you change the target idle or not, you need to set the throttle plates on the throttle body to an optimal

position. To do so, with the engine running, select the Monitor tab. You will see the Idle screen. Look at the “IAC Position” value. This value should be between 6 and 20 with the engine in neutral and up to operating temperature. Also make sure the “TPS” shows 0. If it is not, you need to perform a TPS Zero Learn.

If the “IAC Position” value is zero, you must close the throttle plates until it reads a value of 6-20. Slowly turn the throttle shaft adjustment screw counterclockwise on the throttle body. If the IAC position is “stuck” at zero, it is likely that the engine is idling at a higher speed than you have set for the target idle speed. You need to adjust the throttle plates to resolve this issue.

If the “IAC Position” value is greater than 20, it is a good idea to open the throttle plates until the “IAC Position” value is between 6 and 20. Do this by turning the throttle shaft adjustment screw clockwise. Note that if you open the throttle plates such that the “TPS” position goes above zero, you will need to shut the vehicle off and perform a TPS Zero Learn. Then, restart the vehicle and continue adjusting the throttle plates.

Once the TPS goes above zero, the ECU goes out of its “idle” mode and will lock the IAC position to a fixed value.

When the adjustments are completed, make sure the TPS reads 0 with the engine idling.

15.0 Self-learning

It is time to drive the vehicle and let the system perform the self-learning process. The best way to self-learn is to drive the vehicle under as many different operating conditions as possible - different engine speeds and loads. Start by slowly revving the engine in neutral and holding it at different speeds up to 2500 RPM. This will help the system learn these points. Then drive the vehicle, possibly using different transmission gears to learn in different areas. If you have an automatic transmission, you may want to put it in gear, and with your foot on the brake pedal, apply a SMALL amount of throttle so that the system learns in this area as well.

NOTE: There are several conditions where Learning will NOT occur. They are the following:

- If the engine is below 160° F
- When the engine detects quick accelerator pedal movement
- At certain times when the accelerator pedal is released, and the vehicle is coasting
- If learning is disabled by the user

If you would like to see if self-learning is completed in a certain area, follow these instructions in your Handheld:

1) Select Monitor from the Main Menu.
2) Then select Monitors.
3) Select the Fuel Inj PW icon. The Fuel Learn Status indicates if the learn feature is active.

At this point you can drive and enjoy your KILLSHOT™ EFI as it is.

Diagnostic LEDs

LED #	Function	Color	Definition
1	Power Indicator	Red	System power indicator
2	Engine Running Indicator	Blue	Engine running indicator, Blinking becomes faster with speed
3	Main Relay Indicator	Red	The main relay indicator, the ignition key is turned on, the main relay is turned on, and the key is turned off, the main relay is turned off after the system saves the learning data etc.
4	Fuel Pump Indicator	Blue	Fuel pump relay working indicator

KILLSHOT™ Tuning Reference Guide

The KILLSHOT™ EFI system allows users to adjust some basic tuning settings to optimize engine performance. Tuning is split up into “Basic” and “Advanced.”

Basic Tuning allows for changes to the basic calibration data for **Idle, Spark, Fuel, Fuel Pump, System Setting,** and **System IO**. Advanced Tuning is a control function and 2D table that are less commonly used. These parameters require some understanding before changing.

The Main Menu has six options: **Monitor, Tuning, Logging, Files, Settings, and Wizards.**

Click the "" icon in the upper right corner to return to the Home Screen.

1 SENSORS

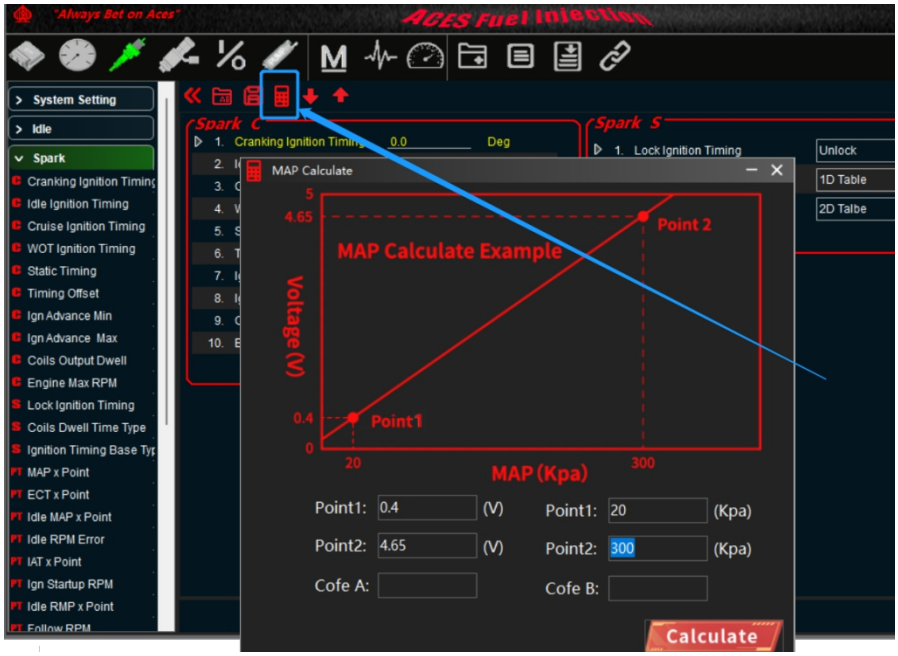
1.1 Basic Sensors Parameters

Basic Sensors Screen

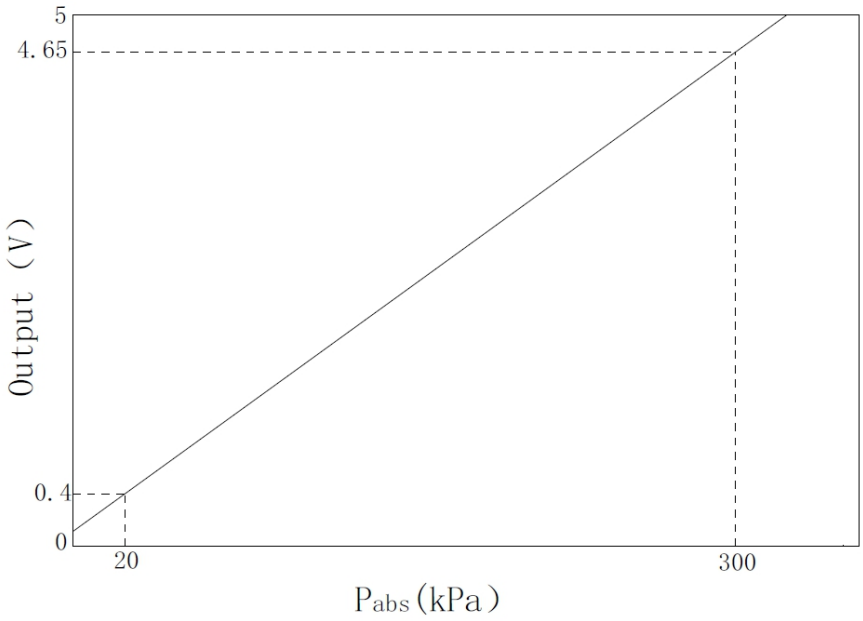
FPS Coef A
FPS Coef B
Fuel pressure sensor coefficient

OPS Coef A
OPS Coef B
Oil Pressure sensor coefficient

Our PC tuning software have a Map calculator
Type the value of pressure vs different voltage into calculator, then calculate the Coef A and Coef B.
Pressure sensor Linearity Coef A : 932
Pressure sensor Linearity CoefB: 79714
Make sure the Sensor Type selected Custom Coef A,B



MAP Calculator



Pressure sensor Voltage Chart

1.2 Advanced Sensors Parameters

Advanced Sensors Screen

FPS Type

FPS type allows you select different fuel pressure sensor.

OPS Type

OPS type allows you select different oil pressure sensor.

2 IDLE

The goal of the operating system is to define the status of the engine related to its operating point. This

status depends on engine speed and load. The following states are defined here: **engine stopped, startup, idle, push, WOT, push fuel cutoff, and follow. Follow** is an engine operating state that helps your engine to get to idle smoothly.

Select Tuning and click the Idle icon to enter the Idle screen.

Tuning Screen

Idle Screen

2.1 Basic Idle Parameters

Basic Idle Screen

Idle IAC Min Step

The minimum of IAC steps

Idle Blanking Windows Pos

At engine idle state, when current idle speed is greater than the target idle speed, the difference between the current speed and target idle speed is less than this value, and the IAC closed-loop control is not performed. This parameter is a positive value.

Idle Blanking Windows Neg

At engine idle state, when current idle speed is less than the target idle speed, the difference between the current

speed and target idle speed is less than this value,and the IAC closed-loop control is not performed.
This parameter is a negative value.

Follow Above Idle Min RPM

Min threshold RPM to get into follow states

Push Above Idle Min RPM

Min threshold RPM to get into push states

Push Above Idle Max RPM

Max threshold RPM to get into push states

Startup Air Fast Decay Cycle

After the engine is started, the starting air quickly decays to the target idle speed according to a certain period. The s maller the value, the faster the air decays.

Startup Air Slow Decay Cycle

After the engine is started, the starting air quickly decays to the target idle speed in a certain period. When the actual speed is close to the target idle speed, the air decay speed should be slowed down. The larger the value, the slowe r the air decay.

Fan On Add Air

When Fan is on, add more IAC steps to keep idle target.

Fan On IAC Loop Lock Time

When Fan is on, add more IAC steps to keep idle target, IAC closed loop is locked in a short time.

2.2 Advanced Idle Parameters

Advanced Idle Screen

After Start Air Decay Type
If you select this option, the speed of starting air attenuation is determined by the table, and the attenuation speed is determined by the ECT look-up table.

IAC Main P
Current idle speed is higher than target idle speed, the setting of proportion.

IAC Main I
Current idle speed is higher than target idle speed, the setting of integration.

IAC Low Side P
Current idle speed is lower than target idle speed, the setting of proportion.

IAC Low Side I
Current idle speed is lower than target idle speed, the setting of integration.

Park Air vs ECT
This is the % position in which the IAC motor will be during cranking and immediately after the engine starts. If it is too high, the engine will be at too high of an RPM once it starts - too low and poor starting will result. Note that this is a temperature-based table. The percentage value changed in the handheld offsets this entire curve.

Speed Raise Air
This is the % position of IAC for adjusting peak RPM after engine startup.

Idle Target Speed
The Idle Target Base table is used to set the desired engine idle speed vs coolant temperature. Typically, slightly higher target values are used at colder engine temperatures.
Startup Air Fast Decay Cycle
Table for Startup Air decay rate to get to target idle speed.

Startup Air Slow Decay Cycle
Table for Startup Air decay rate to get to target idle speed.

3 SPARK

Go to the Tuning page of the Handheld and select the Spark icon.

3.1 Basic Spark Parameters

Basic Spark Screen

Crank Ignition Timing
Crank ignition advance is normally set to 15 for most engines to help quick start.

Idle Ignition Timing
18-34 degrees is typically used at idle but depends on configuration, camshaft, and engine displacement, etc.

Cruise Ignition Timing
32-48 degrees is typically used when cruising for optimal fuel economy.

WOT Ignition Timing
Older V8 engines are usually between 32-38 degrees.

Static Timing
These parameters should be used when having the KILLSHOT EFI control the ignition timing to sync actual engine timing with commanded timing. Use the “static timing set” function and set the timing to a fixed value such as 15 degrees. Rev the engine up to about 3500 RPM (using appropriate caution/safety). Verify that the engine timing matches the Static V alue setting at all RPMs. If it does not, the inductive delay will need to be changed in the Ignition Setup Screen until the timing of the engine matches the value set in the Static Timing Screen.

Timing Offset
Use this value to retard or advance the timing or sync timing at higher RPMs. These values are sett to 0 in the base calibrations. Some ignition modules may need this number altered if the commanded timing does not match the commanded timing as engine speed increases. If the timing starts to retard as rpm increases, this number can be increased in order for the timing to match.

Ign Advance Min
Min threshold of ignition advance

Ign Advance Max
Max threshold of ignition advance

Coil Output Dwell

The dwell time of the KILLSHOT ignition coil; KILLSHOT drives the ACES High Performance Ignition Coil (AC2008) which h as 90mj spark energy with 3ms dwell time.

Engine Max RPM

Max RPM of engine; rev limiter is spark controlled.

Advance Coef

This Coef is timing gradient ramping rate between different ignition tables, the smaller value, the slower ramp.

3.2 Advanced Spark Parameters

Lock Ignition Timing

This is a switch to lock or unlock ignition timing, verifying ignition timing by lock status to check ignition timing or distrib utor sync. When “Unlock” is selected, the KILLSHOT controls timing.

Coil Dwell Time Type

Default setting is “Simple.” This option is to select “Simple” or “table” for coil dwell time.

Advanced Spark Screen

Ignition Timing Base Type

Default setting is ”Simple.” This option is to select “Simple” or “2D” table of MBT Timing. Using the ACES PC Tuning software allows you to build a custom ignition timing curve.

Idle RPM Fast Adjust

The ECU modifies commanded timing at idle to help maintain the target idle speed. This graph is used to vary ignition timing to help regulate idle speed. The horizontal axis of the graph represents the difference between the actual idle speed and the target idle speed, and the vertical axis of the graph represents the number of degrees to alter the ignition timing. If the idle speed is too high, the ECU will retard the timing by the amount specified in the graph. If the idle speed is too low, the ECU will advance the timing by the amount specified in the graph. It is recommended to set this entire table to zero as a starting point. Add

timing trim only if you are otherwise unable to achieve a smooth, stable idle.

IAT Adjust

The IAT Adjust table is used to trim the ignition timing vs. inlet air temperature and is often used on boosted applications as a safety mode because ignition timing is reduced at very high air temperature readings to avoid detonation. Note that the trim values in this table are added (positive values) or subtracted (negative values) from the base ignition timing.

Idle ECT Adjust

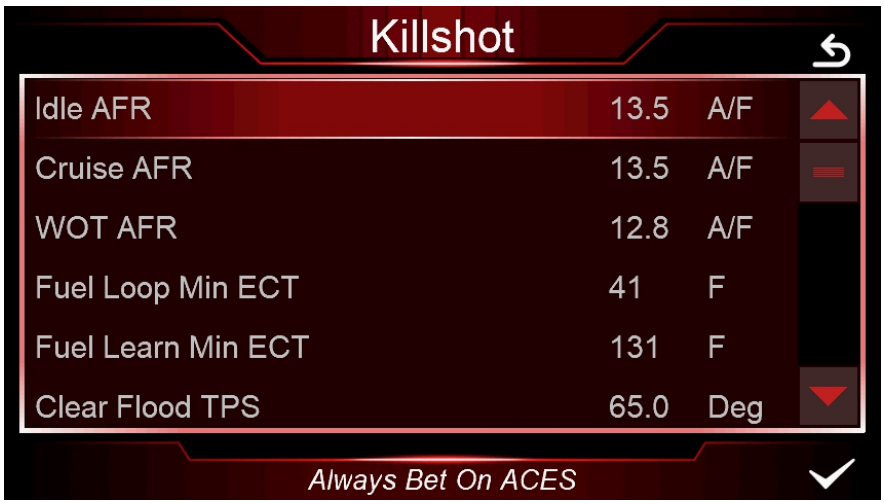
The Idle ECT Adjust is used to trim the ignition timing vs coolant temperature at idle. Sometimes used on N/A applications with very large camshafts to help with warmup. A few degrees of additional timing during warmup can help quite a bit. Note that the trim values in this table are added (positive values) or subtracted (negative values) from the base ignition timing.

Ign Dwell Time

Table of dwell time; time vs battery voltage

4 FUEL

4.1 Basic Fuel Parameters



Basic Fuel Screen

Idle AFR

Target AFR of fuel control when the engine is at Idle, typically between 13.5 and 14.7. Engines with larger cams may need a richer setting for smoothest idle .

Cruise AFR

Target AFR of fuel control when the engine is at Cruise, typically between 13.5 and 14.7. Engines with larger cams may need a richer AFR.

WOT AFR

Target AFR of fuel control when the engine is at WOT, typically between 12.5 and 13.2 on Naturally Aspirated engines. Running richer may reduce power. Running leaner may reduce power or cause potential engine damage .

Fuel Loop Min ECT

Minimum of engine coolant temperature enable Fuel Loop. Fuel loop will be active above this setting.

Fuel Learn Min ECT

Minimum of engine coolant temperature enable Fuel Learn. Fuel Learn will be active above this setting.

Clear Flood TPS

If the TPS value is at 65 or higher during cranking, the ECU will operate in Clear Flood mode, meaning that it will trigger the ignition but will not fire the injectors.

Fuel Power On Percent

This value is multiplying Crank fuel PW of first column of Crank Fuel table when ignition Key on.

Fuel Prime Percent

This value is multiplying fuel PW of first column of Crank Fuel table, it only fires one time once ECU gets RPM signal. It will help wet intake and valve, make crank to run easier.

Rated Injector Pressure

This value is injector working pressure.

After Start Decay Cycle

After engine startup, engine RPM will get to idle from peak RPM, during this period start air will decay out, smaller number of decay cycle will decay fast, engine goes to idle more fast.

After Start Decay Rate

After engine startup, engine RPM will get to idle from peak RPM, during this period start air will decay out, bigger number of decay rate will decay fast, engine goes to idle more fast.

Fuel Learn Rate

The fuel learn can be set to quickly or slowly learn the fuel trim adjustments.

Fuel Learn Cycle

The timer of fuel learn, short timer will learn quickly.

Fuel Learn Read Coef

The coefficient of reading fuel learn data from fuel learn table.

Fuel Learn Min Limit

This value limits how much the fuel learn can learn downwards.

Fuel Learn Max Limit

This value limits how much the fuel learn can learn upwards.

Loop Max Limit

This limits how much extra fuel can be added by the fuel loop.

Loop Min Limit

This limits how much fuel can be removed by the fuel loop.

4.2 Advanced Fuel Parameters

Advanced Fuel Screen

Fuel Loop

This option is to enable or disable fuel loop control default setting is Enable fuel loop control. There is typically no reason to turn off closed loop operation unless you suspect an oxygen sensor problem and want to disable the sensor.

Fuel Learn

This option is to enable or disable fuel learn control, default setting is Enable fuel learn control. If enabled, self - tuning is performed. Learning should be enabled when an engine is first run with the Jackpot and the tuning process is occurring.

Target AFR type

The Simple option is a value at different engine state, The Target AFR Table is a 2D table used for setting target air/fuel ratios throughout the operating range of the engine.

Fuel Inj FPS Compe En

Fuel pressure compensation enable for fuel calculation.

Min Fuel PW

Injector close time.

Injector Off Time
Injector opening time vs different battery voltage.

MAT Fuel Enrichment
The **Manifold Air Temp Enrichment** table is used to compensate for air density changes with inlet air temperature. It can also be used in a safety mode to add additional cooling fuel at very high inlet air temperatures on boosted applications.

After Start Decay Rate
This table is displayed as a 2D graph of the rate at which the after start enrichment will decay out based on engine temperature. The decay rate is shown as the number of crank pulses that must be received by the ECU to reduce the after start enrichment. The higher you set these values, the longer it would take for the after start fuel to decay out once it was applied.

Acceleration Correction vs TPS
Displays a 2D graph of TPS acceleration enrichment fuel.

TPS Acceleration Enrichment vs ECT
Displays a 2D graph of acceleration enrichment fuel applied in ECT change. This 2D graph is increasing or decreasing the 3D table of TPS base film which is activated to running at engine state of acceleration and deceleration.

MAP Acceleration Enrichment vs ECT
Displays a 2D graph of acceleration enrichment fuel applied in ECT change. This 2D graph is increasing or decreasing the 3D table of MAP base film which is activated to running at engine state of acceleration and deceleration.

TPS Acceleration Decay Rate
Displays a 2D graph of TPS acceleration enrichment fuel decay rate applied in ECT change.

MAP Acceleration Decay Rate
Displays a 2D graph of MAP acceleration enrichment fuel decay rate applied in ECT change.

5 Fuel Pump

Turn Off RPM
Engine RPM lower than setting numbers, fuel pump will turn off.

Key On Pump Hold Time
When Key on without engine crank, how long time fuel pump will be power on.

Turn Off After Lose RPM
When ECU lose crank signal, how long time ECU turn off fuel pump.

6 System Setting

6.1 Basic System setting

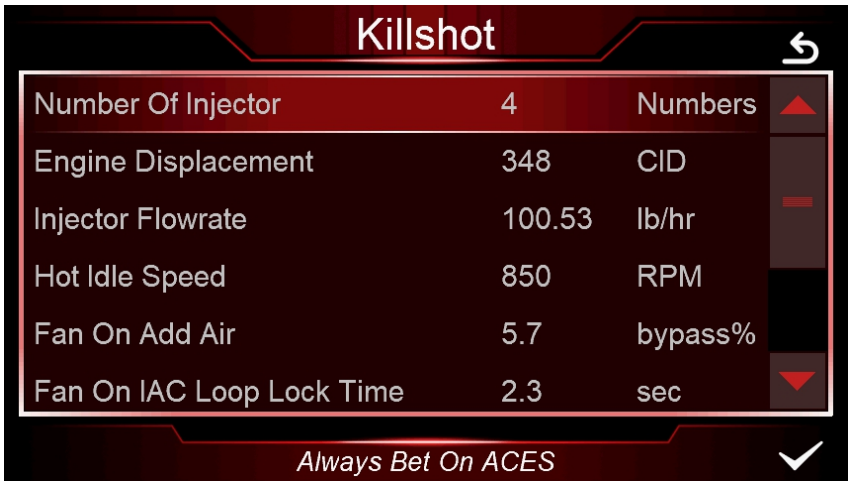
Number Of Injector

This parameter is a part of the ECU calculation to determine the amount of fuel to inject. Enter the number of cylinders the engine has. This must be entered correctly, or the engine will not run correctly, if at all in some cases.

For the KILLSHOT is 4 injectors.

Engine Displacement

This parameter is a part of the ECU calculation to determine the amount of fuel to inject when running . Enter the engines displacement in cubic inches. This must be entered correctly, or the engine will run richer or leaner than intended.



Basic System Setting Screen

Injector Flowrate

This parameter is a part of the ECU's calculation to determine the amount of fuel to inject when running . It is also used for fuel flow and mileage calculations. Enter the flow rate of the injectors in lb./hr. This must be entered correctly, or the engine will run richer or leaner than intended. Keep in mind that fuel pressure affects flow rate. When manufacturers rate injectors, it is at a certain fuel pressure. Injectors from ACES are rated at 45 psi.

Hot Idle Speed

Set idle speed of warm engine.

Fan On Add Air

When Fan is on, add more IAC steps to keep idle target.

Fan On IAC Loop Lock Time

When Fan is on, add more IAC steps to keep idle target, IAC closed loop is locked in a short time.

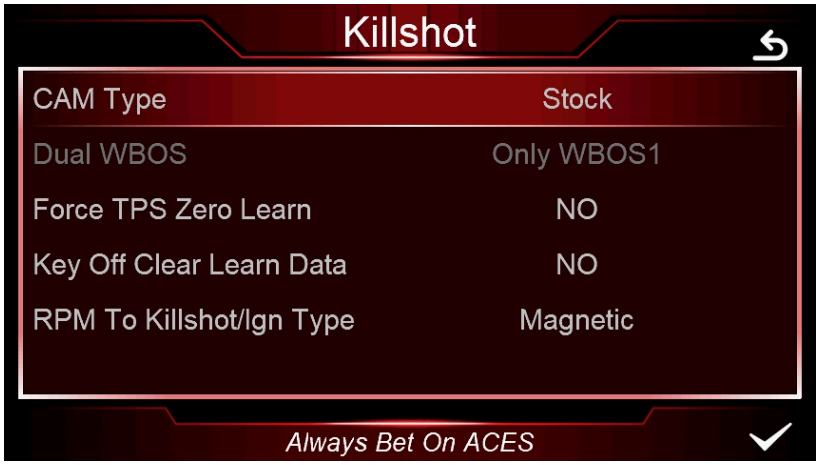
TPS Closed Threshold

This number is the threshold of TPS closed.

TPS Closed Hysteresis

This number is the hysteresis during TPS closed, bigger than Closed threshold.

6.2 Advanced System setting



Advanced System Setting Screen

CD Ignition Box [no timing control]

Magnetic [ECU Controlled Timing]

CAM Type

Select your camshaft type:

Stock/Mild = This selection will work well on most applications equipped with stock or “street performance” camshafts. Choose Stock/Mild If you are unsure of your camshaft specs.

Street/Strip = Select this if your engine has between 8” and 13” of manifold vacuum.

Dual WBOS

Select Only WBOS1 for your KILLSHOT EFI system

Force TPS Zero Learn

Throttle zero position is auto‐learn strategy in Jackpot ECU, choose yes to do TPS Zero Learn again.

Key Off Clear Learn Data

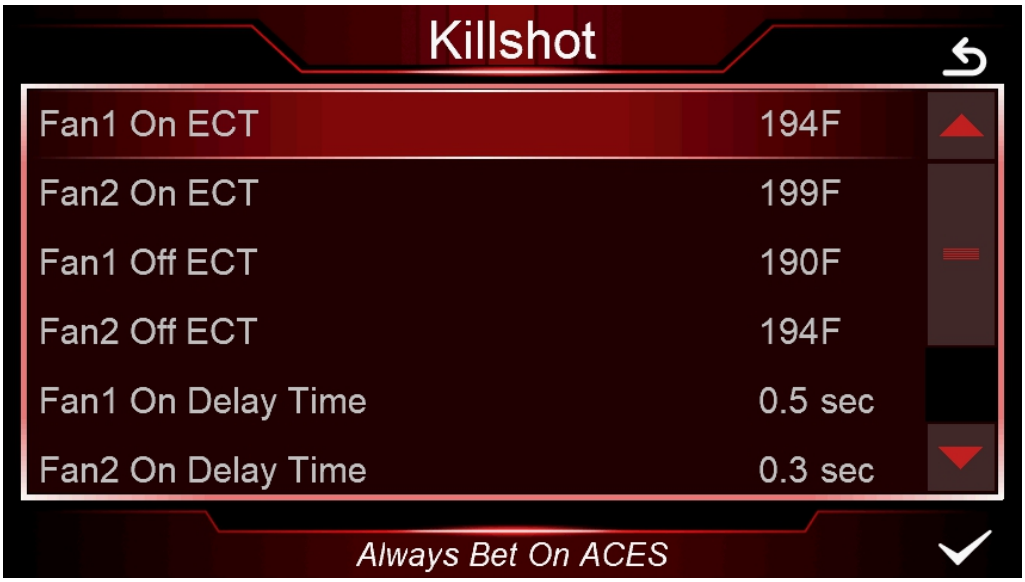
Choose YES, then turn the ignition key off, wait 5 seconds, then turn the key on, all the Learn data (fuel learn table, IAC learn steps, ETC learn steps etc.) will be clear up.

RPM To KILLSHOT / Ignition Type

Select your ignition type:
Coil (-) [no timing control]

7 System IO

Fan1 On ECT - 195°F
Fan2 On ECT - 205°F
Fan1 Off ECT - 180°F
Fan2 Off ECT - 190°F
Fan1 On Delay Time
Fan2 On Delay Time
The ECU has an output to operate a cooling fan. This output switches to ground and is wired to the negative terminal of a relay to activate the fan. This parameter defines the coolant temperature that must be exceeded to activate the fan. It needs to be set higher than Fan Off Temperature (*F).



8 Rev Limiter

8.1 Basic Rev Limiter

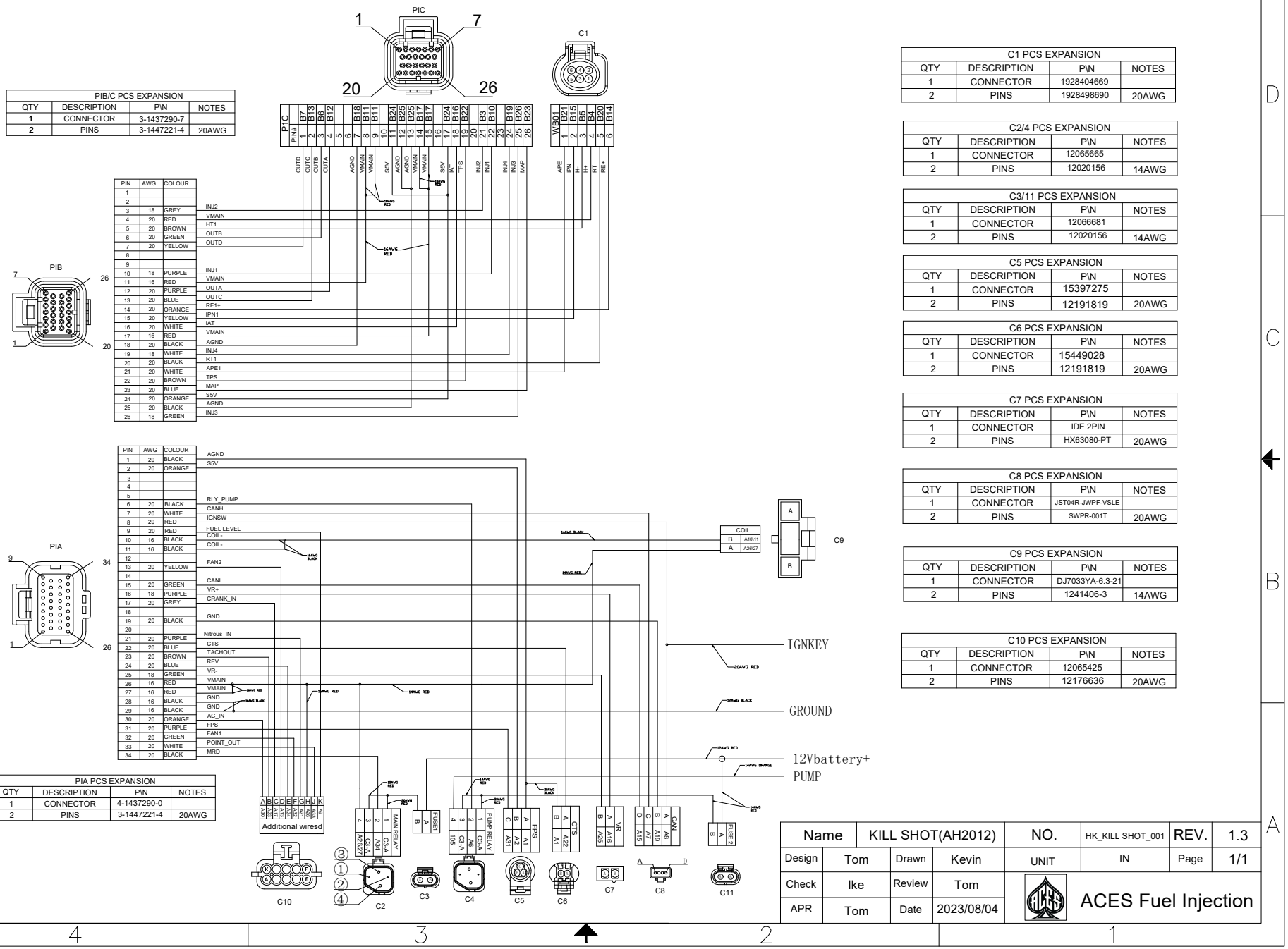
Basic Rev Limiter Screen

Engine Max Rev

8.2 Advanced Rev Limiter

Advanced Rev Limiter Screen

Rev Limiter Enable



PIB/C PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	3-1437290-7	
2	PINS	3-1447221-4	20AWG

PIN	AWG	COLOUR
1		
2		
3	18	GREY
4	20	RED
5	20	BROWN
6	20	GREEN
7	20	YELLOW
8		
9		
10	18	PURPLE
11	16	RED
12	20	PURPLE
13	20	BLUE
14	20	ORANGE
15	20	YELLOW
16	20	WHITE
17	16	RED
18	20	BLACK
19	18	WHITE
20	20	BLACK
21	20	WHITE
22	20	BROWN
23	20	BLUE
24	20	ORANGE
25	20	BLACK
26	18	GREEN

PIN	AWG	COLOUR
1	20	BLACK
2	20	ORANGE
3		
4		
5		
6	20	BLACK
7	20	WHITE
8	20	RED
9	20	RED
10	16	BLACK
11	16	BLACK
12		
13	20	YELLOW
14		
15	20	GREEN
16	18	PURPLE
17	20	GREY
18		
19	20	BLACK
20		
21	20	PURPLE
22	20	BLUE
23	20	BROWN
24	20	BLUE
25	18	GREEN
26	16	RED
27	16	RED
28	16	BLACK
29	16	BLACK
30	20	ORANGE
31	20	PURPLE
32	20	GREEN
33	20	WHITE
34	20	BLACK

PIA PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	4-1437290-0	
2	PINS	3-1447221-4	20AWG

C1 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	1928404669	
2	PINS	1928498690	20AWG

C2/4 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	12065665	
2	PINS	12020156	14AWG

C3/11 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	12066681	
2	PINS	12020156	14AWG

C5 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	15397275	
2	PINS	12191819	20AWG

C6 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	15449028	
2	PINS	12191819	20AWG

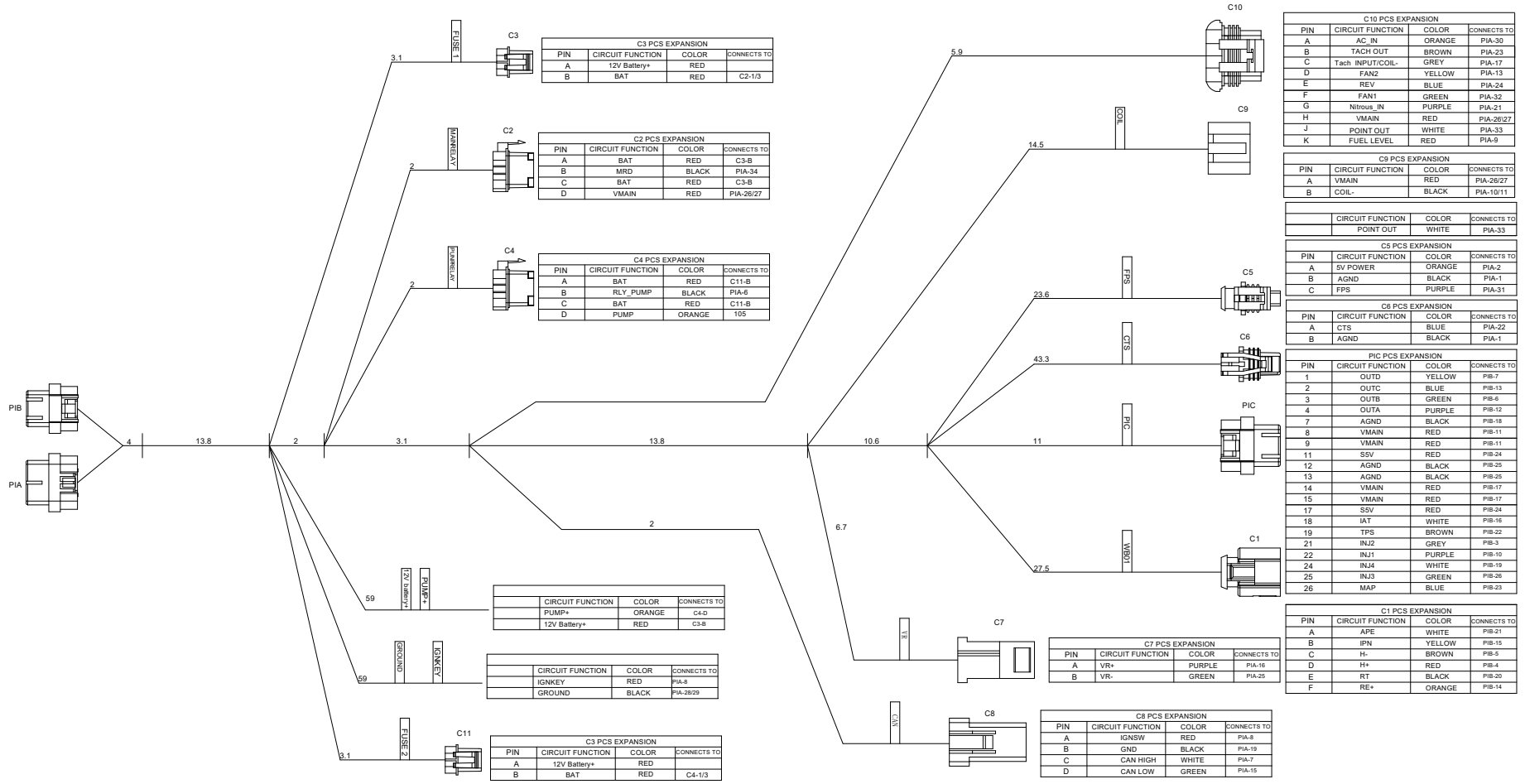
C7 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	IDE 2PIN	
2	PINS	HX63080-PT	20AWG

C8 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	JST04R-JWPF-VSLE	
2	PINS	SWPR-001T	20AWG

C9 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	DJ7033YA-6.3-21	
2	PINS	1241406-3	14AWG

C10 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	12065425	
2	PINS	12176636	20AWG

Name	KILL SHOT(AH2012)		NO.	HK_KILL SHOT_001	REV.	1.3
Design	Tom	Drawn	Kevin	UNIT	IN	Page	1/1
Check	Ike	Review	Tom				
APR	Tom	Date	2023/08/04	ACES Fuel Injection			



C3 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	12V Battery+	RED	
B	BAT	RED	C2-1/3

C2 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	BAT	RED	C3-B
B	MRD	BLACK	PIA-34
C	BAT	RED	C3-B
D	VMAIN	RED	PIA-26/27

C4 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	BAT	RED	C11-B
B	RLY_PUMP	BLACK	PIA-6
C	BAT	RED	C11-B
D	PUMP	ORANGE	105

	CIRCUIT FUNCTION	COLOR	CONNECTS TO
	PUMP+	ORANGE	C4-D
	12V Battery+	RED	C3-B

	CIRCUIT FUNCTION	COLOR	CONNECTS TO
	IGNKEY	RED	PIA-8
	GROUND	BLACK	PIA-28/29

C3 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	12V Battery+	RED	
B	BAT	RED	C4-1/3

C7 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	VR+	PURPLE	PIA-16
B	VR-	GREEN	PIA-25

C8 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	IGNSW	RED	PIA-8
B	GND	BLACK	PIA-19
C	CAN HIGH	WHITE	PIA-7
D	CAN LOW	GREEN	PIA-15

C10 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	AC_IN	ORANGE	PIA-30
B	TACH OUT	BROWN	PIA-23
C	Tach INPUT/COIL-	GREY	PIA-17
D	FAN2	YELLOW	PIA-13
E	REV	BLUE	PIA-24
F	FAN1	GREEN	PIA-32
G	Nitrous_IN	PURPLE	PIA-21
H	VMAIN	RED	PIA-26\27
J	POINT OUT	WHITE	PIA-33
K	FUEL LEVEL	RED	PIA-9

C9 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	VMAIN	RED	PIA-26/27
B	COIL-	BLACK	PIA-10/11

	CIRCUIT FUNCTION	COLOR	CONNECTS TO
	POINT OUT	WHITE	PIA-33

C5 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	5V POWER	ORANGE	PIA-2
B	AGND	BLACK	PIA-1
C	FPS	PURPLE	PIA-31

C6 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	CTS	BLUE	PIA-22
B	AGND	BLACK	PIA-1

PIC PCS EXPANSION

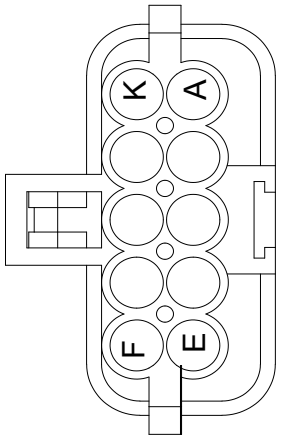
PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
1	OUTD	YELLOW	PIB-7
2	OUTC	BLUE	PIB-13
3	OUTB	GREEN	PIB-6
4	OUTA	PURPLE	PIB-12
7	AGND	BLACK	PIB-18
8	VMAIN	RED	PIB-11
9	VMAIN	RED	PIB-11
11	S5V	RED	PIB-24
12	AGND	BLACK	PIB-25
13	AGND	BLACK	PIB-25
14	VMAIN	RED	PIB-17
15	VMAIN	RED	PIB-17
17	S5V	RED	PIB-24
18	IAT	WHITE	PIB-16
19	TPS	BROWN	PIB-22
21	INJ2	GREY	PIB-3
22	INJ1	PURPLE	PIB-10
24	INJ4	WHITE	PIB-19
25	INJ3	GREEN	PIB-26
26	MAP	BLUE	PIB-23

C1 PCS EXPANSION

PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	APE	WHITE	PIB-21
B	IPN	YELLOW	PIB-15
C	H-	BROWN	PIB-5
D	H+	RED	PIB-4
E	RT	BLACK	PIB-20
F	RE+	ORANGE	PIB-14

Name	KILL SHOT(AH2012)			NO.	HK_KILL SHOT_002	REV.	1.3
Design	Tom	Drawn	Kevin	UNIT	IN	Page	1/1
Check	Ike	Review	Tom	ACES Fuel Injection			
APR	Tom	Date	2023/08/04				

B1

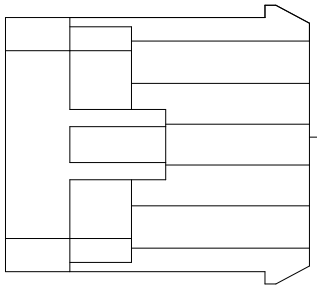


PIN	AWG	CLOUR	
K	20	RED	FUEL LEVEL
J	20	WHITE	POINT
H	16	RED	VMAIN
G	20	PURPLE	Nitrous_IN
F	20	GREEN	FAN1
E	20	BLUE	REV
D	20	YELLOW	FAN2
C	20	GREY	TACH INPUT/COIL-
B	20	BROWN	TACH_OUT
A	20	ORANGE	AC_IN

B1 PCS EXPANSION			
QTY	DESCRIPTION	P\N	NOTES
1	CONNECTOR	12045808	
2	PINS	12059894	20AWG

Name	KILL SHOT(AH2012)-1			NO.	HK_KILL SHOT_003	REV.	1.1
Design	Tom	Drawn	Kevin	UNIT	IN	Page	1/1
Check	Ike	Review	Tom	ACES Fuel Injection			
APR	Tom	Date	2023/08/04				

B1



39.4

FUEL LEVEL
REV
FAN1
FAN2
TACH OUT
AC_IN
TACH INPUT/COIL-
VMAIN
Nitrous_IN

B1 PCS EXPANSION			
PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	AC_IN	ORANGE	PIA-30
B	TACH OUT	BROWN	PIA-23
C	Tach INPUT/COIL-	GREY	PIA-17
D	FAN2	YELLOW	PIA-13
E	REV	BLUE	PIA-24
F	FAN1	GREEN	PIA-32
G	Nitrous_IN	PURPLE	PIA-21
H	VMAIN	RED	PIA-26\27
J	POINT	WHITE	PIA-33
K	FUEL LEVEL	RED	PIA-9

Name	KILL SHOT(AH2012)-1			NO.	HK_KILL SHOT_004	REV.	1.1
Design	Tom	Drawn	Kevin	UNIT	IN	Page	1/1
Check	Ike	Review	Tom	ACES Fuel Injection			
APR	Tom	Date	2023/08/04				

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(423) 590-2237

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