About

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 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 LS-based 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 in engine management technology.

Values

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

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Aces EFI The Joker™ Pro Sequential EFI CDI System Overview

Aces Fuel Injection provides next-level performance for classic V8 engine with The Joker™ Sequential Multi-Port Injection EFI System. Aces Fuel Injection provides the latest EFI innovation for this system by integrating the EFI control module and a CDI ignition system in one ECU. This kit features an aluminum intake manifold (available in two finishes, black and raw aluminum), throttle body, the fuel rails, fuel injectors (8), and all the necessary sensors to get your engine up and running. Aces Fuel Injection designed this fully sequential multiport fuel injection system to provide the best fuel distribution for your traditional V8 engine. Sequential multi-point fuel injection meters fuel more precisely than TBI-style systems, giving you more precise control over air-fuel ratio, better cold start, and improved fuel distribution through the entire RPM band. This results in improved fuel economy, increased power, and enhanced throttle response at any RPM!

The Joker™ ECU is built on Aces' 32-bit Power Architecture®. This technology allows the ECU to manage input and output

signals and voltage (fuel injectors, ignitions coils, sensors and triggers), as well as RPM signal faster and more consistently than any other EFI system available.

Aces EFI's The Joker™ EFI kit include a 5" high-resolution, full-color, LCD touchscreen handheld controller. The Aces EFI tuning software includes multiple base calibrations to choose from for either naturally aspirated or boosted applications. The calibration wizard allows you to answer a few simple questions about your specific combination, giving you the perfect start-up tune. Once the system is up and running, the Self-Tuning functionality monitors data and makes real-time changes to the calibration, taking all the guesswork out of the tuning process. The more you drive, the better the tune! If you have a higher-horsepower combination or require more advance tuning features, Aces EFI tuning software provides an easy-to-use software suite that allows full access for advanced users (laptop required).

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

AECS EFI The Joker™ Pro Sequential EFI CDI System Features

The most versatile EFI system for your traditional V-8 engine
32-bit Power Architecture® based MCU and IC driver chips for automotive powertrain applications. This technology manages input/output signals and voltage, and RPM faster and more consistently than the competition.
Advanced innovations make this system the perfect upgrade of any TBI system.
Integrated Digital CDI with 220 mj spark energy output and 8 injector drivers (High Impedance Injectors) for Sequential fuel injection.
5-Inch-High Resolution Handheld tuner with GPS speedometer
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.
Speed Density-based airflow models and algorithm strategy.
Eight high-impedance injector drivers for sequential fuel injection.
Adaptive self-tuning strategy for idle control and fuel control.
Dual wideband O2 sensors for closed loop control.
High-quality Bosch 4.9 wideband sensors.
Supports boosted applications with the use of a 3bar TMAP sensor, OEM-quality TPS and IAC sensors.
Dual electric fan control.
Integrated fuel pump relay for seamless key-on activation.
CAN communication for Handheld Controller-based calibration and display.
Free Aces advanced EFI Tuning Software for complete control of your The Joker™ EFI system.
Aces CAN module adds inputs and outputs and connects to digital dash displays.

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

WARNINGS, NOTES, AND NOTICES

ADVANCED USER CAPABILITIES

Aces The Joker™ EFI software allows for advanced tuning functionality. A laptop is required to access the advance 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.

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 (coming soon), which can be purchased separately. This system is designed for stock and mild cam, naturally aspirated traditional Small-Block Chevrolet V8 engines.

WARNING! The Joker™ MPFI systems consist of numerous sophisticated components. Failure of any one component does not constitute, nor does it justify, warranty of the complete system. Individual service items are available for replacement of components.

WARNING! To preserve 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 Joker™ MPFI system before you begin. Failure to read and understand these instructions could result in damage to The Joker™ MPFI components that are not covered by the warranty and could result in serious personal injury and property damage.

WARNING! The oxygen sensor in this kit is recommended for use with ONLY unleaded fuel. 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 the above 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 sensor used with this product. 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 must perform the installation, adjustment, and repair. It is particularly important to remember one of the very 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! Aces The Joker™ 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!

NOTE: Our system is designed for usage with a Hall effect Distributor “Gambler series”. Aces EFI Systems are NOT compatible with HEI ignition systems. These ignition systems produce and back feed noisy, dirty electrical signals that can interfere with the normal operation of the Aces EFI system. Any damage to the system found to be the result of using an HEI ignition system or components will void the warranty.

1.0 Part List

Item	Description	QTY	Service Part
1	The Joker ECU	1	AS2015
2	Handheld	1	AS2009
3	Wire harness	1	AH2015
4	Wide band O2 sensor	2	AE1060
5	Clamp-on Oxygen Sensor Bung	2	AE1061
6	Coolant Temperature Sensor	1	AE1052
7	Gambler Series Distributor	1	AD2023 or AD2024,AD2025(Come with Top end kits)
8	Fuel Injectors – 36 or 65 lb./hr.	8	AE1001(Come with Top end kits)
9	Four-Barrel Throttle Body or 92,102mm TB	1	AM1004 or AM1006,AM1007(Come with Top end kits)
10	Intake Manifold w/ Fuel Rail Kit	1	SBC,SBF302,SBF351W,BBC454,MOPAR318-460,MOPAR413-440(Come with Top end kits)

2.0 The Joker™ MPFI SYSTEM INSTALLATION

These instructions are designed to cover a wide variety of vehicle applications. If your vehicle is not equipped with any items referred to in these instructions, such as transmission kick-down linkage, air conditioning, or power brakes, proceed to the next step. Also, if you are unfamiliar with any of the procedures in these instructions consult a shop manual for your vehicle and engine application.

2.1 Fuel System Requirements

The Joker™ MPFI system requires a high-pressure fuel system providing a minimum of 43 psi of fuel pressure. The following recommended options are available separately.

NOTE: Fuel pressure has a direct role in how much fuel is delivered to the engine when the injectors are opened. Higher fuel pressure will deliver more fuel during an injector opening event. Lower fuel pressure will deliver less fuel during an injector opening event. It is critical for the proper operation of your fuel injection system that the fuel pressure matches the injector pulse widths demanded by the calibration for your specific application.
Fuel Pressure Regulator Vacuum Reference: The Fuel Pressure Regulator MUST reference manifold pressure to ensure a proper fuel pressure differential during an injector opening event under high-vacuum conditions. The vacuum reference will lower fuel pressure slightly under idle and cruise conditions. The amount of pressure reduction will vary from engine to engine. During wide open throttle conditions, the fuel pressure should read the set point value of 43psi . The fuel pressure regulator should always be set to the target pressure with the vacuum reference hose disconnected from the Fuel Pressure Regulator. The hose from the manifold MUST be plugged to prevent a vacuum leak when setting the pressure. Remove the plug and reconnect the vacuum line to the fuel pressure regulator after target pressure is achieved.

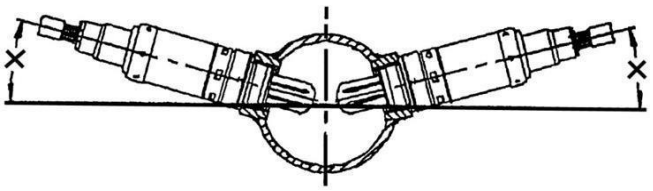
Suggested Aces MPFI Fuel System Kits and Installation

A complete high-pressure EFI fuel system must be installed for the Aces The Joker™ system to operate properly. The pump should be capable of supplying 255 liters/hour or 400 lb./hr. of fuel at The Joker™ system requirement of 43 -58 PSI. If using an in-line fuel pump, there should be a 100-micron pre-filter before the pump. All systems should contain a 10-micron post filter after the fuel pump and as close to the fuel rail as practicable. An EFI fuel pressure regulator is required. It should be installed after the fuel rail in a return-style configuration. If you need help with your fuel system components or configuration, please contact the Aces Technical Service department or visit our web acesefi.com

AF4004 Command Center 2 surge tank (340 LPH)
AF4015 Tight-Fit In-tank (255 LPH)
AF4019 Tank Conversion Internal Regulator (340 LPH)
AF4101 PTFE Hose Kit 20ft
AF4102 PTFE Hose Kit 40ft
AF2010P Fuel Delivery Kit in-line pump 650hp

2.2 Oxygen Sensor Installation

The oxygen sensor should be mounted at a point where it can read a good average of exhaust from all the cylinders on each bank. This would be slightly after each bank of cylinders merge. Do NOT mount the sensor far back in the exhaust as this will negatively impact closed loop operation response. If you have long tube headers, mount the sensor approximately 1-10" after the collector. You must have no less than 18–24" of exhaust pipe after the sensor.
The Joker™ EMS systems come with Bosch LSU 4.9 wideband oxygen sensors.
NOTE: The Joker™ EFI kits include two (2) wideband O2 sensors.
V8 engine, Install the wideband O2 sensor into exhaust pipe of Driver's Side bank then connect to plug labeled WBO1 on The Joker™ harness. Install the other wideband O2 sensor into exhaust pipe of the Passenger Side bank then connect to plug labeled WBO2 on The Joker™ harness. Installation and connection must be correct, or the vehicle will not run properly. The system can operate on one o2 sensor depending on exhaust system layout but is preferred to be used with two O2 sensors. If using one, in the setup wizard only one WBO2 will be selected and it will be attached to the WBO2(1) connection.
Oxygen Sensor Mounting Procedure
NOTE: Never run the engine if the O2 sensors are not plugged in and powered by the ECU—it will damage the wideband sensors. If you need to plug the hole temporarily, use an O2 sensor plug, or a spark plug with an 18mm thread.
NOTE: Someone with experience in welding exhaust systems should install the oxygen sensor bung. Any competent exhaust shop will be able to perform this task at a minimum cost. (Note: If you weld on the car, make sure all wiring to the ECU is disconnected, and it's best to remove the ECU from the vehicle when welding).
WARNING! Use of leaded fuel is not recommended!
WARNING! Use of some RTV silicone sealers will destroy the oxygen sensor used with this product. Ensure the RTV silicone sealant you use is compatible with oxygen sensor vehicles. This information should be found on the RTV package.
Locate a position for the oxygen sensor as close to the engine as possible. If your vehicle has catalytic converters, the oxygen sensor MUST be located between the engine and the catalytic converters.



NOTE: 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. Be sure to pick a location where there is enough room around the exhaust pipe and sensor to easily install and remove the sensor without causing damage to the sensor or wiring.

Drill a 7/8”hole in the location picked for the sensor. Weld the threaded bung into the 7/8”hole. Weld all the way around the boss to insure a leak-proof connection. Once the bung and exhaust pipe are completely cooled, install the oxygen sensor into the threaded bung and tighten securely. It is a good idea to add appropriate type anti-seize for exhaust pipe material to the threads to aid in removal. Do not get any anti-seize on the tip of the sensor.
On vehicles equipped with an air pump, the oxygen sensor must be mounted before the air injection into the exhaust, or the air pump must be disconnected. Aces recommends that if the air is injected into both exhaust manifolds, mount the oxygen sensor into the pipe immediately after the exhaust manifold. Disconnect the air pump tube from the exhaust manifold and plug both ends. Check with local ordinances for the legality of this procedure in your area.
**** 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. As this may create exhaust gas reversion giving a false Oxygen content reading to the sensor at lower speeds.***
**** 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 doesn’t need.***
WARNING! Failure to disconnect the air pump 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.

2.3 Check for Hood Clearance

Prior to removing your old manifold, we recommend making several columns of modeling clay and placing them on your air cleaner in various positions.

Close the hood completely and then reopen it.

Measure the clay columns and record your hood clearance.

Compare the A-B height of your old intake manifold with your new intake manifold. Also consider that the carburetor/air cleaner combination determines the difference in the air cleaner-to-hood clearance.

2.4 Remove Old Manifold Procedure

Disconnect the ground cable from the battery followed by the positive cable. The battery should be completed disconnected prior to the start of installation.

Clean any loose debris, dirt, and grease from the top of the engine adjacent to the intake manifold and valve covers. This will help prevent harmful debris from falling into the engine during the installation process.

Identify the vacuum and crankcase ventilation hoses (if any) leading to the air cleaner and note the routing and connection points. Remove the air cleaner.

Prior to removing any other vacuum lines, identify the routing of the lines. Mark and remove the vacuum lines from the carburetor and/or intake manifold.

WARNING: Hot coolant and steam may be present if the engine is still warm.

Drain the radiator. (It may be necessary to remove the bottom radiator hose if there is no drain plug in the radiator).

Disconnect the throttle linkage, transmission kick-down linkage (auto trans only), and choke rod from the carburetor, (if applicable).

Loosen the gas cap to relieve pressure from the fuel system. Disconnect the fuel line from the carburetor. Plug the end of the fuel line to prevent fuel leakage.

Remove the carburetor.

Tag and disconnect the ignition coil and sensor wires. Remove the ignition coil bracket and the coil.

Remove the radiator hose, thermostat housing, and thermostat.

Remove all water and vacuum fittings from the manifold.

Remove all remaining brackets (if any) from the manifold.

Loosen and remove the valve covers to assist in the manifold removal and the new manifold installation.

Remove Old Distributor Procedure:

CAUTION! FOLLOW THESE INSTRUCTIONS CAREFULLY, AS SERIOUS DAMAGE CAN OCCUR WHEN THE IGNITION IS NOT RE-INSTALLED CORRECTLY.

Rotate the engine to 12° Before Top Dead Center (BTDC) on the compression stroke of cylinder #1. It may be necessary to remove the spark plug from the #1 cylinder to establish when the engine is on the compression stroke.

Remove the distributor cap. Note the position of the rotor and make a mark on the distributor body in line with the rotor tip (it should point to the position of the cylinder #1 spark plug wire on the distributor cap).

Note the position of the distributor vacuum canister (or other distributor body feature) and place some type of reference mark on a convenient surface not attached to the intake manifold.

Note the position of the points, if open, how much; if closed, note the distance from the point block to the cam lobe. If the distributor has a magnetic pickup, note the position of the trigger wheel with respect to the pick-up.

Remove the distributor. DO NOT rotate the engine after removing the distributor (but if you do, the crankshaft timing marker is your reference).

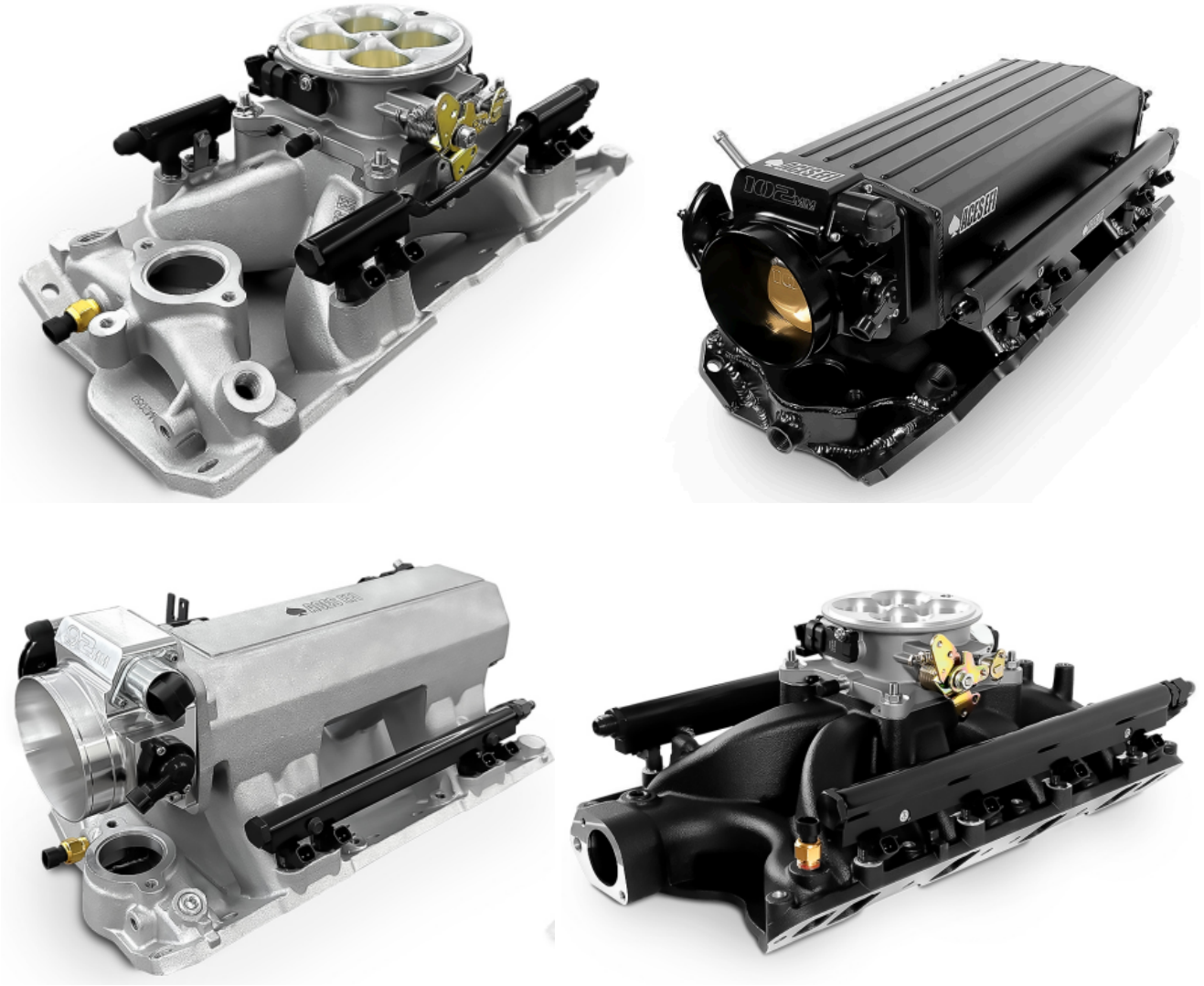
Remove the 12 intake manifold bolts.

Remove the intake manifold. If the intake manifold is stuck to the mounting flanges, do not pry against cylinder head port flanges, as they could become damaged and compromise the gasket sealing with your new intake manifold. Double check that all the bolts have been removed and pry upward carefully at the engine block end seal surfaces.

2.5 Install the Aces Intake Manifold

Clean the cylinder head port flange and the engine block end seal surfaces. To prevent gasket pieces from falling into ports and the lifter valley when cleaning old gaskets from head surfaces, stuff paper towels into all the ports and lay rags in the lifter valley. When clean, carefully remove the paper towels from the cylinder head ports and then the rags from the lifter valley. Make sure that all particles that fell on the rags are completely removed. Wipe surfaces with rags soaked in solvent, such as brake cleaner or lacquer thinner to remove any oils or grease. This is a must for proper manifold/gasket sealing.

Apply a thin coat of gasket adhesive to the cylinder head side of the intake gasket surfaces and the cylinder head port flanges. Allow the adhesive to activate per instructions on adhesive packaging. Lay the manifold gaskets in place, making sure that gaskets are adhered to the cylinder head port flange and will not slip from their properly installed positions.



ACES Intake Manifold

Trial fit your new intake manifold before applying any RTV silicone sealant. Place the new intake manifold into position; check that it properly seats on the intake manifold gaskets. There should be a slight gap between the engine block and the manifold at the end seal surfaces. Check to make sure all the intake manifold bolts can be installed. If there are any other fitment issues such as hood clearance or installation of components dependent on the manifold, they should be checked at this time.

When you are fully prepared to install the intake manifold, apply a ¼" wide bead of oil-resistant RTV-silicone sealant to the front and rear block-sealing surfaces, making sure to overlap manifold gaskets at all four corners. Do not use the cork or rubber end seal gaskets included in the gasket set. Apply a light film of RTV-silicone around the water passage openings.

Carefully, lay your intake manifold in place. If the manifold must be moved, the RTV-silicone may need to be cleaned and re-applied. For the bolts to be installed in bolt holes that are drilled through, apply a dab of thread sealer on the threads. For the blind bolt holes, apply a drop of motor oil to the bolt threads.

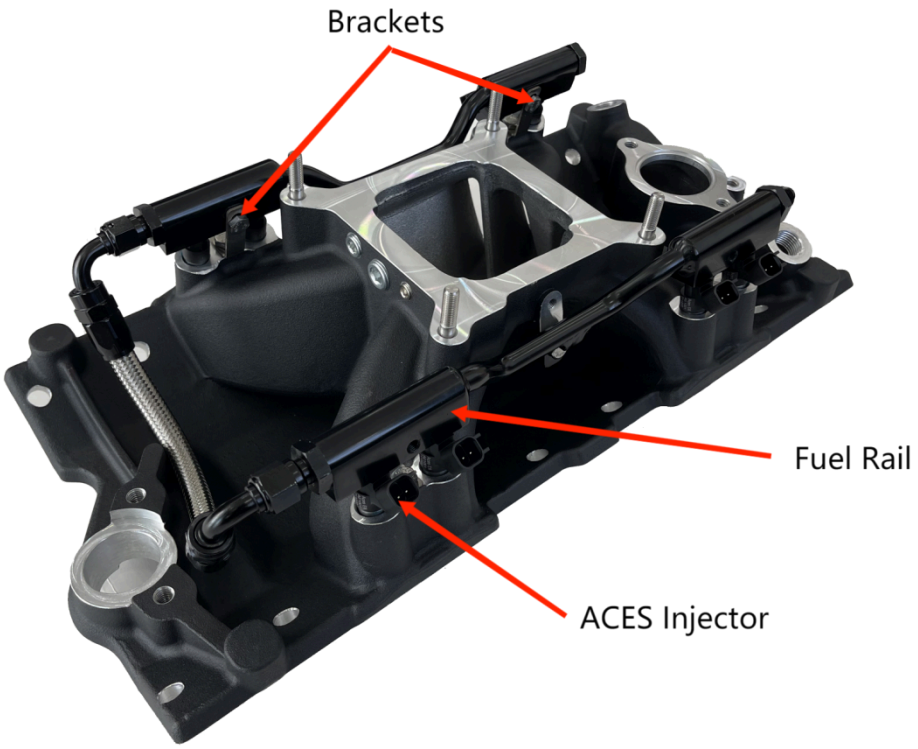
Apply silicone lubricant to each fuel injector O-ring and insert injectors into the ports of the manifold. To avoid interference between the injector wiring harness and the throttle cable. Be careful to plan your installation so the injector connectors are faced in the correct side of the fuel rail for your install.

Apply thread locking compound to the screws. Use these screws and washers to attach the fuel rail brackets to the manifold. Orient the brackets for attaching the fuel rail.

Assemble the fuel rails to the injectors. Check to see that the fuel rail brackets are oriented correctly for attachment of the fuel rails.

Attach each fuel rail to the intake manifold using washers and screws with thread locking compound. If using the shorter fuel rail brackets, the bottom hole on the manifold will be used. If using the taller fuel rail brackets, the upper hole of the manifold will be used. Torque each screw to 75 in-lbs., then torque again to 90 in-lbs.

Install the thermostat, gasket, and thermostat housing. Be sure that the thermostat housing is in good condition and has been cleaned of any old gasket material. If the mounting flange on the thermostat housing is not flat or is damaged, replace it before continuing.



Install the heater hose fitting, heater hose, and radiator hoses. Use thread sealer on the threads of the heater hose fitting.

Install the engine coolant temperature (ECT) sensors and vacuum fittings into the manifold. Use thread sealers on the pipe threads of the sensors and fittings. Install pipe plugs in any unused water and vacuum ports in the manifold (plugs have been provided in the kit).

2.6 Install Aces The Gambler Series Cam Sync Distributor

Verify the engine is still positioned at 12 degrees before top dead center with cylinder #1 on a compression stroke.

Install the gasket onto the distributor housing and apply a liberal amount of lubricant to the distributor gear.

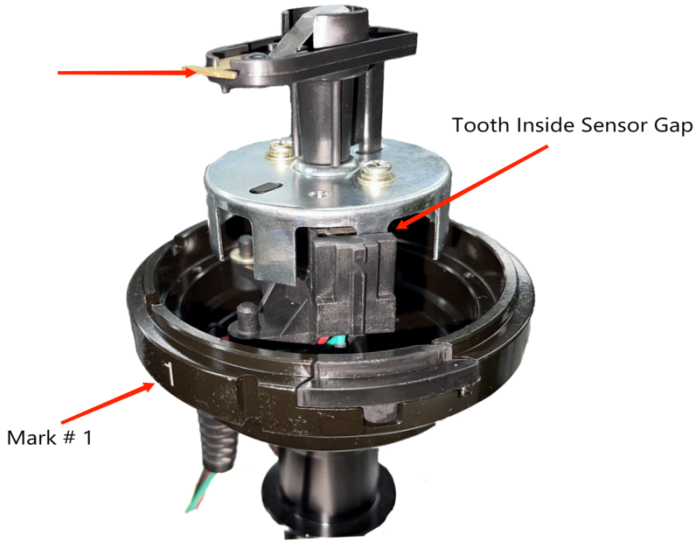
NOTE: Disregard distributor housing O-rings on some Chevrolet applications.

Install the Aces Gambler Series Distributor so that the rotor is pointed in the proximity of the #1 stamped on the outside of the distributor housing and the short trigger tooth is just entering the distributor sensor.

SBC distributor, the short trigger tooth is just entering the sensor in clockwise rotation

SBF distributor, the short trigger tooth is just entering the sensor in anticlockwise rotation

NOTE: You may need to remove and reinsert the distributor a few times to get the alignment correct. Make sure that the distributor seats down completely and has full engagement with the oil pump drive. You may need to rotate the oil pump shaft to ensure it is engaged properly.



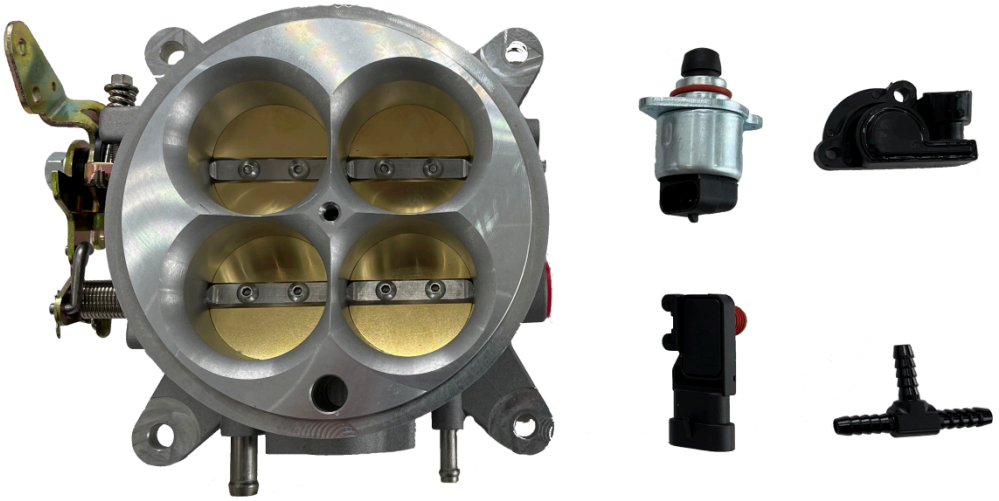
DISTRIBUTOR ROTOR LOCATION AT INSTALLATION POINTING TO #1 ON SIDE OF HOUSING WITH ENGINE AT 12° BTDC CYLINDER #1 ON COMPRESSION STROKE.

Tighten the hold down clamp leaving it just loose enough that you can rotate the distributor during the timing procedure, but not loose enough that the distributor will rotate on its own. The final timing will be set using Aces handheld.

Install the spark plug wires. Position cylinder 1 spark plug wire on the distributor cap post located at the 1 stamped on the distributor housing.

2.7 Install Aces Throttle Body and Others

Install throttle body studs in the manifold. Place the throttle body gasket on the clean carburetor pad. Do not use any type of sealant on the throttle body gasket.



4 Barrel Throttle Body

Install the throttle body and throttle cable bracket. Connect all linkage and throttle springs. Rotate throttle lever to wide-open throttle position and check for smooth operation. Also be sure the throttle opens completely without the throttle blades rotating over center. If the throttle blades rotate over the center, a hung throttle condition could occur.

Connect all vacuum and fuel lines. Refer to your tags or drawings for correct placement.

Automatic transmissions only: Attach transmission kick-down bracket if needed. Adjust kick-down or throttle pressure

linkage for proper shift points (refer to your vehicle's shop manual for the proper adjustment procedure). Check all linkages, making sure that they function freely.

Reinstall valve covers and new gaskets.

Install the A/C and coil brackets, coil, wires, and all brackets that were removed from the manifold.

Close the drain and fill the radiator to the proper level with coolant. While filling, allow trapped air to bleed from the intake manifold at the heater hose fitting until coolant flows from the fitting. Then, re-install the heater hose and continue adding coolant to the proper level.

IMPORTANT! When the installation of the intake manifold is complete, change the oil to remove any coolant or debris that may have contaminated the crank case.

2.8 The Joker™ System

Main Power/Battery Connection

The Joker™ ECU has a main battery power and ground connector on the Main harness. The loose wire of The Joker™ harness located approximately 20" from the ECU connectors is the ground (black wire). The black wire should go to the negative post DIRECTLY on the battery. The left position, the loose wire of The Joker™ harness located approximately 20" from the ECU connectors is the positive terminal (red wire). The red wire should go to the positive post DIRECTLY on the battery. If you have a "dual post" battery, it is a great idea to purchase separate posts/studs to connect the ECU power and ground to the non-used terminals. Always use the fused power cable with the proper connectors supplied by Aces only. Don't connect to the ECU until after ALL wiring and installation is performed.

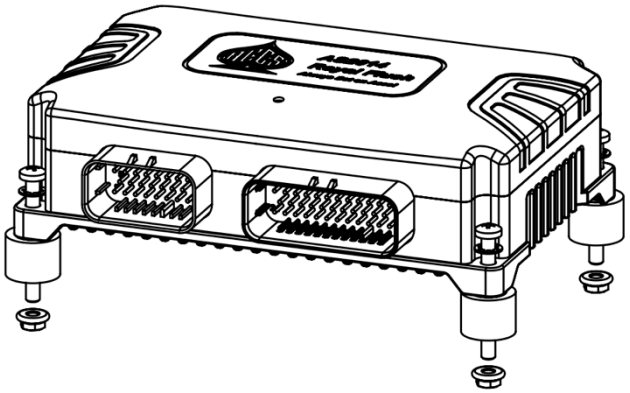
The Joker™ ECU has two connectors:

PIA 23pin Connector					
PIN	**DEFINATION**		**PIN**	**DEFINATION**	
1	COIL+		13	CANH	
2	BAT-		14		
3	BAT-		15	ACFAN	
4	STEP		16	FAN2	
5	IGNSW		17		
6	TACH		18	BURN	
7	VMAIN		19	LAUNCH	
8	VMAIN		20	CANL	
9	BAT-		21	FAN1	
10			22	MRD	
11			23	RLY_PUMP	
12	POINT				
PIB 35pin Connector					
PIN	**DEFINATION**		**PIN**	**DEFINATION**	
1	VMAIN		19	APE2	
2	AGND		20	IPN2	
3	TPS		21	IPN1	
4			22	OUTD	
5	INJ7		23	OUTC	
6	INJ5		24	VMAIN	
7	INJ6		25	MAP	
8	S5V		26	CTS	
9	INJ1		27	AC_IN	
10	INJ3		28	RE2+	

11	HT1		29	RT2	
12	HT2		30	RE1+	
13	VMAIN		31	APE1	
14	IAT		32	INJ2	
15	FPS		33	INJ4	
16	Nitrous IN		34	OUTA	
17	INJ8		35	OUTB	
18	RT1				

2) ECU Mounting

The 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, or other “electrically noisy” devices as possible.
Install vibration mounts. These vibration mounts are just the thing to help isolate severe racing vibrations and keep the controller at a distance from the mounting surface for heat dissipation.
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.



3.0 Harness Install

The following indicates the p nector on the main harness is labeled with the sensor name. The name on this label for each sensor is in parenthesis below.

3.1 Wiring

An EFI system relies heavily on being supplied with a clean and constant voltage source. The grounds of an electrical system are just as important as the power side. The Joker™ ECU’s contain multiple processing devices that require clean power and ground sources. The wiring harnesses must be installed in such a manner that it is separated from “dirty” power and ground sources.
Install the main power and ground directly to the battery POSTS/TERMINALS, not to any other place!
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 not physically contact any EFI wires.
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.
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 as close to a 90-degree angle as possible.
Do not use the electric fan outputs to directly power a fan. They must only trigger a relay.
The fuel pump output lead can be used to power the fuel pump, but it is recommended to use the output as a trigger wire for a relay.
Do not use improper crimping tools.
Do not use connectors like “t-taps”, etc. Use proper crimpers/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”).
Do not connect the red switched +12V wire to “dirty” sources, such as the ignition coil, audio systems, or 12V sources connected to HID head lamps.

The Joker Wire Harness

3.2 Coolant Temperature Sensor

Install the Coolant Temperature Sensor (Item 3) 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 if not changing the intake manifold. 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.
Connect the CTS connector to the sensor.

Coolant Temperature Sensor

3.3 Throttle Position Sensor (TPS)

Connect to the cable driven throttle body.

TPS Sensor

3.4 Idle Air Control (IAC)

Connect to the cable driven throttle body.

IAC Motor

3.5 Wide Band Oxygen Sensor (WBO1 and WB02)

Connect to the oxygen sensors previously installed. The Joker™ systems are intended to be used with Bosch LSU 4.9 wideband oxygen sensors (supplied).

The Joker kits have two sensors, one for each bank. One sensor should be installed in exhaust pipe of the driver side, another one should be installed in exhaust pipe of passenger side. Plug wire connector labeled ***WBO2 1*** *into oxygen sensor on driver side, plug wire connector labeled* ***WBO2 2*** *into oxygen sensor on passenger side.*

Dual Wide Band O2 sensor

3.6 Sub wire harness

Aces EFI The Joker™ EFI system provides 2 different sets of sub wire harness AH2013-1 and AH2013-2, AH2013-1 is applied to intake manifold with 4150 flange and 4 barrel throttle body, AH2013-2 is apply to intake manifold with 92 or 102mm throttle body.

Many other MAP sensors can be configured for use with JACKPOT™ ECU but will require custom calibrations to be made via software.

Sensor sub harness AH2013-1

*Include MAP IAT IAC and TPS connector, GM style MAP sensor without PN and AE1040, part No. AH2011-7

Sensor sub harness AH2013-2)

*Include TMAP IAC and TPS connector, MAP is ACES AE1041 2.8 bar, part No. AH2011-10

Sub Harness AH2013-1

3.7 The AECS Gambler Series Cam Sync Distributor

The Aces Gambler Series Distributor is designed for Aces port injection systems. This distributor has a special reluctor

wheel, designed not only to provide RPM signal to the ECU, but also to send cylinder #1 signal to ECU. The ECU uses this special signal to calculate sequential injection timing.

The distributor has a 3-pin connector—12 volts, ground, and Hall-effect signal.

The Gambler Series Distributor

3.8 Ignition Coils

The Joker™ ECU integrates Digital CDI with Max 220 mj spark energy output. Aces recommends using Aces BLACKJACK Pro Series Ignition Coil (PN AC2008) to get 150mj spark energy, it is beneficial to cold start, maintaining idling stability and improved fuel economy.

Ignition Coil Connector

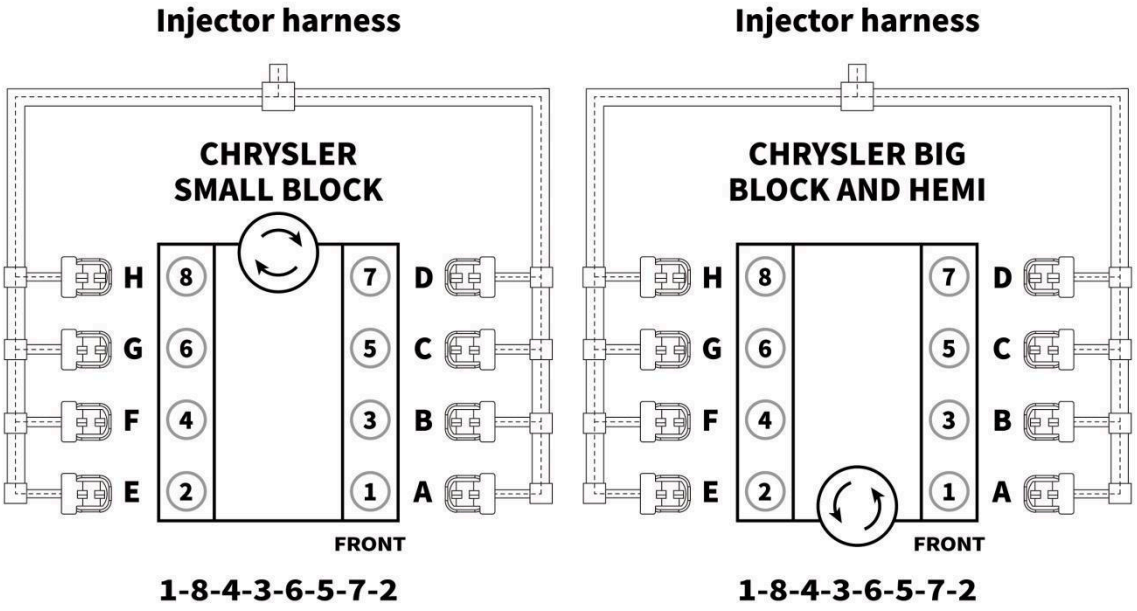
AC2008 Ignition Coil ●Primary Resistance: 0.273Ω ●Primary Inductance: 2.63 mH ●Secondary Resistance: 3.42 kΩ ●Secondary Inductance: 15.77 H ●Output (50pF load): 47 kV ●Output Energy: 150 mJ ●Peak Secondary Current: 100 mA +/- 7% ●Arc Duration: 200 uS ●Turns Ratio 78:1	

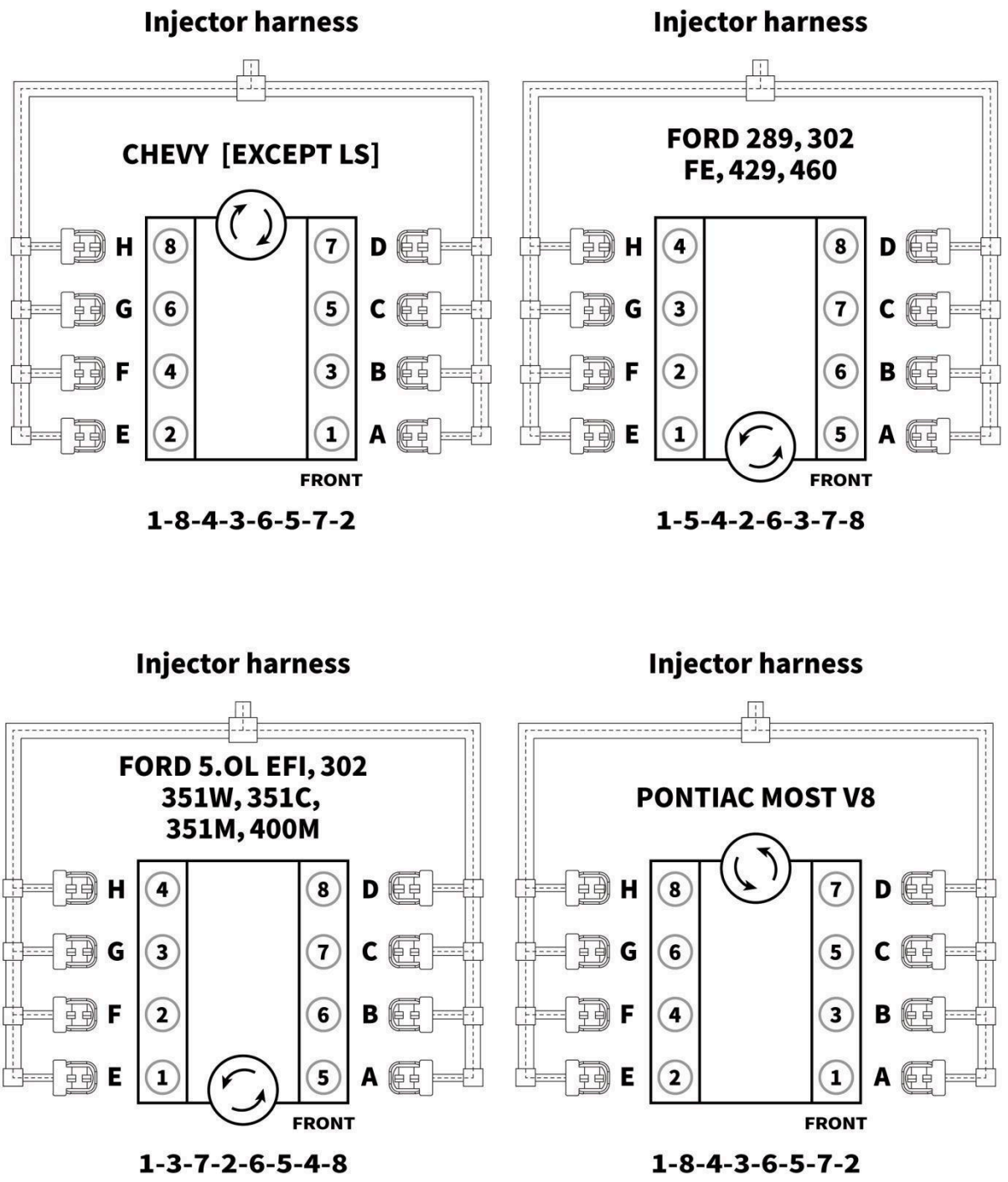
3.9 Fuel injectors

A fuel injector is a solenoid valve that can be opened and closed very quickly. To open the valve, current must flow through a solenoid contained in the upper part of the injector assembly. The Joker™ triggers the injector by providing a ground path to the negative terminal. Fused power is provided to the other terminal from the harness.
The Joker™ is compatible with high-impedance injectors only. For direct drive operation, injector coil resistance must be greater than 8 ohms.
Aces EFI recommend Aces injectors AE1001 36 lb/hr with 43-58 PSI fuel pressure for your classic V8 engine, it can support over 500hp. If you need high flow rate injectors, Aces fuel injector with OEM quality is your best choice.

ACES Injector	Flowrate	
AE1001	36.00	lb/hr
AE1002	65.00	lb/hr
AE1003	80.00	lb/hr
AE1004	100.00	lb/hr
AE1005	211.00	lb/hr

The Joker™ harness has EV6 connectors. The injection strategy of The Joker™ ECU is sequential. Make sure to plug each injector connector into a corresponding injector, otherwise engine damage may result.





The Joker™ ECU has dual lambda controller and dual wide band O2 sensor for 2 banks of a V8 engine. A closed loop lambda controller needs corresponding injectors and wide band O2 sensors. Connect connectors to the corresponding injectors. Connect WBO1 connector to driver side wide band O2 sensor, then connect WBO2 connector to passenger side wide band O2 sensor. These installation operations are very important to make sure that The Joker™ ECU Dual lambda closed loop works properly.

Aces Fuel Injector

3.10 Handheld

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 information of the EFI system. It should be installed such that the handheld controller can be easily used in the passenger compartment. The handheld plugs directly into the main harness at either connector labeled **"CAN."** This connector is located approximately 11.8 inches from the ECU connector. The handheld does not have to remain in the vehicle or utilized after the vehicle is set up and running properly.

CAN connector

3.11 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 17.8" 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 20" 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 Joker™ ECU. This wire is located approximately 17.8" from the ECU connectors.

Pump (Color = Orange) Used to directly power 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 -10 gauge is recommended.

3.12 Additional Outputs

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.

Tach Out (Color = Grey) This wire provides a 12v square wave output and can be used to trigger a conventional tachometer.

Fan1 (Color = Green) This output will provide 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. It should be connected to the ground trigger of the relay.

Fan2 (Color = Yellow) This output will provide 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. It should be connected to the ground trigger of the relay.

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

Burn (Color = Yellow) Burn out Rev Limiter, feeding 12 V power to this wire tells the ECU that a burn out control has been activated.

Launch (Color = Blue) Launch Rev Limiter, feeding 12 V power to this wire tells the ECU that a Launch control has been activated.

Step (Color = Brown) Step Retard, feeding 12 V power to this wire tells the ECU that a step retard has been activated.

AC_IN (Color = Green) This 12V input will provide a 12V input defined AC is on.

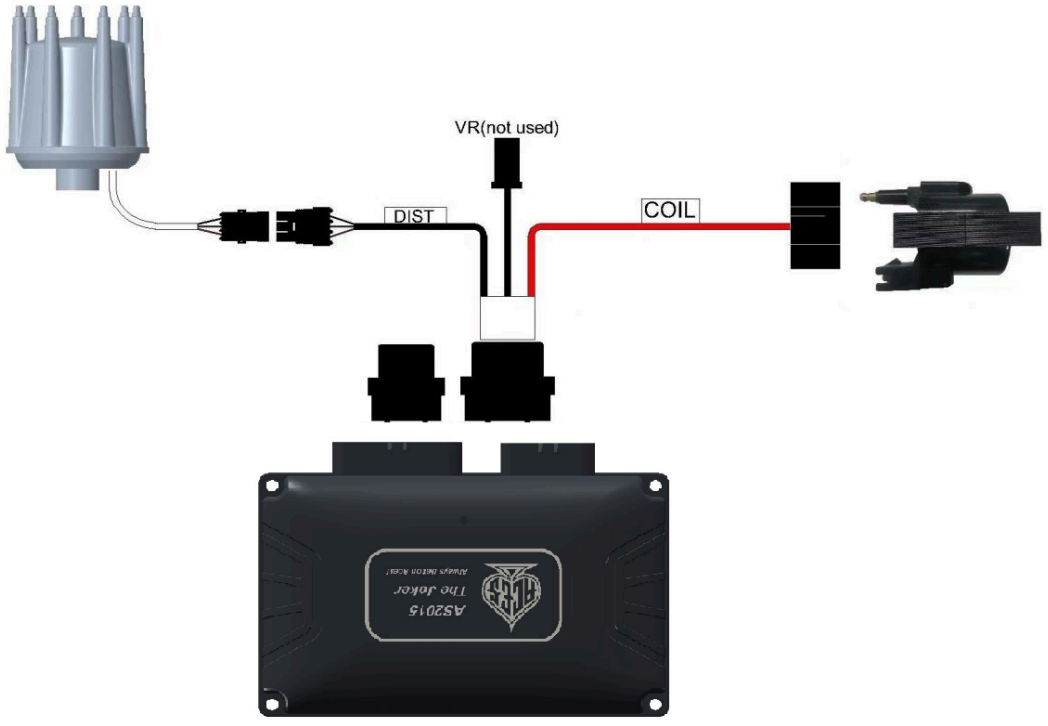
Fuel Level (red) This is a fuel level sensor input resistance that can go from 0-250 or from 250-0, it can represent the percentage of fuel in the tank.

4.0 Ignition Wiring--Timing Control

The Joker™ EFI can control timing using Aces The Gambler distributors like AD2023.

Direct Drive Coil

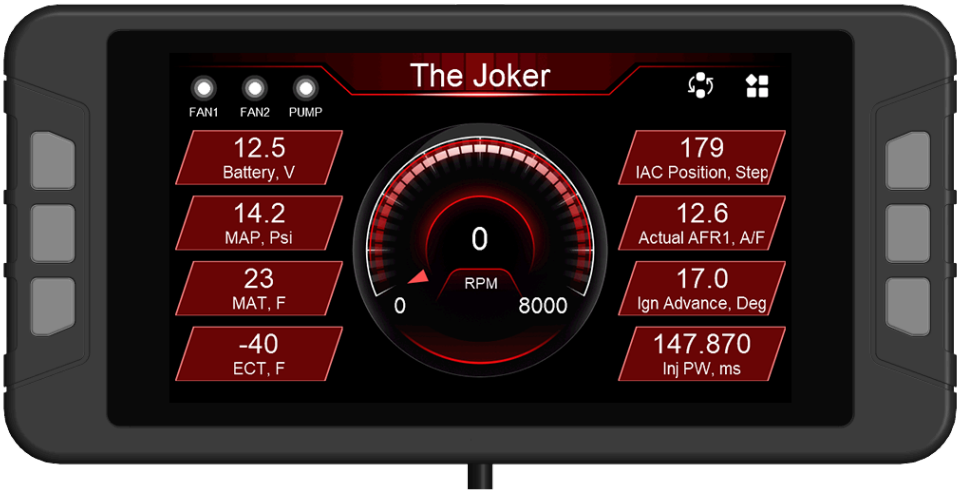
The Joker™ ECU integrates Digital CDI with Max 220 mj spark energy output. Aces recommends using Aces BLACKJACK Pro Series Ignition Coil (PN AC2008) to get 150mj spark energy, it is beneficial to cold start, maintaining idling stability and improved fuel economy.



5.0 Handheld Navigation & Use

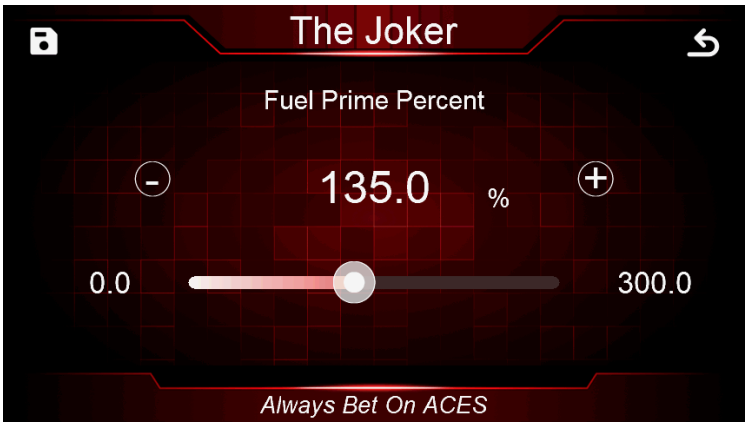
The handheld is composed of a 5.0-inch touch screen and six physical buttons. The LCD is with very delicate color display

and large screen size. There are navigation buttons on both sides. The external interface is CAN bus interface and a type-C USB interface. All operations can be done by touching the screen or the physical buttons on both sides.
The handheld can be used to monitor and calibrate the system (for example: idle speeds, AFR targets, Fuel pump, etc.). The handheld needs to relate to the ECU. It is very portable and can be connected to ECU for monitoring and calibration at any time.
There are touch screen buttons on sides of the display screen and there are physical buttons on sides of handheld. They match each other. Different Interfaces support different button operations. The user can operate the handheld by touching the screen or the buttons on both sides, such as switching the interface and modifying the calibration data, upload/download calibration data, etc.



5.1 Making Adjustments

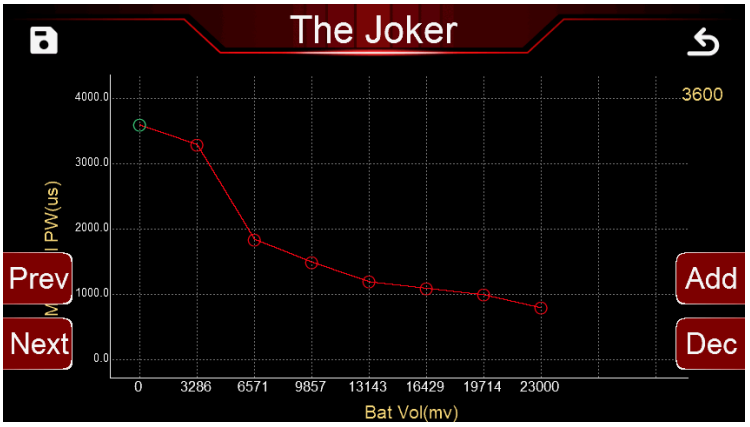
(1) Slider Bar: Slide the bar or click "⊖" and "⊕" to adjust the parameters, click " " to save, and click " " to cancel saving.



(2) Numeric keyboard: Click the edit box "135.0%" 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.



5.2 Connection

The handheld is connected to the ECU through the CAN bus, and its program can be upgraded through the Type-C USB interface.

5.3 Navigation buttons

Aces is designed for reliable operation and use. There are buttons on both sides of the display and. They match with each other. Different interfaces support different button operations. The user can operate the handheld by touching the screen or the buttons on both sides, such as switching the interface and modifying the calibration data, upload/download calibration data, etc.

5.4 Main Menu

The home screen has 6 selections icon. They are explained in more details later in the instructions.

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 to better observe the ECU data.

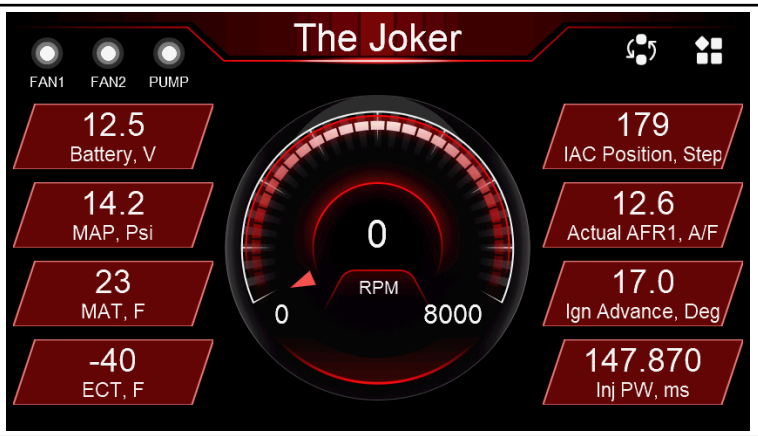
Files - Saves and loads tuning calibrations. Also shows information about the ECU and handheld controller.

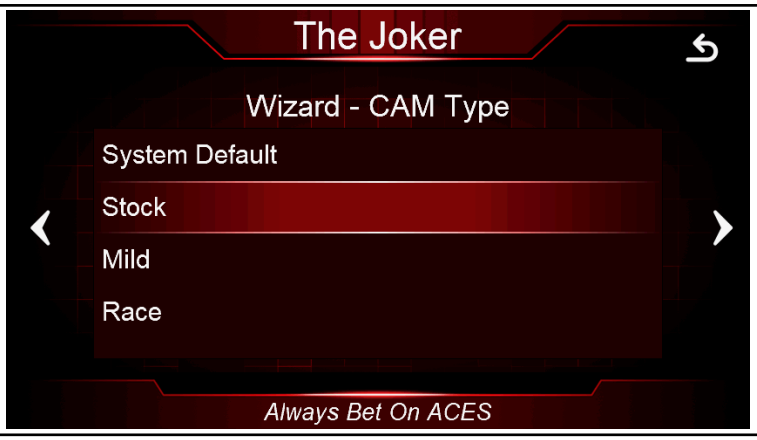
Settings - Adjust the backlight brightness and volume for sound of buttons or touchscreen and see information about the handheld.

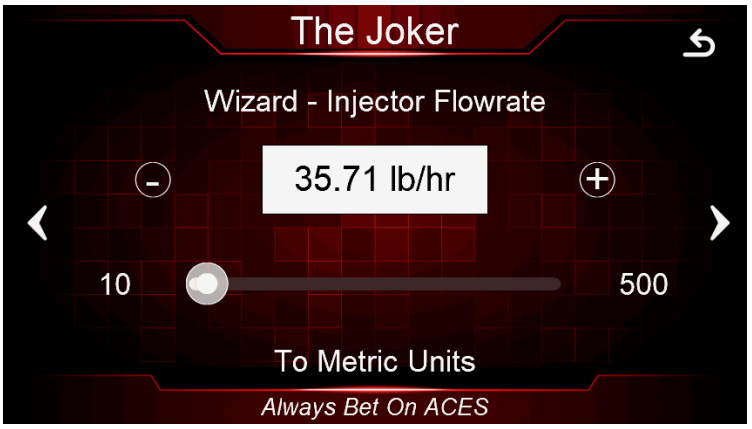
Wizards - Creates a base calibration and performs the TPS Zero Learn function.

The Joker™ 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.

6.0 CALIBRATION WIZARD

	**Select System** Connect handheld to wiring harness and Power up the ECU, then Select The Joker™ EFI system on the system select screen. Press " ".
	**Home Screen** Click the " " icon in the upper right corner to enter Main Menu. Press " ".
	**Main Menu** Click the Wizards from main menu Press " ".
	**Start Wizard** Click the Start Wizards to go to configure you The Joker™ EFI system. Press " ".

	**Camshaft Type** Select your camshaft type: Stock= This selection will work well on most applications equipped with stock or “street performance” camshafts. Choose Mild If you are unsure of your camshaft specs. Race = Select this if your engine has between 8” and 13” of manifold vacuum Press “ ”.
	**Crankshaft Type** Select your engine Crankshaft RPM signal type, The Aces Gambler distributor has 8x reluctor wheel which is 7 long teeth and one short tooth indicated cylinder1. Press “ ”.
	Engine Type Press “ ”.
	MAP Type Press “ ”.

	**Dual WBOS** Select Dual WBOS for your The Joker™ Press “ ”.
	**Spark Energy** Select spark energy, Ignition coil AC2008 is 150mj Press “ ”.
	**Number Of Injector** Select 8 injectors for you The Joker™ Press “ ”.
	**Injector Flowrate** The Joker™ comes with is 36 lb/hr Press “ ”.

	**Engine Displacement** Use slide bar to set your engine displacement. Press " ".
	**Firing Order** Set your engine firing order for The Joker™ ECU. The ECU needs the firing order for sequential injection. Correct firing order is important for your engine work well properly: incorrect firing order can cause poor performance or engine damage. The default setting of firing order is 1-8-4-3-6-5-7-2. Press " ".
	**Hot Idle Speed** Use the slider bar to set your hot idle speed. This is the target RPM that will be enable at coolant temperatures above 160 °F Press " ".
	Click " " to save the configuration to the ECU, click " " to return to wizard for modifying configuration, click " " to return to the main menu. Press " ".

7.0 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 activate 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” when not cranking. RPM’s will display once the engine is cranking or running.
- **MAP** (Manifold Air Pressure Sensor) – Should read from 95-102kpa (13.7-14.7psi). At high elevations it could read as low as 75 (10.8psi).
- **TPS** (Throttle Position Sensor) – Slowly depress the throttle to wide open. It should read as high as 100 at wide open throttle. Cable operated throttle bodies should read 0 closed. With engine off at low tps percent the reading will reset to zero until higher in plate angle this is normal as this “zeroing can help with startup conditions”. This does not happen if engine is running.
- **CTS** (Coolant Temperature Sensor) – reads engine temperature. If the engine is “cold,” it should read close to ambient temperature.
- **Battery** – Will read battery voltage. Should be 12.0 volts minimum.

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

8.0 STARTUP ENGINE

At this point, you're ready to start the engine. Before attempting to start your vehicle with a newly installed The Joker™ EFI system, Aces recommends running through the following check list to help ensure a safe and successful start.

•Double-check all wiring.

•Power and Ground are run directly to the battery.

•The small Red “**IGNSW**” wire from The Joker™ ECU will have power during both Key On and Cranking.

•The Joker™ ECU, fuel pump, fuel lines, and wires are securely mounted away from heat sources and pinch points.

•Wide Band Oxygen Sensor is installed in a proper location.

•No exhaust leaks.

•Throttle linkage is complete and operational from the pedal.

•Handheld powers up during Key On.

•Each step of the Initial Setup in the Handheld must be done.

•At Key On the fuel pump primes.

•There are No fuel leaks when system is under pressure.

•When ready to start engine, watch for Engine RPM on Handheld Dash to know that The Joker™ ECU is getting

proper input RPM signal.

•Be prepared to adjust the throttle blades as shown above.

Crank the engine and look at the RPM parameter. It should indicate the numbers of RPM. The engine should fire and run and come to an idle. Cold engine will have high RPM around 12-1500RPM depend 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 for advice.

9.0 AFTER STARTUP

Once the vehicle has started, look for any fuel or coolant leaks. Let the vehicle warm up and look at some other parameters to make everything is operating properly.

- **Fuel Loop State1/2** – 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 Joker™ calibrations are such that the system should be operating in a closed loop almost all the time.
- **Inj Percent1/2** – 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% in front 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 AFR1/2** – This will show the air/fuel ratio the wideband oxygen sensor is reading. The Closed Loop Compensation should be adding or subtracting fuel all the time such that the AFR Left should always be close to the Target AFR value.

- **Fuel Learn State1/2** – This indicates the state of The Joker™ "Self-learning" operation (Learn Status). The system will automatically adjust the fuel learning table itself as you drive around. There are several conditions that must occur for Self-Learning to occur. The engine temperature must exceed 160° F. The system must be operating in a closed loop mode, and the Self Learning must be enabled. The Joker™ basic setups has the Self Tuning enabled. Once the engine reaches 160° F, Self-Learning should be active.

If any of these parameters are not showing a proper value. Investigating these issues before further driving of the vehicle will be needed to prevent mechanical or electrical damage, keeping safety in mind.

10.0 Timing Verification

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

1.Switch the ignition key ON to power The Joker™ system up and in the Handheld **Tuning >>Spark>>Basic >> Static Timing**. This screen allows you to set the distributor exactly where The Joker™ ECU needs it to be positioned to operate the timing.

2.Start the engine, then set the static timing to 12-degree BTDC, then go to handheld **Tuning>>Spark>>Advanced>>Lock ignition Timing,** Click **Enter** button to select **Lock** then save, now ignition timing is locked at 12 degrees BTDC verify the timing in value in the home screen to check, Now using the timing light, rotate the distributor until you see 12 degree BTDC on the balancer. Then tighten the hold down clamp.

3.Set **Lock Ignition Timing** to "unlock", set the static timing to 12 degrees BTDC. Back to the Home screen and The Joker™ ECU will now be controlling the ignition timing. Advancing or retarding ignition timing can make an engine want to speed up or slow down. The Joker™ can use this principle 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, what we call fast adjust by advancing or retarding ignition timing, slow adjust is maintain the desired idle speed by IAC. The Joker™ ECU has both strategies of idling 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**, you can adjust the Idle, Cruise, WOT and Cranking timing settings. It is HIGHLY suggested that a timing map used in The Joker™ EFI PC Software is a good timing map built for the engine The Joker™ EFI is controlling timing on. The Timing map that was built using the handheld is very basic and each engine will perform much more optimally with a timing curve built for the specific engine combination.

★ Timing Offset

Use this value to retard or advance the timing or 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 values to match.

11.0 IDLE SETTING

Once the engine is warm 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 set between 6 and 20 with the engine in neutral and up to operating temperature. Also make sure the "TPS" value is showing a value of 0. If it is not, you need to perform a TPS Zero Learn.

If the "IAC Position" value is showing 5, you must close the throttle plates until it reads a value of 6-20. Slowly turn the throttle shaft adjustment screw on the throttle body out (counterclockwise). If the IAC position is "stuck" at 5, it is likely that the engine is idling at a higher speed than you have set the target idle speed for. 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 (turn the throttle shaft adjustment screw in, clockwise) the throttle plates until the "IAC Position" value is between 6 and 20. Note that if you open the throttle plates such that the "TPS" position goes above a value of 0, 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 a value of 0, 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 a value of 0 with the engine idling.

12.0 SELF-TUNING

At this point, it is time to just drive the vehicle and let the system perform its self-tuning process. The best way for this is to drive the vehicle under as many different operating conditions as possible. Different engine speeds and loads. Start by slowly revving the engine up 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 sees quick accelerator pedal movement.
- Certain times when the accelerator pedal is lifted, and the vehicle is coasting.
- If the learn is disabled by the user.

If you are interested in seeing if Self Tuning is completed in a certain area, you can look at the following:

- Select Monitor from the Main Menu then select Monitors.
- Select the Fuel Inj FW icon.
- The Fuel Learn States and indicates if the learn feature is active.

At this point you can drive and enjoy your The Joker™ EFI as it is. The full instruction and tuning manual can be found on the product pages of www.Acesfuelinjection.com and describes in detail how you can adjust various parameters to further optimize fuel economy and overall performance, if desired.

DIAGNOSTIC LEDS

LED #	Color	Function	Definition
1	Red	Power Indicator	System power indicator
	Blue	Engine Running Indicator	Engine running indicator, Blinking becomes faster with speed, if no Blinking during cranking, means ECU does not get RPM signal from distributor.

More Tuning Information

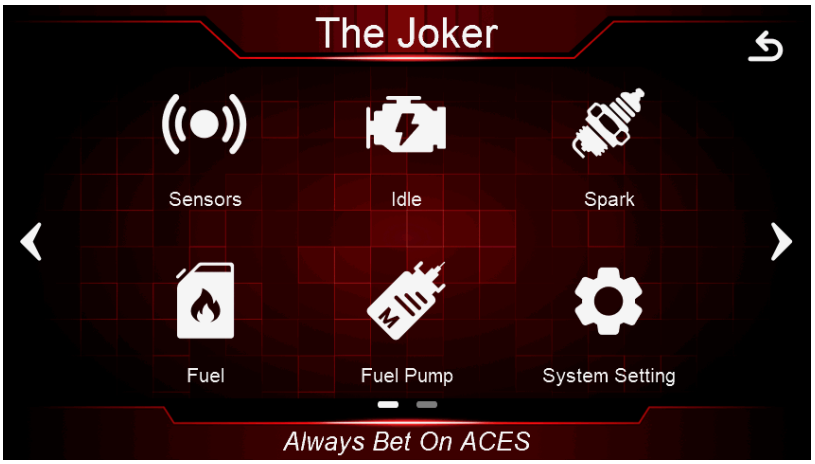
THE JOKER ™ EFI allows the user to adjust some basic tuning changes to help optimize engine performance. The tuning is split up into “Basic” and “Advanced”.

The Basic Tuning allows changes basic calibration data **of Idle, Spark, Fuel, Fuel Pump, System Setting and System IO**. The 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 6 selections (see following figure): **Monitor, Tuning, Logging, Files, Settings, Wizards**.

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

1.0 Sensor



Tuning Screen

1.1 Basic Sensor Parameter

FPS Coef A
FPS Coef B
Fuel pressure sensor coefficient.

OPS Coef A
OPS Coef B
Oil Pressure sensor coefficient.

MAP Linearity Coef A
MAP Linearity Coef B

MAP sensor calibration type allows you change custom MAP sensor, edit the value of pressure vs different voltage.
Information on MAP sensor calibration should be available from the sensor's manufacturer.
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

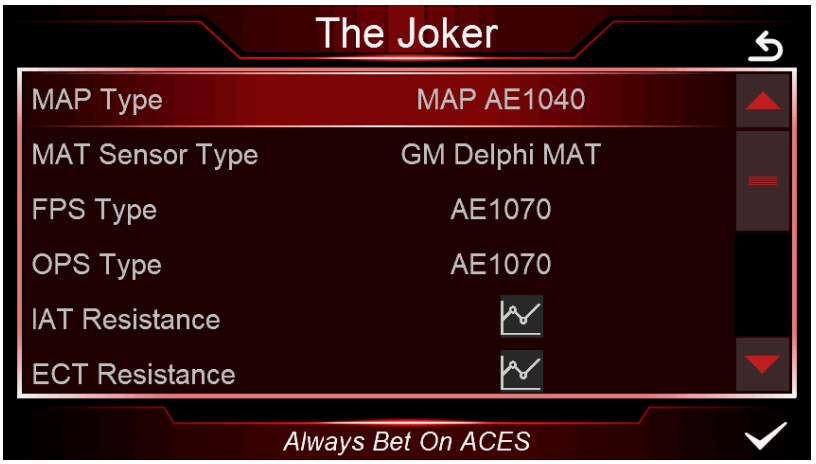
Basic Sensor Parameter

1.2 Advanced Sensor Parameter

MAP Sensor Type

Aces The Joker™ EFI provides several different MAP sensor settings for you to choose. The default setting of system with 4-barrel throttle body system is GM1 bar MAP.

MAP sensor calibration type allows you to change to a custom MAP sensor and edit the value of pressure vs different voltage. Information on MAP sensor calibration should be available from the sensor's manufacturer.



Temperature Sensors calibration

Aces The Joker™ EFI provides several different MAT sensor settings for you to choose. The default setting of the system with a 4-barrel throttle body system is GM Delphi MAT.

MAT sensor calibration type allows you change custom MAT sensor and edit the value of temperature vs different resistance. Information on temperature sensor calibration should be available from the sensor's manufacturer.

MAT Sensor Type
This allows you to select different MAT sensors.

FPS Type
FPS type allows you select different fuel pressure sensor.

OPS Type
OPS type allows you select different oil pressure sensors.

IAT(MAT) Resistance
ECT Resistance
MAP Custom 1Bar
MAP Custom 3Bar
FPS
OPS

2.0 IDLE

The goal of the engine operating states is to define the state of the engine related to its operating point. This state depends basically on engine speed and load. The following states are defined here: **engine stopped**, **startup**, **idle**, **push**, **WOT**, **push fuel cutoff**, **follow**. **Follow** is an engine operating state to make engine get to idle smoothly
Click the Idle icon to enter the idle screen.

Idle Screen

2.1 Basic Idle Parameter

Basic Idle Screen

Hot Idle Speed
This is the target RPM that will be enabled at coolant temperatures above 160°F.
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 positive value.
Follow above idle Min RPM -- Min threshold RPM to get into follow states.
Push above idle Min RPM -- Min threshold RPM to get in to push states.
Push above idle Max RPM -- Max threshold RPM to get in to 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 smaller 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 slower the air decay.
Push Air Increase Ratio - This Value is Air (IAC motor steps) increase ratio during throttle body open process, bigger number is increasing fast.
Push Air Decay Ratio - This Value is Air (IAC motor steps) decrease ratio during throttle body close process.
Follow Air Decay Ratio - This Value is Air (IAC motor steps) decrease ratio once engine is at Follow state, bigger number is decreasing fast to get idle target quickly, but too fast, engine is easy to shut down, smaller number will cause engine stuck at Follow state with high RPM long time.
Fan On Add Air - How much percent air will be added during Fan On.
Fan On IAC Loop Lock Time - Idle loop control will be locked in a split second, then idle closed loop will keep operating soon. This strategy is to make idle speed smoother when the fan is turned on.

2.2 Advanced Idle Parameter

Advanced Idle Screen

After Start Air Decay Type -- If you select this option, the speed of starting air attenuation is determined by the 1D 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 integrate.
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 integrate.
Park Air vs ECT
This is the % position the IAC motor will be at 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.
Startup Air Fast Decay Cycle
1D table for Startup Air is decaying fast to get to target idle speed.
Startup Air Slow Decay Cycle
1D table for Startup Air is decaying slow to get to target idle speed.
Idle Target Speed
1D table for idle target speed vs engine coolant temperature.

3.0 SPARK

3.1 Basic Spark Parameter

Basic Idle Screen

Crank Ignition Timing
Crank ignition advance is normally set to 15 for most engines to help them start quickly.
Idle Ignition Timing
18-34 degrees is typically used at idle. The larger the camshaft, the more timing is usually used.
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 Joker 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 12 degrees. Rev the engine up as high as possible (using appropriate caution/safety). Verify that the engine timing matches at all RPMs the Static Value setting. 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 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.
Engine Max RPM
Max RPM of engine, Rev limiter is spark control based.
Cut Ign&Fuel – Cut ignition and fuel when the Engine Max RPM is hit. Means that ignition and fuel will be removed from individual cylinders as needed to limit RPM.
***The strategy of fuel and ignition cut is individual cylinder control, it performs engine stable and smooth at Max RPM, Launch RPM, Burn RPM status.**
Ign Advance Min
Min threshold of ignition advance
Ign Advance Max
Max threshold of ignition advance
Coil Output Dwell
THE JOKER ignition coil dwell time. The Joker CDI driving the ACES high performance ignition coil AC2008 has 150mj spark energy.
Advance Coef
This Coef is timing gradient ramping rate between different ignition tables, the smaller value, the slower ramp.

3.2 Advanced Spark Parameter

Lock Ignition Timing
This is a switch to lock or unlock ignition timing. Verify ignition timing by lock status to check ignition timing or distributor sync. Leave **Unlock** with ignition wire -timing control settings. You can have The Joker control timing.
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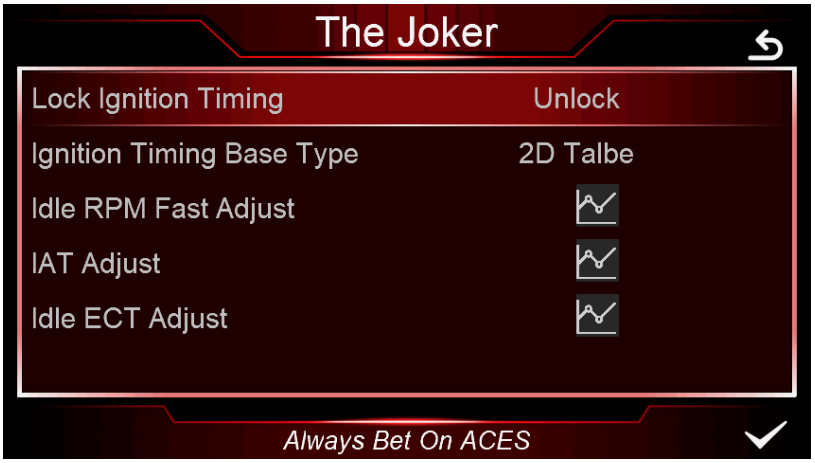


Advanced Spark Screen

Ignition Timing Base Type

The default setting is **Simple**. This option is to select simple or **2D** table of MBT Timing, Using the Aces PC Tuning software allows for a user to build a custom ignition timing curve.

The MBT Timing is the main ignition table in the calibration. The MBT Timing Table is a 3D table used for setting ignition timing throughout the operating range of your engine. The first step in calibrating the MBT Timing table is to use the table below to fill in your timing values. This table gives you a general idea of during starting, idle, cruise, transition or high load, and deceleration. These values will get you in a safe area to start the tuning process.

Idle RPM Fast Adjust

The ECU modifies commanded timing at idle to help maintain the target idle speed. This is a 1D graph 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

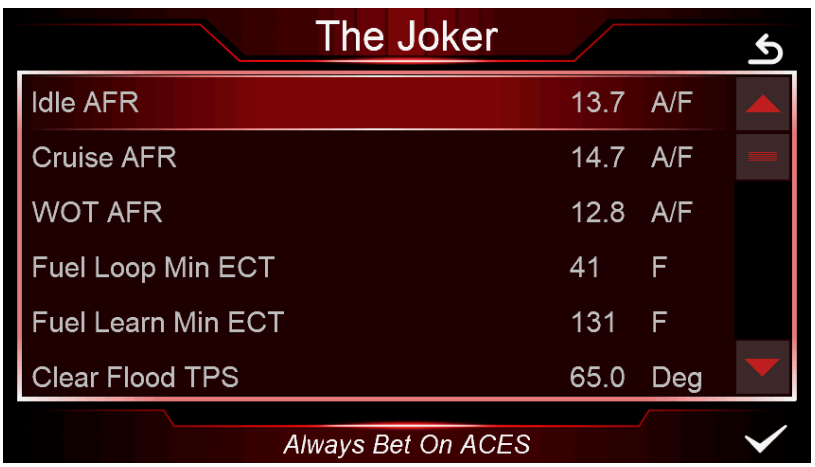
The IAT Adjust table is used to trim the ignition timing vs. inlet air temperature. Often used on boosted applications as a safety mode. Ignition timing is reduced at very high air temperature readings to avoid detonation. Note that the trim values in this table are added (positive values) or subtracted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

4.0 FUEL

4.1 Basic Fuel Parameter



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 engine coolant temperature enables **Fuel Loop**. Fuel loop will be active above this setting.

Fuel Learn Min ECT

Minimum engine coolant temperature enables **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 Prime Percent

This value is multiplying fuel PW of first injection during engine cranking.

Rated Injector Pressure

This value is injector working pressure, fuel pressure of Aces fuel injector is 43PSI.

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 faster.

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 faster.

Cylinder 1-8 Correction

The fuel correction of each cylinder is multiplying fuel PW. The Simple option is a value multiplying fuel PW for each cylinder at whole engine operation. Another option is a 3D table for setting fuel percent vs MAP and RPM. This table should be adjusted on the engine dyno or chassis dyno. It is better to have a lambda meter installed into each exhaust runner to monitor lambda.

Fuel Learn Cycle

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

Fuel Learn Rate

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

Fuel Learn Read Coef

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

4.2 Advanced Fuel Parameter

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 Joker 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 Correction Type

The Simple option is a value multiplying fuel PW for each cylinder at whole engine operation. Another option is 2D table for setting fuel percent vs MAP and RPM.

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 Enrichment vs TPS

Ads additional, momentary fuel based on the rate of change of the TPS. Same function as an accelerator pump on a carburetor.

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.

Fuel Inj FPS Comp En

Fuel pressure compensation enables fuel calculation.

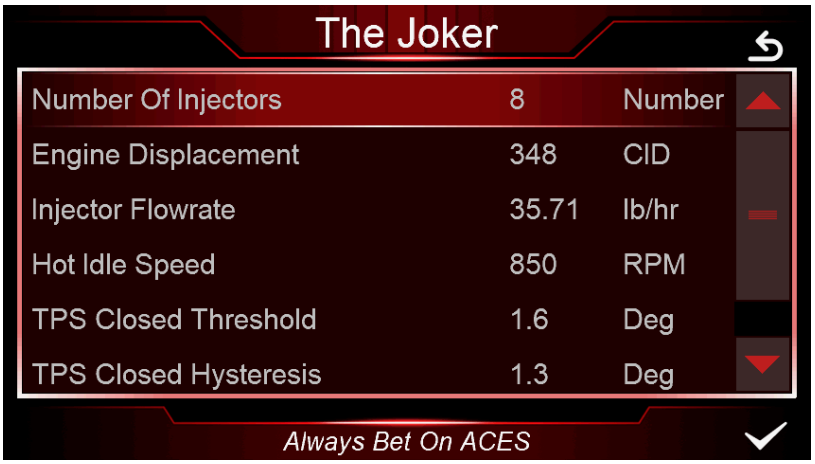
5.0 Fuel Pump

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.

6.0 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 JOKER is 8 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.
Firing Order
Set your engine firing order for The JokerTM ECU. ECU needs firing order to make sequential injection to match

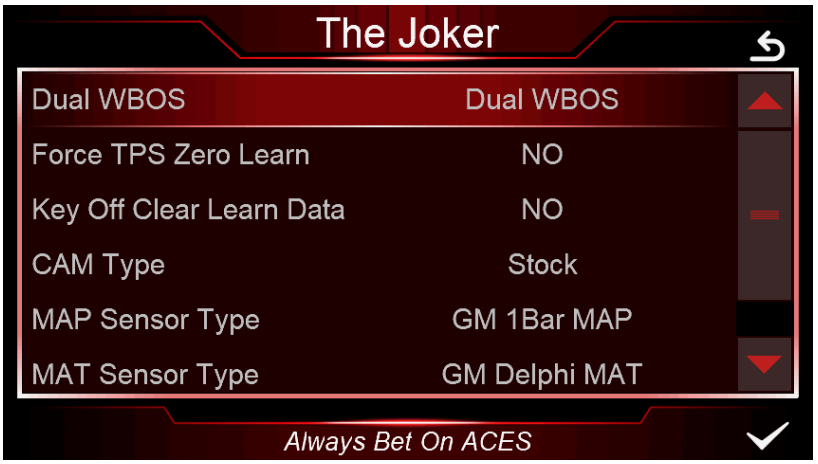
each other. Correct settings are important to let the engine work well; otherwise poor performance or engine damage may result.
The default setting of firing order is 1-8-4-3-6-5-7-2.

Hot Idle Speed
Set idle speed of warm engine.

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

Crankshaft Type
Select your engine Crankshaft RPM signal type, The Aces Gambler distributor has 8x reluctor wheel which is 7 long teeth and one short tooth indicated cylinder1.

Dual WBOS
Select Dual WBOS for your The Joker EFI system.

Force TPS Zero Learn
Throttle zero position is auto-learn strategy in The Joker ECU, choose yes to do TPS Zero Learn again.

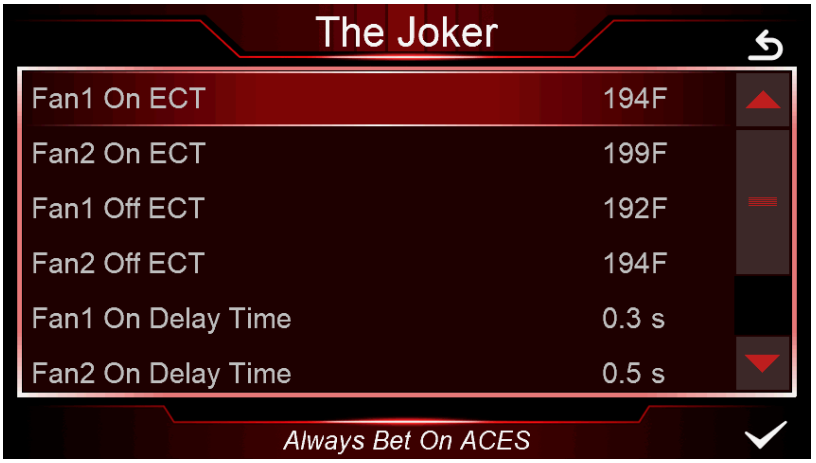
Key Off Clear Learn Data
Choose YES, then turn the ignition key off, wait 5 seconds, then turn the key on, all of the Learn data (fuel learn table, IAC learn steps, ETC learn steps etc.) will be clear up.

Camshaft Type
Select your camshaft type:

- **Stock** = This selection will work well on most applications equipped with stock or “street performance” camshafts. Choose **Mild** If you are unsure of your camshaft specs.
- **Race** = Select this if your engine has between 8” and 13” of manifold vacuum.

7.0 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
AC Fan 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 ralay. 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).



System IO Screen

8.0 Rev Limiter

8.1 Rev Limiter Basic Setting

Engine Max RPM
Max RPM of engine, Rev limiter is spark control.
Cut Ign&Fuel – Cut ignition and fuel when the Engine Max RPM is hit. Means that ignition and fuel will be removed from individual cylinders as needed to limit RPM.
*The strategy of fuel and ignition cut is individual cylinder control. It ensures the engine performs stable and smooth at Max RPM, Launch RPM, Burn RPM status.
Launch Target Rev
This limit is activated when 12 volts are applied to the Launch Wire. It is adjustable from Launch Enable Min Rev to 15,000 rpm.
Launch Enable Min Rev
Launch control will be enable above this setting.
Burn Max Rev
Burnout Rev Limit. This limit is activated when 12 volts are applied to the Burn wire. It is adjustable from 2,000 to 15,000 rpm.
Launch Drop RPM
This option is for Manual shift applications using the clutch between shifts. This RPM value will set up a window so the Launch limiter will not reactivate when using the clutch between shifts. This RPM will be set lower than Launch RPM.
Launch Retard
This feature will be activated when the launch button is applied. The Launch retard is used to offset the ignition timing during the 8 seconds after the launch button is released. It can optimize traction immediately after launch.
Launch Retard Ramp Time

This adjustment determines the rate (over time) that timing will be ramped back into the engine until the run curve timing is met. When driver releases the clutch, the engine RPM meets Launch Drop RPM, then timing will begin ramping back into the engine. The Ramp determines how fast this is done.

Launch Filter Coefficient

This is a filter coefficient that smooth timing curve from engine run to launch and ramp back.

N2O Retard

The retard is activated when 12 volts are applied to the Nitrous wire. The maximum retard allowed by the ignition is a total of 30°

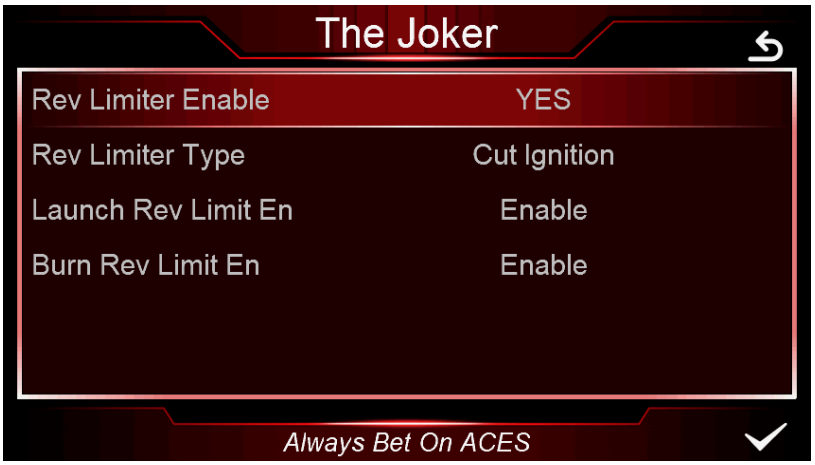
N2O Retard Ramp Time

The retard step can be ramped to and from its full retard amount. It is adjustable from 0-2.5 seconds in 0.01 second increments.

Launch Retard Ramp Time

This adjustment determines the rate (over time) that timing will be ramped back into the engine until the run curve timing is met. When driver releases the clutch, the engine RPM meets Launch Drop RPM, then timing will begin ramping back into the engine. The Ramp determines how fast this is done.

8.2 Rev Limiter Advanced Setting



Rev Limiter En

This option is to enable or disable Rev Limiter controller, default setting is Enable.

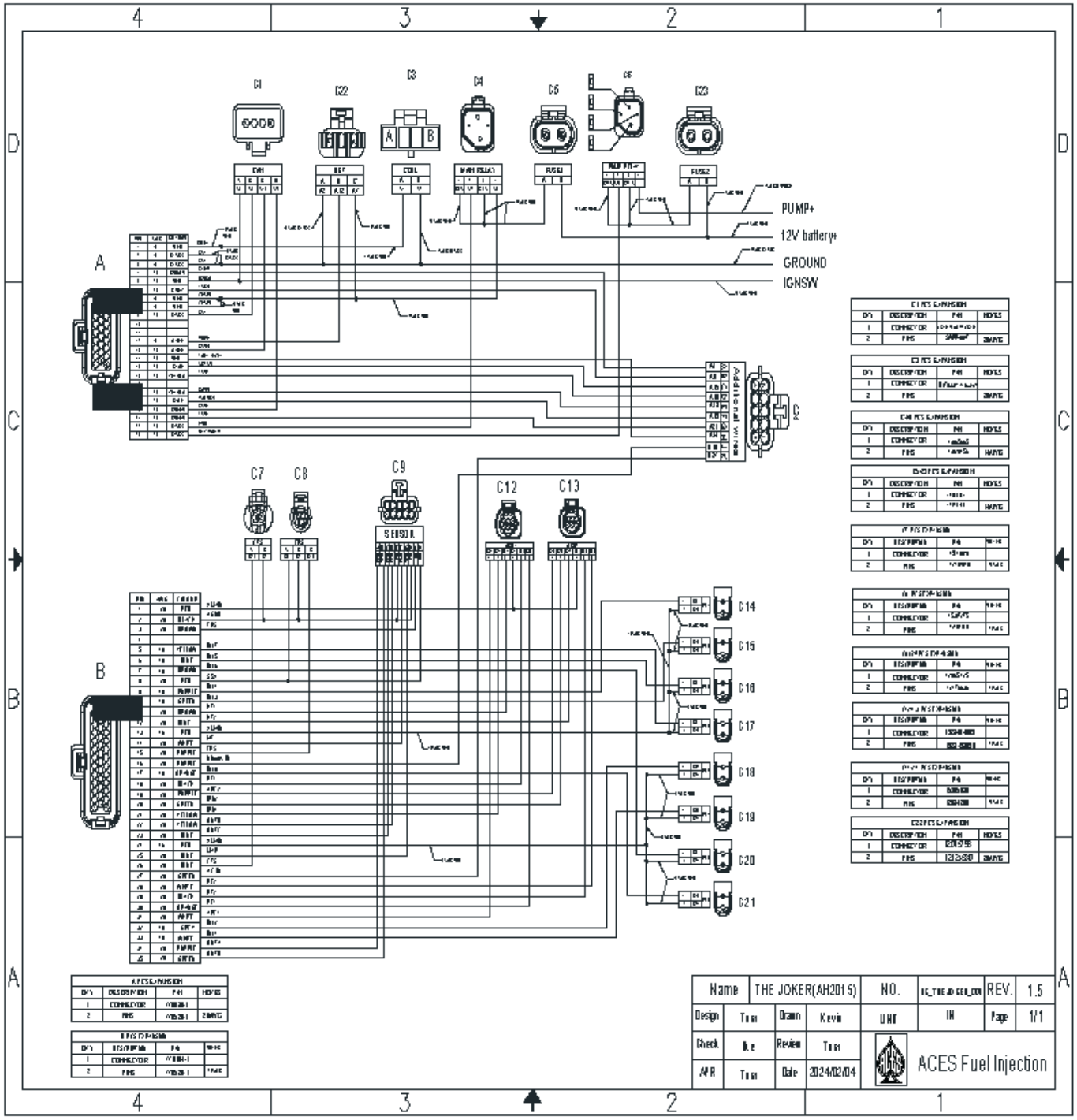
Launch Rev Limit En

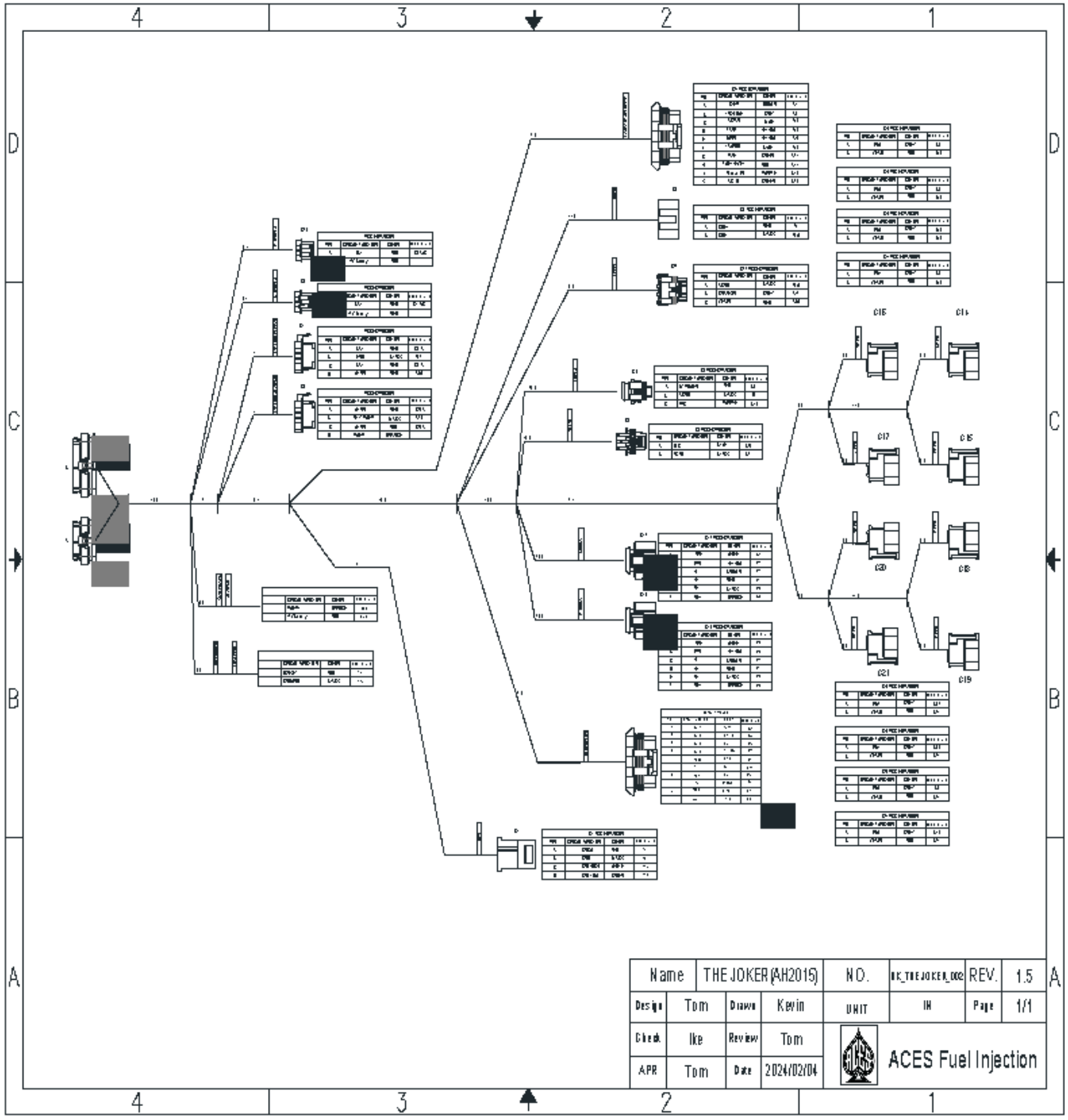
This option is to enable or disable Launch controller for Royal Flush, default setting is Enable.

Burn Rev Limit En

This option is to enable or disable Burnout controller for Royal Flush, default setting is Enable.

The Joker Wire Harness AH2015





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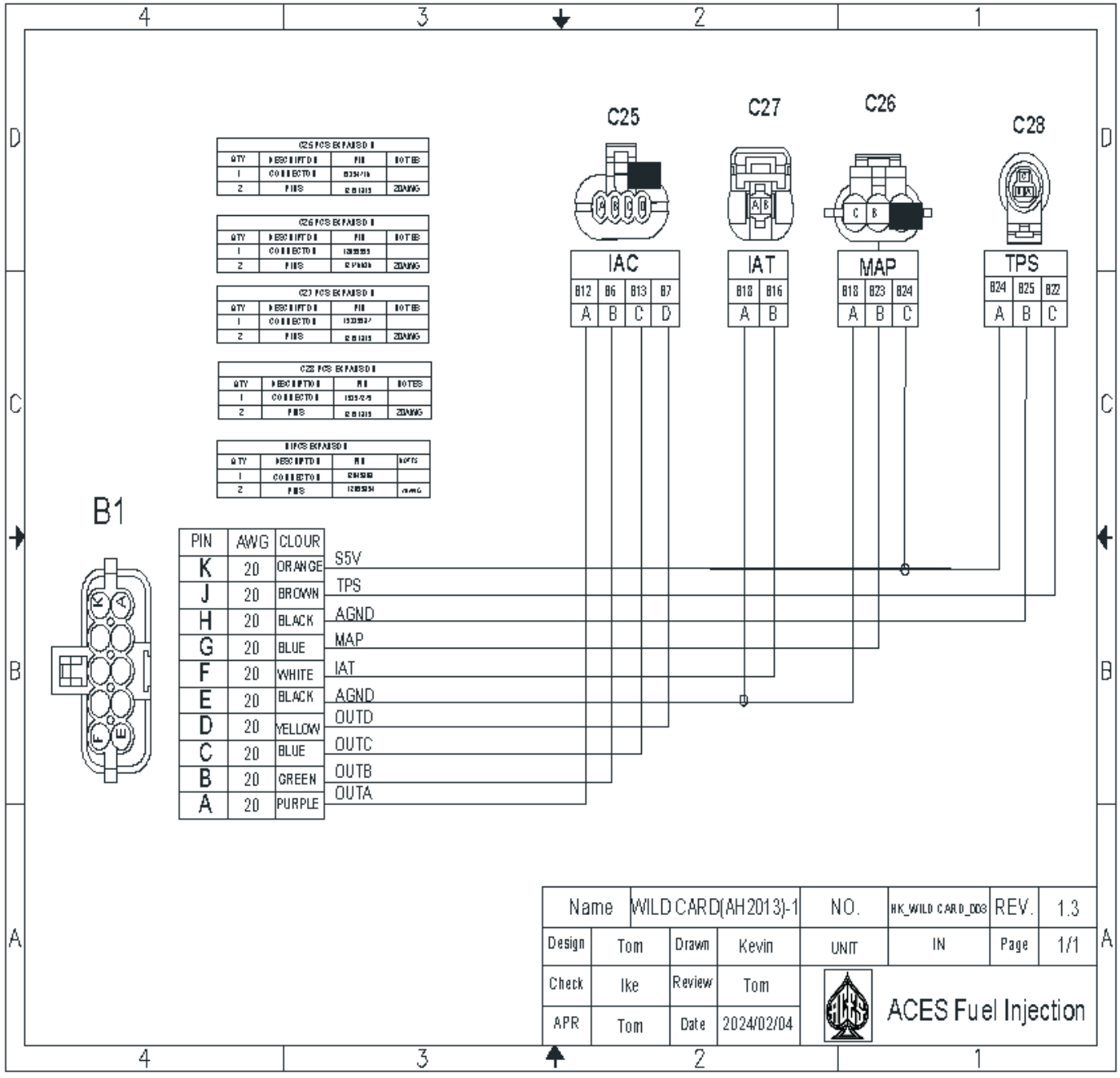
Design	Tom	Drawn	Kevin	UNIT	IN	Page	1/1
Check	Ike	Review	Tom	ACES Fuel Injection			
APR	Tom	Date	2024/02/04				

Sub harness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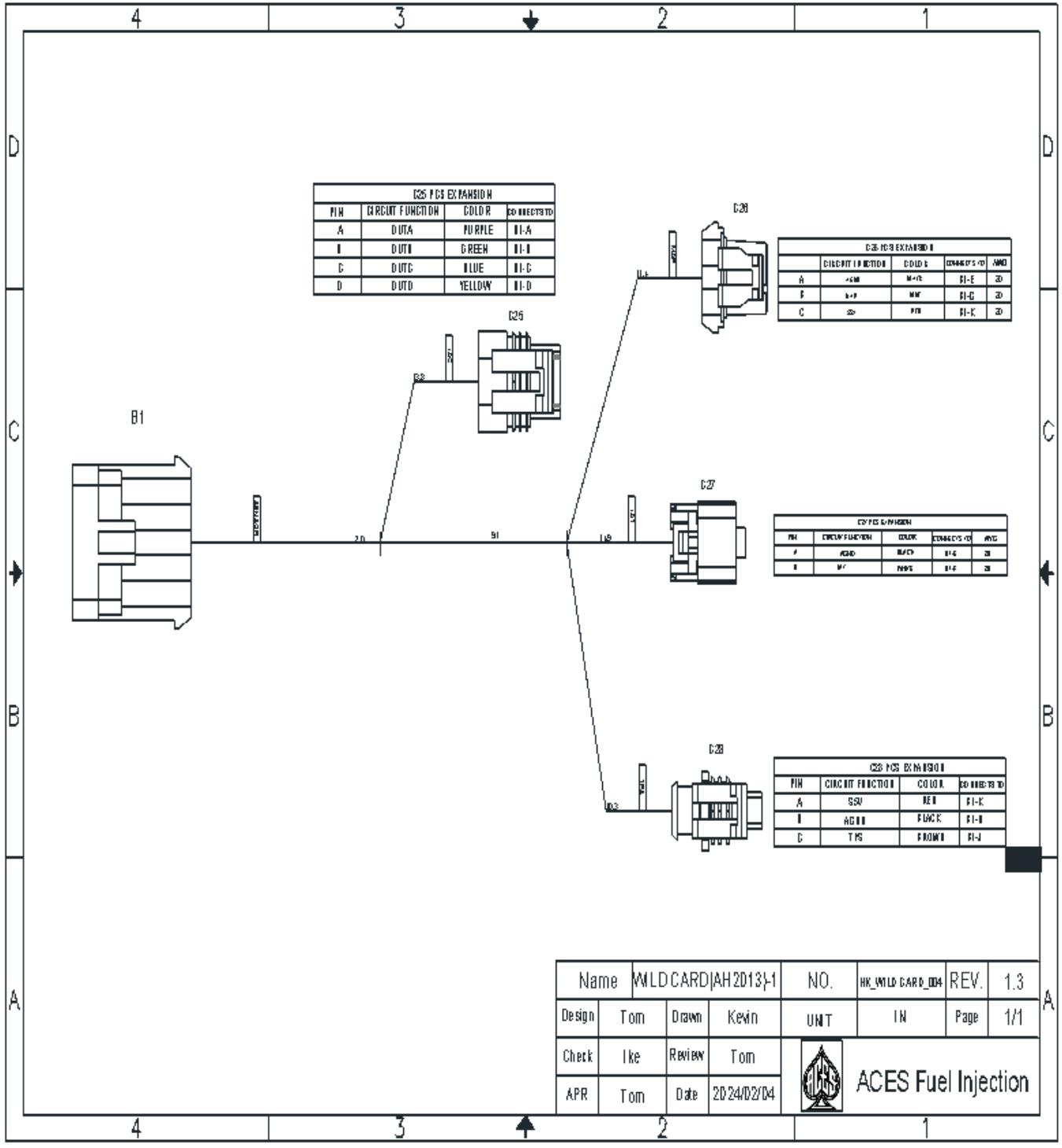
C27
C26
C28
IAC
IAT
MAP
TPS
B12 B6 B13 B7
A B C D
B18 B16
A B
B18 B23 B24
A B C
B24 B25 B22
A B C
B1
PIN AWG CLOUR
K 20 ORANGE S5V
J 20 BROWN TPS
H 20 BLACK AGND
G 20 BLUE MAP
F 20 WHITE IAT
E 20 BLACK AGND
D 20 YELLOW OUTD
C 20 BLUE OUTC
B 20 GREEN OUTB
A 20 PURPLE OUTA
Name WILD CARD(AH2013)-1
NO. HK_WILD CARD_003
REV. 1.3
Design Tom
Drawn Kevin
UNIT IN
Page 1/1
Check Ike
Review Tom
APR Tom
Date 2024/02/04
ACES Fuel Injection


D25 PCS EXPANSION
PIN
CIRCUIT FUNCTION
COLOR
CONNECTS TO
A
OUTA
PURPLE
B1-A
B
OUTB
GREEN
B1-B
C
OUTC
BLUE
B1-C
D
OUTD
YELLOW
B1-D
D26
D27
D28
B1
D25
Name
WILDCARD(AH2013)-1
NO.
HK_WILD CARD_004
REV.
1.3
Design
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Kevin
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Tom
APR
Tom
Date
2024/02/04
ACES Fuel Injection

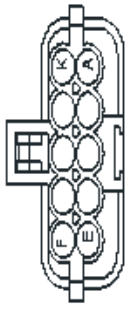
C60 PCS EXPANSION			
QTY	DESCRIPTION	P/N	NOTES
1	CONNECTOR	15326967	
2	PINS	12191819	20AWG

C62 PCS EXPANSION			
QTY	DESCRIPTION	P/N	NOTES
1	CONNECTOR	15351716	
2	PINS	12191819	20AWG

C59 PCS EXPANSION			
QTY	DESCRIPTION	P/N	NOTES
1	CONNECTOR	1928403966	
2	PINS	963512-1	20AWG

C61 PCS EXPANSION			
QTY	DESCRIPTION	P/N	NOTES
1	CONNECTOR	15397215	
2	PINS	12191819	20AWG

B2 PCS EXPANSION			
QTY	DESCRIPTION	P/N	NOTES
1	CONNECTOR	15415206	
2	PINS	12159061	20AWG

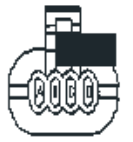


B2

PIN	AWG	CLOUR	
K	20	RED	5V
J	20	BROWN	TPS
H	20	BLACK	AGND
G	20	BLUE	MAP
F	20	WHITE	IAT
E	20	BLACK	AGND
D	20	YELLOW	OUTD
C	20	BLUE	OUTC
B	20	GREEN	OUTB
A	20	PURPLE	OUTA

C60

IAT	
B18	B16
A	B



C62

IAC			
B12	B6	B13	B7
A	B	C	D

C59

MAP		
B24	B18	B23
1	2	3

C61

TPS		
B25	B24	B22
A	B	C

Name	WILD CARD(AH2013)-2		NO.	HK_WILD CARD_006	REV.	1.3
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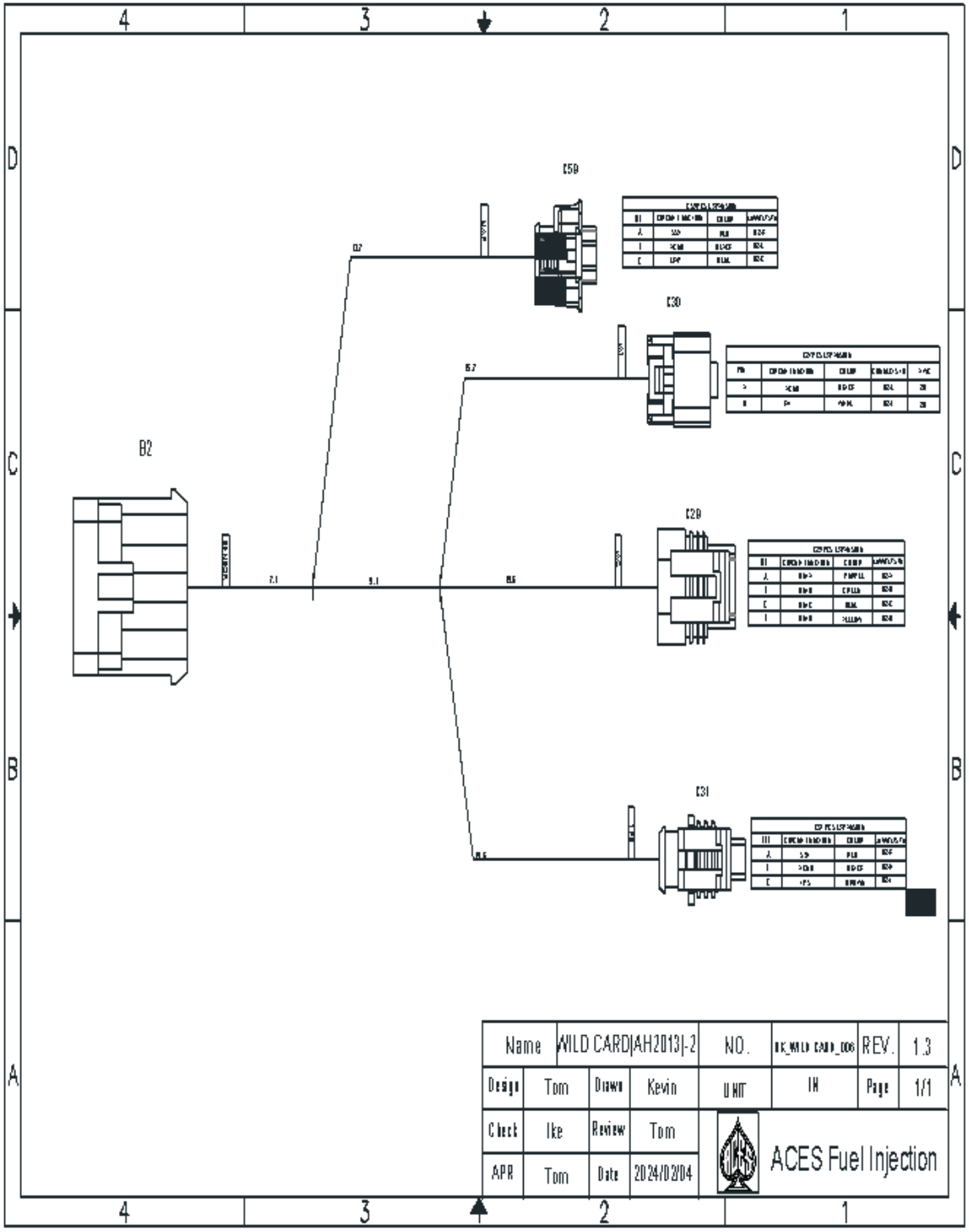
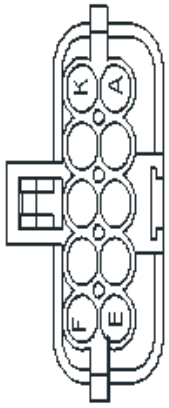
Check	Ike	Review	Tom	ACES Fuel Injection			
APR	Tom	Date	2024/02/04				


C59
C30
B2
C29
C31
0.7
0.5
0.5
0.5
Name
WILD CARD(AH2013)-2
NO.
REV.
1.3
Design
Tom
Drawn
Kevin
Page
1/1
Check
Ike
Review
Tom
APR
Tom
Date
2024/02/04
ACES Fuel Injection

B3



PIN	AWG	CLOUR	
K	20	GREEN	AC_IN
J	20	PURPLE	Nitrous_IN
H	20	RED	FUEL LEVEL
G	20	GREEN	FAN1
F	20	BLUE	LAUNCH
E	20	YELLOW	BURN
D	20	YELLOW	FAN2
C	20	BLUE	ACFAN
B	20	GREY	TACH_OUT
A	20	BROWN	STEP

B3 PCS EXPANSION			
QTY	DESCRIPTION	PIN	NOTES
1	CONNECTOR	12045808	
2	PINS	12059894	20AWG

Name	THE JOKER(AH2015)-3			NO.	HK_THEJOKER_003	REV.	1.5
Design	Tom	Drawn	Kevin	UNIT	IN	Page	1/1
Check	Ike	Review	Tom	ACES Fuel Injection			
APR	Tom	Date	2024/02/04				

B3

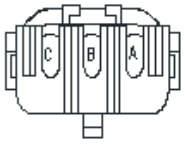
B1 PCS EXPANSION			
PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A	STEP	BROWN	A4
B	TACH OUT	GREY	A6
C	ACFAN	BLUE	A15
D	FAN2	YELLOW	A16
E	BURN	YELLOW	A18
F	LAUNCH	BLUE	A19
G	FAN1	GREEN	A21
H	FUEL LEVEL	RED	A14
J	NITROUS_IN	PURPLE	B16
K	AC_IN	GREEN	B27

Name	THE JOKER(AH2015)-3			NO.	IK_THEJOKER_001	REV.	1.5
Design	Tom	Drawn	Kevin	UNIT	IN	Page	1/1
Check	Ike	Review	Tom	ACES Fuel Injection			
APR	Tom	Date	2024/03/04				

B4 PCS EXPANSION			
QTY	DESCRIPTION	P/N	NOTES
1	CONNECTOR	12010717	
2	PINS	12020827	18AWG

C32 PCS EXPANSION			
QTY	DESCRIPTION	P/N	NOTES
1	CONNECTOR	12015793	
2	PINS	12124580	18AWG

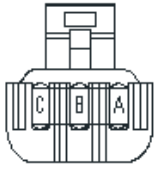
B4



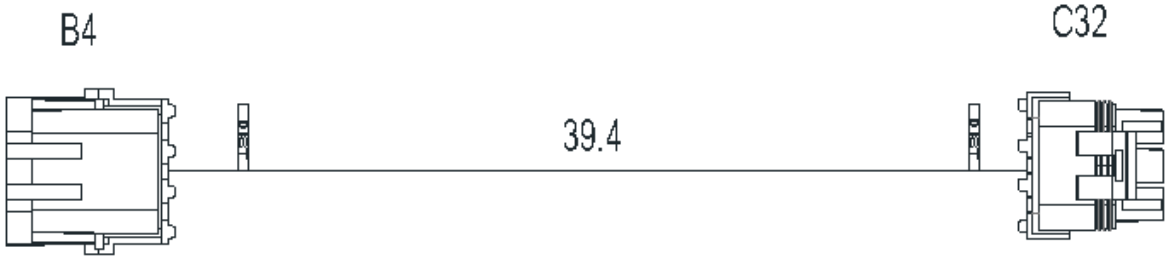
PIN	AWG	BLACK
A	18	BLACK
B	18	WHITE
C	18	RED

B4-A	A
B4-B	B
B4-C	C

C32



Name	WILD CARD(AH2013)-4			NO.	HK_WILD CARD_003	REV.	1.3
Design	Tom	Drawn	Kevin	UNIT	IN	Page	1/1
Check	Ike	Review	Tom	ACES Fuel Injection			
APR	Tom	Date	2024/02/04				



C32 PCS EXPANSION			
PIN	CIRCUIT FUNCTION	COLOR	CONNECTS TO
A		BLACK	B4-A
B		WHITE	B4-B
C		RED	B4-C

Name	WILD CARD(AH2013)-4			NO.	HK_WILD CARD_010	REV.	1.3
Design	Tom	Drawn	Kevin	UNIT	IN	Page	1/1
Check	Ike	Review	Tom	ACES Fuel Injection			
APR	Tom	Date	2024/02/04				

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