



GEN3 PRO SEFI System

System Hardware Installation &

BigComm Software

User Instruction Manual

Revision 2.1 – December 2010

Table of Contents

	Section	Page(s)	Hyperlink
	Frequently Asked Questions		FAQs
	Key Notes Summary (from the Manual)		Key Notes Summary
1	Introduction	2	
2	Features	3	
3	Package Contents	5	
4	Main Wire Harness Installation	6	Main Harness Installation
5	Injector Wire Harness Installation	20	Injector Harness Installation
6	Wide Band Oxygen Sensor Installation	21	Wide Band O2 Installation
7	ECU Installation	22	ECU Installation
8	BigComm Software Overview	22	BigComm Software Overview
9	BigComm Software Installation	23	BigComm Software Installation
10	Communication Cable-to-PC Connection	28	Connecting to the PC
11	Using the Tool Bar	28	Using The Tool Bar
12	Establishing a Connection	32	Establishing a Connection
13	BigComm Main Menu Screen	33	BigComm Main Menu Screen
14	Inputting Values into Cells	34	Inputting Values Into Cells
15	Closing Windows	34	Closing Windows
16	Configuration	34	Configuration
17	Hardware Configuration	35	Hardware Configuration
18	Operating Configuration	37	Operating Configuration
19	Dwell Time Table	40	Dwell Time Table
20	Load vs. RPM	42	Load vs RPM
21	Firing Order	46	Firing Order
22	Injector Opening Time	46	Injector Opening Time
23	Injector Phase Angle	47	Injector Phase Angle
24	Air Fuel Ratio	50	Air Fuel Ratio
25	Air Fuel Ratio Table	50	Air Fuel Ratio Table
26	Positive O2 Correction	54	Positive O2 Correction
27	Negative O2 Correction	55	Negative O2 Correction
28	View Lambda	56	View Lambda
29	AFR Parameters	57	AFR Parameters
30	Spark	58	Spark
31	Spark Table	59	Spark Table
32	Fuel	63	Fuel
33	Fuel Table	64	Fuel Table
34	Starting	67	Starting
35	Cranking	68	Cranking
36	After Start Delay	69	After Start Delay
37	After Start Correction	70	After Start Correction
38	After Start Decay	71	After Start Decay
39	Idle	72	Idle
40	Throttle Follower	73	Throttle Follower
41	Desired Idle RPM	74	Desired Idle RPM
42	Idle Spark	74	Idle Spark
43	IAC Start Position	75	IAC Start Position
44	IAC Gain Terms	76	IAC Gain Terms
45	Warm Up	77	Warm Up
46	Air Temperature Correction	77	Air Temperature Correction
47	MAP vs. Coolant	78	MAP vs Coolant
48	Transient Fuel	79	Transient Fuel
49	dMAP Correction	80	Power Valve Fuel
50	DMAP RPM Modifier	81	dMAP RPM Modifier
51	MAP AE Decay Rate	82	MAP AE Decay Rate



Table of Contents Continued

	Chapter	Page(s)	Hyperlink
52	MAP AE Inc Rate	83	MAP AE Inc Rate
53	Run Time Correction	84	Run Time Correction
54	dMAP Parameters	85	dMAP Parameters
55	DTPSdt	87	Accel Pump Shot
56	AE Position Correction	88	AE Position Correction
57	Individual Cylinder	89	Individual Cylinder
58	Individual Cylinder – Spark	90	Individual Cylinder Spark
59	Individual Cylinder – Fuel	90	Individual Cylinder Fuel
60	Boost	91	Boost Control
61	Boost Parameters	92	Boost Parameters
62	Boost PWM	93	Boost PWM
63	Boost Stage (spark) 1,2 & 3	94	Boost Spark 1 2 and 3
64	Start Line Timing	95	Start Line Timing
65	Dash	99	Dash
66	Configure Dash	99	Configure Dash
67	Save a Dash	102	Save a Dash
68	Load from File	104	Load From File
69	Save to File	105	Save to File
70	BigStuff3 Data Acquisition		BigStuff3 Data Acquisition
71	Logging to an External to PC		Logging to PC
72	Configure Log	108	Configure Log
73	Record Log	109	Record Log
74	View Log from File	110	View Log From File
75	Dash/Logging procedure to record Data Log session	113	Dash Logging Procedure
76	Replay (Optional Feature)	114	Replay
77	Configure Replay	115	Configure Replay
78	Upload	116	Upload
79	View Replay from File	116	View Replay From File
80	Calibrating with the Trace function	118	Calibrating with the Trace Function
81	Loading and Saving Calibration Files	121	Loading and Saving Calibration Files
82	Save a Calibration	121	Save Calibration
83	Load a Calibration	124	Load a Calibration
84	Acronym Definition	126	Acronym
85	Control Keys	126	Control Keys
86	Function or “Quick Keys”	127	Function or Quick Keys
87	Key Notes Summary (from this manual)		Key Notes Summary
88	ECU Pin-out	128	ECU Pin Out
89	Frequently Asked Questions		FAQs

To avoid problems reading this manual and using the Hyperlinks, download Adobe Reader 9 or higher, free software available at www.adobe.com.

1. Introduction

Thank you for purchasing BigStuff3’s GEN3 Pro SEFI system. The GEN3 Sequential Electronic Fuel Injection (SEFI) system includes “Wide Band Oxygen” (WBO2) air/fuel ratio control, injector phasing and individual cylinder fuel and spark compensation as standard features. These features, along with numerous others, make the GEN3 WBO2 SEFI system one of the most technologically advanced SEFI systems on the market.



2. GEN3 PRO SEFI System Standard Features

- Configurable Load & RPM axes to enable optimization in desired operating range.
- Programmable “peak-&-hold” injector drivers with current chopping capability.
- Programmable injector opening vs. battery voltage.
- “Wide Band Oxygen Sensor” (WB02) Air/Fuel Ratio (AFR) control to eliminate base engine and transient fuel calibration guesswork. Optional system methanol system capable of reading AFR down to 2.9:1.
- Capable of driving smart Coil-on-Plug (COP) ignitions with the stock sensors for the GM LSX engines and the Ford MOD motor. The GEN3 system for Hemi’s is capable of driving the stock dumb coils.
- Injector phasing, at the start of the fuel injection event.
- Ignition system type is software configurable for GM HEI, Ford TFI, LT1, V6_DIS, and IPU.
- GM Idle Air Control (IAC).
- Individual cylinder fuel & spark compensation.
- Turbocharged starting line timing curve.
- An integrated 2-Step is a base feature on all Coil-On-Plug (COP) ignitions based systems and is optional on distributor ignition based systems. Optional 3-Step is also available on all systems.
- 1, 2, 3, 4 and 5 BAR MAP sensor compatible.
- Comprehensive transient fueling algorithms.
- Seamless decel fuel cut-off.
- Excellent cold starting and drivability.
- The Throttle Position Sensor voltage output is linearized between .5V and 4.5V for GM and .9V to 4.5V for Ford.
- Low side drive fuel pump and engine cooling fan functionality (see relay diagrams below).
- Capable of controlling two fuel pumps in a stage configuration. The low side pump is the primary pump. The high side drive pump is the secondary, controlled as a function of TPS.
- Closed Loop PID WBO2 heater control to insure accurate and consistent AFR control.
- Improved EMI algorithms.
- True Speed-Density algorithm allows for easier tuning.
- Windows 95, 98, 2000, NT, XP, Vista and Windows 7 compatible calibration software.
- Compact, black powder coated aluminum extruded ECM with integrated rubber isolators
- Electronics rated from -40 °C to +105 °C



- Aesthetically pleasing, nylon braided wire harnesses with integrated ECU and Injector/WBO2 fuse protection.
- OEM style Packard & TYCO waterproof connectors & terminals

GEN3 PRO SEFI System Optional Features



- **New four (4) Stage, Dry Nitrous, Oxide System available in February 2011! For more information, see the manual on our website under Manuals.**
- **Integrated CO2 Boost controller! No longer any need for a separate, standalone system.**
- **EJET – Electronic carburetor! Call BigStuff3 for more details.**
- Wide-band methanol control down to 2.9:1 A/F ratio
- Engine Torque Management systems (ETM and SR2 or ETM/SR2) using cylinder cut-off, spark or a combination of both!
- CAN interface to:
 - Various RacePak™ dashes. Send GEN3 engine operating information directly to a RacePak dash.
 - Racepak™ V300 or 500 data acquisition systems. Send GEN3 engine and powertrain data to a Racepak™ data acquisition system and avoid having to buy redundant sensors.
 - RacePak™ EGT monitoring and recording. The GEN3 system can also data log RacePak EGT Data without the need for another external data acquisition system.
- E10 – E85 ethanol “flex fuel” systems for COP and distributor based GEN3 systems. Uses a GM style “flex fuel” sensor.
- Sequential fuel control for up to 24 injectors low (or high) impedance injectors, in a staged configuration.
- Barometric Pressure Compensation
- Transmission control for GM 4L60E/80E transmissions.
- Data Logging Internal (**DAI**) - 128k of on board RAM for internal data logging – 52 user selectable channels (twenty two (22) 16 bit channels & thirty (30) 8 bit channels), 10-bit resolution, with a 50Hz acquisition rate.
- Data Logging External (**DAE & DAE-2**) - Additional data logging capabilities of the following engine/vehicle parameters
 - Fuel pressure (150 psi) - Oil Pressure (150 psi) - Turbo back Pressure (150 psi)
 - Trans Line Press (500 psi) - Drive shaft RPM - Turboshaft RPM

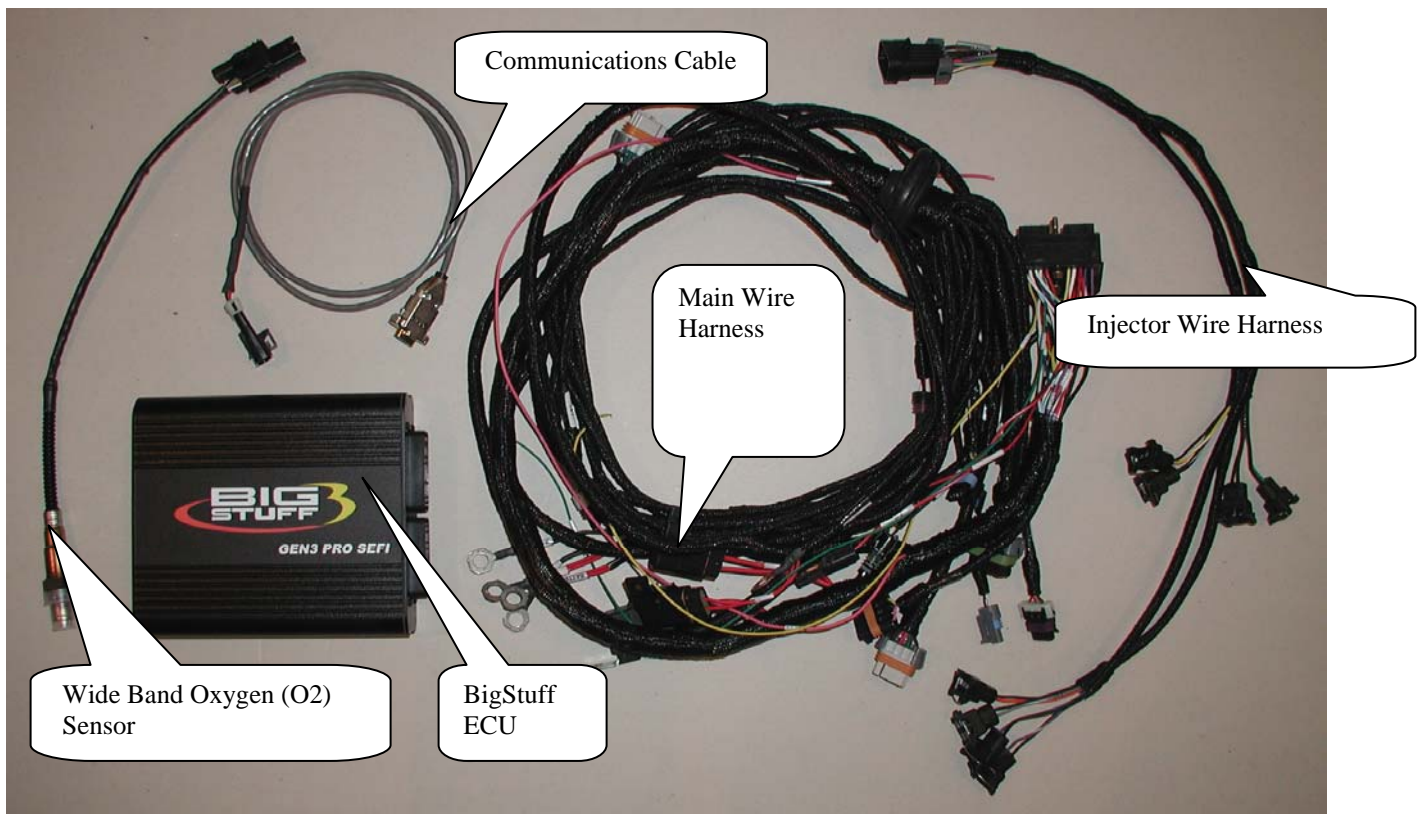


- Pan Vacuum
- Accelerometer
- Clutch or trans-brake input
- TCC % slip
- MPH
- Auxiliary control of:
 - Fuel Pump (High & Low Side drive)
 - 2 spare high & low side outputs
 - Torque converter clutch
 - 1 spare PWM high & low side output
 - 1 to 3 stage boost control
 - Fan low & high speed control

3. Package Contents – Base System with DAI

The BigStuff Engine Management System includes the following components:

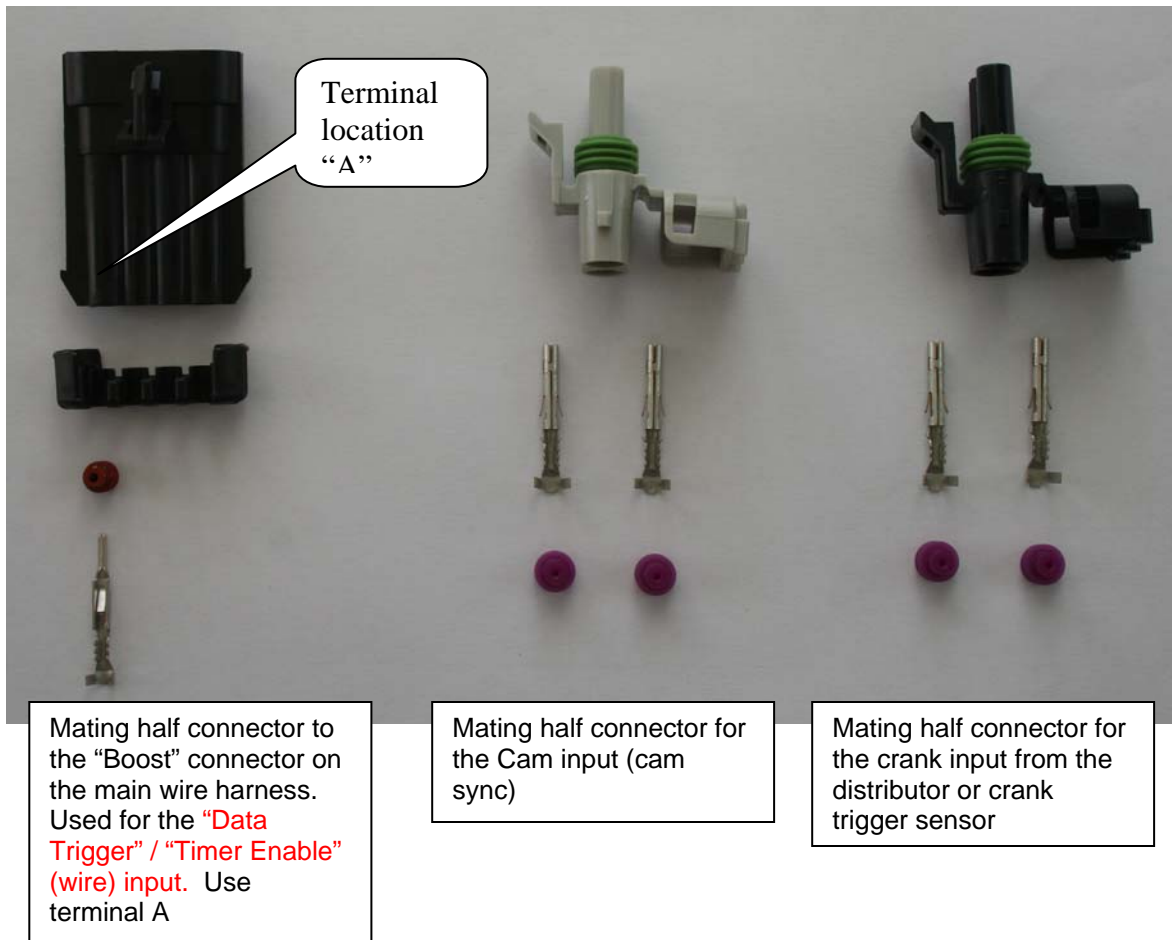
- Black, powder coated aluminum Engine Control Unit (ECU)
- Main Wire Harness
- Injector Harness
- Wide-band Oxygen Sensor (**handle with care!**)
- Communication Cable



The base GEN3 system for distributor ignition applications includes the following three sensor kits. The 4-way connector to the left is the mating half connector to the “Boost”, which is located on the main wire harness. The terminal and seal provided need to go into terminal location “A” used to trigger the internal (Replay) data logger and “Timer Enable” wire. For more information on how to wire and use these base system features go to the [Boost](#) section below.

The gray 2-way connector kit below is the mating half connector to **cam** input. For more information on how to wire the cam sync go to the [Cam](#) section below.

The black 2-way connector kit below is the mating half connector to **crank** input. For more information on how to wire the crank input go to the [Crank](#) section below.



4. Main Wire Harness Installation

To improve the overall wire harness installation process, the harness was manufactured with identification labels at the end of each wire or connector to ensure that connections are properly made. The main wire harness has two halves; one half is intended to be located inside the vehicle with the ECU, the other half connects to the sensors in the engine compartment. The two halves of the harness are separated by a firewall grommet designed to fit snugly in a 2-1/8" hole in the firewall.



The best location for the hole is in an unobstructed location, on either side of the engine closest to where the ECU will be mounted in the passenger compartment. Care should be taken to keep the harness as close to the center of the vehicle as possible. Locating the hole too far away from the vehicle center may affect wire lengths that connect to sensors on the engine. Once the main harness is installed, the connections need to be made to sensors, the ECU, etc. The paragraphs below describe how and where each connection should be made.

The instructions below are specific to the BigStuff engine management systems. Hyperlinks (underlined, blue wording) in the column titled “Further Details” were included to further assist with the main wire harness installation. Left clicking the PC’s mouse on the hyperlink will immediately link to a photo of the connector along with additional installation information. To return to the same location in the table, simply left click on the “Return-to” hyperlink at the end of the text.

Note: Additional components such as relays and special connectors may be required to complete your specific installation. Contact your dealer or BigStuff3 for further details.

Important System Wiring/Grounding Notes:

BigStuff3 cannot stress the importance of properly grounding the GEN3 system!! The GEN3 **main wire harness ground cables, and the ignition system ground cable(s), MUST BOTH be grounded to the same negative post, of the same battery!!** Failure to run the ground cables from **both** of these systems **directly to the battery** will cause performance issues and potentially damage one or both of the electronic systems. No other ground paths/solutions are acceptable!

A common practice is to run a AWG 1 through AWG 4 isolated ground from the battery to a firewall ground lug, and then run every other electrical system ground to it. This grounding solution will create ground loop issues!! If the isolated ground lug is only going to be used for the GEN3 and ignition system, then it will work. The problem with this approach is that with time other systems also end up being grounded to this lug, which will then cause ground loop issues. To avoid ground loop issues, and the hours of frustration that come with them, ground the BS3 and MSD systems directly to the battery!!

Also, do not splice any other ground wires (from other systems/components) into either the MSD or BS3 ground cables.

The GEN3 system 12V power cables can be connected to the vehicle cut-off switch. Power for the BigStuff3 GEN3 system and the ignition system should also be from the same source (the battery or the cutoff switch). To avoid the potential of severely damaging the ECU, make the positive and negative connections to the **battery first, and then connect the header connectors to the ECU.** For coil-on-plug systems, the main wire harness “coil ground” wire (eyelet) must also be grounded to the **cylinder head/engine**. No other ground locations are adequate.

If a 16V charging system is being used, **do not charge the battery with the ignition switch on.** The 16V battery charger can reach peak voltages above the maximum rated voltage of some of the electronic circuitry. These over-voltage conditions can completely damage the ECU. This type of damage is easy to identify and is not covered under the factory warranty! **Also, when running a 16V charging system with a GEN3 coil-on-plug system, the maximum coil dwell cannot exceed 4 milliseconds. If running a 12V system, the maximum coil dwell cannot exceed 6 milliseconds.**



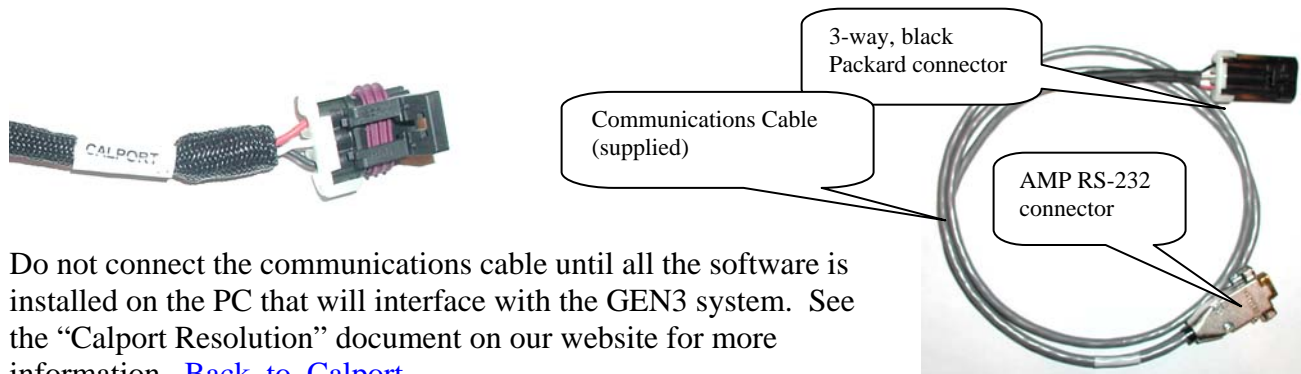
Harness Label	Wire Color/Connector Type	Label Definition	Connect To	Further Details
Calport	Black 3-way Packard connector with a purple seal	The calibration port that allows the ECU to interface with an external computer	Connect one end of the RS-232 communications cable (supplied) to the ECU and the other end to the serial port of an external computer.	Click CalPort for further information.
Primary Fuel Pump (LS) – Must be wired as the Primary pump!	Single lead Packard connector with a single black/white wire.	Low Side drive	Connect to the negative side of the fuel pump relay .	Do not connect this wire directly to the fuel pump. <u>A relay must be used.</u> Fuel_Pump
Secondary Fuel Pump (HS) Must be wired as the Secondary pump!	Single lead Packard connector with a single red and white striped wire	High Side drive	Connect to the positive side of the fuel pump relay .	Do not connect this wire directly to the fuel pump. <u>A relay must be used.</u>
Fan	Single lead Packard connector with a single black/red wire.	Engine cooling fan connection	Connect to the negative side of a cooling fan relay.	Do not connect this wire directly to the fan or positive side of the relay. <u>A relay must be used.</u> Fan
Points	Single white wire	Connection for inductive pickup ign.	Only to the MSD system white points input wire	Points
12V Switch	Single pink wire	Switched 12V supply input	Connect to a 12V source that is “live” when the ignition key is in the “start” position	See paragraph below titled “Ignition Connection” for further relevant information. Switched Ignition
Battery (4 connections)	Four (4) 3/8” ring terminals. Two (2) red wire terminals and two (2) black wire terminals.	Positive and Negative Battery Connections	The vehicle battery only!	See paragraph below titled “Battery Connections” for further important information. Battery_Connections

Harness Label	Wire Color/Connector Type	Label Definition	Connect To	Further Details
HEI	Black, 4-way Packard connector	High Energy Ignition [Original Equipment (OE) ignition]	Connect to GM factory installed ignition system.	Inductive pickup ignitions will not use this connection! See paragraph below titled "HEI" for further relevant information. Ignition
Cam	Gray, 2-way Packard connector with a separate ground wire (3/8" ring terminal)	Camshaft Position Sensor Input	Connect to the camshaft position sensor on the engine	Used only for injector phase angle and individual cylinder spark control. <u>System includes a mating 2-way Packard connector & terminals.</u> Cam
Crank	Black, 2-way Packard connector with a separate ground wire (3/8" ring terminal)	Crankshaft Position Sensor Input	Connect to the crankshaft position sensor on the engine	<u>System includes a mating 2-way Packard connector & terminals.</u> Crank
H2O	Black, 2-way Packard connector.	Engine Cooling Fluid Temperature Input	Connect to the GM (only) coolant temp. sensor, typically located on the intake manifold	Coolant Temperature
Air	Gray, 2-way Packard connector.	Engine Intake Air Temperature Input	Connect to the GM (only) air temp. sensor typically located in the air intake duct between the air cleaner and the throttle body	Air Temperature
IAC	Black, 4-way Packard connector	Idle Air Speed Control (IAC) input	Connect to the IAC motor assy located on or near the throttle body.	Meters and controls intake air around the throttle blades at idle and during cold starts. IAC
TPS	Black, 3-way Packard connector	Throttle Position Sensor	The TPS located at the end of the throttle shaft on the throttle body	Senses the position of the throttle blades [0% (throttle closed) to 100% (throttle wide open)]. TPS

Harness Label	Wire Color/Connector Type	Label Definition	Connect To	Further Details
MAP	Green, 3-way Packard connector	Manifold Absolute Pressure Sensor	Connect to the MAP sensor	MAP
Crank	Black, 2-way Packard connector with a separate ground wire (3/8" ring)	Crankshaft position sensor input	Connect to crankshaft sensor	<u>System includes a mating 2-way Packard connector & terminals</u> Crank
2-Step	Single yellow wire	2-Step trigger function	Clutch or trans brake switch	Two_Step . Optional feature.
Boost	Black 4-way connector with an orange seal	Staged or PWM Boost Control	Connects to optional 4-way connector to solenoid or PWM boost valve	Boost
Main Fuse & Relay	N/A	N/A	N/A	Main Fuse and Relay
Vehicle Battery Fuse	N/A	N/A	N/A	Vehicle Battery Fuse
Header Connector	N/A	No label, see link to photo in "Further Details" Column	BigStuff Engine Control Unit (ECU)	Header_Connector
Injector Harness	Black, 10-way Packard connector	Injector harness connector	Connect to main wire harness	Injector_Harness

The paragraphs below further support the information outlined in the table above.

Calport - ECU to PC interface cable



Do not connect the communications cable until all the software is installed on the PC that will interface with the GEN3 system. See the "Calport Resolution" document on our website for more information. [Back to Calport](#)

Primary Fuel Pump (LS) – (Single lead Packard connector with a single black/white wire). **This is the PRIMARY pump connection. If only one fuel pump is being used, it must be wired to this low side connection!**



This connector **must** go to the negative side of a fuel pump relay, not directly to the fuel pump. **Terminating this connection directly to a fuel pump will damage the Big Stuff controller and will void the warranty!** The primary fan wire is red with a white stripe, but the connector is identical to the fuel pump connector(s); so make sure to read the wire label to ensure the connector is terminated correctly. Wire the primary (low side) fuel pump relay per the diagram below.

This diagram is also available on the Bigstuff3 website via this link: <http://bigstuff3.com/pdf/LS%20Fuel%20Pump%20Wiring%20Diagram.pdf>. The fuel pump relay is **not** supplied with the system. A standard 40 Amp, four post relay, available at most part stores, will work. [Back to Fuel Pump](#)

Secondary Fuel Pump (HS) – (Single lead Packard connector with a single red and white striped wire). **This is the SECONDARY pump connection. If only one fuel pump is being used, it must be the Primary Fuel Pump (LS) shown above!** The secondary fuel pump turns on as a function of throttle position and is configurable!



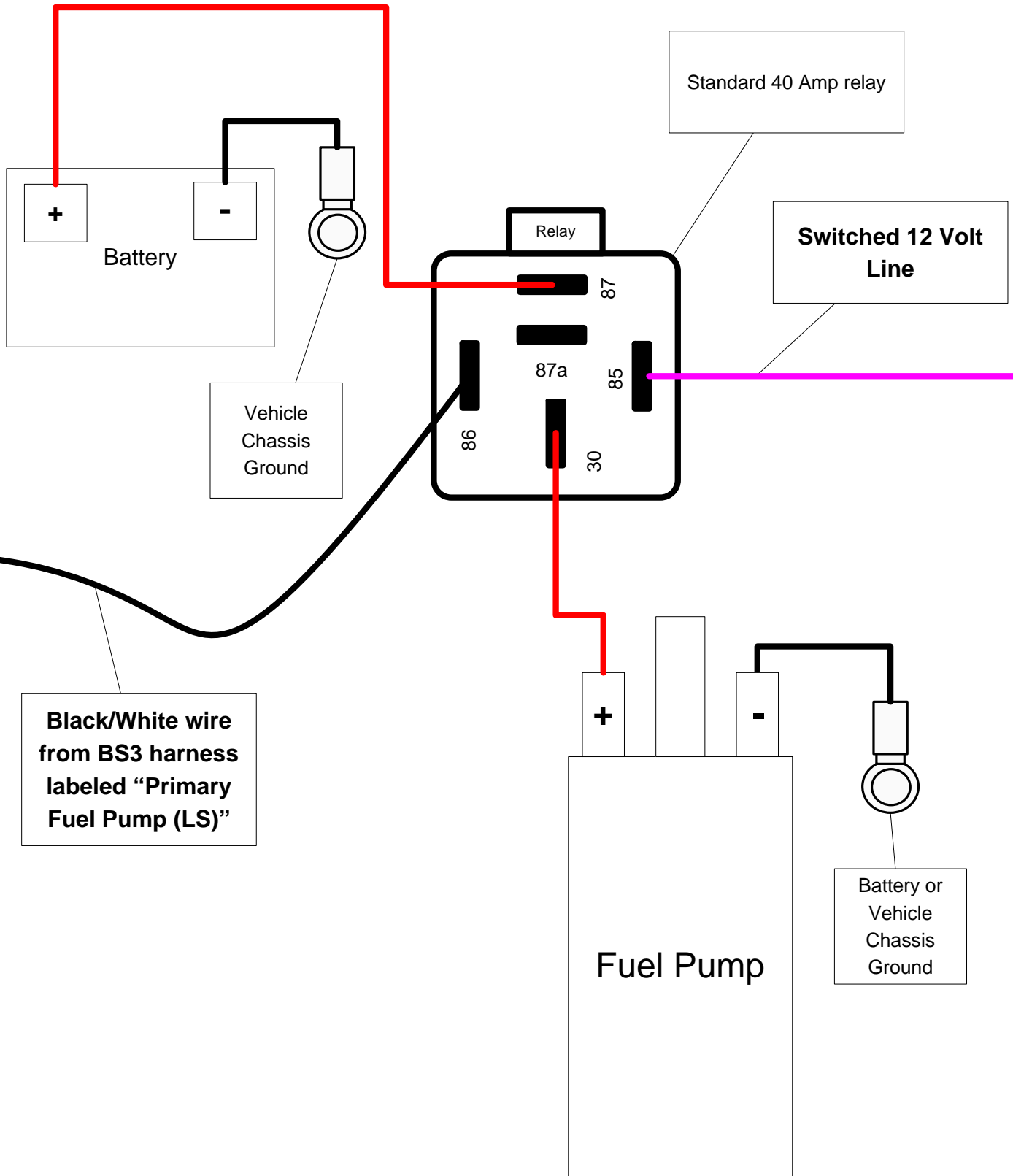
This connector **must** go to the positive side of a fuel pump relay, not directly to the fuel pump. **Terminating this connection directly to a fuel pump will damage the Big Stuff controller and will void the warranty!** The fan connector is identical to the fuel pump connector(s); so make sure to read the wire label to ensure the connector is terminated correctly.

Wire the secondary (high side) fuel pump relay per the diagram below. This diagram is also available on the Bigstuff3 website via this link: <http://bigstuff3.com/pdf/HS%20Fuel%20Pump%20Wiring%20Diagram.pdf>. The fuel pump relay is not supplied with the system. A standard 40 Amp, four post relay, available at most part stores will work.

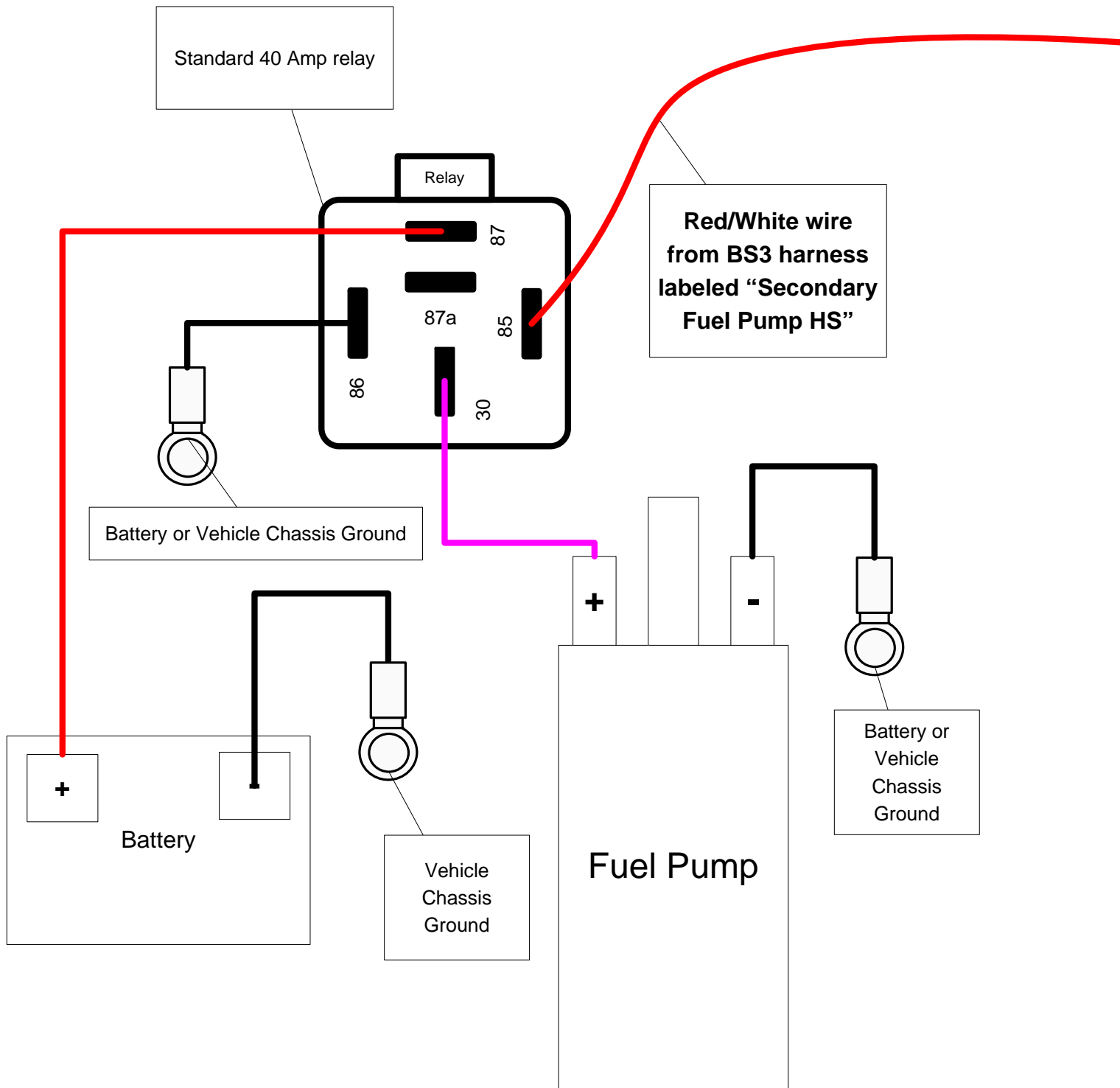
[Back to Fuel Pump](#)



Primary Fuel Pump (LS) - Relay Wiring Diagram



Secondary Fuel Pump (HS) Relay Wiring Diagram



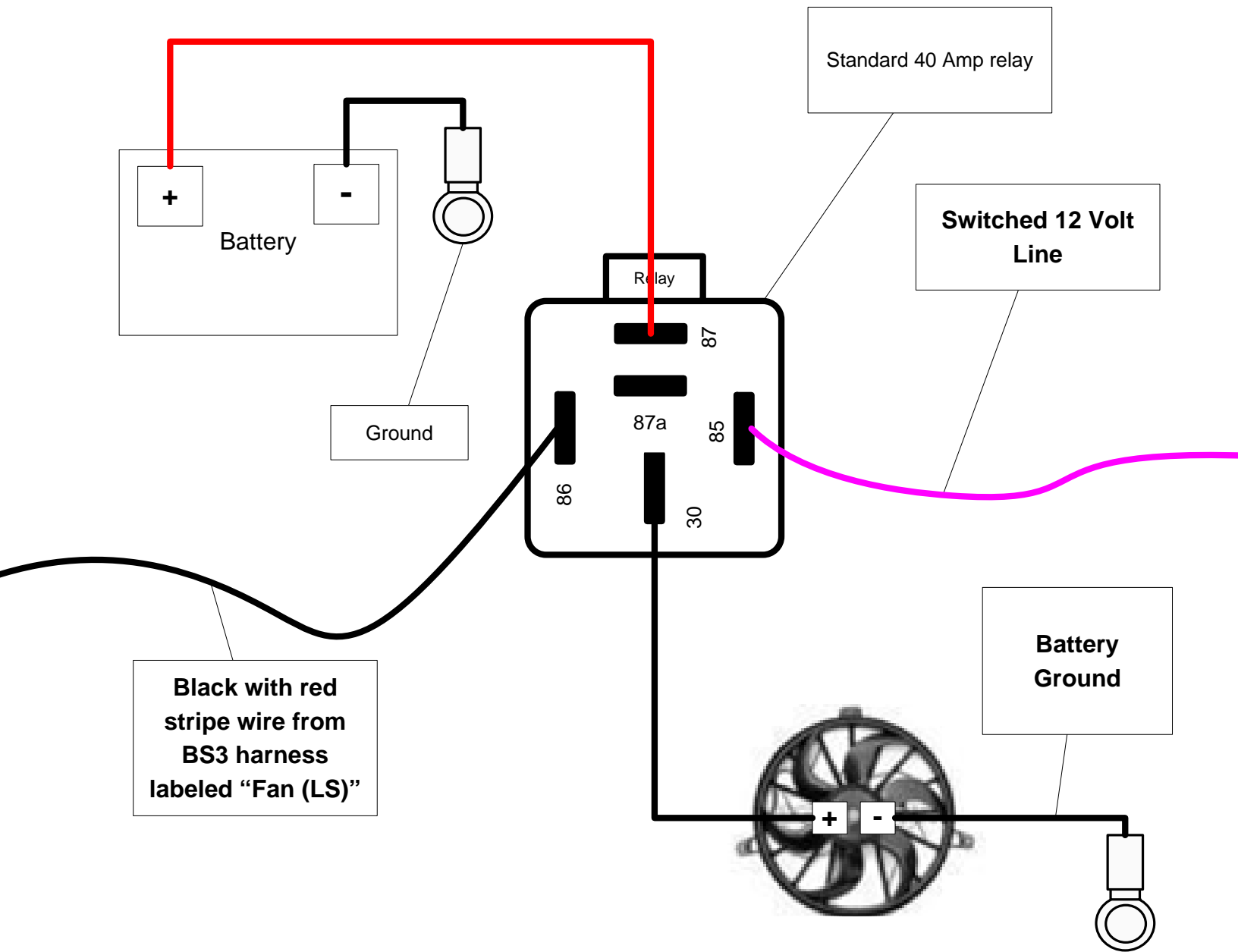
Fan Control (engine cooling fan) – (Single lead Packard connector with a single black with red stripe wire)



This termination **must** go to the negative side of a fan relay, not directly to the fan. **Terminating this connection directly to a fan will damage the BigStuff controller and will void the warranty!** The fan connector is identical to the fuel pump connectors; so make sure to read the label to ensure the connector is terminated correctly.

Wire the fan relay per the diagram below. This diagram is also available on the Bigstuff3 website via this link: <http://bigstuff3.com/pdf/Cooling%20Fan%20Wiring%20Diagram.pdf>. The fan pump relay is not supplied with the system. A standard 40 Amp, four post relay, available at most part stores will work. [Back to Fan](#)

(Cooling) Fan Relay (LS) Relay Wiring



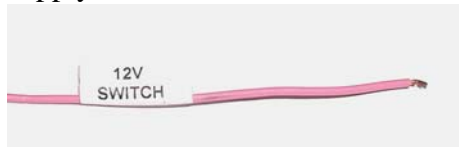
Points – (Single white wire)

Do not connect this wire if a factory ignition system is being used. This is the GEN3's "points" signal wire. It needs to be connected to the "points" output connection from the aftermarket ignition module, e.g. MSD 6A box.

- Note : Applying 12V to the BS3 points wire will immediately damage the GEN3 ECU!

**[Back to Points](#)****12V Switched – (Single pink wire)**

A **secure** connection must be made to a switched 12V supply. The best source is a switched 12V supply at the vehicle fuse block. Twelve volts (12V) must be present on this wire during and after cranking. **If the 12V supply does not remain during and after cranking, the ECU will not power up and the engine will not start and/or remain running.** A simple way to determine if a live 12V supply exists during cranking is to check it with a voltmeter.



Securely fasten the voltmeter's red (+ positive) wire to the ignition input on the fuse block. Secure the voltmeter's black wire (- negative) to an adequate ground location. Crank the engine and the voltage meter should indicate an output of between 12 to 14 volts. If the output voltage is below 12 volts, check to make sure the battery is fully charged and all the cells of the battery are functioning properly.

NOTE: If the engine cranks, but does not start make sure the battery voltage is at or above 12V during cranking. Low battery voltage conditions must be fixed prior to starting the engine. Battery voltage (especially during cranking) is even more important with coil-on-plug applications. [Back to Switch Ignition](#)

Positive and Negative Battery Connections – (Four (4) 3/8" ring terminals. Two (2) red wire terminals and two (2) black wire terminals)

The GEN3 **main wire harness ground cables and the ignition system must BOTH be grounded to the same negative post of the same battery!!** Failure to run the ground cables from both these systems directly to the battery will cause performance issues and potentially damage one or both of the electronic systems. No other ground paths/solutions are acceptable!

To avoid ground loop issues, and the hours of frustration that come with them, ground the BS3 and MSD systems directly to the battery!!

Also, do not splice any other ground wires (from other systems/components) into either the ignition or BS3 ground cables.

The BigStuff3 GEN3 system 12V power cables can be connected to the vehicle cut-off switch.

Power for the BigStuff3 GEN3 system and the ignition system should also be from the same source (the battery or the cutoff switch).



The positive and negative battery cable lengths have been designed (are long enough) to accommodate a trunk-mounted battery. If the cable lengths are not long enough, splice, solder and shrink wrap AWG 8 wire the remaining distance to the battery. Make sure the two clearly marked black wires battery (-) are **securely fastened to the negative battery post (NO EXCEPTIONS)**. The red cable battery (+) must be securely fastened to the positive (+) battery post. Connecting the positive and negative cables to the wrong battery post **will damage the ECU**. This type of damage is easy to identify, and is not covered under the factory warranty. To avoid the potential of severely damaging the ECU, **connect the head connectors to the ECU only after the battery connections are properly made.**

[Back to Batt Connections](#)

Ignition Systems Setup

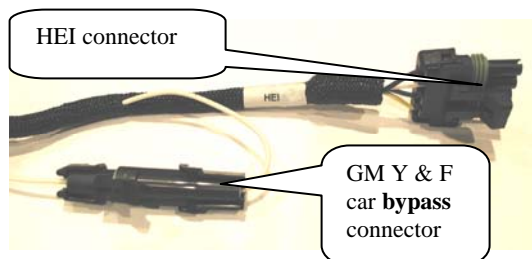
For additional information on ignition system setups, go to the BigStuff3 website, and then the document titled Ignition System Setup Tutorial. The link is:

<http://bigstuff3.com/pdf/Ignition%20Guide%20rev%201.2.pdf>. The Ignition System Setup Tutorial document covers the following nine (9) ignition system setups:

1. Stand-alone IPU Distributor Only
2. Modified IPU Distributor (serving as the cam sync) with a Crank Trigger Setup
3. MSD Distributor Used to Only Distribute Spark from an MSD 6A/7A/8A,... box, with a Crank Trigger.
4. MSD 2340 Cam Sync Distributor with a Crank Trigger Setup
5. MSD All-in-One, Crank and Cam Sync Distributor
6. GM's CAM Sync Drive with BigStuff3's 24 Tooth Crank Wheel.
7. MSD Mag44 Magneto
8. GM LS1/2/7 COP System
9. Ford Mod Motor COP System

Also in the "How-to/Help" section of the website there is additional information on the setting up the Ford TFI, GM HEI, GM Opti-spark & MSD8 ignition systems. More information, along with the appropriate links to the website, is provided below.

HEI Ignition – (Black, 4-way Packard connector)

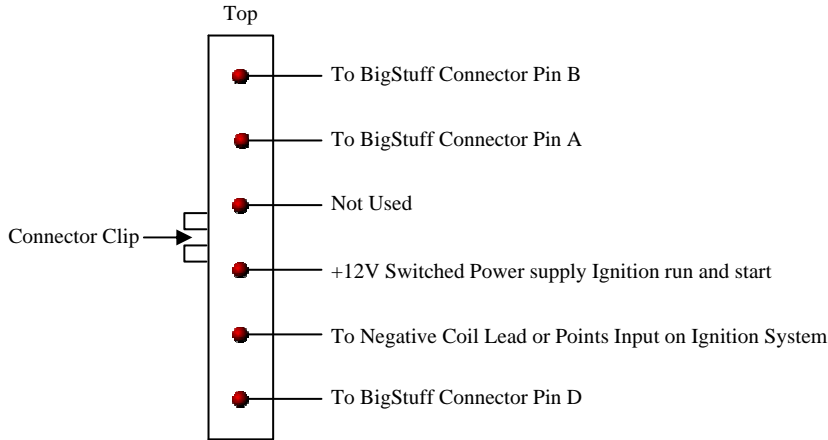


The main harness HEI connection is designed to work with a GM Y-car (Corvette) distributor. The HEI connection also includes a "bypass" connector for setting the timing.

Re-configuring the A, B, C and D pins of the main harness HEI connector allows for other types of types of ignition systems to be used. The diagrams below outline connector configurations that can be made to interface with Ford TFI, Buick DIS, GM Optispark and GM Northstar ignition systems. [Back to Ignitions](#)

HEI Connector on Main Wire Harness	A	B	C	D
Ford TFI	Spout	PIP	Not Used	Ground
GM HEI	EST	REF HI	Bypass	DIST RTN
Buick DIS	EST	REF HI	Bypass	DIST RTN
GM Optispark	EST	LOW RES	Not Used	DIST RTN
GM Northstar DIS	EST	Crank Ref	Bypass	DIST RTN

Ford Thick Film Ignition (TFI) Pin-out Detail

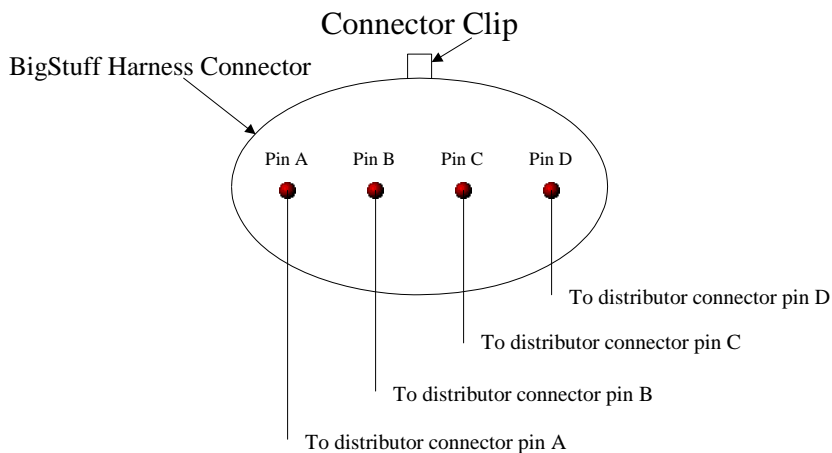


Note: BigStuff Connector Pin C is not used with the Ford TFI Ignition

More Ford TFI ignition wiring information is available on the Bigstuff3 website via this link: <http://bigstuff3.com/pdf/Ford%20TFI.pdf>.

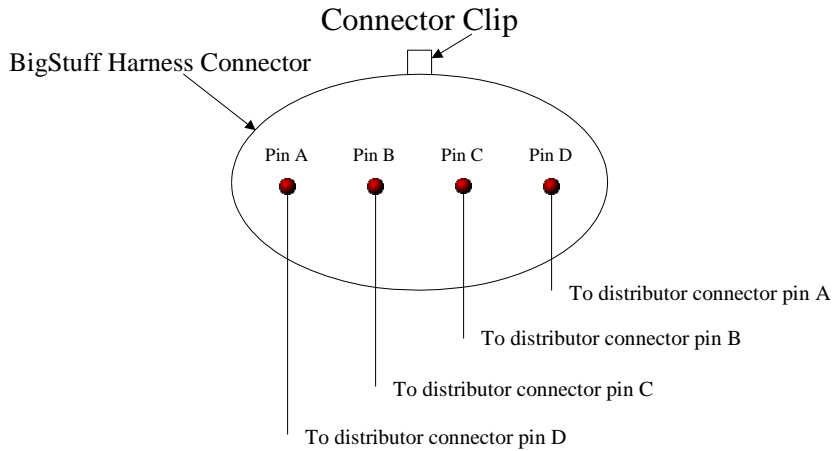
GM High Energy Ignition (HEI) Pin-out Detail

(For Distributors with Ignition Coil in the Distributor Cap)



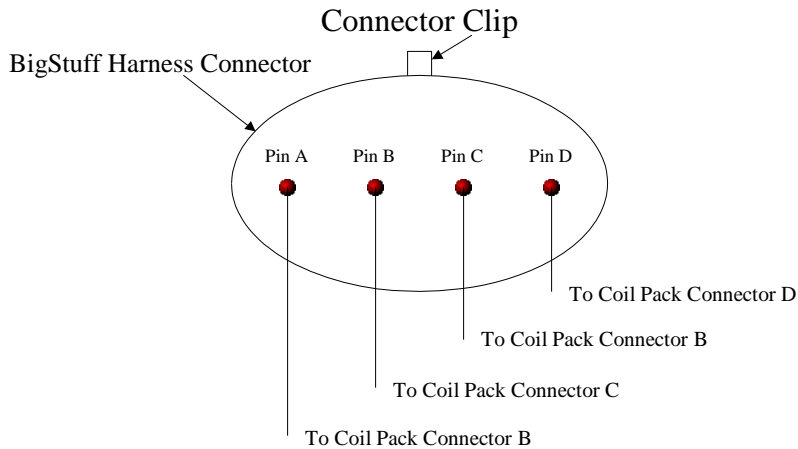
GM High Energy Ignition (HEI) Pin-out Detail

(For Distributors with External Ignition Coil)

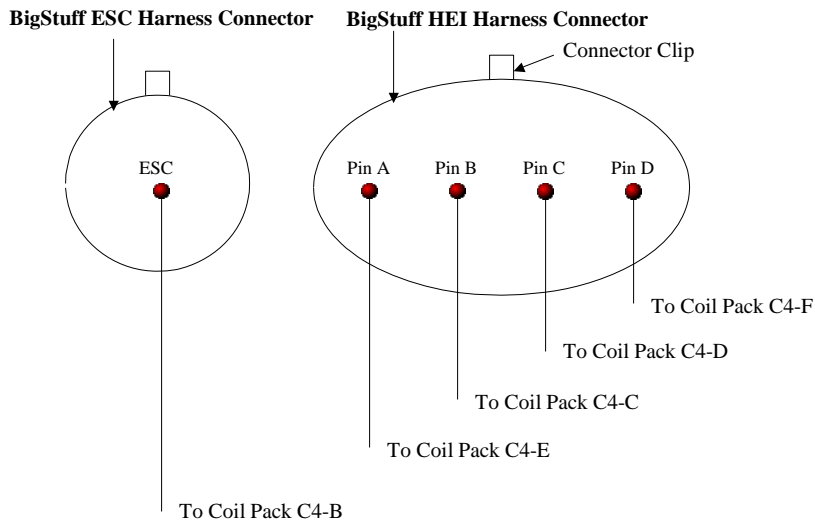


More GM HEI ignition wiring information is available on the Bigstuff3 website via this link:
<http://bigstuff3.com/pdf/Visio-Small%20Cap%20HEI%20Drawing.pdf>.

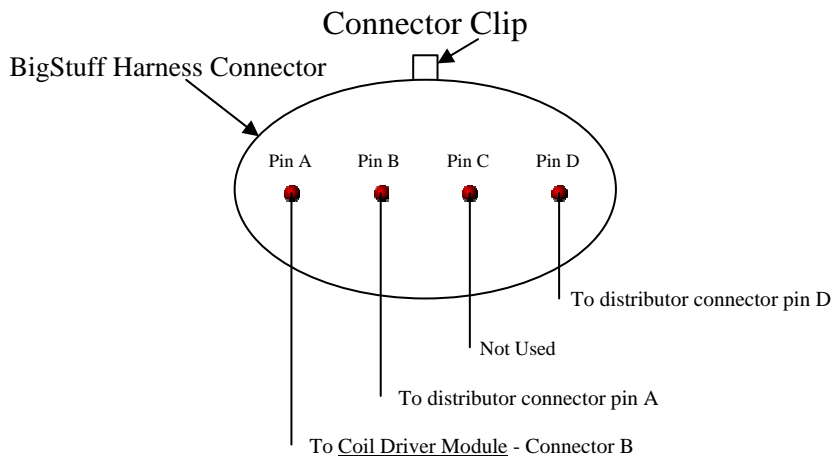
Buick Direct Ignition System (DIS) Pin-out Detail



GM Northstar Direct Ignition System (DIS) Pin-out Detail



GM Opti-spark Ignition Pin-out Detail



More GM Opti-spark ignition wiring information is available on the Bigstuff3 website via this link:
<http://bigstuff3.com/pdf/OPTiSpark%20to%20BS3%20HEI%20Wiring.pdf>.

[Back to Ignitions](#)

CAM – [(Gray, 2-way Packard connector with a separate ground wire (3/8” ring terminal))]

For distributor based applications, BigStuff3 recommends using the cam sync input. The cam sync input is required for all coil-on-plug applications. The GEN3 system will to operate sequentially without the cam sync hooked up, but the point of injection (the number of degrees BTDC where the fuel is injected) will vary every time the engine is started. Individual spark control per cylinder will also not function without the cam sync hooked up.



The 3/8” ring terminal must be fastened to a secure ground location, preferably on the engine block near the Cam sensor. The main wire harness side Packard connector must be connected to the sensor. The system is supplied with the sensor side mating connector, terminal and seals, which needs to be configured per the table below.

BS3 2-Way Gray Cam Connector	MSD Synch Pulse
A – Red (+)	A – Green (+)
B – Black (-)	B – Purple (-)

[Back to Cam](#)

H2O – (Black, 2-way Packard connector)

This connector mates with a GM (only) coolant temperature sensor. [Back to Coolant Temperature](#)



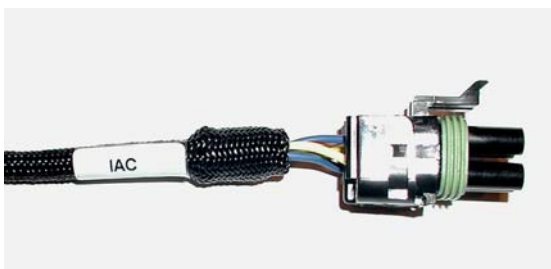
Air – (Gray, 2-way Packard connector)

This connector mates with a GM (only) air temperature sensor. [Back to Air Temp](#)



IAC (Idle/Air Control) – (Black, 4-way Packard connector)

The base main harness IAC connector was designed to work with a GM style IAC motor and valve assembly with a 2 by 2 connector. If a GM style IAC motor and valve assembly with a 1-by-4 in-line connector is the factory installed IAC, the 2-by-2-connector can be removed and replaced with a 4-by-1 in-line connector per the pin-out table below. The 1-by-4 connector is available from BigStuff3. The LS1/LS7/Ford Mod Motor systems main harness IAC connector is a 1x4 GM style IAC motor connector.



BS3 2-by-2 IAC Connector Pin-out Identifier	4-by-1 In-line IAC Connector Pin-out Identifier
A	D
B	C
C	B
D	A

More IAC wiring information is available on the Bigstuff3 website via this link:
<http://bigstuff3.com/pdf/IAC.pdf>. [Back to IAC](#)

TPS (Throttle Position Sensor) – (Black, 3-way Packard connector)

The main harness TPS connector was designed to work with a GM “L98” style TPS. If a late model GM or Ford TPS is being used, refer to the pin-out tables or the BigStuff3 website link below.



GM Late Model

BS3 3-by-1 TPS Connector Pin-out Identifier	GM Late Model Round, “3-Point” TPS Connector Pin-out Identifier
A	B
B	C
C	A

Ford TPS

BS3 3-by-1 TPS Connector Pin-out Identifier	Ford TPS Connector Pin-out Identifier
A	C
B	B
C	A

More TPS wiring information is available on the Bigstuff3 website via this link:
<http://bigstuff3.com/pdf/TPS.pdf>. [Back to TPS](#)

Crank – [(Black, 2-way Packard connector with a separate ground wire (3/8” ring))]

The black Packard connector must be connected to the inductive pickup crankshaft sensor or distributor (not supplied). The black wire ring terminal should be securely fastened to the engine block. **The GEN3 system is supplied with the sensor side mating connector, terminals and seals.** The table below shows the wiring configuration of several commonly used crank trigger references. Other crank trigger systems can be used, assuming the connections are properly made.



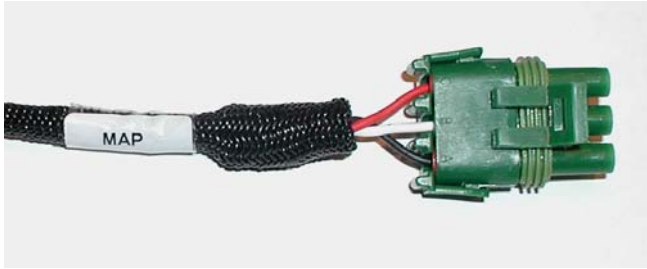
[Back to Crank](#)



Crank Trigger Reference	BS3 Connector - A (Red wire)	BS3 Connector - B (Black wire)
MSD Distributor	Violet/Black wire	Orange/Black wire
MSD Crank Trigger	Green	Purple
Accel 44000 Series	Black	White
Accel Crank Trigger	Black	White

MAP (Manifold Absolute Pressure) – (Green, 3-way Packard connector)

The GEN3 system is supplied with Packard green connector, which directly mates to a GM style 1 BAR Manifold Absolute Pressure (MAP) sensor. For normally aspirated engines, a 1 bar sensor is



used. For blown or turbocharged applications a 2 BAR MAP sensor must be used for boost pressures up to 15 PSI. For boost pressures up to 30 PSI a 3 BAR MAP sensor must be used. If a 2 or 3 BAR MAP sensors are used, the harness side MAP sensor connector can be easily modified (or replaced). The modification involves cutting a new key-way in the connector. Contact a BigStuff

dealer if questions come up related to the MAP sensor supplied with your system, and to procure the necessary connectors.

BigStuff3's four (4) BAR MAP sensor is capable of sensing pressures up to 52 PSI. A new connector (available from BigStuff3) must be used with the four (4) BAR MAP sensor.

For speed/density applications the MAP sensor must be connected to an intake manifold port.

For Alpha/N systems, a 1 BAR MAP sensor can be used to sense ambient air pressure in the hood scoop or air cleaner. **Do not attach the sensor pressure port to the manifold.**

More MAP sensor wiring information is available on the Bigstuff3 website via this link: <http://bigstuff3.com/pdf/MAP-Pressure.pdf>. [Back to Map](#)

Boost (Black 4-way Packard Connector)

The 4-way boost connector



The 4-way "Boost" connector in the main wire harness plays several key roles in the operation of the following base system features. This connector is used to:

- Trigger the internal data logger (connector location A)
- Trigger the internal timer, known as the "Timer Enable" (connector location A)

- Trigger three (3) stages of timing and/or boost control (connector locations B, C & D).

All GEN3 DAI systems are all sold with the mating half, 4-way connector, terminal (used for the “Timer Enable/DAI Trigger wire) and seal.

Connector location “A”, on all GEN3 base systems, enables two (2) functions.

1. The internal timer, referred to as the “Timer Enable”. No matter how the GEN3 system is configured, or what options the system has, Pin A of the Boost connector will always act as the internal timer trigger wire (used for boost and traction control, and other optional features). The timer enable wire (connector location “A”) must have 12V applied to it at the exact moment the system is configured to start a timing sequence, like boost or traction control. Initiating both the timing sequence (Timer Enable) and internal data logger (DAI trigger) can be accomplished by inverting the 12V signal from the brake switch or trans-brake as shown in the diagram below.
2. Internal data logger (know as the Replay function) trigger wire. When upgrades/options are added to the GEN3 system, the data log trigger wire may be moved to header 2, terminal location Y2.

When the GEN3 system is upgraded to include optional features like DAE, DAE2, SR2 and ETM traction control, 16 or 24 injector upgrades, and the NTK methanol upgrade, the wire used to trigger the internal data logger is moved from Hdr. 1, pin location L2, to header 2, pin location Y2. No matter how the GEN3 system is configured, or what options the system has, Pin A (which runs to Header connector 1 terminal L2) of the Boost connector will always act as the Timer Enable trigger wire (used for boost control, nitrous control, traction control, and other optional features).

Note: The “Timer” sequence will be reactivated, every time the throttle is closed and then opened again, since the “Minimum RPM and Minimum TPS criteria are re-satisfied.

The other three terminal locations (B, C & D) in the Boost connector can be used to turn on three (3) stages of boost control (via relays), along with corresponding, and independent, timing retard tables for each stage. The three stage Boost control can also be used to control other types of solenoids (e.g. in a wet nitrous system).

The boost solenoids **must** be turned on using relays, in a low side configuration for each stage.

Each boost stage (solenoid) that is activated has a corresponding timing retard table associated with it. The timing retard stages can be configured in the BigComm software under Boost from the main tool bar. If no timing retard is desired, for any one of the three stages, leave zeros in the timing retard tables.

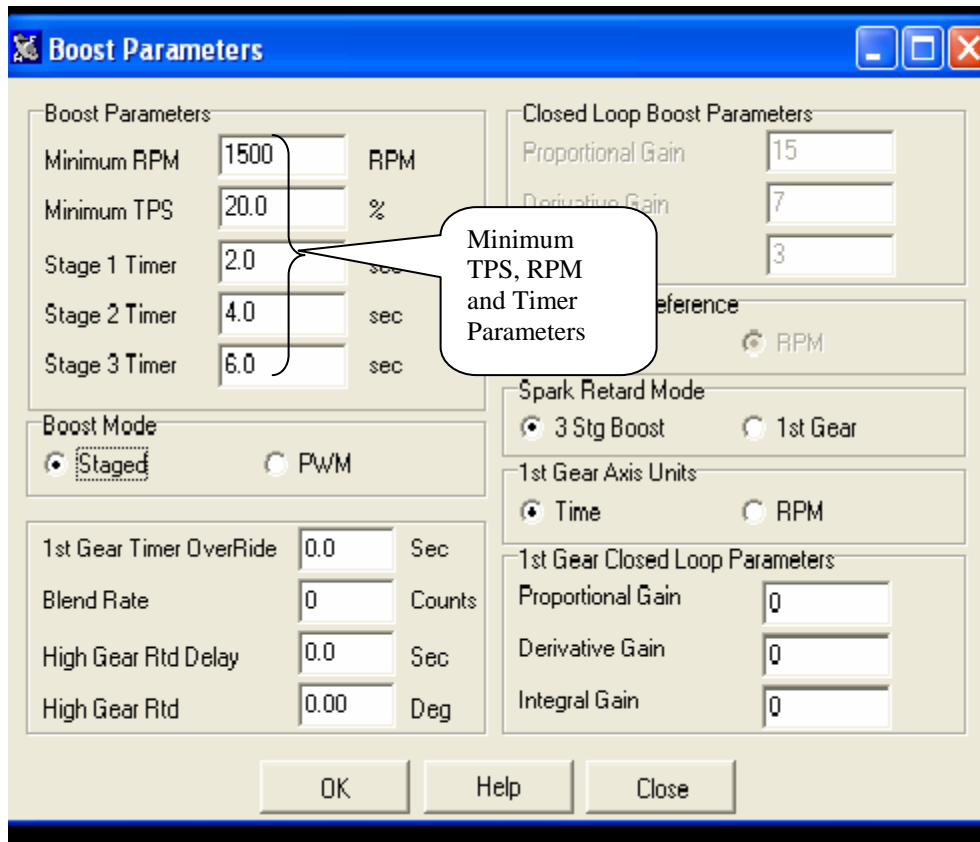
In order to activate the three (3) boost stages, and corresponding timing retard stages, the following criteria must be met:

- The minimum RPM and TPS settings under “Boost Parameters” must be met. These parameters are user configurable. From the main BigComm tool bar go to “Boost” (see screen print below)
- There must be a value in each of the three timer cells
- The time period, for each of the three timers cells, must be larger than the preceding timer value even if only one (1) of three (3) stages is going to be used. For example, if stage 1 is set for .5 seconds, then stage two must have a timer value greater than .5 and stage 3 must have a timer value greater than the value used in stage 2. If there is a zero value in any of the timer



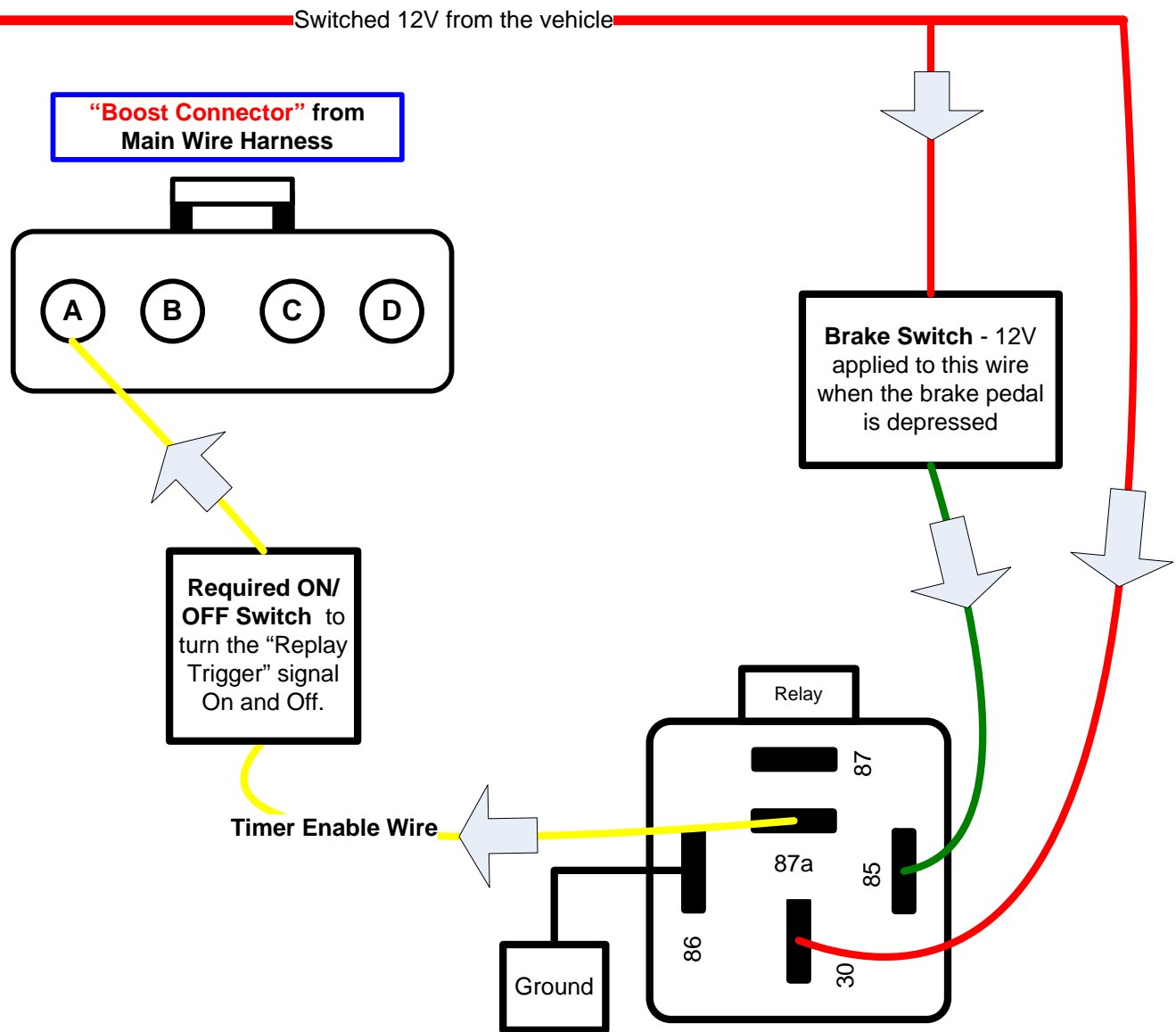
cells the staged boost and timing retard control will not work, since a zero value forces the ECU to automatically revert to the base timing map.

Note: The three (3) stage Boost control feature can be used to just retard the timing (without switching solenoids on) if the criteria outlined in the section directly above are met.



For more information see Boost_Control in Section 60. [Back_to_Boost](#)

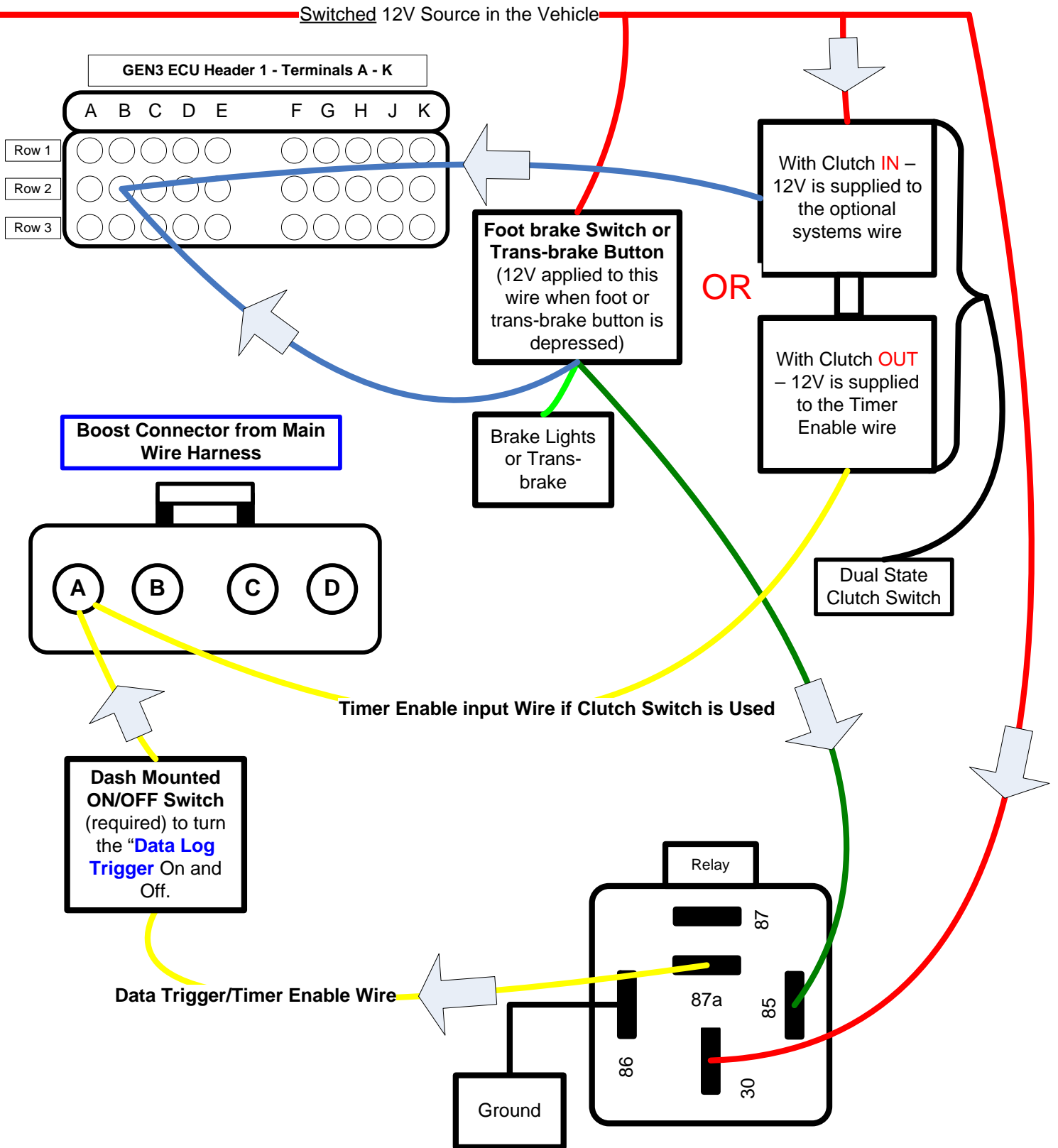
BigStuff3 Base System - Data Log Trigger/Timer Enable - Wiring Diagram Using the Brake Pedal Switch



With all GEN3 base systems, the Boost connector location “A” is used to enable two (2) functions.

1. The internal timer, referred to as the **“Timer Enable”**. No matter how the GEN3 system is configured, or what options the system has, Pin A of the Boost connector will always act as the internal timer trigger wire (used for boost and traction control, and other optional features). The timer enable wire (connector location “A”) must have 12V applied to it at the exact moment the system is configured to start a timing sequence, like boost or traction control. Initiating both the timing sequence (Timer Enable) and internal data logger (DAI trigger) can be accomplished by inverting the 12V signal from the brake switch or trans-brake as shown in the diagram above.
2. Internal data logger (know as the **Replay** function) trigger wire.

BigStuff3 - Data Log Trigger/Timer Enable/Starting Line Timing - Wiring Diagram Off Foot, Trans-brake **OR** Dual State Clutch Switch – No BS3 2-Step



2-Step (Yellow wire)

The 2-step function **is not** a standard feature on the GEN3 distributor ignition based systems, but the yellow 2-Step wire can be hooked to enable starting line timing retard for stick shift cars and turbo applications. The 2-step and 3-step functionality are available as options on the GEN3 distributor ignition based systems. **The 2-Step and 3-Step upgrade must be ordered along with part number BS3-005-025.**

Note: The 2-step functionality **is** a base feature on all coil-on-plug systems. 3-step control is an option on all GEN3 systems.

If the system is fitted with the BS3 2-step control, the GEN3 ECU will maintain the engine RPM at the user defined 2-Step RPM limit if the following criteria are met:

- The DAI (or optional DAE) trigger switch is turned on (12V is applied to the data log trigger wire).
- 12V is applied to the yellow 2-step wire (via a clutch, foot-brake or trans-brake switch)
- The Throttle position (TPS) is above 25%. **The 25% throttle position must be achieved with a quick tip-in, rather than creeping up to 25% TPS level.**

If the GEN3 system was ordered (or upgraded) with the optional 3-step, a second wire will be supplied in header 2, terminal location W1. This wire must have 12V supplied to it for the 3-step to work.

For the optional 3-step to function correctly, the following criteria must be met.

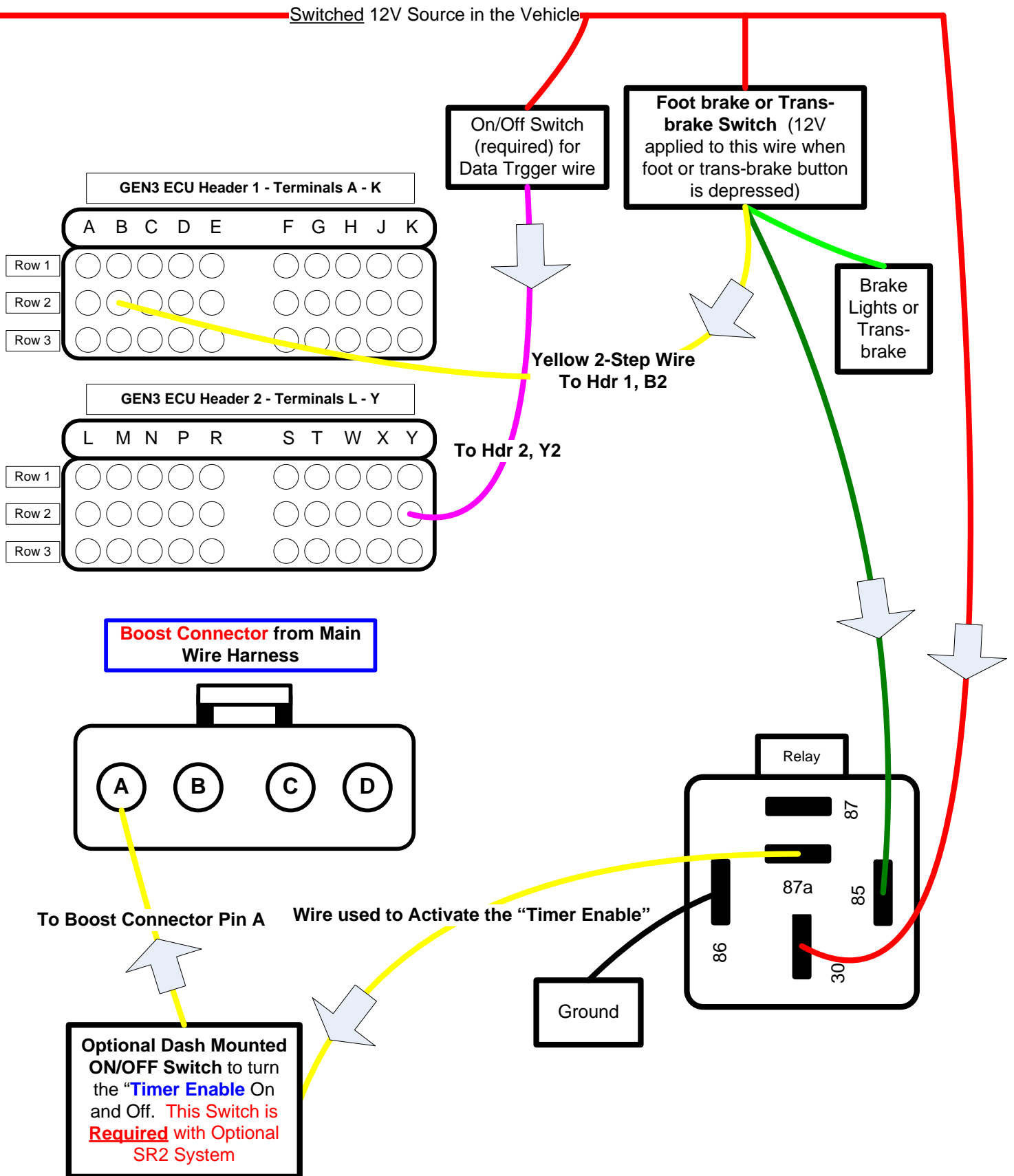
- 12V must be applied to the DAE wire (Hdr 2, wire Y2)
- The Throttle position (TPS) must be above 25%. **The 25% throttle position must be achieved with a quick tip-in rather than creeping up to 25% TPS.**
- 12V must be applied to the 2-step wire (Hdr 1, wire B2).
- 12V must be applied to the 3-step wire (Hdr 2, wire W1). **The 3-step function will automatically override the two step function when 12V is applied to the 3-step wire (with 12V still applied to the 2-step wire).**

Note: If the GEN3 system has both 2-step and 3-step functionality, and only one of the two rev starting line rev limiters will be used, BigStuff3 recommends using the 3-step (two-step high) control.

Note: The internal (or optional external) data logger trigger wire (describe in the Boost section below) must be enabled (12V supplied to the data trigger wire) for the 2-step and/or 3-step to function. [Back to 2 Step](#)

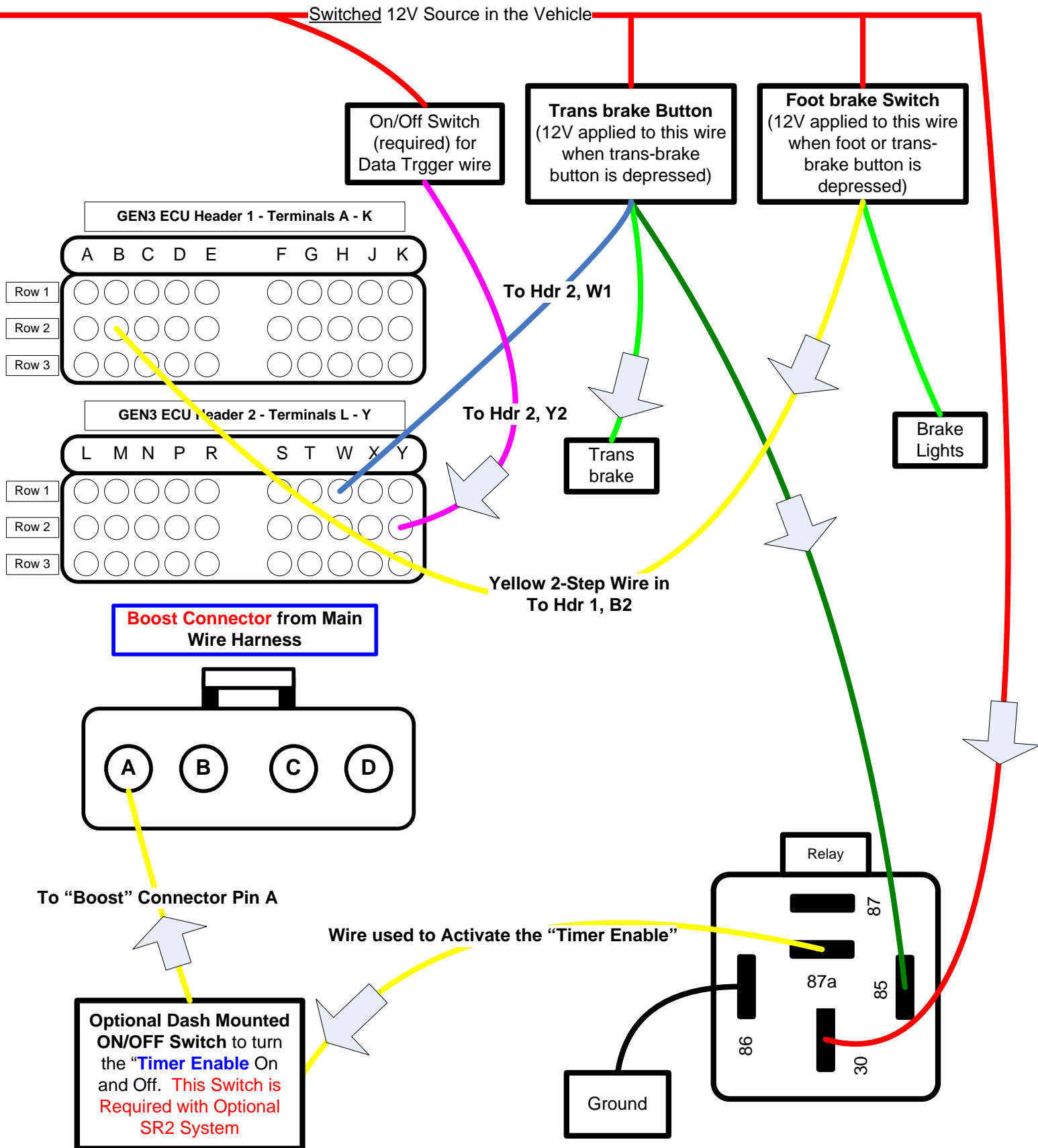


BigStuff3 - Data Log Trigger & Timer Enable - Wiring Diagram Off Foot Brake & Trans-brake Switches – With Optional 2-Step

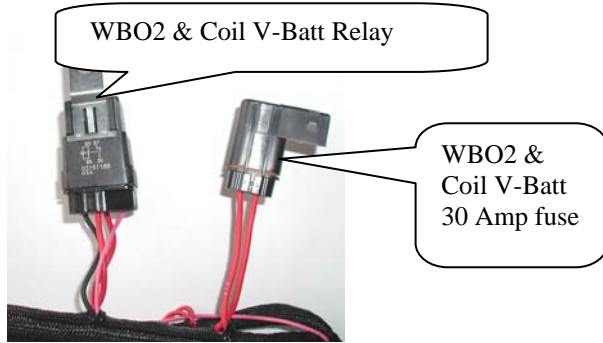


BigStuff3 - Data Log Trigger & Timer Enable - Wiring Diagram

Off Foot Brake & Trans-brake Switches – With Optional 2-Step & 3-Step



Main Fuse & Relay



[Back to Main Fuse and Relay](#)

ECU 3-Amp Fuse



This fuse protects the ECU electronics. [Back to Vehicle Battery Fuse](#)

Two (2) Thirty (30)-Way ECU Header Connectors



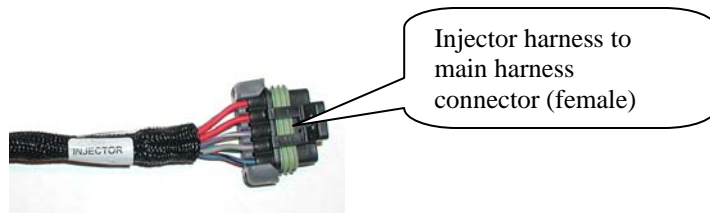
To avoid the potential of severely damaging the ECU, **connect the head connectors to the ECU only after the battery connections are made**. The two 30-way MWH header connectors are keyed such that they will only fit in only one (1) of the two (2) ECU mating-half connectors. To fasten the MWH connectors to the ECU, use a 1/4-nut driver. Make sure the header connectors, on all the harnesses, are tightened to 15 – 20 in lbs. Do not over-tighten

the header connectors!! Connect header connector A through K first, the L through Y.

[Back to Header Connector](#)

5. Injector Harness Installation – (Black, 10-way Packard Connector)

Once the main harness is installed and all the connections to it are made, the injector harness can be installed and connected to the main harness. Each injector connector (on the injector wire harness) is marked for the cylinder it needs to be attached to. There are specific injector wire harnesses for Chevy (Chrysler), Ford and Buick V6 engines. The firing order is configured **within the GEN3 ECU!**



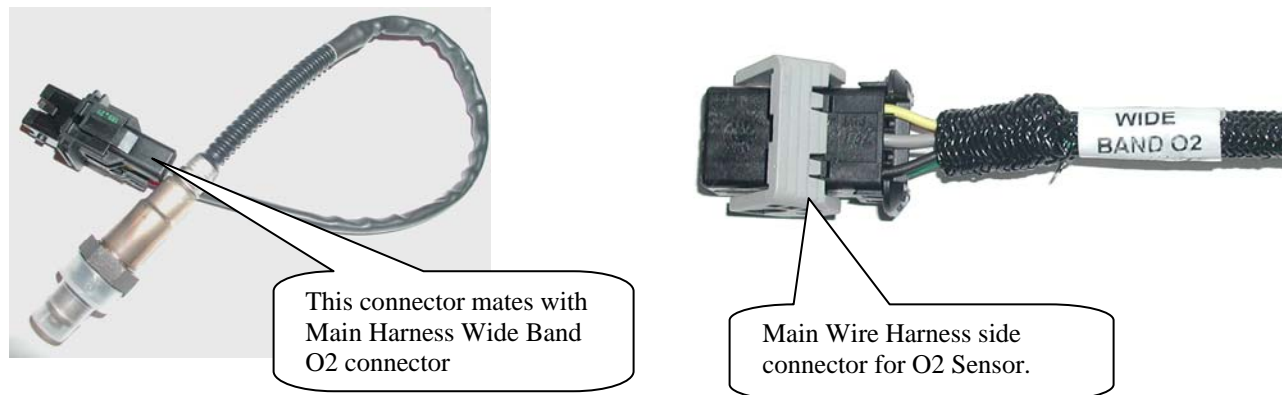
The main-harness-to-injector harness connection should be made on the end of the engine opposite the ignition distributor.

Injector Wire Harness diagrams, and pin out information, for Chevy (Chrysler), Ford and Buick V6 applications, are available on the BigStuff3 website via the following links:

- Chevy (and Chrysler) - <http://bigstuff3.com/pdf/Visio-chevy%20Injector%20Harness.pdf>.
 - Ford - <http://bigstuff3.com/pdf/Visio-Ford%20Injector%20Harness.pdf>.
 - Buick V6 - <http://bigstuff3.com/pdf/Visio-Buick%20Injector%20Harness.pdf>.
- [Back to Injector Harness](#)

6. Wide Band Oxygen Sensor Installation

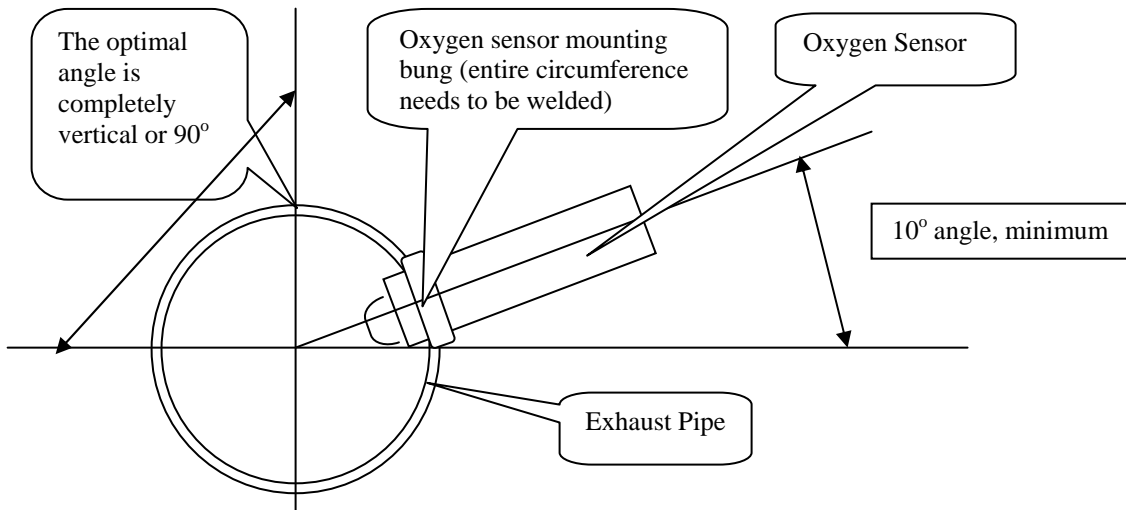
Once the main and injector harnesses are installed, the Wide Band Oxygen (WBO2) sensor needs to be installed and connected to the main harness. First, install the wide band sensor.



The WBO2 sensor threads into the sensor mounting bung [(optional) (see picture below)], which needs to be drilled and welded into the exhaust pipe. Before drilling and welding read the design guidelines below.

- Install mounting bung approximately 8” – 12” from where the primary pipes enter the exhaust collector.
- Make sure the mounting location selected does not allow condensation to collect directly in front of the sensor. Make sure there are no depressions, projections, edges, etc. in the exhaust pipe near the sensor tip.

- The mounting angle of the sensor should be tilted a minimum of 10° to the horizontal tip of the sensor. The tip of the sensor must be tilted down. See the diagram below. The optimum sensor angle is 90°.



- Make sure sensor cabling is routed and secured away from the exhaust system.

Stainless steel mounting bungs are also available for turbocharged applications.

Drill a 7/8" – 15/16" hole in the exhaust pipe. Weld a WBO2 sensor-mounting bung into the exhaust pipe. The mounting bung was manufactured with a lip to help locate it prior to welding it to the exhaust pipe. **The entire circumference of the mounting bung must be welded and free of exhaust leaks! Exhaust leaks around the bung will affect sensor readings!** Carbon and stainless steel bungs are available from BigStuff3.

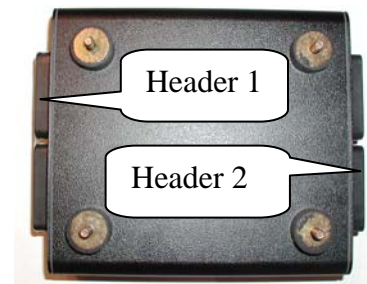


This side (with the mounting lip) goes into the exhaust pipe to locate it prior to being welded

Once the sensor-mounting bung is welded into place, thread the sensor into the bung. Installation torque is about 10 – 15 ft/lbs. Connect the oxygen sensor 6-way connector (with gold plated terminals) to the main wire harness.

7. ECU Installation

The ECU must be installed in the passenger compartment! The ECU has four 1/4-20 x 5/16 x 1/2" threaded isolation grommets threaded into the bottom of the housing. To avoid the potential of severely damaging the ECU, **connect the head connectors to the ECU only after the battery connections are made.**



Note: If the factory installed isolation grommets are not used to mount the ECU, the bolts used **must not** extend beyond the 1/4" factory installed depth. Using bolts or threaded rods that are longer than 1/4" **will contact and damage the ECU, and void the warranty!** The isolators are not used for any type of electrical grounding.

The GEN3 system hardware installation process is now completed. The next step is to install the BigComm software, which allows the sensor interfaces to be checked, and ultimately start and operate the engine.

The remainder of the manual will describe how to install and use the BigComm software to monitor and calibrate the GEN3 ECU parameters and variables.

8. BigComm Software Overview

The GEN3 system can be configured to operate on almost any engine configuration, normally aspirated; nitrous oxide injected, supercharged and turbocharged applications! The BigComm software was designed to control the engine and act as the interface between the BigStuff3 GEN3 ECU and the engine it is installed on. View it as the screwdrivers and wrenches once used to make crude adjustments to a carburetor. The BigComm software allows the user extraordinary fuel and ignition system tune ability for improved performance and drivability.

The BigComm software allows full user access to all of the tables needed to calibrate the GEN3 system. Calibrations can be modified both “on-line” and “off-line”.

The engine control tables in the BigComm ECU are stored in non-volatile memory, allowing for the stored information not to be lost when power to the ECU is removed.

The minimum computer requirements to run the BigComm software are:

- Microsoft Windows 95/98/Me/2000/NT/XP/Vista & **Windows7**
- 300 MHz or faster Pentium processor.
- BigStuff3 recommends a minimum of 128K of RAM.
- RS-232 serial port recommended. A USB port can also be used with a port adapter (not included).

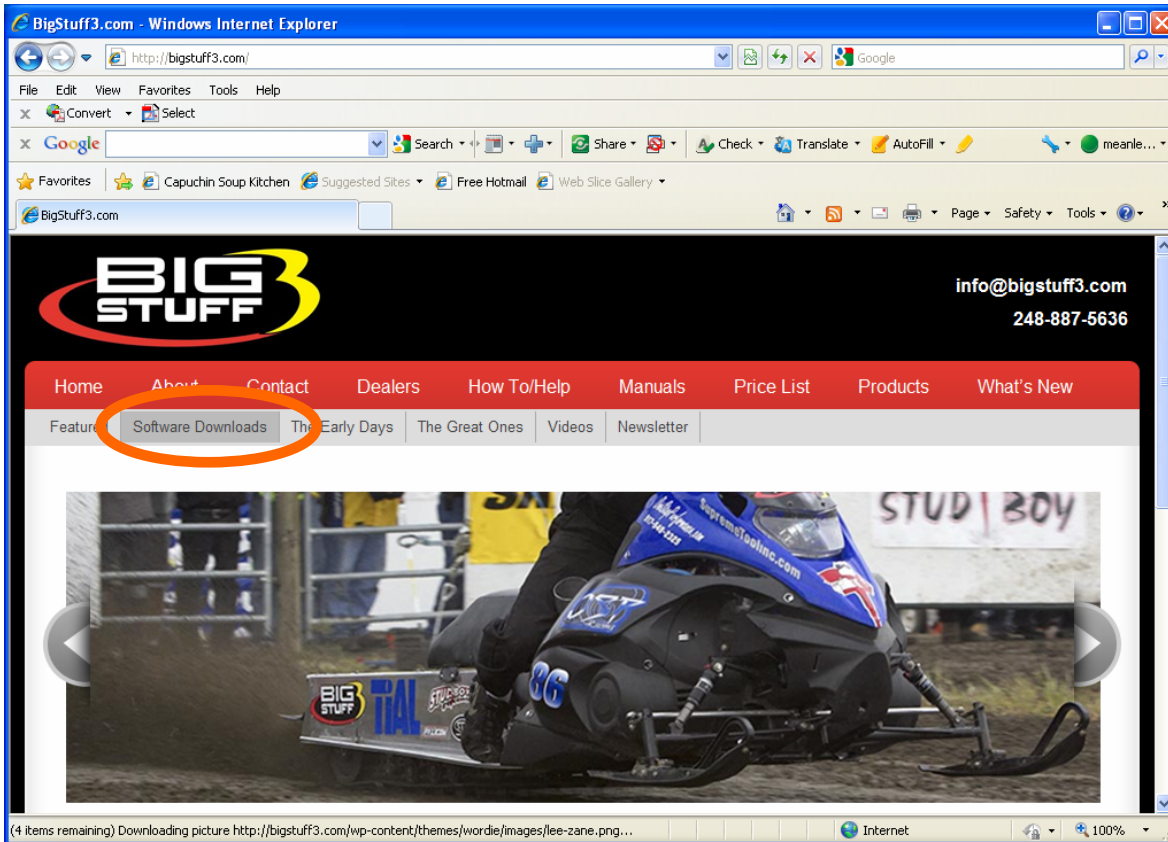
Initial engine calibrations are best performed on a dynamometer. If the user elects to calibrate the engine in the vehicle, BigStuff3 strongly recommends that two people be involved, one person to drive the vehicle, the other to operate the laptop computer.

9. BigComm Software Installation

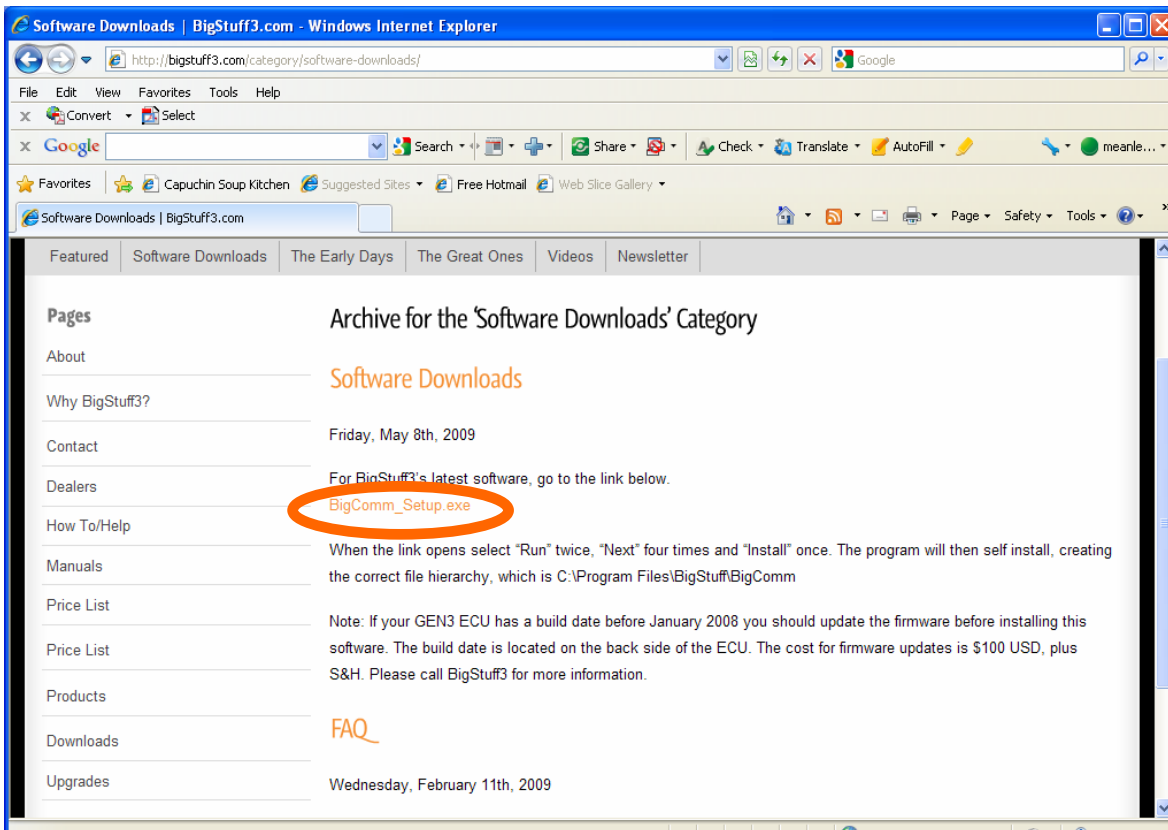
The GEN3 system software is available from the BigStuff3 website via: www.BigStuff3.com. From the website home page, go to “Software Downloads” as shown in the screen print below.

Note: A CD ROM disk is no longer supplied with a CD ROM software Disc, but one can be purchased from BigStuff3.

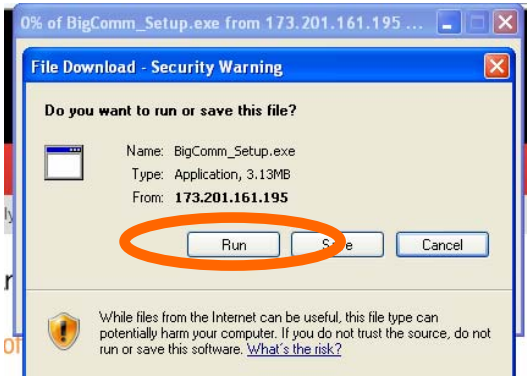




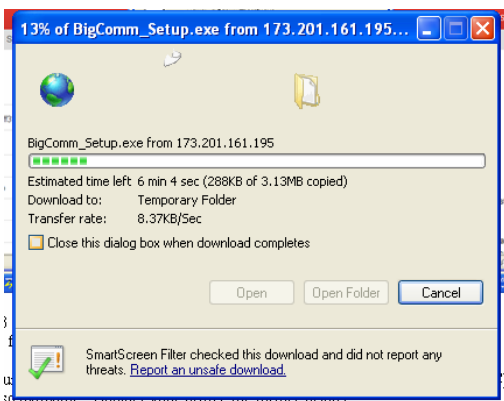
Double click on the [BigComm_Setup.exe](#) link shown below.



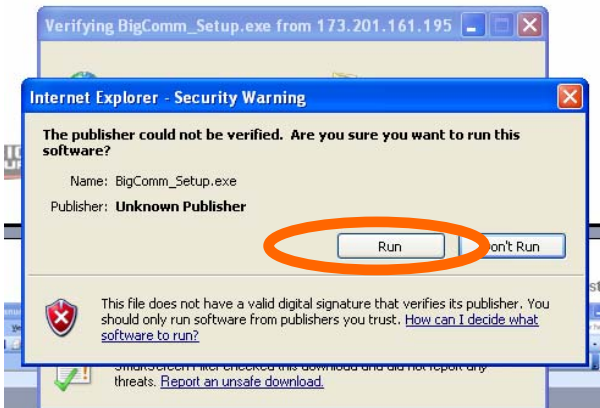
Double click on “Run”.



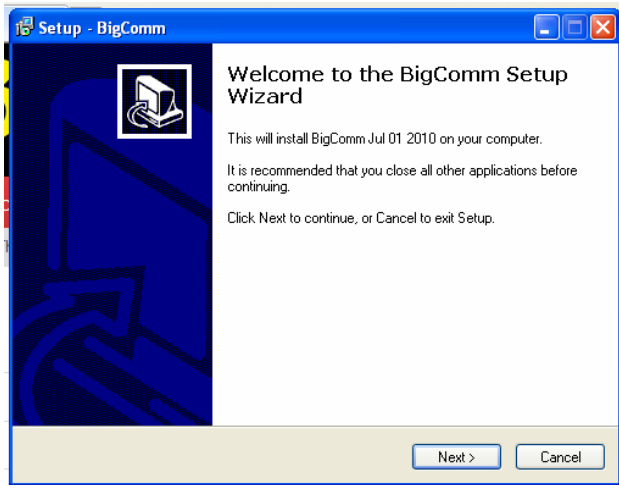
Download progress will be displayed as shown below.



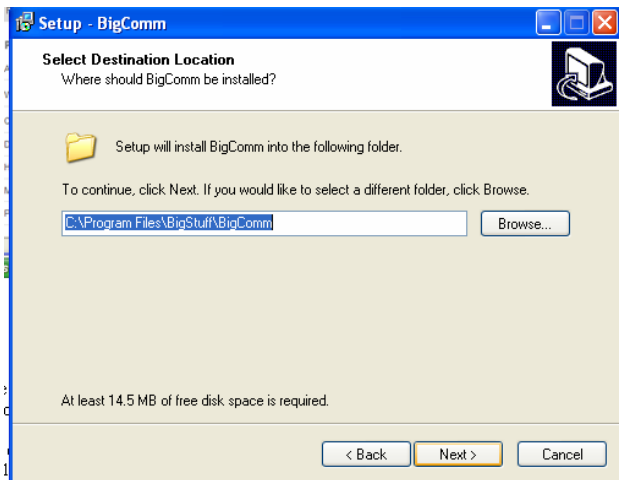
Again, double click on “Run”.



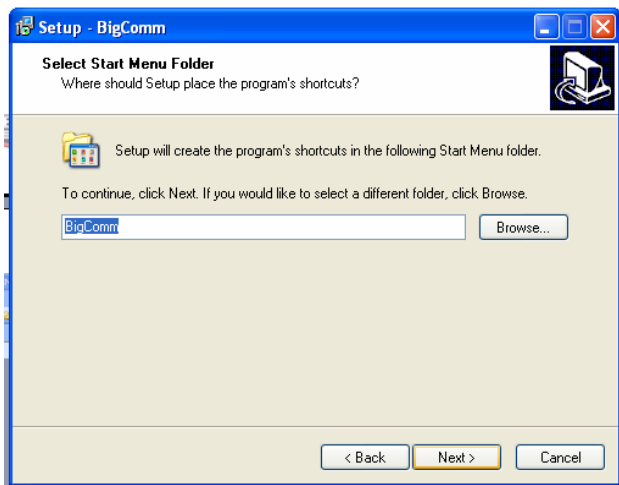
Double click on ”Next”.



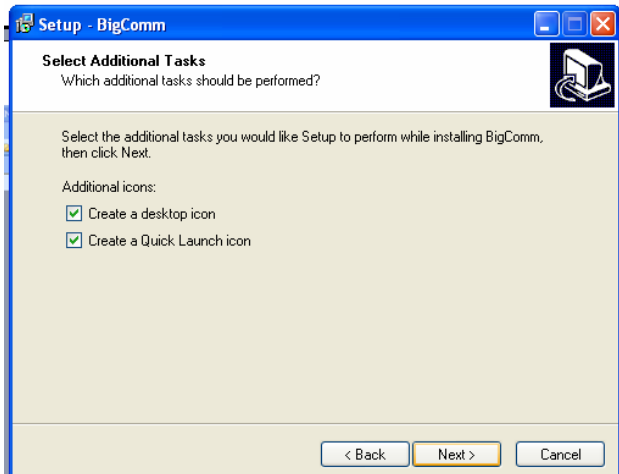
The software will automatically install using the correct file hierarchy, which is C:\Program Files\BigStuff\BigComm. This file structure is required for the software to work correctly. **Do not change the file location or file hierarchy!! Click “Next”.**



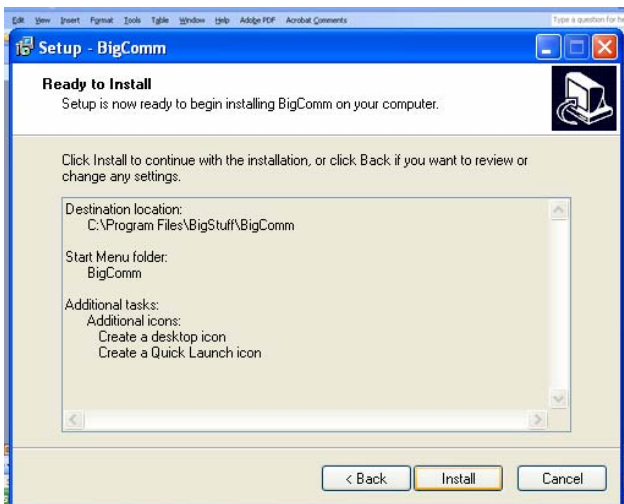
Click “Next” again.



To create a link on your desktop, and in the short cut tool bar in the lower right-hand corner of the PC's desktop, put a check box next to both the "Create a desktop icon" and "Create a Quick Launch icon" as shown in the screen print below, then double click "Next".

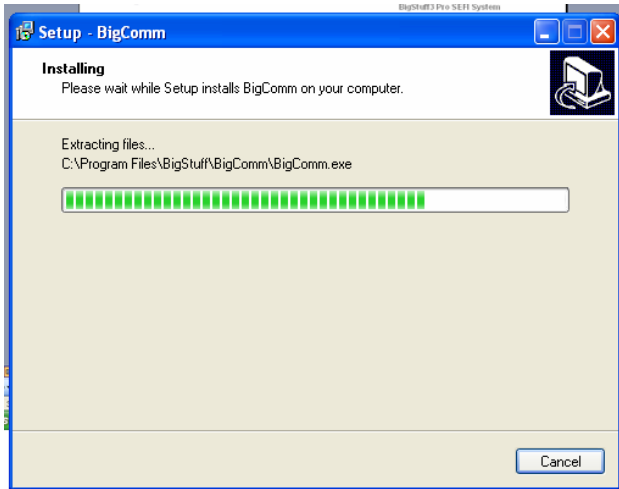


Next, double click "Install".

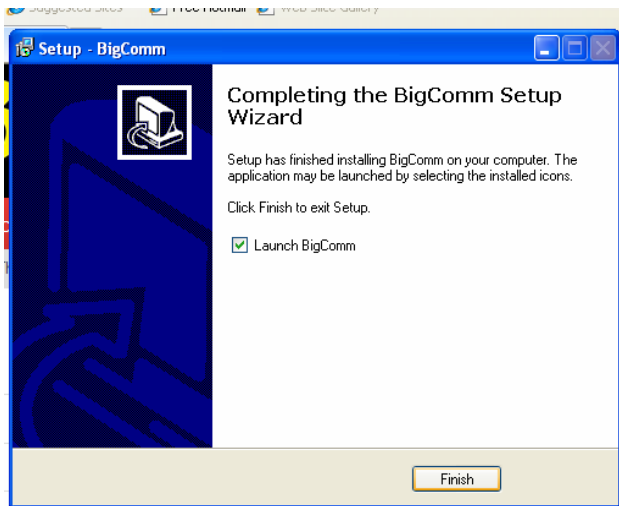


The software will self install on your PC as shown below.





Lastly, if you want to open software put a check mark in the box next to Launch BigComm, as shown below.



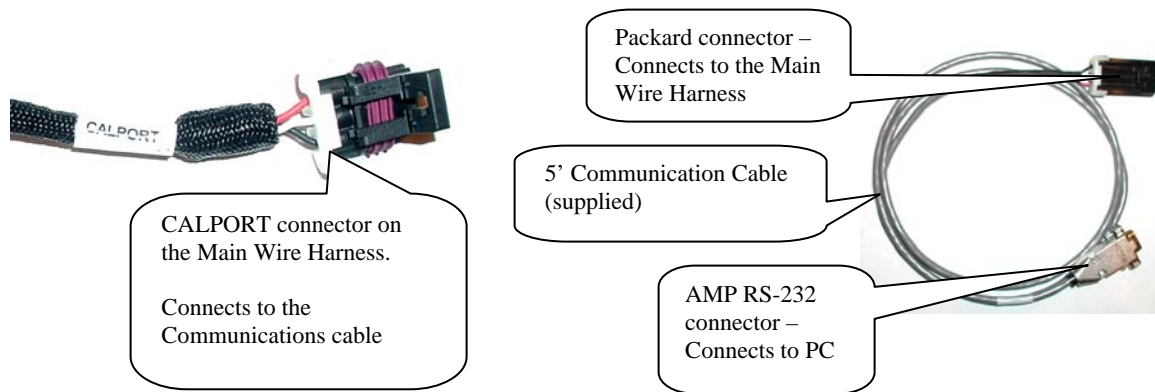
Connecting to the PC

The BigComm software has now been successfully installed on your personal computer!

A 5' communication cable connects the BigStuff3 ECU with a personal computer (PC). A 25' cable is also available from BigStuff3.

Using the communication cable supplied with the system, connect the 3-way Packard connector to the mating half 3-way connector marked CalPort on the Main Wire Harness.

Connect the RS232 connector to the back of the personal computer.



CalPort Problems?

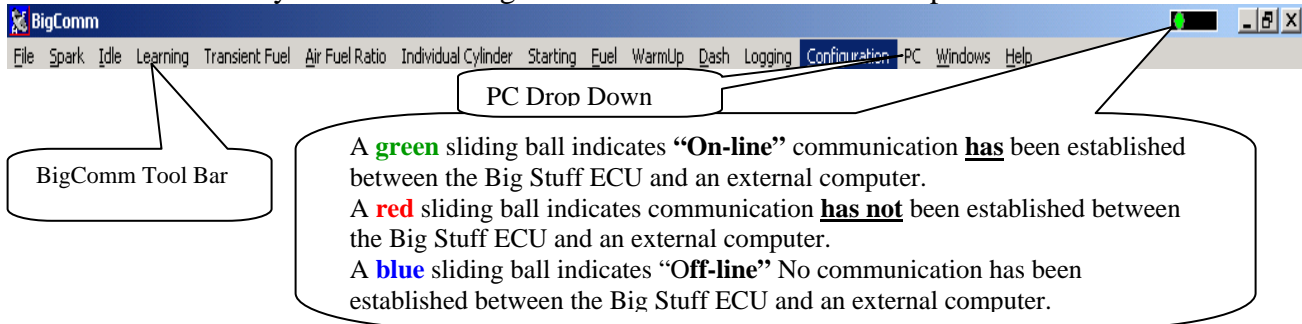
If the RS-232 connector located at the end of the interface cable (supplied with the system) cannot be connected to your PC, a 9-pin serial port interface adapter will need to be procured. If the PC is a newer model it will most likely have a USB port. If the PC being used is an older model it may only have a 25 pin **serial** port. Make sure the 25-pin port, on the back of the PC, is a serial port and not a parallel port, there is a difference. The parallel port will not work. Parallel ports are typically printer ports that let data travel in only one direction.

If your PC is configured with only a USB port, a USB-to-9 pin adapter must be procured. USB-to-9 pin or 25-pin-to-9 pin serial adapters are readily available at Radio Shack or comparable stores. Radio Shack’s USB port to 9-pin serial adapter is part number 26-949 (+/- \$40.00).

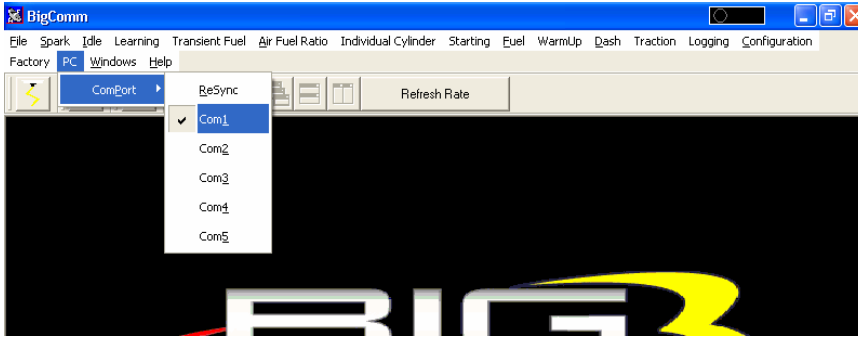
Prior to establishing communication with the GEN3 ECU, the PC’s COM port, needs to be selected. In order to complete the PC COM port selection a quick overview of the Tool Bar is required. The configuration tables within the BigComm software are accessed using the BigComm Tool Bar explained below. For additional information, on how to resolve Com Port communication problems, go to the BigStuff3 Website. Next go to the How To/Help Section. The BigStuff3 website link is: <http://bigstuff3.com/pdf/Comport%20Connection%20Resolution.pdf>.

11. Using the Tool Bar

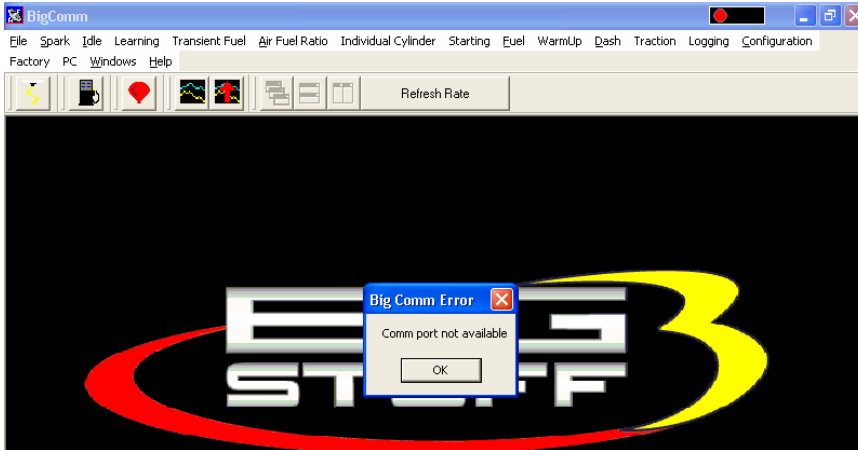
The Tool Bar is located at the very top of the BigComm Main Menu screen. All of the BigComm software functionality is accessed using the Tool Bar and associated drop down screens.



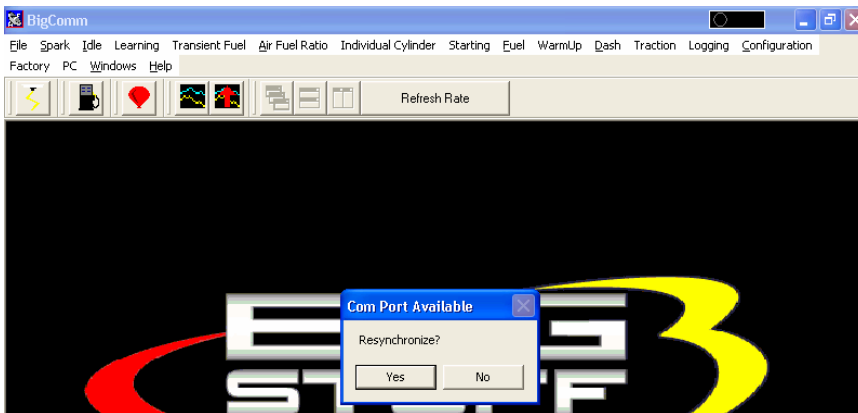
Left mouse click on “**PC**” on the main tool bar. Select the COM Port associated with the USB cable that was installed. Close the BigComm software.



If the Com Port selected is not available, the following message will appear.



Select another Com Port until an available port is identified. Once the PC identifies an available Com Port, the following screen will appear.



Press the PC's **“Enter”** key or left mouse click on **Yes** and the Com Port will resynchronize.

Next, double click the left mouse button on the BigComm short cut icon located on the Windows desktop.



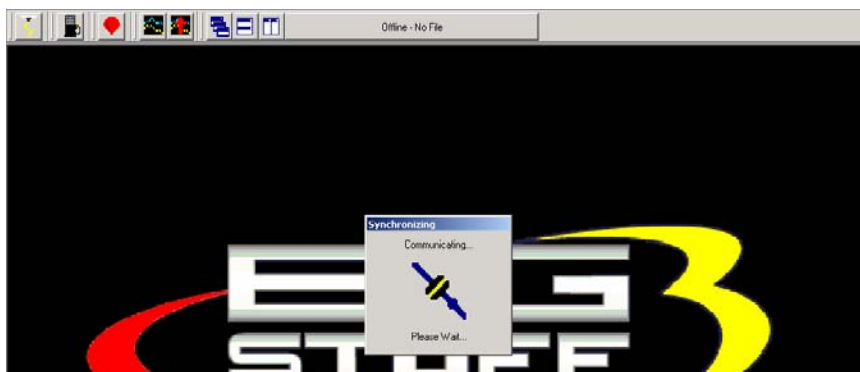
The BigComm software will attempt to establish a connection between the PC and the GEN3 ECU. The



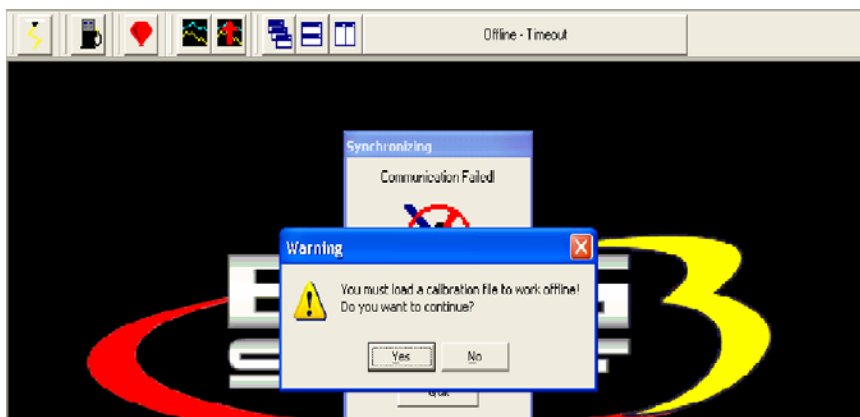
following screen will appear.



If the GEN3 ECU is not powered up (the ignition key is not in the “Run” position) and the Communications cable is not connected, communication cannot be established. The following screen will appear. This may also occur if the Comm Port is not configured correctly. If this occurs, use the above process of configuring the Comm Port until communication is established.

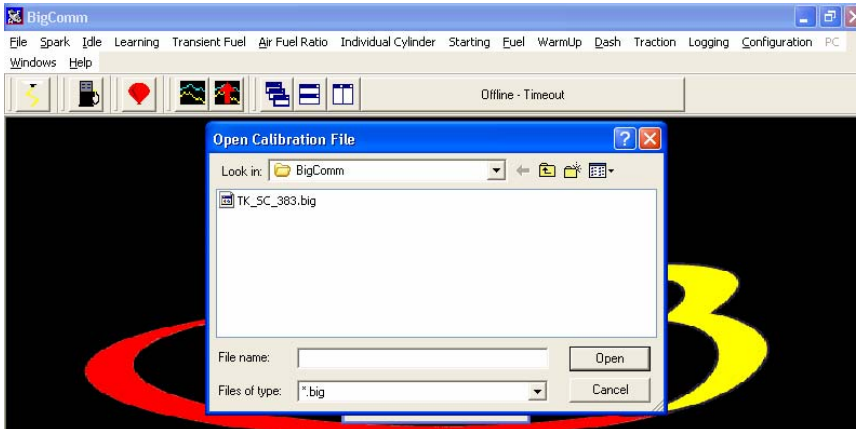


Left mouse click the **Work Offline** button. The BigComm software will ask what calibration should be used “off-line”. The following screen will appear, informing the user that a calibration file must be loaded to work “off-line”.



Left mouse click on Yes and the BigComm software should go to the BigComm folder. If the PC does not automatically take you to the BigComm folder, navigate to **C: Program**

Files/BigStuff/BigComm. Double left click on the calibration to be used for “off-line” modifications and the calibration will be loaded. After the calibration is loaded, the Main BigComm window will open.



12. Establishing a Connection

The sequence for connecting the GEN3 ECU to the Main Wire Harness is as follows:

- First connect battery terminals.
- With the ignition switched off, connect the 30-way header connector, with terminals A-K to the ECU.
- After terminals A-K are connected to the ECU, connect the header connector with terminals L-Y

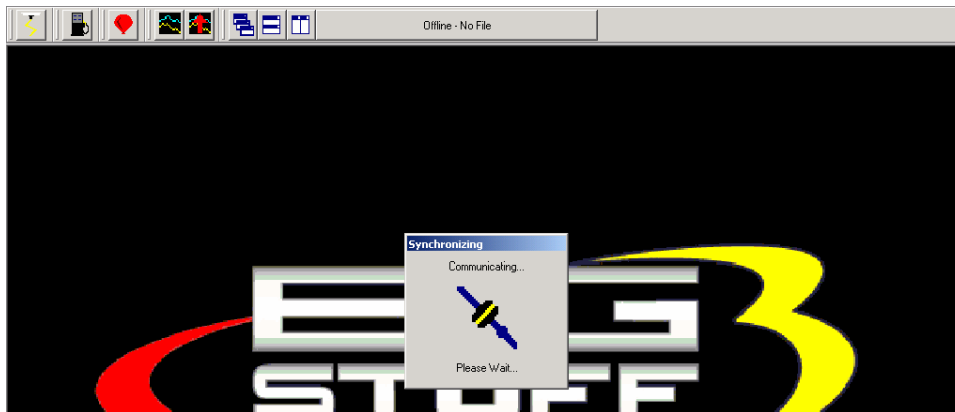
This assembly sequence should preserve the firmware and initial calibration that was loaded in at the factory.

Assuming that the system wire harnesses, ECU and software are all installed and connected correctly, the next step is to establish communication between the PC and BigStuff3 GEN3 ECU. Double check to make sure the communication cable connections, between the PC and to the GEN3 ECU, is securely in place. Again, the plastic Packard style connector mates with the main wire harness connector labeled “Calport”. Turn the PC on and power up the BigComm ECU by turning the vehicle ignition to the “Run” position.

Left mouse click (double click) the BigComm icon on the Windows desktop.

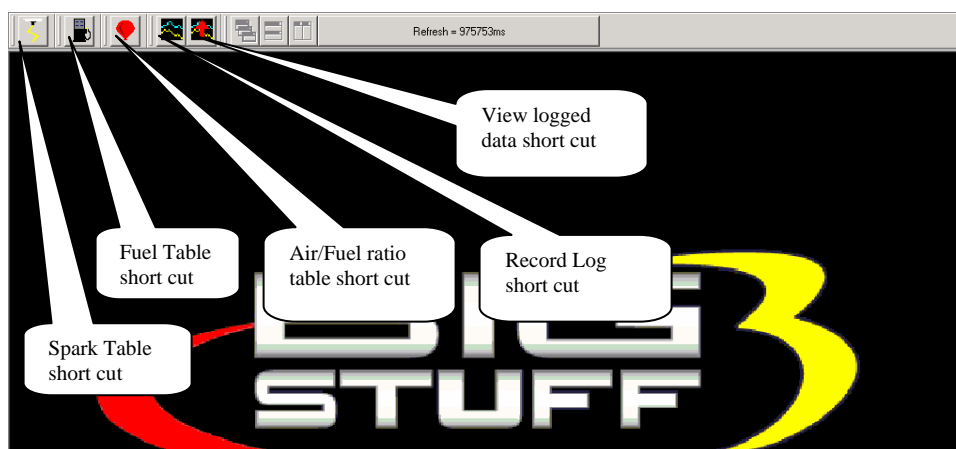


The following screen will appear.



Once communication has been established, the BigComm “Main Menu” screen will open and the [Green Sliding Ball](#) in the tool bar will become active.

13. BigComm Main Menu Screen



The engine is not yet ready to be started. Additional items need to be configured before attempting to start the engine!

In some cases, the ECU may be delivered with a calibration that will closely match your engine configuration. This “base calibration” will allow the engine to be started and run. If this is not the case, the following steps need to be taken.

Note: BigStuff3 recommends checking all of the settings in the configuration tables to ensure the system as supplied will operate correctly.

14. Inputting Values into a Cell

There are two methods for inputting values into cells as follows:

- **Arrow Keys** – Use the PC keyboard arrow keys to navigate the cursor horizontally and/or vertically to the cell to be changed. Input the desired value and hit **“Enter”**.
- **Using the Mouse** - Use the Mouse to navigate the cursor to the cell to be changed and left Mouse click on the cell. Input the desired value and hit **“Enter”** to save the change.

15. Closing Windows

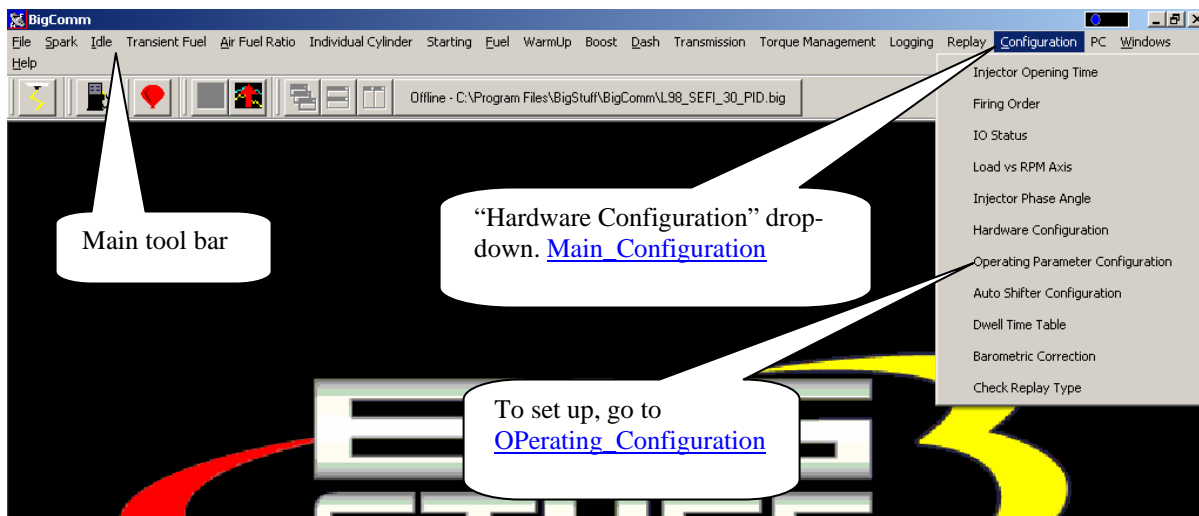
Open windows can be closed using the PC's mouse. To close an open window, left mouse click on the "X" in the upper right corner of any window, or simply hit the PC's "Esc" key. If multiple windows are open, continue to hit the **Esc** key until all windows are closed and the main BigComm window is displayed. Hitting the **Esc** key too many times may result in a message stating, "**Do you really want to quit?**" Hit "**No**" to continue working with the BigComm software. Hit "**Yes**" to close the BigComm software.

16. Configuration

The BigStuff3 ECU needs to be configured to the engine it will control. For example, the ECU needs to know if it is operating a 4, 6 or 8 cylinder engine along with other important engine parameters and variables. The initial configuration steps can be accomplished with the vehicle ignition key in "run" position and the engine off. The ECU must be supplied with 12V – 14V for the ECU to be "live".

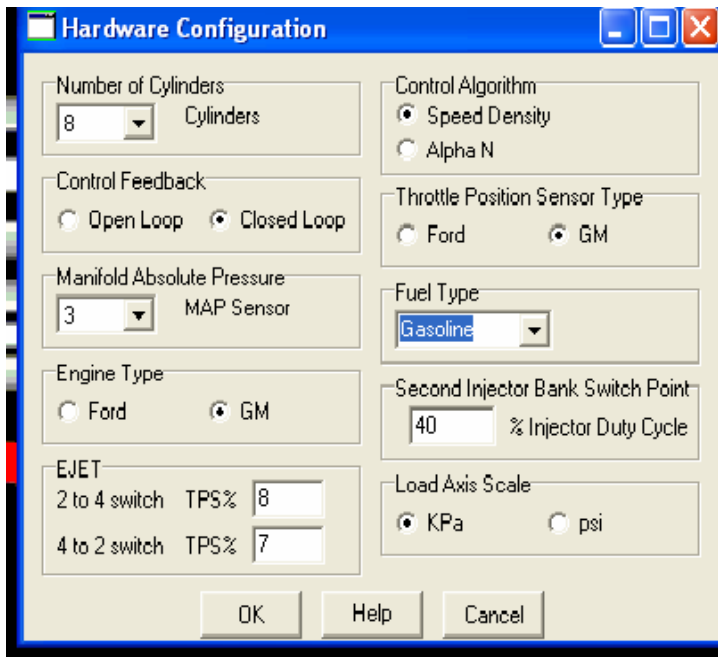
17. Hardware Configuration

From the tool bar on Main Menu screen, left click on the "**Configuration**" and the drop down screen below will open.



Keep the left mouse button depressed and slide the mouse pointer down until "**Hardware Configuration**" is highlighted. Release the left mouse button. The screen below will open.

Hardware Configuration Table



The Hardware Main Configuration table is relatively self-explanatory. Working from the top of the table, select the parameters in the screen print above as follows:

- Select the number of cylinders the engine has.
- Select whether system will operate using a speed density (engine speed and engine load) or Alpha N (throttle angle and engine speed) algorithm. The majority of the engine applications use the Speed-Density control algorithm. If the camshaft duration exceeds 260° at .050" lift, the Alpha N control algorithm should be considered. Contact BigStuff3 if you are uncertain whether Speed Density or Alpha N control is best for your application.
- Select the fuel feed back control configuration. "Open Loop" control uses the oxygen (O2) sensor feedback to ensure the user defined air/fuel ratio is achieved. "Open Loop" control does not use the oxygen sensor feedback to ensure the desired air/fuel ratio is achieved. In most cases, tuners will set the initial calibration, and perform subsequent fine tunes in "Closed Loop", but will race with the O2 sensor turned off ("Open Loop"). Note: The air actual air/fuel ratio will still be displayed and recorded (via the Replay feature) while in "Open Loop" mode.
- Select the type of Throttle Position Sensor (TPS) being used (to output throttle angle to the ECU). The TPS is located on the side of the throttle body, at the end of the throttle shaft. GM style TPS sensors have a .5V to 4.5V output and Ford sensors have a .9V to 4.5V output.
- Select the Manifold Absolute Pressure (MAP) sensor setting for the application. Make sure the appropriate MAP sensor has been purchased for the boost pressures that the engine will see. For normally aspirated engines, a 1 BAR MAP sensor should be used and the 1 BAR MAP setting should be selected. For blown or turbocharged applications with boost pressures up to 15 PSI a 2 BAR MAP sensor should be used and the 2 BAR MAP setting must be selected. For boost pressures up to 30 PSI, a 3 BAR MAP sensor should be used and the 3 BAR MAP setting should be selected. For boost pressures up to 52 PSI, a 4 BAR MAP sensor should be used and the 4 BAR MAP setting should be selected. For boost pressures up to 60 PSI (gauge) a 5 BAR MAP sensor should be used and the 5 BAR MAP setting should be selected. **If a 5 BAR MAP sensor is going to be used, contact BigStuff3 to make your**



system was supplied with the correct firmware and MAP sensor.

[Return to Main Configuration](#)

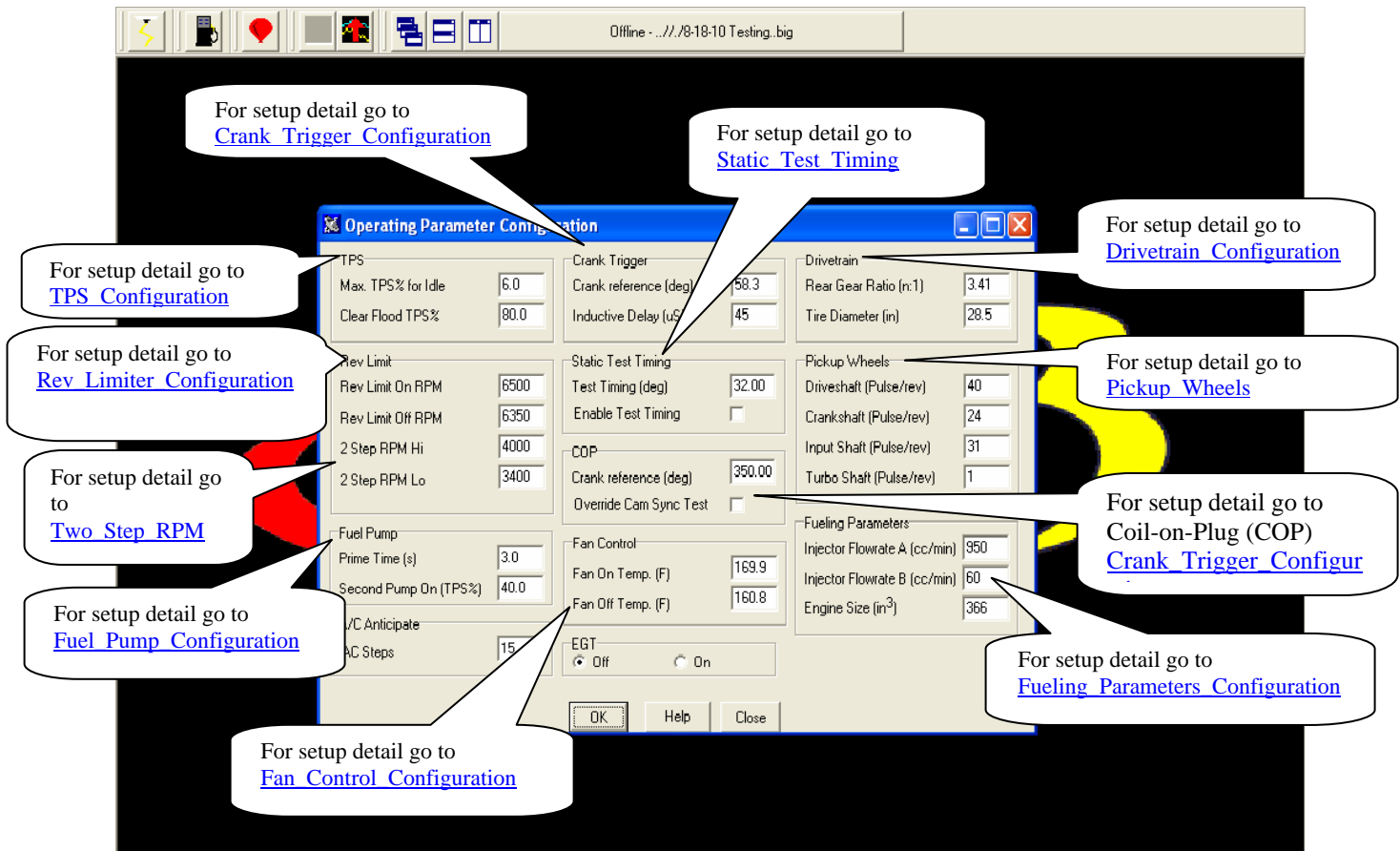
- Select the type of fuel the engine will run on. The ECU firmware contains algorithms enabling the following fuel types to be used:
 - Gasoline
 - Ethanol (E98)
 - Methanol
 - E85 – **Do not select this setting unless running BigStuff3's E85 Flex-fuel system!**

Although E85 can be selected, it should not be used unless the optional E85 (Flex Fuel) system has been purchased. Do not select E85 even if straight E85 will be used. Contact BigStuff3 for more details.

- Engine Type – Select either Ford or GM. It is important that this selection be correct. The GEN3 ECU uses this information for the individual fuel and spark control.
- Second Injector Switch Point (Injector Staging) - This feature is for 16 or 24 injector systems. It allows for 16 or 24 injectors to be run sequentially, in a staged configuration. This feature is especially useful for engines running alcohol fuel where a large volume of fuel is required and two or three injectors per cylinder are being used. By staging the injectors you get better idle quality and drivability. The first set of injectors operate until the user defined injector duty cycle is reached, then the second and/or third set of injectors are introduced. When this occurs **the duty cycle, of all the sets of injectors, is recalculated and set to the same duty cycle, even if the flow rates of the three sets of injectors are different.**
- Load Axis Scale – The user can choose to see the fuel map, spark map and Air/Fuel Ratio (AFR) map in kPa or PSI.
- EJET – Applicable only if running the BigStuff3's electronic carburetor system. Contact BigStuff3 for more details.

18. Operating Configuration (F5 – “Quick Key”)

Next, the system “**Operating Configuration**” needs to be set up. From the Main Menu screen Tool Bar, left click on “**Configuration.**” Keep the left mouse button depressed and slide the mouse pointer down until “**Operating Configuration**” is highlighted. Release the left mouse button. The screen below will open.



The paragraphs below outline how each operating parameter should be configured. The hyperlinks, in the screen print below, link to the instructional text for each subject item.

TPS

This input screen allows the user to set:

- The TPS sensor to the correct output voltage when the throttle is completely closed.
- The Clear Flood TPS %, described later in this section.

Note: It is important to have the TPS (%) setup correctly. The TPS sensor (on the throttle body) and software need to be setup properly to ensure that the full resolution (1% to 100%) of the sensor can be utilized and the following related features function properly (described later in the manual):

- Idle Spark Control - See [Idle Spark](#) for more information.
- Decel Fuel Cutoff (DFCO) - See [dMAP Parameters](#) for more information

How to Set Max TPS % for Idle

Note: Make sure that the correct type of TPS (GM or Ford) is selected during the hardware configuration process outlined above. See [TPS Configuration](#).

In the input table set the “Max TPS % for Idle” at **2%**. Next, go to the TPS sensor located on the throttle body. With the throttle blades completely closed and with the engine running at its normal

operating temperature and preferred idle speed, adjust the TPS so that the TPS % value shown in the Dash (see screen print directly below) reads between 1% to 2%.

The dashboard can be configured to appear at the bottom of most of the BigComm software screens. An example of a dashboard is shown below. See [Dashboard](#) for more details (described later in this manual).

Inj Fuel Flow = 0 lb/hr	Gross Inj PW = 0.0mS			
Base Inj PW = 13.6mS	RPM = 0	Vol Eff = 100.0%	Act AFR = 0.0:1	BLM Corr = 0.0%
CLT Corr = 0.0%	O2 Corr = 0.0%	AFT Corr = 0.0%	AIR Corr = 0.0%	ATM Corr = 0.0%
Scaled Load = 0x00	Scaled RPM = 0x00	TPS = 0.0%	Vbat = 13.5V	MAP = 14.3kPa

TPS Signal in the Dash.

How to Set Clear Flood TPS %

Set the Clear Flood TPS % value to **80%**. This setting tells the ECU not to add fuel when the following conditions exist.

- o The engine is cranking (between 75 and 400 RPM).
- o The throttle position is at 80% or greater (user specified)

If these conditions are met, the ECU does not add fuel **during cranking**. This function is especially useful when attempting to start a flooded engine. Once the fuel is cleared from the engine, release the throttle to restart the engine. [Return to TPS Setup](#)

Rev Limit

The “Rev Limit On RPM” and “Rev Limit Off RPM” section of the Rev Limiter Configuration table refers is focused at “Engine Saver” RPM control. The 2-Step RPM Lo and 2-Step RPM Hi section of the Rev Limiter Configuration table is focused on engine launch RPM control.

Rev Limit On RPM” and “Rev Limit Off RPM” section allows the user to set the maximum engine RPM before fuel shutoff occurs. This setting is referred to as “Rev Limit On RPM”. The screen also includes an input for “Rev Limit Off RPM,” which is the RPM where fuel will be reintroduced to the engine. A small RPM band (at least 200 RPM) is required between the “Rev Limit On” and “Rev Limit Off” RPM inputs, so that the engine has a small band (hysteresis) between the rev limiter on and off limits. **The hysteresis, for supercharged/blower engines should be at least 1,000 RPM.**

Note: **The engine may not run if there is no band between the On and Off limits or the RPM inputs are reversed!** For example, if the “Rev Limit On” is set for 7,100 RPM and the “Rev Limit Off” is set at 7,300 RPM the engine will not run. [Return to Rev Limiter Setup](#)

Rev Limit On RPM” and “Rev Limit Off RPM” section allows the user to set the:

2-Step RPM Lo = 2-Step (engine RPM launch) RPM

2-Step RPM Hi = 3-step (engine RPM launch) RPM

The 2-step Lo (2-Step) and 2-Step Hi (most commonly referred to as 3-step) control are not standard features on the GEN3 distributor ignition based systems. In base system form, the 2-step wire can be used for starting line timing retard for stick shift cars and turbo applications. The 2-step and 3-step functionality are available as options on the GEN3 distributor ignition based systems.



Note: The 2-step functionality is a base feature on all coil-on-plug systems. 3-step control is an option on the GEN3 coil-on-plug systems.

If the GEN3 system is equipped with 2-Step control and 12 Volts is applied to Header Connector 1, pin B2, the ECU will begin rev limiting the engine to the user define 2-Step Lo RPM setting.

If the GEN3 system is equipped with both the 2-Step and 3-Step (mostly used for turbo applications) features, and 12V is applied to Header Connector 2, pin W1, the ECU will begin rev limiting the engine to the user define 2-Step Hi RPM setting. When 12V is applied to Header Connector 2, pin W1 (the 2-Step Hi wire) the GEN3 ECU will automatically override the 2-Step Lo RPM and seamlessly jump to the 2-Step Hi RPM level.

[Return to Two Step RPM](#)

Fueling Parameters

This screen requires the user to input the fuel injector flow rate and the engine displacement (in cubic inches).

A flow rate calculator is available on the BigStuff3 website via this link:
<http://bigstuff3.com/pdf/Fuel%20Pressure-Injector%20flow%20Calc.xls>.

The flow rate constant that must be inputted into the “Fueling Parameters” table is centimeters per minute, **not pounds/hour**. Once the injector flow rate, in pounds per hour is calculated, the flow rate in cubic centimeters/minute (cc/min.) can be calculated by multiplying the lbs/hr rate by 10. For example, using the on-line flow rate calculator it was determined that the actual pound/hour flow rate of 160#/hr injectors, at 55 PSI, is 177 pounds/hour. To get cubic centimeters per minute, multiply the 177 value by 10 and the result is 1,770 cubic centimeters/minute. Input this value into the Fueling Parameters “Injector Flow Rate A” cell.

The same calculation is used for the second set of injectors, in a 16 injector system, except the calculated flow rate for the second set of injectors must be inputted into the Fueling Parameters “Injector Flow Rate B” cell. For a 24 injector setup, the **combined** flow rate of the **first two sets** of injectors must be inputted into the “Injector Flow Rate A” cell, and the flow rate for **the last set** of injectors must be inputted into the “Injector Flow Rate B” cell. [Return to Fueling Parameters Setup](#)

Crank Trigger

See settings below for the input values [Crank Ref Angle (deg) and Inductive Delay (μs)] to be used, based on the most common configurations. Additional information on this subject is available on the BigStuff3 website under the How To/Help section via this link:
<http://bigstuff3.com/pdf/Ignition%20Guide%20rev%201.2.pdf>.

The crank timing (Crank Ref Angle) should equal the value in the table.

Engine Type	Crank Ref Angle	Inductive Delay (μ seconds)
LT1	6°	24
V6 DIS	10°	24
Ford TFI	10°	24
GM HEI	6°	24
IPU	45-50°	32
LS1	350°	N/A



[Return to Crank Trigger Configuration](#)

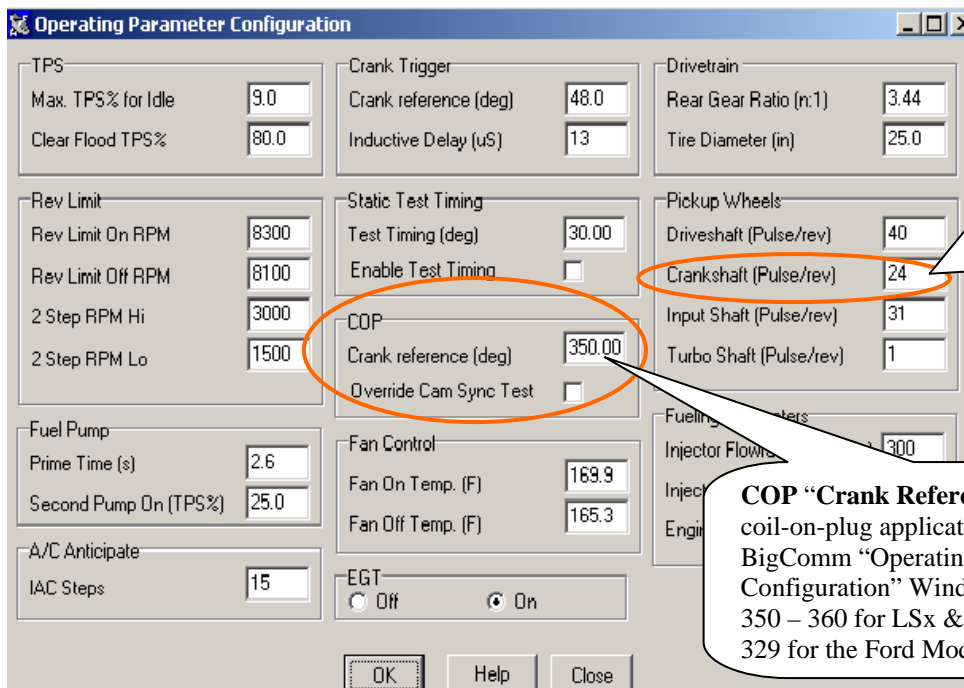
COP - Setting the “Crank Reference” for Coil-on-Plug Engines (not distributor based engines)

Crank Reference (deg)

A good “Crank Reference starting point value, by engine type is as follows:

- GM LSx and Chrysler Hemi engines: 350°.
- Ford Mod Motors: 329.

Start by inputting the Crank Reference starting point value from above into the COP “Crank Reference” cell (see screen print below). With the engine RPM above 2,500 RPM, use a timing light to confirm that the spark advance value displayed in the “Dash” window (see below) exactly matches the value shown on the crank dampener. If they do not match, change the value (move the number up or down) in the “Crank Reference” cell until the value in the “Dash” window exactly matches the crank value (on the dampener) you see with the timing light.



Crankshaft Pulses/rev for COP Engines

For the LS1 COP engine the value must be 24. For the LS2 and LS7 COP engines, the value must be 60. The Ford Mod Motor COP engine the value must be 36.

COP “Crank Reference” window (for coil-on-plug applications only) in the BigComm “Operating Parameter Configuration” Window. Start with 350 – 360 for LSx & Hemi engines and 329 for the Ford Mod Motor.

“Dash” Window

Press <Ctrl> <Enter> keys together to Update Window

Fuel Press = 0 psi	Gross Inj PW = 1.8mS	Act Drv Shaft = 5475 RPM	% Ethanol = 0.0%	Act L_AFR = 0.0:1	LO2 Corr = -100.0%
Vol Eff = 23.4%	AFT Corr = 0.0%	AIR Corr = 0.0%	CamCrk Adv = 11.0 deg	Inj %Duty Cycle = 3%	Boost = -4.5psig
Air Temp = 77.2F	Scaled Load = 0x28	MAP = 70.1kPa	RPM = 1900	Des IAC = 27.0	Spk Adv = 36.0 deg
	Scaled RPM = 0x23	UEGOR = 86.0	TPS = 15.5%	CLT Corr = 0.0%	O2 Corr = 0.0%
				Coolant = 231.1F	Vbat = 13.3V

Dash

Static Test Timing (This feature is not functional with all released firmware)

The “Static Test Timing” feature allows for a quick way to lock the entire spark map to a fixed value. This feature eliminates the need to enter a fixed spark value into all the cells in the spark map when setting the “Crank Reference” value. A “Test Timing” value of 40° is recommended. The enable check box, directly below the calibration value, must be checked to invoke this feature. Once enabled, the user can adjust the “Crank Reference” value up or down to ensure that the “Dash” spark advance value (Spk_Adv in the Dash) equals 40° at the crankshaft (on the dampener).

Note: The Static Test must be run with the engine RPM at 2,500 or above.

This feature can also be enabled as a quick way to verify the rotor phase (using a timing light through a hole in the distributor cap) at peak horsepower timing. Enter the timing value for peak horsepower instead of the suggested 40°.

Note: Do not forget to uncheck the Static Test Timing box once the test is complete, although the “Test Timing” value becomes invalid once the TPS exceeds the Clear Flood TPS for safety reasons (in case you forget to disable it), and during cranking.

For more detailed information on how to use this feature, and how to set the “Crank Reference” go to the BigStuff3 website under the How To/Help section via this link:

<http://bigstuff3.com/pdf/Ignition%20Guide%20rev%201.2.pdf>. [Return to Static Test Timing](#)

Fan Control

This input screen allows the user to determine at what coolant temperature the GEN3 ECU will turn the engine-cooling fan(s) on (Fan On Temp) and off (Fan Off Temp). The Fan Off temperature should be ~ 5° to 10° less then the Fan On temperature. The fan must be wired into the GEN3 system using a relay. See the section above titled [Fan](#) for specific detail on how to accomplish this.

[Return to Fan Control Setup](#)



Fuel Pump

The Fuel Pump Configuration section has two input cells. Both input cells assume that the GEN3 ECU will control one or two fuel pumps.

If a mechanical pump is being used, or if the fuel pump(s) will be controlled via an independent switch, no inputs are need in this section.

Assuming the GEN3 will control the fuel pump(s), the first input is the fuel pump “Prime Time” (in seconds), allowing the user to set the amount of time the fuel pump will run when the ignition is turned to the “On” position. This allows the user time to prime the fuel pump and check for leaks before the engine is started. A time period of up to 25 seconds can be inputted into this screen. See the section above titled [Fuel Pump](#) for additional information.

The second input, “Second Pump On (TPS%)” is only needed if the GEN3 ECU is being used to turn on a second fuel pump, **as a function of throttle position (TPS)**. See the section above titled [Fuel Pump](#) for additional information. [Return to Fuel Pump Setup](#)

Drivetrain

The vehicle final drive ratio and tire diameter inputs are required to enable the ECU to make the correct Mile-Per-Hour (MPH) calculations. [Return to Drivetrain Setup](#)

Pickup Wheels

This section allows the user to configure the pulses per rev input for the following pickup wheels:

- **Driveshaft (Pulse/rev) – Assumes GEN3 system is equipped with the DAE, SR2 or ETM options.**

Input options – 1, 2, 4 or 40 pulses per rev. For the SR2 and ETM systems, using a 4 magnet pinion collar, use 4 pulses per rev. For the optional GM transmission control system use 40 pulses per rev.

- **Crankshaft (Pulse/rev)**

Input options:

- 2 pulses per rev – 4 cylinder engine. Assumes either a two (2) magnet crank trigger wheel or four (4) reluctor distributor.
- 3 pulses per rev – 6 cylinder engine. Assumes either a two (3) magnet crank trigger wheel or four (6) reluctor distributor.
- 4 pulses per rev – 8 cylinder engine. Assumes either a two (4) magnet crank trigger wheel or four (8) reluctor distributor.
- 24 pulses per rev – 8 cylinder GM LS1 and HEMI COP engines.
- 36 (36-1 crank wheel) pulses per rev – 8 cylinder Ford Modular Motor COP engine.
- 60 (60 -2 crank wheel) pulses per rev – 8 cylinder GM LS1 engine.

For more information on ignition system setups, go to the BigStuff3 website, and then Ignition System Setup Tutorial. The link is: <http://bigstuff3.com/pdf/Ignition%20Guide%20rev%201.2.pdf>.



- **Input Shaft (Pulse/rev) – Assumes GEN3 system is equipped with the DAE option.**
Input options – 1, 2, 4 or 31 pulses per rev. No input required unless the GEN3 system is equipped with the DAE option. Call BigStuff3 for more details.
- **Turbo Shaft (Pulse/rev) - Assumes GEN3 system is equipped with the DAE option.**
Input options – 1 pulse per rev – The turbo must have a tooth provisioned into the turbine shaft for this to work. [Return to Pickup Wheels](#)

19. Dwell Time Table – for coil-on-plug systems only

The dwell time affects the amount of primary current in the ignition coil. The longer the coil dwell the more primary current available for a spark event. GM coils are current limited to a max of 7 Amps. GM coils (approx 98mj of spark energy) reach their current limit in approximately 6 ms of dwell time. BigStuff3 also offers optional “Hot” coils (103 mj of spark energy). BigStuff’s GEN3 ECU allows for coil saturation at high RPM, where maximum spark energy is required, but also allows the coils to run at lower dwell times (ms), at lower RPM, to avoid overheating the coils. Directional coil dwell times to use are as follows:

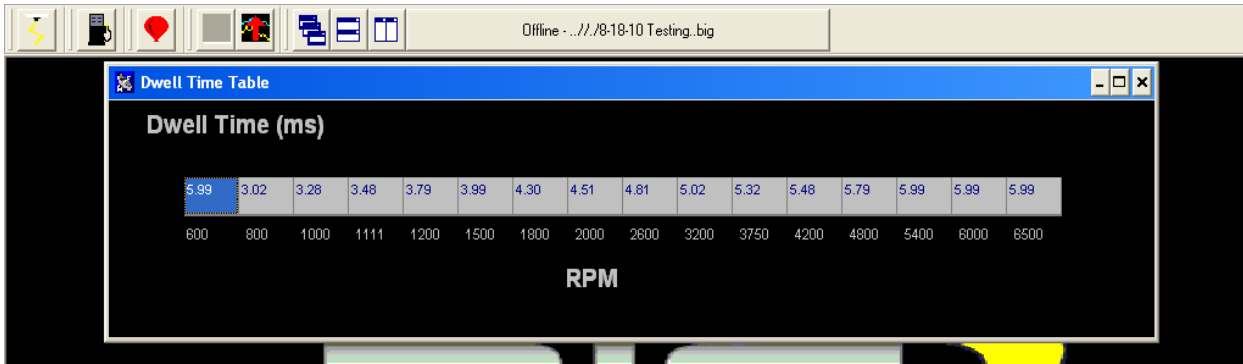
- LS1 coils with a 12V charging system.
 - From idle to approximately 4,000 RPM, use about 3.0 milliseconds near idle and no more than about 4.0 milliseconds at approximately 4,000 RPM.
 - From approximately 4,100 - Max RPM, use no more than about 6 milliseconds of total dwell time at max RPM.
- LS1 coils with a 16V charging system.
 - From idle to approximately 4,000 RPM, use about 2.0 milliseconds near idle and no more than about 3.0 milliseconds at approximately 4,000 RPM.
 - From approximately 4,100 - Max RPM, use no more than about 4.0 milliseconds of total dwell time at max RPM.

The 1 x 16 table allows coil dwell-time to be set as a function of engine RPM.

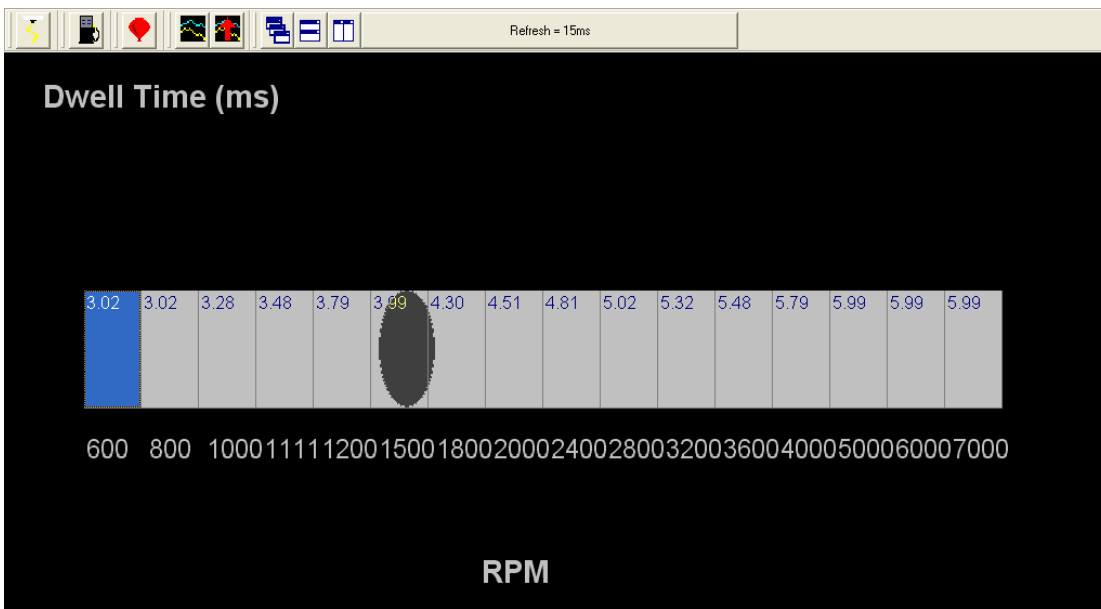
Note: The RPM values, at the bottom of the dwell-time input table, are established when the Load vs. RPM Axis table is configured.



An example of a default table, supplied with the system, is shown below.

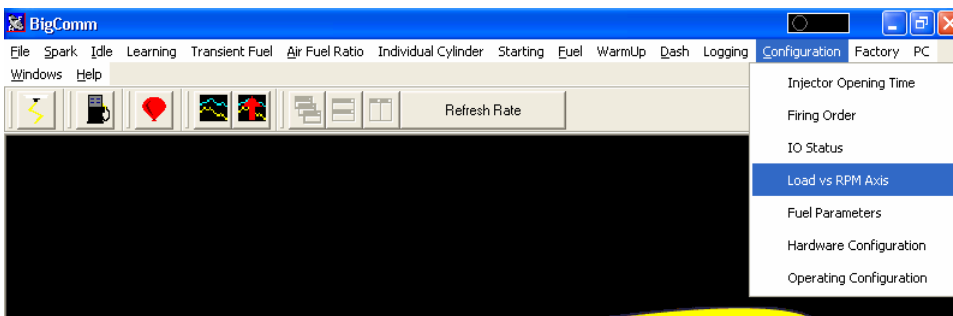


This is the same table as is shown above with the window maximized.



20. Load vs. RPM

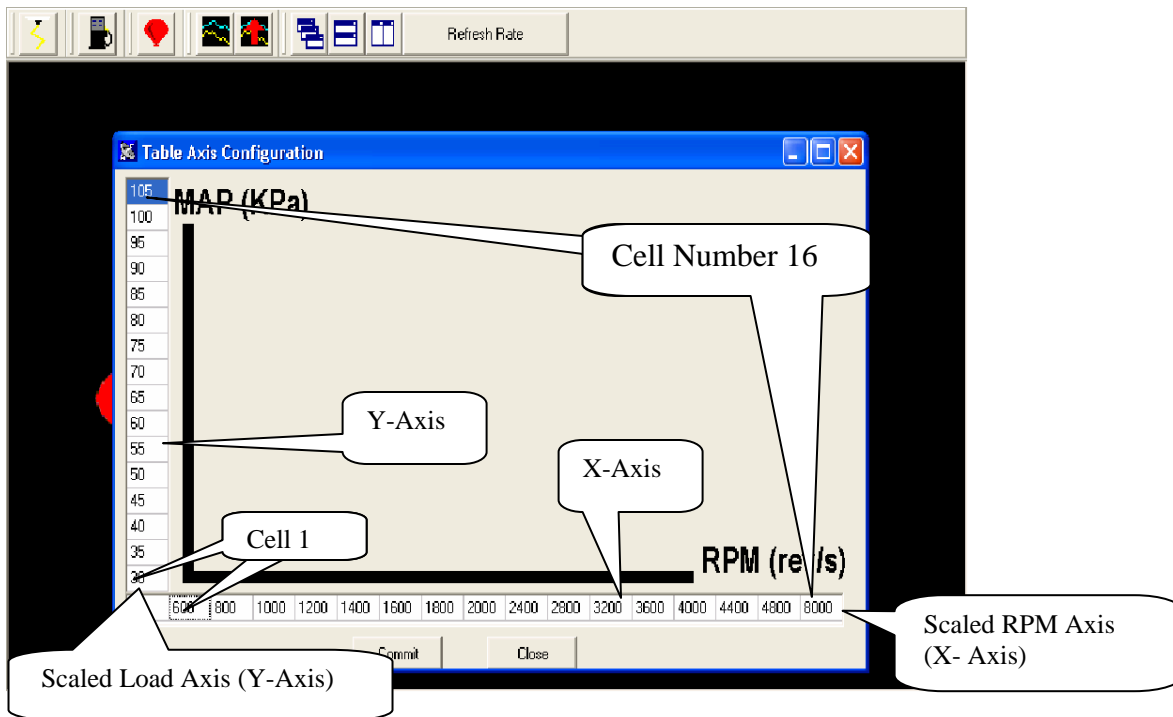
The BigStuff3 GEN3 SEFI system offers configurable Load & RPM axes!



This feature allows the user to configure the X axis (RPM) and Y Axis (Load), so that a majority of the available 16 cell by 16 cell fuel and spark map area is available for calibrating. Systems with fixed X & Y axes allow only a small portion of the available map area to be used to calibrate the fuel and spark needs of the engine.

This capability is extremely important if the engine is fuel or spark sensitive at a given load and/or RPM. For example, if the engine/transmission/rear gear combination makes the engine sensitive to throttle changes at 2,200 rpm, the user can configure the X-axis in 200 or 300-RPM increments at or around 2,200 RPM.

If the “Speed Density” control algorithm was selected during the aforementioned Hardware Configuration step, the screen should show MAP (kPa) in the Y axis and RPM in the X axes. If the screen shows TPS % and the preferred control algorithm is “Speed Density,” go back to [Main Configuration](#) and select Seed Density instead of Alpha N.



“Scaled” RPM inputs from this table define the RPM break points used in the following tables, to name a few, which are described later in this manual!!!

- Dwell Time Table
- Injector Phase Angle (degree) Table
- Boost Spark (retard) Table
- Starting Line Timing Table

The following table offers default **Load** schedules for 1, 2, 3, & 5 BAR MAP sensor applications.

MAP (KPa) (Y Axis) Cell Number	Load Schedule for 1 BAR MAP Sensor (Normally Aspirated Engine)	Load Schedule for 2 BAR MAP Sensor (Up to 15 PSI of Boost)	Load Schedule for 3 BAR MAP Sensor (Up to 30 PSI of Boost)	Load Schedule for 5 BAR MAP Sensor (Over 30 PSI of Boost)
16	106	205	300	500
15	100	195	275	450
14	95	180	250	400
13	90	165	225	350
12	85	150	200	300
11	80	135	175	25
10	75	125	150	200
9	70	115	125	175
8	65	105	110	150
7	60	95	100	125
6	55	85	90	100
5	50	75	80	90
4	45	65	70	80
3	40	55	60	70
2	35	45	50	60
1	30	35	40	50

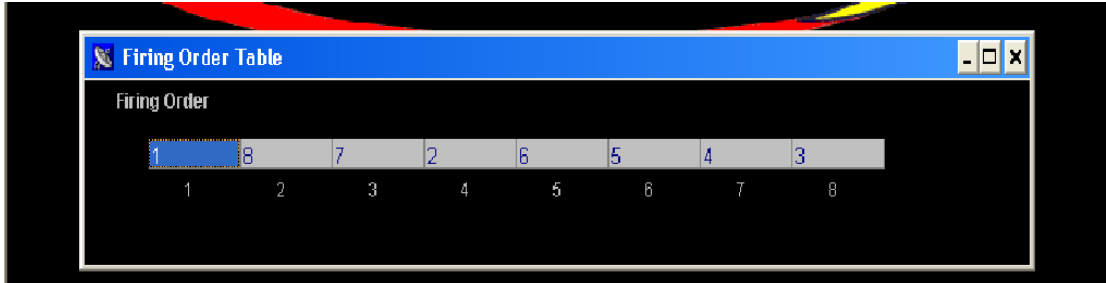
The following table offers default **RPM** Schedules for several engine configurations.

RPM (Y Axis) Cell Number	RPM Schedule for a Stock (Torque) Engine	RPM Schedule for a Mild Street Engine (6,500 Max RPM)	RPM Schedule for a High RPM Racing Engine (9,500 Max RPM)
16	5,200	6,000	9,500
15	4,800	5,500	9,000
14	4,400	5,000	8,500
13	4,000	4,500	8,000
12	3,600	4,000	7,500
11	3,200	3,600	7,000
10	2,800	3,200	6,500
9	2,400	2,800	6,000
8	2,000	2,400	5,000
7	1,800	2,100	4,000
6	1,600	1,800	3,500
5	1,400	1,500	3,000
4	1,200	1,200	2,500
3	1,000	1,000	2,000
2	800	800	1,500
1	600	600	1,000



21. Firing Order

Once the Load and RPM axes have been configured, go back to the **Configuration** on the Tool Bar. Left click on the “**Configuration**” and the drop down screen will open. Keep the left mouse button depressed and slide the mouse pointer down until “**Firing Order**” is highlighted. Release the left mouse button. The screen below will open.

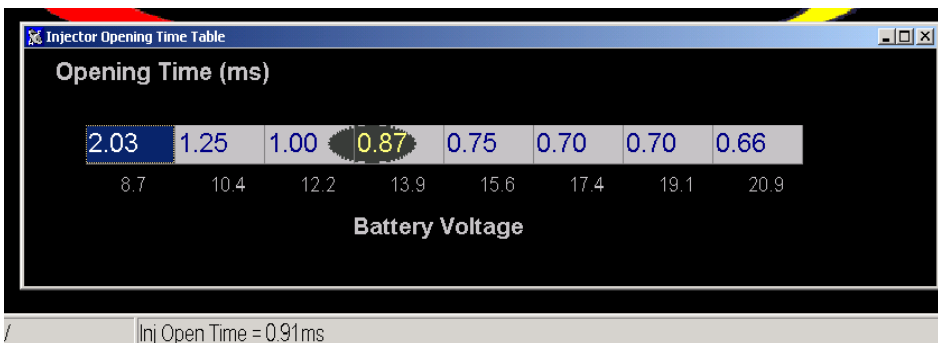


Setting the Firing Order

To set the firing order, simply work from left to right and input the firing order of the engine the system is installed on. The LS1 firing order (1-8-7-2-6-5-4-3) is shown in the example above. There are specific injector wire harnesses for Chevy (Chrysler), Ford and Buick V6 engines. Make sure you have correct injector wire harness type for your engine. For More information on injector wire harness pin outs go to [Injector Harness](#)

22. Injector Opening Time

Next, go back to **Configuration** on the Tool Bar. Left click on the “**Configuration**” and the drop down screen will open. Keep the left mouse button depressed and slide the mouse pointer down until “**Injector Opening Time**” is highlighted. Release the left mouse button. The screen below will open.



The purpose of this table is to allow the user to configure the ECU to maintain a constant injector flow rate with varying battery voltages.

Fuel injectors have a minimum pulse width (in milliseconds) required before they will open and let fuel flow. For example, with a constant battery voltage of 13.4V, a 60 lb/hr. Bosch injector is not likely to open until the ECU sends a pulse width command of 1.4 to 1.5 milliseconds (injector opening time is also influenced by fuel pressure).

At a given voltage, the minimum pulse width required to open an injector will vary based on injector size, injector type and manufacturer. This input screen allows the user the ability to fine tune flow rates (injector opening time) based on battery voltage.

23. Injector Phase Angle

Injector Phase Angle setting allows the ECU to “time” the fuel delivery relative to the intake valve opening!

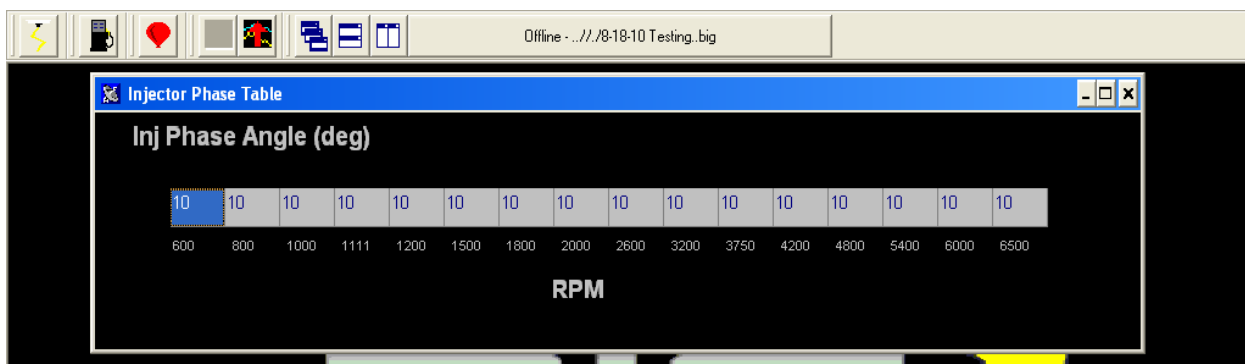
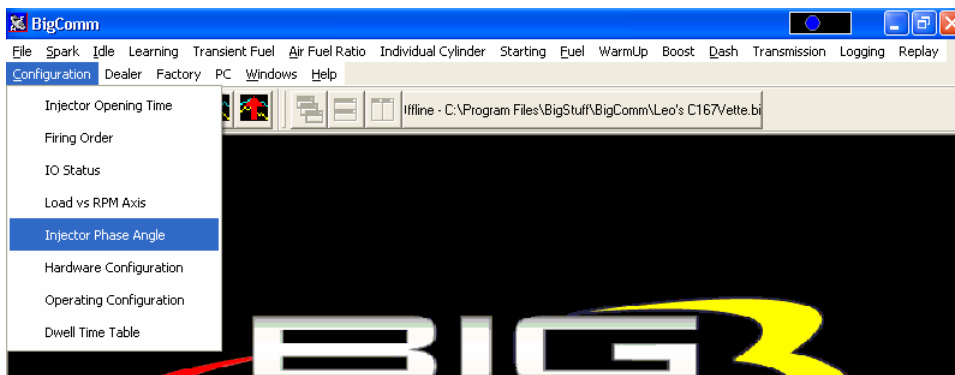
Note: The main wire harness cam connector (cam sync) must be hooked up for the injector Phase Angle and Individual cylinder spark control functions to work.

To calculate the actual Start of Injection (SOI), use the following formula:

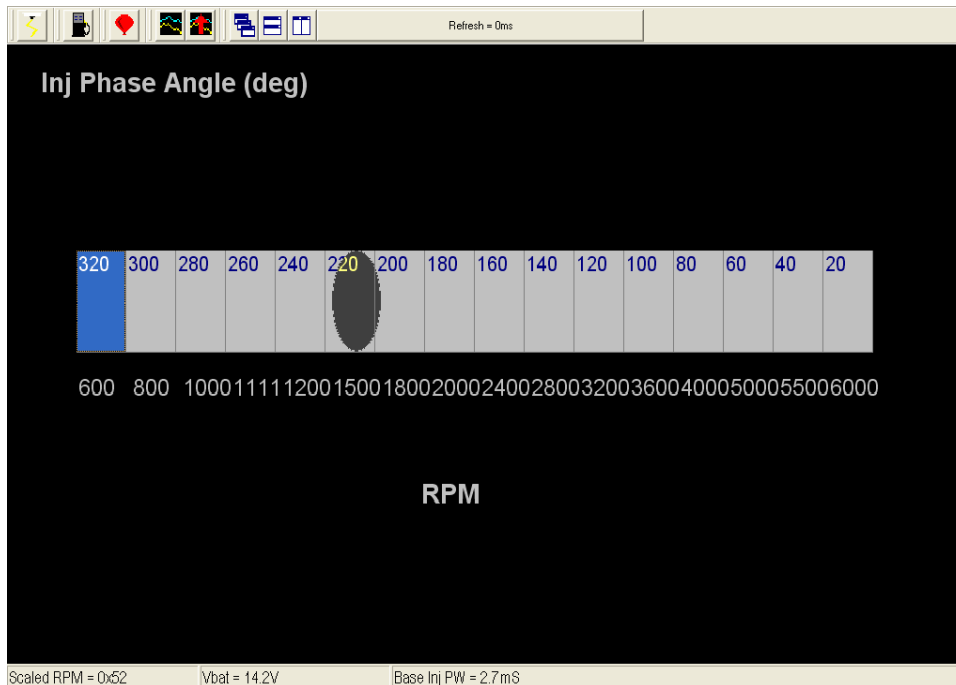
$SOI = \text{Injector Phase Table Value (from Injector Phase Table below)} - \text{Crank Reference Value (Crank Trigger Configuration)}$ = Injection Point (point where injector will begin introducing fuel).

The major benefit of this feature is realized when using high flow injectors with a smaller duty cycle.

Note: The RPM values, at the bottom of the table, are from the Load vs. RPM Axis drop down accessible from the Configuration tab from the Main Menu screen.



Same screen print as is shown above with window maximized.



You have now reached a milestone! The following necessary tasks have been completed:

- The BigComm software has been installed
- Communication with the ECU has been established.
- The hardware and operating parameters have been configured.

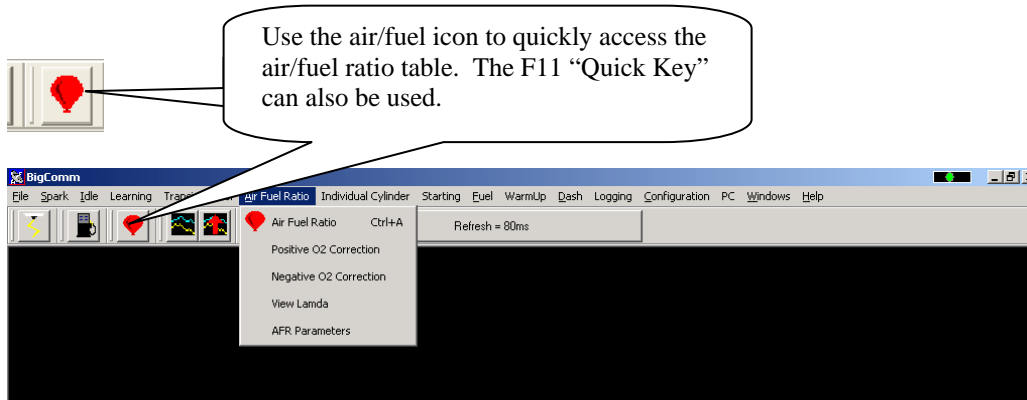
The following sections of the manual will outline how to use the Air/Fuel Ratio table, O2 Correction tables and the Fuel Table. Calibrating the engine for steady state operation is an iterative process using these tables.

The fuel calibration process, in order of importance, is as follows:

- The air/fuel ratio table must be configured to desired ratios for the different engine speed and load combinations.
- The positive and negative O2 correction tables must be configured.
- The volumetric efficiency (VE) values in the Fuel Table must be calibrated.

Once these tables are configured as a baseline, the [Calibrating with the Trace Function](#) (a great feature) can be used to fine-tune the interrelationships of the aforementioned tables. The “Trace” function allows the engine to be quickly calibrated “On-line” (ECU powered up) or “Off-Line” (PC only). The Trace Function will be explained later in this manual.

24. AIR FUEL RATIO (F11 – (“Quick Key”))



25. Air Fuel Ratio Table

Note: In some cases, the ECU shipped with your system will come pre-configured with a table, which will closely match your engine configuration. The air fuel ratio table below allows the user to input desired air/fuel ratios for sixteen (16) engine **speed** (RPM) and 8 **load** (MAP or TPS) combinations. The X-axis represents engine RPM and allows for 16 inputs and the Y-axis represents engine load and allows for 8 inputs. For each speed and load combination (cell) the engine operates within, the ECU uses the WBO2 sensor feedback to achieve the desired air/fuel ratio for that cell.

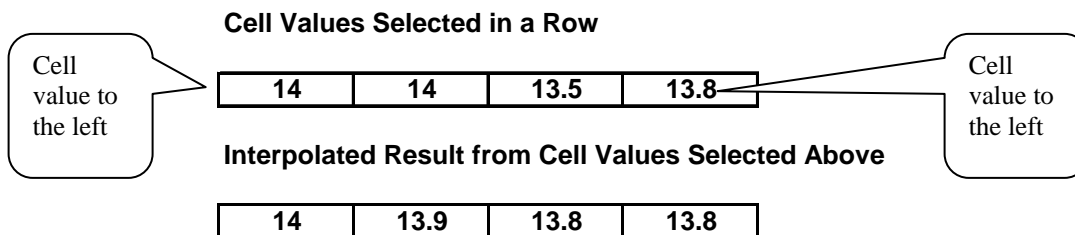
While the engine is running, a “real-time Ellipse” will move throughout the Air Fuel Ratio table relative to the current RPM & Load “operating point”. Use it as a point of reference to help calibrate the Air Fuel Ratio table.

To change a cell value in the Air Fuel Ratio table, move the cursor using the PC’s mouse or the arrow keys to the cell to be changed. Click on the cell and type a desired Air Fuel Ratio value (from 10.5 to 15.0) and hit “**Enter**” to save the change.

To make changes to multiple cells simultaneously, left mouse click and drag the cursor (down and to the right) across the cell range to be changed. Release the left mouse button and a secondary drop down screen will appear outlining three potential “cell fill” options



- **Fill** – Choosing “Fill” will open a secondary drop down- screen which allows the selected cells to be changed to the value inputted into the window.
- **Multiply** – Choosing “Multiply” will open a secondary drop down-screen which allows the values of the selected cells to be changed by the ” Multiply” value inputted into the window. For example, if the values in the cells selected are 13 and the inputted “Multiply” value was 80, the new cell values would be 10.4.
- **Interpolate** – If a series of cells in the same row are selected and the “Interpolate” “cell-fill” option is selected the ECU will use the value in the cell all the way to the left and the cell value all the way to the right and interpolate the numbers in between so that the values are linear.



If a series of cells in the same column are selected and the “Interpolate” option is selected the ECU will use the value in the cell all the way at the bottom and the cell value all the way at the top and interpolate the numbers in between so that the values are linear.

Cell Values Selected in a Column

13
13
14
13.9

Interpolated Result from Cell Values Selected Above

13
13.3
13.6
13.9

If a range of cells (multiple rows and columns) are selected and the “Interpolate” “cell-fill” option is selected the ECU will use the value in the cells at the bottom left and top left corners, bottom left and bottom right corners and the bottom left and top right corners of the entire range and interpolate the numbers in between so that the values are linear.

Range of Cell Values Selected

13	13	13	13
13.8	13.8	13.8	13.8
14.1	14.1	14	14
14	14.2	14.2	14

Interpolated Result from Range of Cell Values Selected Above

▲ 13	13	13	13 ►
13.3	13.3	13.3	13.3
13.6	13.6	13.6	13.6
14	14	14	14 ►

- **Cancel** – Hit cancel to disregard making any changes.

Example Air Fuel Ratio Tables

Example air fuel ratio tables, for a normally aspirated street engine, a super charged engine and a turbocharged engine, are shown below. The air/fuel ratio values in these cells can be used as base lines for each of the engine configurations. The “Example Maps” below are segmented into engine operating areas (Cruise, Idle, Wide Open Throttle, etc.) to help the user understand what part of the map is “active” under different driving conditions (engine speed and load combinations).

Normally Aspirated Street Engine

LOAD	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1
	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
	14.5	14.5	14.5	14.6	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	14.5	14.5	14.5	14.6	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	14.5	14.5	14.5	14.6	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	14.5	14.5	14.5	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	600	800	1,000	1,100	1,200	1,500	1,800	2,400	2,800	3,000	3,500	4,000	4,500	5,200	5,500	6,000
	RPM															

Super Charged Engine (15 PSI)

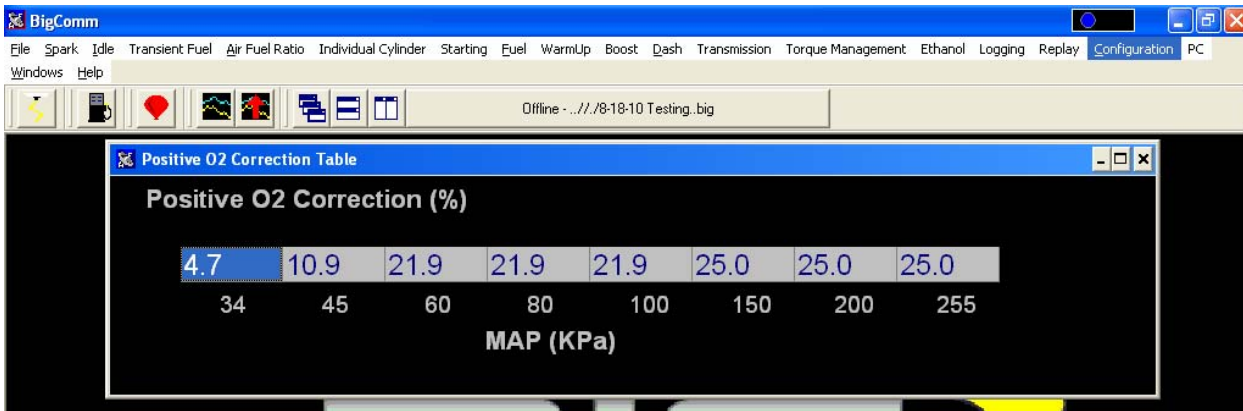
LOAD	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	14.6	14.6	14.6	14.6	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	600	800	1,000	1,150	1,200	1,500	1,800	2,000	2,400	2,800	3,200	3,600	4,000	5,000	6,000	7,000
	RPM															



Turbocharged Engine (30 PSI)

LOAD	13.1	13.1	13.1	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	13.5	13.5	13.5	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.75
	14	14	14	12	12	12	12	12	12	12	12	12	12	12	12	12
	14.5	14.5	14.5	12.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
	14.5	14.5	14.5	13	13	13	13	13	13	13	13	13	13	13	13	13
	14.5	14.5	14.5	14.6	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	14.5	14.5	14.5	14.6	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	14.5	14.5	14.5	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
	600	800	1,000	1,150	1,200	1,500	1,800	2,000	2,400	2,800	3,200	3,600	4,000	5,000	6,000	7,000
	RPM															

26. Positive O2 Correction



The air fuel ratio table above allows the user to specify desired air/fuel ratios for 128 speed & load combinations. The positive and negative O2 correction tables below allow the user to specify how much fuel the O2 Correction will be allowed to add or subtract to achieve the user defined air/fuel ratio.

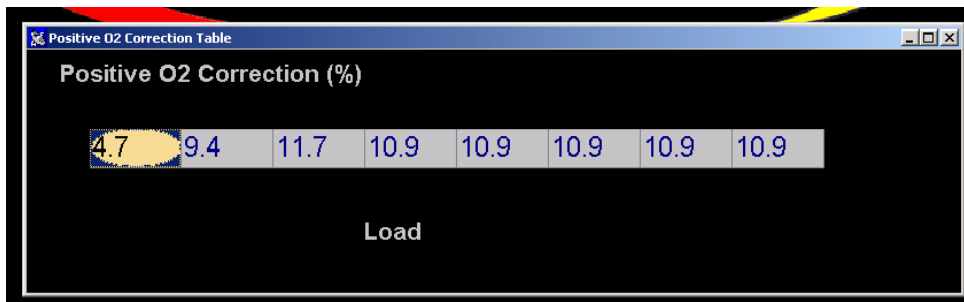
The positive and negative O2 Correction tables limit the amount added or subtracted.

The eight (8) horizontal input cells in the tables below correspond to the eight (8) vertical “Load” rows in the Air/Fuel Ratio Table. The input values in the tables below add or subtract fuel, as a percentage, for each cell in the entire engine “Load” row. The cell all the way to the left corresponds to the bottom row in the air/fuel ratio table and the cell all the way to the right corresponds to the top row of the air/fuel ratio table.

The user input values in the Positive O2 Correction table need to be positive numbers and the input values for the Negative O2 Correction table need to be negative numbers as shown in each table.

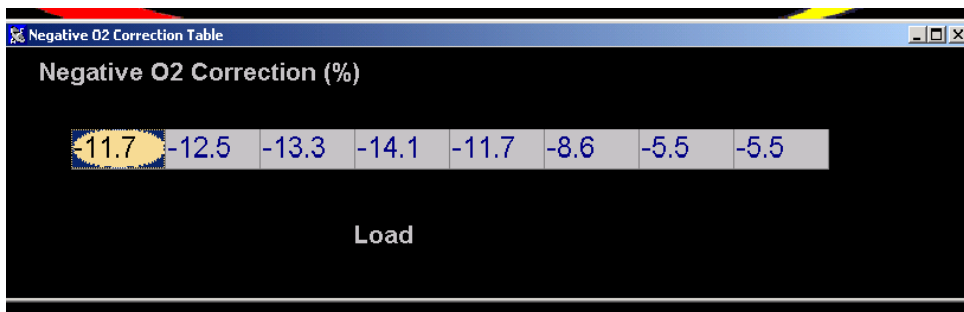
To make changes to the values in these tables, use the left or right arrow keys to move the cursor to the cell to be changed. Input the desired value and hit “Enter”.





27. Negative O2 Correction

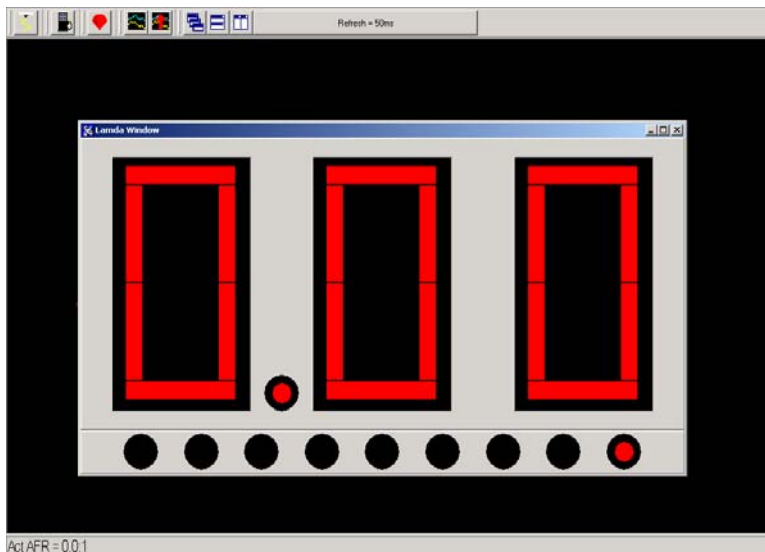
This table is configured and operates in the same way as the table above. The difference being that this table limits the amount of Negative O2 Correction.



28. View Lambda (F2 – “Quick Key”)

The View Lambda allows the user to view the current Lambda status in a large LED-like format.

The window can be expanded or contracted by locating the mouse cursor at the edge of the window. The cursor will change shape from an arrow with one (1) point, two an arrow with points on both ends. When the cursor is in the two-point mode, hold the left mouse button down and pull the edge of the window in or out to expand or contract the window.



29. AFR Parameters (F11 – “Quick Key”)

The **Air/Fuel Ratio (AFR) Parameters** table allows the user to configure control parameters associated with closed loop fuel control, using the WBO2 sensor.

The following paragraphs will describe the function of each control parameter.

RPM On & RPM Off Inputs

- RPM On – Defines the RPM the engine needs to exceed before the ECU will allow the system to go into closed loop fuel control using the O2 sensor.
- RPM Off – Defines the RPM the engine needs to fall below before the ECU will not allow the system to operate in closed loop fuel control. The RPM Off value needs to be at least 100 RPM less than the RPM On value.

Max Step and Gain (for the Oxygen Sensor) Inputs

- Maximum Step – Defines the aggressiveness (number of steps) of the O2 sensor when it updates the O2 correction factor. The step sizes can go from 1% to 12%. For example, if the O2 sensor needs to make a 15% correction and the Step Gain is set at one (1) the O2 correction loop will go through 15 iterative steps to close the O2 correction gap. If the Step Gain is set to 12, the sensor will go through only a few steps to close the O2 correction gap.
- Gain % - Gain can range from 1% to 50%. The gain function subtracts the desired air fuel ratio from the actual air fuel ratio then multiplies the difference by the user defined gain % and affects the closed loop response.

Hot & Cold Delay Inputs –

- Hot Delay - This input (in seconds) is the time the ECU waits before allowing the system to go into closed loop fuel control when the engine coolant is above 60°F.
- Cold Delay - This input (in seconds) is the time the ECU waits before allowing the system to go into closed loop fuel control when the engine is below 60°F.

The Minimum Coolant Temperature threshold described below also affects the Hot and Cold Delay parameters.

Minimum Coolant Temperature

The minimum coolant temperature input is the temperature threshold the engine coolant needs to exceed before the ECU will let the system go into closed loop control.

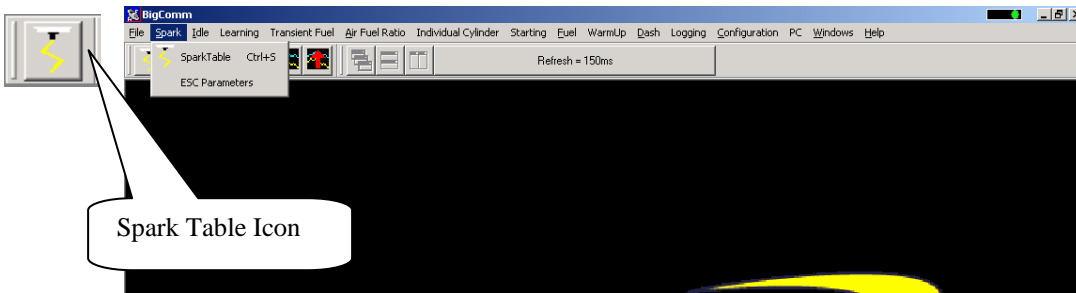
To make changes to the values in these tables, use the left or right arrow keys to move the cursor to the cell to be changed. Input the desired value and click on “OK” at the bottom of the table.



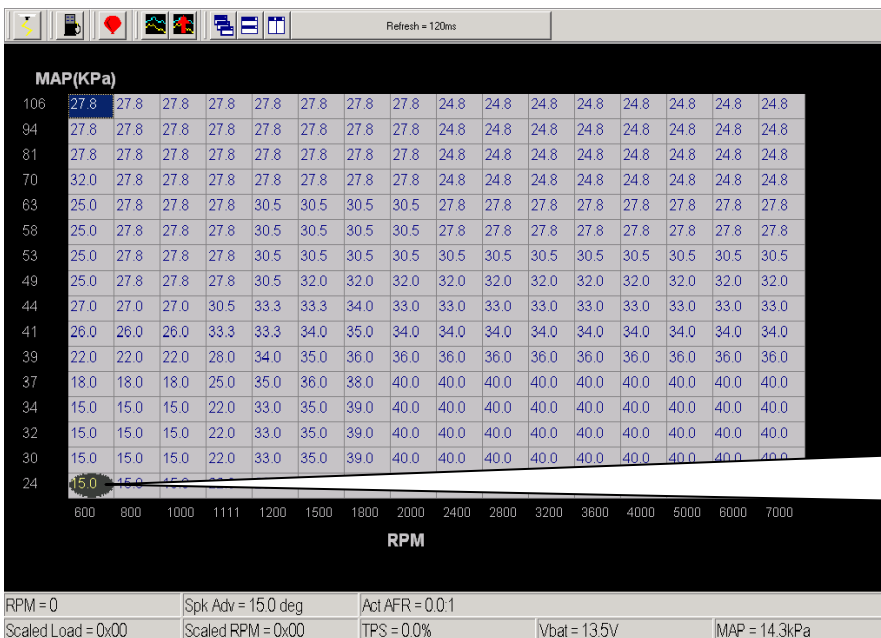


30. SPARK (F4 – “Quick Key”)

There are several ways to access the base **Spark** table. The quickest methods are to hit the F4 “Quick Key” or left mouse click on the **Spark** Table icon, accessible from the main BigComm Screen. The Main Tool Bar can also be used to access the **Spark** table. From the Main BigComm software screen tool bar left click on **Spark** and the drop down screen will open.



31. Spark Table



The ellipse will move throughout the Spark table relative to the current RPM & Load “operating point”

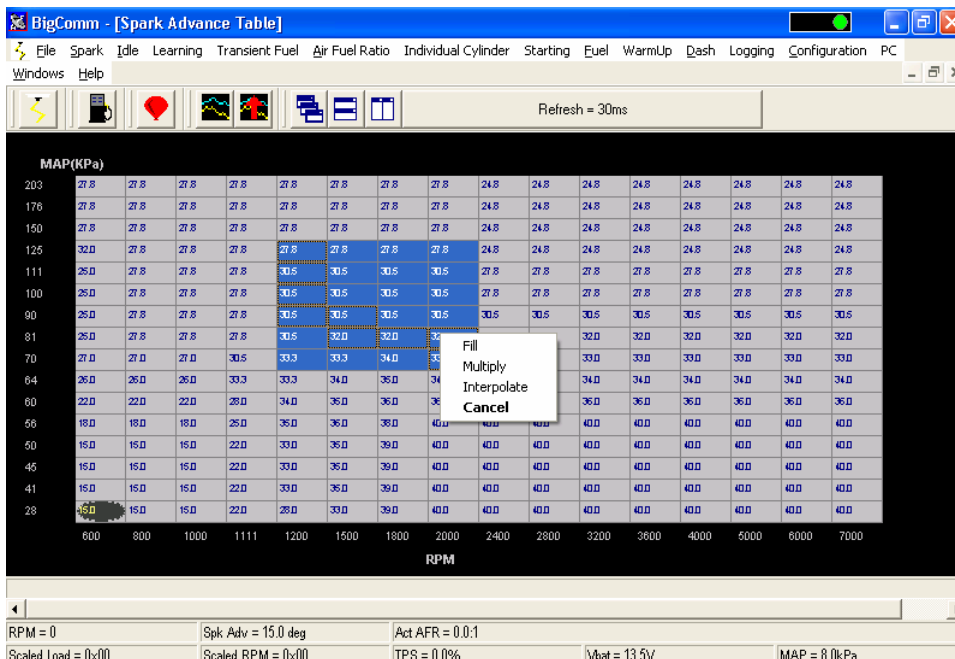


The **Spark** table uses actual timing values in each of the 256 cells in the table. The Spark table allows the user to input Spark values for sixteen- (16) engine speed (RPM) and sixteen (16) load (MAP or TPS) combinations. The X-axis represents engine RPM and allows for 16 inputs and the Y-axis represents engine load and allows for sixteen (16) inputs as well. The X and Y-axes are configurable. For information on how to configure the X and Y-axes see [Load vs RPM](#)

While the engine is running, a “real-time Ellipse” will move throughout the Spark table relative to the current RPM & Load “operating point”. Use it as a point of reference to help calibrate the Spark table.

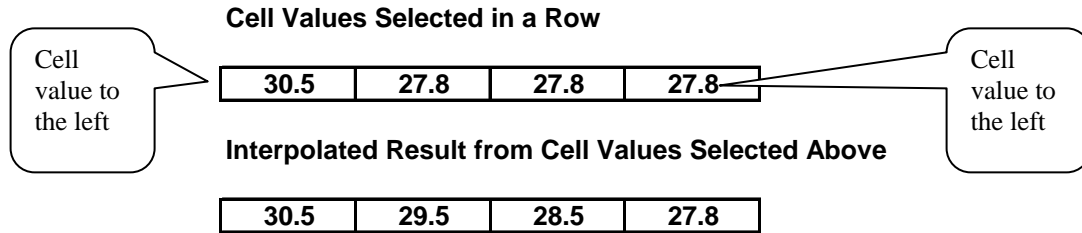
To change a cell value in the Spark table, move the cursor using the PC’s mouse or the arrow keys to the cell to be changed. Click on the cell and type a desired Spark value (from to 15.0 to 63.8) and hit **“Enter”** to save the change.

To make changes to multiple cells simultaneously, left mouse click and drag the cursor across the cell range to be changed. Release the left mouse button and a secondary drop down screen will appear outlining three potential “cell fill” options.



- **Fill** – Choosing “Fill” will open a secondary drop down- screen which allows the selected cells to be changed to the value inputted into the window.
- **Multiply** – Choosing “Multiply” will open a secondary drop down-screen which allows the values of the selected cells to be changed by the ” Multiply” value inputted into the window. For example, if the values in the cells selected are 13 and the inputted “Multiply” value was 80, the new cell values would be 10.4.
- **Interpolate** – If a series of cells in the same row are selected and the “Interpolate” “cell-fill” option is selected the ECU will use the value in the cell all the way to the left and the cell value all the way to the right and interpolate the numbers in between so that the values are linear.





If a series of cells in the same column are selected and the “Interpolate” “cell-fill” option is selected the ECU will use the value in the cell all the way at the bottom and the cell value all the way at the top and interpolate the numbers in between so that the values are linear.

Cell Values Selected in a Column

27.8
30.5
32
33

Interpolated Result from Cell Values Selected Above

27.8
29.5
31.3
33

If a range of cells (multiple rows and columns) are selected and the “Interpolate” “cell-fill” option is selected the ECU will use the value in the cells at the bottom left and top left corners, bottom left and bottom right corners and the bottom left and top right corners of the entire range and interpolate the numbers in between so that the values are linear.

Range of Cell Values Selected

27	30.5	33.3	33.3
26	33.3	33.3	34
22	28	34	35
18	25	35	36
15	22	33	35

Interpolated Result from Range of Cell Values Selected Above

▲ 27	29	31	33.3
24	27	30.3	33.5
21	25.3	29.8	34
18	23.5	29	34.5
15	21.5	28.3	35 ▶

- **Cancel** – Hit cancel to disregard making any changes.

The illustration below shows the areas of the Spark map that the ECU accesses under different driving conditions.



Cell Changes using the “Page Up” & “Page Down” Keys (Fuel and Spark Tables)

Multiple cell values can also be changed simultaneously using the “Page Up” and “Page Down” keys. This approach offers a quick alternative to using the mouse. Use the keyboard arrow keys (up/down/left/right) to maneuver to area of the map where the desired cell changes will be made. Next, depress and hold the keyboard “Shift” key. Now, use the arrow keys, to maneuver through the cells to be changed. As the cells are being selected they will become highlighted. Once the desired cell range has been highlighted, release the “Shift” key. Depress the “Page Up” key to increase the cell values and the “Page Down” key to decrease the cell values. The cell values will increase or decrease by a value of one (1) for every keystroke. To exit this mode, depress any one of the arrow keys.

MAP (Kpa) - Engine Load

203	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8
176	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	21.8	21.8	24.8	24.8	24.8	24.8	24.8
150	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	21.8	24.8	24.8	24.8	24.8	24.8	24.8
125	32	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8
111	27.8	27.8	27.8	30.5	30.5	30.5	30.5	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8
100	27.8	27.8	27.8	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5
90	25	27.8	27.8	27.8	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5
81	25	27.8	27.8	27.8	30.5	32	32	32	32	32	32	32	32	32	32	32
70	25	27	27	30.5	33.3	33.3	34	33	33	33	33	33	33	33	33	33
64	27	26	26	33.3	33.3	34	35	34	34	34	34	34	34	34	34	34
60	26	27	28	34	35	36	36	36	36	36	36	36	36	36	36	36
56	22	25	25	35	36	38	40	40	40	40	40	40	40	40	40	40
50	18	15	15	22	33	35	39	40	40	40	40	40	40	40	40	40
45	15	15	15	22	33	35	39	40	40	40	40	40	40	40	40	40
41	15	15	15	22	33	35	39	40	40	40	40	40	40	40	40	40
28	15	15	15	22	28	28	28	28	28	40	40	40	40	40	40	40
	600	800	1,000	1,150	1,200	1,500	1,800	2,000	2,400	2,800	3,200	3,600	4,000	5,000	6,000	7,000

Seldom Used

Wide Open Throttle

Acceleration

Cruise

Idle

Deceleration

Seldom Used

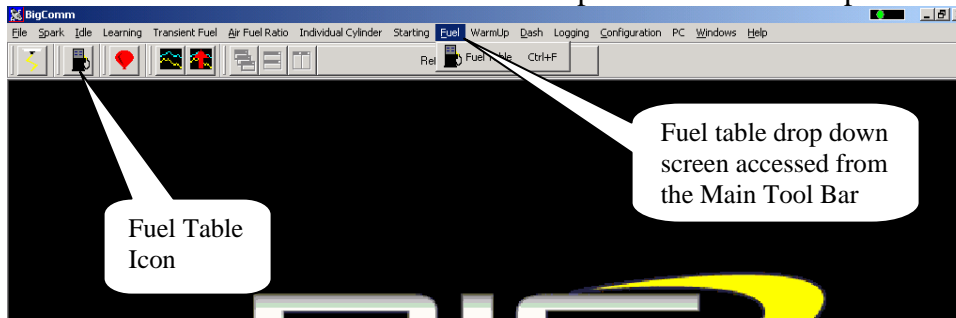
The **BigComm** software allows the user to configure the **Load** (MAP) and RPM axes allowing for a larger number of cells (map area) to be used for the fuel and spark tables.

32. FUEL (F3 – “Quick Key”)

There are several ways to access the base **Fuel** table. The quickest methods are to hit the F3 key or left mouse click on the **Fuel** Table icon, accessible from the main BigComm Screen.

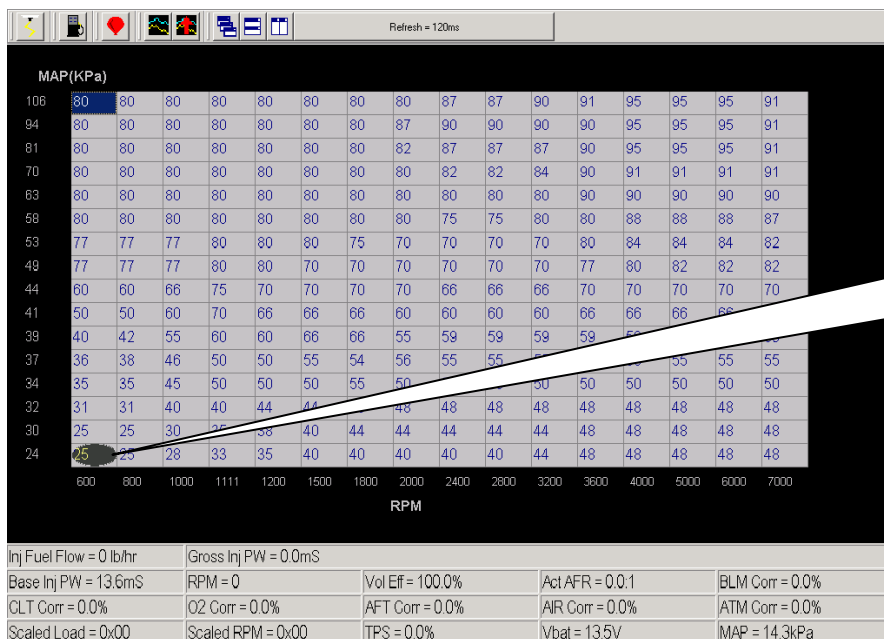


The Main Tool Bar can also be used to access the “Fuel” table. From the Main BigComm software screen tool bar left click on **Fuel** and the drop down screen will open.



Using the PC’s mouse, keep the left mouse button depressed and slide the mouse pointer down until “Fuel Table” is highlighted. Release the left mouse button. The screen below will open.

33. Fuel Table



Note: In some cases, the ECU shipped with your system will come pre-configured with a table that will closely match your engine configuration.

The **Fuel** table uses Volumetric Efficiency (VE) values in each of the 256 cells in the table. Volumetric Efficiency is the measure for how efficient the engine is operating at a given engine speed and load combination. The efficiency of the engine is nearly perfect, at a value of 100. Volumetric Efficiency (VE) is highest at peak torque.

Note: If the fuel map VE values, around peak torque, are above 125, there is a good chance the injector flow rates, inputted into the Operating Configuration/ Fueling Parameters table, are too low. The opposite can also be true. If the VE values near peak torque are below 80, there is a good chance the injector flow rates, inputted into the Operating Configuration/Fueling Parameters table, are too high.

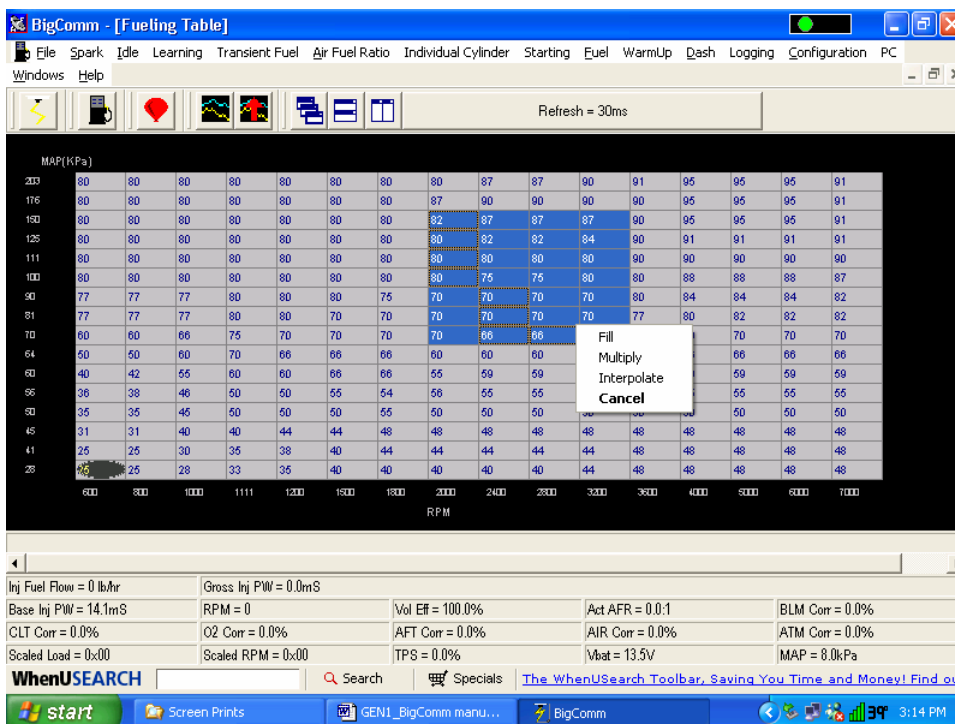


The Fuel table allows the user to input desired (VE) values for sixteen (16) engine speed (RPM) and sixteen (16) load (MAP or TPS) combinations. The X-axis represents engine RPM and allows for 16 inputs and the Y-axis represents engine load and allows for sixteen (16) inputs as well. The X and Y-axes are configurable. For information on how to configure the X and Y-axes see [Load vs RPM](#)

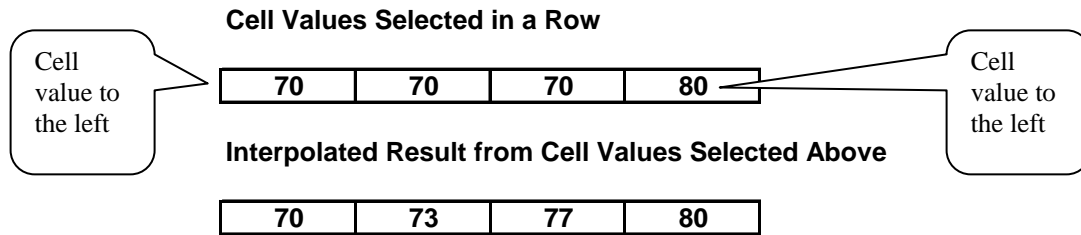
While the engine is running, a “real-time Ellipse” will move throughout the Fuel table relative to the current RPM & Load “operating point”. Use it as a point of reference to help calibrate the Fuel table.

To change a VE cell value in the Fuel table, move the cursor using the PC’s mouse or the arrow keys to the cell to be changed. Click on the cell and type a desired VE value (from 15.0 to 200) and hit “**Enter**” to save the change.

To make changes to multiple cells simultaneously, left mouse click and drag the cursor across the cell range to be changed. Release the left mouse button and a secondary drop down screen will appear outlining three potential “cell fill” options



- **Fill** – Choosing “Fill” will open a secondary drop down- screen which allows the selected cells to be changed to the value inputted into the window.
- **Multiply** – Choosing “Multiply” will open a secondary drop down-screen which allows the values of the selected cells to be changed by the ” Multiply” value inputted into the window. For example, if the values in the cells selected are 13 and the inputted “Multiply” value was 80%, the new cell values would be 10.4.
- **Interpolate** – If a series of cells in the same row are selected and the “Interpolate” “cell-fill” option is selected the ECU will use the value in the cell all the way to the left and the cell value all the way to the right and interpolate the numbers in between so that the values are linear.



If a series of cells in the same column are selected and the “Interpolate” “cell-fill” option is selected the ECU will use the value in the cell all the way at the bottom and the cell value all the way at the top and interpolate the numbers in between so that the values are linear.

Cell Values Selected in a Column

90
80
70
70
70

Interpolated Result from Cell Values Selected Above

90
85
80
75
70

If a range of cells (multiple rows and columns) are selected and the “Interpolate” “cell-fill” option is selected the ECU will use the value in the cells at the bottom left and top left corners, bottom left and bottom right corners and the bottom left and top right corners of the entire range and interpolate the numbers in between so that the values are linear.

Range of Cell Values Selected

80	80	80	80
80	80	80	80
80	79	77	80
77	77	75	80

Interpolated Result from Range of Cell Values Selected Above

▲ 80	80	80	80 →
79	80	80	80
78	79	80	80
77	78	79	80 →

- **Cancel** – Hit cancel to disregard making any changes.

Cell Changes using the “Page Up” & “Page Down” Keys (Fuel and Spark Tables)

Multiple cell values can also be changed simultaneously using the “Page Up” and “Page Down” keys. This approach offers a quick alternative to using the mouse. Use the keyboard arrow keys (up/down/left/right) to maneuver to area of the map where the desired cell changes will be made.



Next, depress and hold the keyboard “Shift” key. Now, use the arrow keys, to maneuver through the cells to be changed. As the cells are being selected they will become highlighted. Once the desired cell range has been highlighted, release the “Shift” key. Depress the “Page Up” key to increase the cell values and the “Page Down” key to decrease the cell values. The cell values will increase or decrease by a value of one (1) for every keystroke. To exit this mode, depress any one of the arrow keys.

The illustration below shows the areas of the base fuel map that the ECU accesses under different driving conditions.

Hint: Use the 02% Correction feedback in the **Dash** to help calibrate the Fuel table VE values.

MAP (Kpa) - Engine Load

203	80	80	80	80	80	80	80	80	80	87	90	91	91	91	91	91
176	80	80	80	80	80	80	80	80	80	87	90	91	91	91	91	91
150	80	80	80	80	80	80	80	83	83	87	90	95	95	95	95	91
125	80	80	80	80	80	80	80	80	82	82	84	90	91	91	91	91
111	80	80	80	80	80	80	80	80	80	80	80	90	90	90	90	90
100	80	80	80	80	80	80	80	80	80	80	80	87	87	87	87	87
90	77	77	80	80	80	80	75	75	75	75	75	82	82	82	82	82
81	77	77	77	80	80	70	70	70	70	70	70	82	82	82	82	82
70	60	60	77	75	70	70	70	70	66	66	66	66	70	70	70	70
64	50	50	60	70	66	66	66	60	60	60	60	60	66	66	66	66
60	40	40	50	60	60	66	66	56	56	59	59	59	59	59	59	59
56	36	36	50	50	55	55	56	56	56	55	55	55	55	55	55	55
50	35	35	45	50	50	55	50	50	50	50	50	50	50	50	50	50
45	31	31	40	40	44	44	48	48	48	48	48	48	48	48	48	48
41	25	25	35	35	38	38	44	44	44	44	44	48	48	48	48	48
28	25	25	28	33	35	35	40	40	44	44	48	48	48	48	48	48
	600	800	1,000	1,150	1,200	1,500	1,800	2,000	2,400	2,800	3,200	3,600	4,000	5,000	6,000	7,000

The **BigComm** software allows the user to configure the **Load (MAP)** and **RPM** axes allowing for a larger number of cells (map area) to be used for the fuel and spark tables.

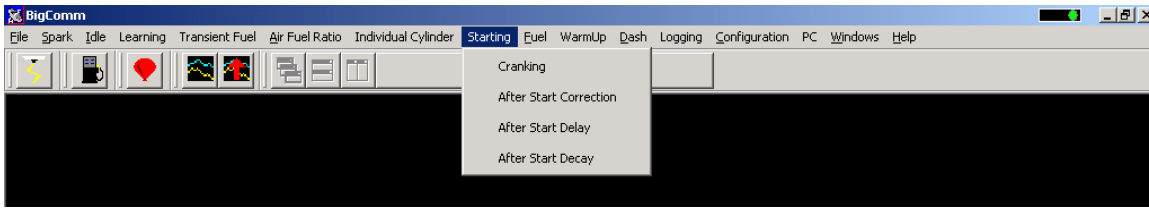
Note: Be sure the ECU is properly configured and the Base Fuel and Spark Tables are calibrated before configuring and calibrating any of the following engine operating parameters.

34. STARTING

The “**Starting**” drop-down selections allow the user to calibrate parameters associated with starting (cranking) and running the engine for a short period of time (temperature dependent) after the engine is initially started.



To configure engine starting fuel, go to **Starting** on the Tool Bar. Left click on “**Starting**” and a drop down screen will open. Keep the left mouse button depressed and slide the mouse pointer down until the desired “**Starting**” fuel drop down is highlighted.



The sequence of events the ECU steps through during an engine “start” are defined, in order, in the next four sections as follows:

- Cranking
- After Start Delay
- After Start Correction (adding fuel)
- After Start Decay

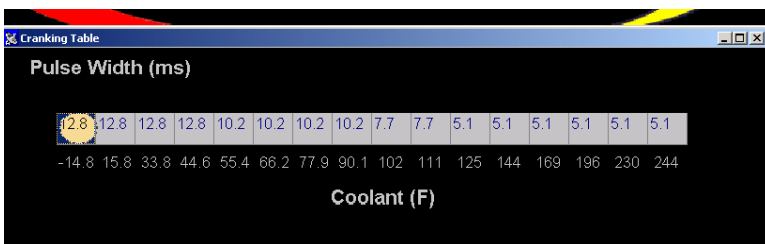
35. Cranking (F1 – “Quick Key”)

The inputs in this table are only used by the ECU when the engine is in the cranking mode (< 400 RPM).

The **Cranking** table allows the user to input the actual pulse width the injectors will operate at during engine cranking. The pulse width required is a function of the engine coolant temperature. The colder the engine the larger the pulse width required.

If the throttle needs to be opened to start the engine during **Cranking**, the ECU is adding too much fuel. Therefore, a smaller injector pulse width needs to be entered into the input cell relative to the engine coolant temperature. Make sure pulse width modifications are inputted into the correct input cells. Entering a smaller pulse width into the cell representing an engine coolant temperature of 144° will not help start the engine when the temperature is 55°.

Note: If the throttle is opened to position greater than what was set in the **Clear Flood TPS %** setting, the ECU will not add fuel. See [Clear Flood Setting](#) for more details.



While the engine is cranking, a “real-time Ellipse” will move within the Cranking table relative to the current engine coolant temperature “operating point”. Use it as a point of reference to help calibrate the Cranking table.

To change a value in the **Cranking** table, move the cursor using the PC's mouse or arrow keys to the cell to be changed. Input the desired value and hit "**Enter**" to save the change.

Once the engine starts (the ECU will detect the rapid change in engine speed) the ECU will ignore the **Cranking** table and begin using inputs from the **After Start Delay** (see section 37).

36. AfterStart Delay

Once the ECU detects the engine has started, it uses the vehicle coolant temperature sensor and inputs from the **After Start Delay** table to decide when to introduce the **After Start Correction Fuel**. The ECU begins counting the crankshaft interrupts. When the ECU counts off the number of interrupts defined in the **After Start Delay** table, for the current engine operating temperature, the ECU adds the **After Start Correction Fuel**. The delay mentioned here is very, very short. The table below shows that nine (9) interrupts were used at -14° and 16 interrupts at 230° . One can appreciate how quickly nine (9) or sixteen (16) crankshaft interrupts occur at an engine speed of 800 RPM.

While the engine is running, a "real-time Ellipse" will move within the **After Start Delay** table relative to the current engine coolant temperature "operating point". Use it as a point of reference to help calibrate the **After Start Delay** table.

To change a value in the **After Start Delay** table, move the cursor using the PC's mouse or arrow keys to the cell to be changed. Input the desired value and hit Enter to save the change.

Coolant (F)	Interrupts
-14.8	9
33.8	8
55.4	8
77.9	11
102	13
125	14
169	16
230	16

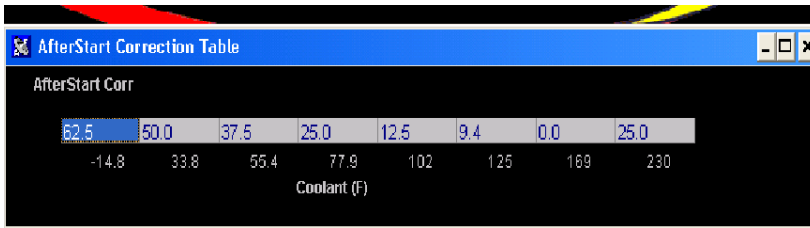
37. AfterStart Correction

As outlined above, the ECU delays the introduction of **After Start Correction** fuel once the engine starts.

The table below allows the user to define the amount of **After Start Correction** fuel to be added as a function of coolant temperature. The **After Start Correction** fuel is added synchronously as a percent (%) of the base pulse width (defined in the Fuel table). As you will notice in the table, the percent (%) of fuel added is greater at the two temperature extremes. The largest amount of fuel is needed when the engine is coldest. A larger amount of fuel is also added when the engine is hot versus the mid range temperatures, to release any vaporized fuel that may have "boiled" in the fuel rail(s) during a hot soak.

While the engine is running, a "real-time Ellipse" will move within the **After Start Correction** table relative to the current engine coolant temperature "operating point". Use it as a point of reference to help calibrate the **After Start Correction** table.

To change a value in the **After Start Correction** table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change.



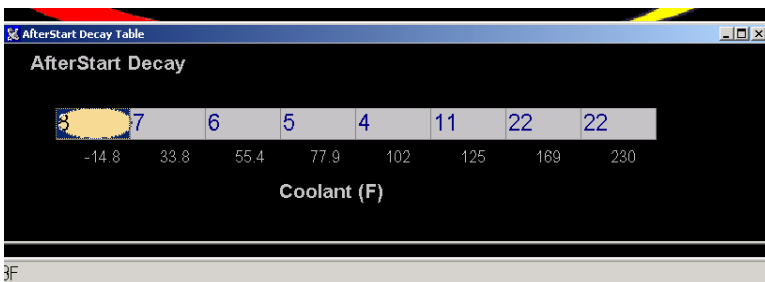
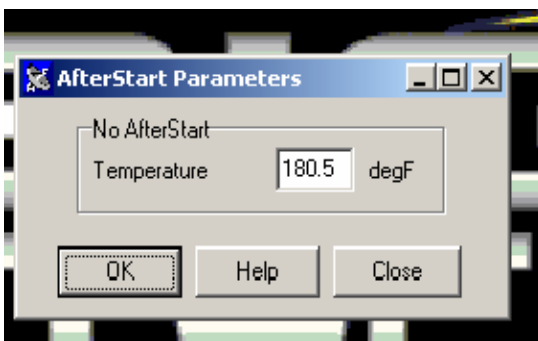
38. AfterStart Decay

The **After Start Correction** fuel, being added by the ECU during an engine starting routine, is only required for a very short period of time. The ECU pulls the fuel back out, or decays it, as a function of crankshaft interrupts and coolant temperature. The ECU decays the **After Start Correction Fuel** over the number of interrupts, depending on the temperature the engine is currently operating at, defined in the **After Start Decay** table. The decay period mentioned here is very, very short. The table below shows 8 interrupts were used at -14° and 22 interrupts at 230° .

While the engine is running, a “real-time Ellipse” will move within the **After Start Decay** table relative to the current engine coolant temperature “operating point”. Use it as a point of reference to help calibrate the **After Start Decay** table.

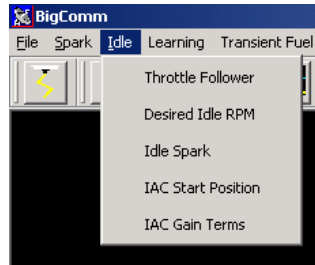
To change a value in the **After Start Decay** table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change.

AfterStart Parameters



39. Idle

The “**Idle**” drop down offers the user five tables to calibrate the engine idle quality. Each input table will be described in the paragraphs below. To get to the **Idle** drop down screen, go to the main Tool Bar and left click on **Idle** and the screen below will appear. Hold the left mouse down and drag it to the desired input screen and release the mouse button.



40. Throttle Follower

Throttle bodies used with electronic fuel injection systems have an air by-pass channel molded or machined into the valve body to allow air to be bypassed around the throttle blades when they are fully closed. The air entering the engine through the bypass channel is used to control the engine idle speed. The amount of air needed to maintain a desired engine speed varies depending on engine coolant temperature, camshaft overlap, etc. The Idle Airspeed Control (IAC) motor (and plunger) control the amount of air allowed to be bypassed around the throttle blades.

The “Throttle Follower” table allows the user to set a relationship between throttle blade angle and the position of the IAC metering valve (plunger). This is required to keep the engine from stalling when the throttle position changes from some percent (%) open to fully closed very quickly.

The fixed values along the bottom of the table below represent the percent (%) throttle position which increase in increments of eight (8) percent. The input values above the fixed numbers are used by the ECU to position the IAC metering valve (plunger), inside the bypass channel. The position of the metering valve (plunger) will vary depending on throttle position. The default values, configured with the system as shipped, will work with a majority of engine applications.

While the engine is running, a “real-time Ellipse” will move within the **Throttle Follower** Table relative to the current TPS (%) “operating point”. Use it as a point of reference to help calibrate the **Throttle Follower** table.

To change a value in the **Throttle Follower** table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit “**Enter**” to save the change.

 A screenshot of the "Throttle Follower Table" window in the software. The window title is "Throttle Follower Table". Below the title bar, the text "Throttle Position" is displayed. A horizontal bar contains a series of input cells with values: 22, 33, 44, 55, 55, 60, 66. Below this bar, a scale for "TPS(%)" is shown with markers at 0, 8, 16, 24, 32, 40, 48, and 56. A yellow ellipse is positioned over the first cell (22) on the scale.

41. Desired Idle RPM

The **Desired Idle Rpm** table allows the user to set the desired engine RPM as a function of coolant temperature. To configure the table, input the desired engine RPM for the each temperature shown at the bottom of the table. The ECU controls the idle speed so transitions between temperature ranges are not noticeable.

Note: The TPS needs to be set properly for this input to function properly. See [TPS Configuration](#) for further assistance.

While the engine is running, a “real-time Ellipse” will move within the **Desired Idle Rpm** Table relative to the current engine coolant temperature “operating point”. Use it as a point of reference to help calibrate the **Desired Idle Rpm** table.

To change a value in the **Desired Idle Rpm** table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit “**Enter**” to save the change.

Desired RPM							
1500	1500	1400	1200	1000	850	720	700
-14.8	33.8	55.4	77.9	102	125	169	230
Coolant (F)							

0x00 Coolant = -14.8F RPM = 0

42. Idle Spark

The **Idle Spark** control function helps maintain idle quality by introducing bi-directional spark timing as an additional control variable. This is a very useful idle control function!

Note: Idle spark control is only active when the actual throttle position (the TPS % value shown in the dash) **is below the Max TPS for Idle value inputted into the set up table**. For example, “Idle Spark” control will not function if the Max TPS for Idle value (inputted into the [Operating Configuration](#) table) is set to 4%, and the actual TPS % is 5%, with the throttle blade completely closed.

“Idle Spark” control will function if the actual throttle position (TPS %) is 2% and the “Max TPS for Idle” value is set at 4%. In this case, “Idle Spark” control would function until the throttle blade was opened above 4%. Back to [TPS Configuration](#)

The fixed values, below the table, are the ECU’s reference points for how many RPM the engine is operating at above or below the “Desired RPM.” The fixed values define the active control (RPM) range. The active range is from 256 RPM below the “Desired” RPM to 224 RPM above the “Desired” RPM.

The bi-directional input table allows the user to quickly advance the timing (left side of the input table) when the RPM begins falling below the “Desired RPM” setting. Once the timing is advanced it needs to be retarded (right side of the input table) as the engine RPM begins increasing. The zero point in the table is equal to the user defined, “Desired” RPM.



While the engine is running, a “real-time Ellipse” will move within the **Idle Spark** table relative to the current RPM Delta “operating point”. Use the ellipse as a point of reference to help calibrate the **Idle Spark** table.

To change a value in the **Idle Spark** table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value, and hit “**Enter**” to save the change.

The values shown in the table below can be used as a baseline.

See [Throttle Follower and Idle Spark Setup](#) below for more information on how to use the “Idle Spark” control in combination with the “IAC Start Position” to improve overall idle control.

Idle Spark (deg)															
15.0	12.0	10.0	7.0	7.0	6.0	6.0	5.0	2.0	2.0	2.0	2.0	4.0	6.0	6.0	8.0
-256	-224	-192	-160	-128	-96	-64	-32	0	32	64	96	128	160	192	224
RPM Delta															

43. IAC Start Position

A general description of the IAC motor and valve (plunger) was described above in the “Throttle Follower” paragraph. The IAC motor can be in one (1) of one hundred eighty (180) potential positions, from fully open to fully closed. Fully closed would represent position number one and fully open would represent position number 180. The ECU monitors key engine operating conditions and positions the IAC valve (plunger) accordingly. When the engine is shut off, the IAC goes to position number zero and then counts back to position number 90, or half way open, and stays there. When the engine goes into cranking mode the ECU reads the coolant temperature and instructs the IAC what position to go to. Based on user defined inputs, the **IAC Start Position Table** allows the ECU to position the IAC valve to a predetermined position while the engine is cranking, so that when the engine starts the idle speed can be quickly reached and maintained.

The “position” values shown in the table below can be used as a baseline for most applications. You can see from the large values in the table that when the coolant temperature is cold, the IAC seeks a position in the direction of the fully open position (position number 180). As the engine reaches normal operating temperature, the IAC finds the position that allows the engine to idle at the user prescribed “Desired” idle speed.

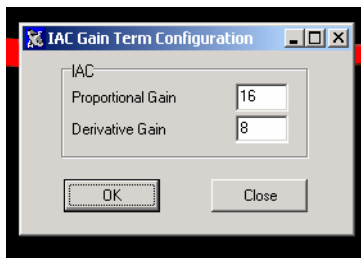
While the engine is running, a “real-time Ellipse” will move within the **IAC Start Position** table relative to the current engine Coolant Temperature “operating point”. Use it as a point of reference to help calibrate the **IAC Start Position** table.

To change a value in the **IAC Start Position** table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit “**Enter**” to save the change.

IAC Position							
179	170	165	160	100	75	40	30
-14.8	33.8	55.4	77.9	102	125	169	230
Coolant (F)							

44. IAC Gain Terms

This input table allows the user to set how quickly the IAC motor moves (in or out) in a given period of time. Use the default settings that come with the ECU unless it becomes necessary to control the IAC motor speed. The Proportional Gain setting should be from 4 to 16. The Derivative Gain should be $\frac{1}{4}$ to $\frac{1}{2}$ of the Proportional Gain. Enter the desired value in the table and left mouse click OK to save the information.



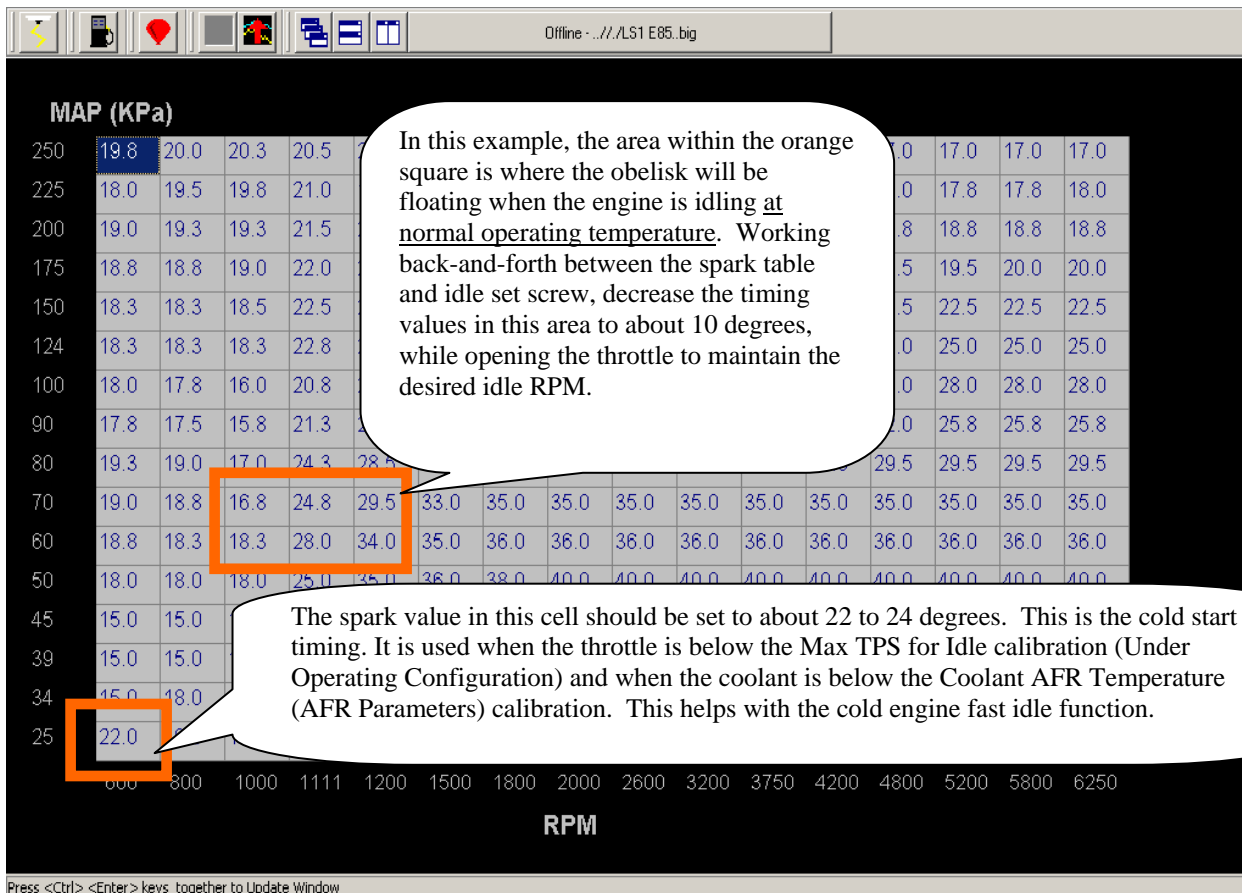
See Throttle Follower & Idle Spark Table Setup Tips section directly below for more information on how to use the “Idle Spark” control, in combination with the “IAC Start Position”, to improve overall idle control.

Throttle Follower & Idle Spark Table Setup Tips

This brief tutorial will outline how to set the IAC Throttle Follower and Idle Spark tables to ensure engine idle stability, under various engine operating conditions.

Setup Steps

1. Run the engine until it reaches its normal operating temperature.
2. Hook up the PC to the GEN3 ECU, and make sure communication is established.
3. Zero out the Idle spark calibration. From the main BigComm tool bar, go to Idle, then Idle Spark in the drop down menu.
4. The following process steps are iterative. The goal is to decrease the ignition timing in the spark map while opening the throttle blade to maintain the desired engine rpm. When the timing in the spark map is decreased, the engine RPM will also decrease below the desired level. To offset the drop in engine speed, the throttle blade set screw will need to be adjusted to increase the engine RPM back to the desired level. The task is to get the spark timing to about 10 degrees while maintaining the desired idle RPM (at normal engine operating temperature). The cells below and around the obelisk (the floating football shape), will be used. See the example screen print below.



Again this is an iterative process. If the timing values within the orange square above were to be decreased from 30 degrees to 10 degrees all at once, the engine would die. To avoid this, slowly work back and forth decreasing the timing and then opening the throttle blade with the set screw until the engine idles at the desired RPM, with only about 10 degrees of spark timing in the cells, below and around the obelisk.

- From the main BigComm tool bar, go to “Idle” and then “Throttle Follower Table” in the drop down.
- Loosen the TPS (the settings to use if your TPS is not adjustable are covered below). Adjust the TPS to 2% - 3%, so the obelisk is floating inside the first cell of the Throttle Follower Table. Tighten the TPS sensor down. Make sure the desired IAC value (“Des IAC”) in the Dash is decreasing towards the minimum value of 5.
- If you are able to adjust the TPS, so that the obelisk is completely inside of the first cell, input the values in the example table shown below, into your Throttle Follower Table. These values represent a good starting point. Some additional fine adjustments may be required.

TPS %	0	8	16	24	32	40	48	56
IAC	5	44	88	111	122	133	144	150

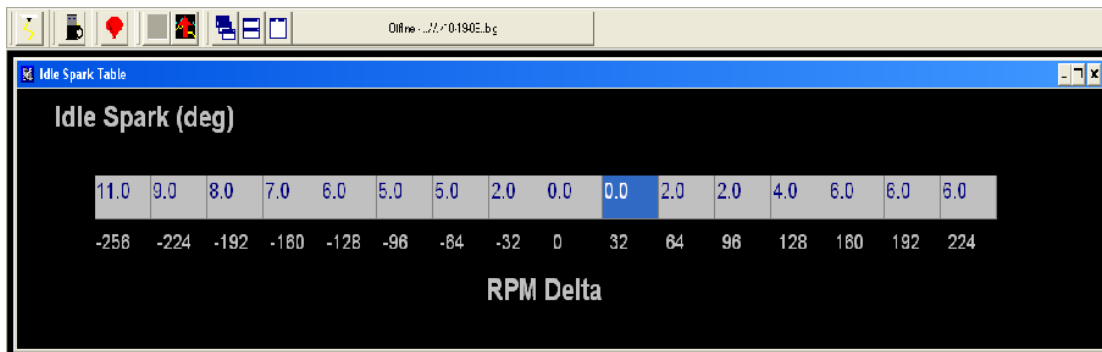
If after adjusting the TPS, the obelisk is straddling the first two cells, input the values in the example table shown below, into your Throttle Follower Table. These values represent a good starting point. Some additional fine adjustments may be required.

TPS %	0	8	16	24	32	40	48	56
IAC	5	25	50	90	122	133	144	150

If the TPS is not adjustable, and the obelisk will not fit inside the first cell(s), input the values in the example table shown below, into your Throttle Follower Table. These values represent a good starting point. Some additional fine adjustments may be required.

TPS %	0	8	16	24	32	40	48	56
IAC	5	5	44	90	118	125	144	150

Next, from the main BigComm tool bar, go to “Idle” and then “Idle Spark” in the drop down. The table below will open. Input the values shown below into your Idle Spark table.



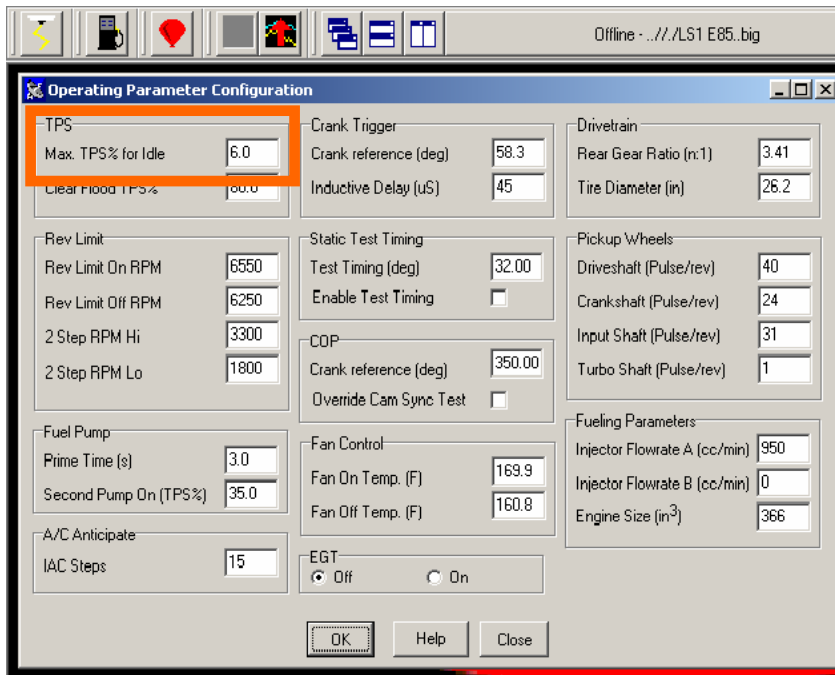
In an effort to maintain a stable idle, the GEN3 ECU will:

- Add (advance) the timing values to the left of the zero RPM cell to the base spark map timing values.
- Subtract (retard) the timing values to the right of zero RPM cell from the base spark map timing values.

Since the timing values in the spark map are now approximately 10 degrees at idle, the Idle Spark Table now has significant authority in maintaining idle stability, by introducing large (as a percent of 10 degrees of timing) timing values when the engine RPM decreases or increases.

Do **not** put negative values into the cells to the right zero RPM in the table. The ECU automatically treats these as timing retard values.

Lastly, from the main BigComm tool bar go to Configuration/Operating Configuration/TPS. Make sure the “Max TPS% for Idle” value is 2% to 3% above the TPS % at idle. For example, if the TPS % that was set at idle is 2%, the value in this table should be 4% or 5%, otherwise there will be no Idle Spark Control.



45. Warm Up

Before the engine reaches normal operating temperature, i.e. 180° additional fuel is required as a function of engine coolant temperature and manifold absolute pressure (for speed-density applications). To calibrate “warm up enrichment” fuel go to the Main Tool bar and highlight “**Warm Up.**” Keep the left mouse button depressed and slide the cursor down to select Coolant Correction or Air Temperature Correction, depending on the table to be accessed.

46. Air Temperature Correction

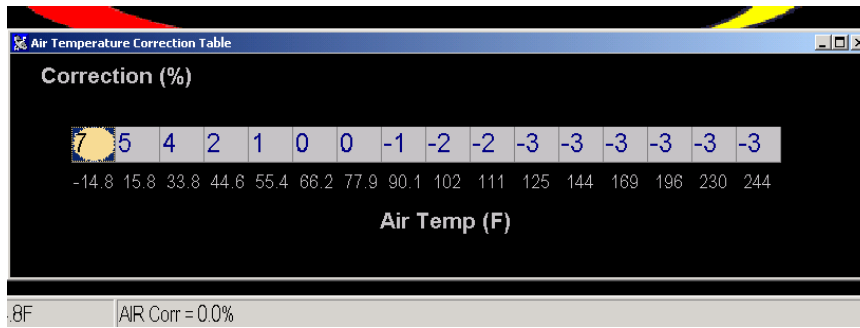
The inputs from this table are used by the ECU if “Alpha N” was the control algorithm selected during the Main Configuration set up. **If “Speed Density” the control algorithm was selected, the ECU ignores inputs from this table.**

For Alpha N systems, the ECU uses input from this table for air temperature compensation. The fixed numbers in the input table represent air temperature from -14.8° to 244 ° F. The ECU uses the user-defined inputs for each temperature point to add or subtract fuel relative to the base fuel map values.

While the engine is running, a “real-time Ellipse” will move within the **Air Temperature** table relative to the current engine Coolant Temperature “operating point”. Use it as a point of reference to help calibrate the **Air Temperature** table.

To change a value in the **Air Temperature** table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit “**Enter**” to save the change. The input values need to be smaller working from the left to right. As the engine warms up it needs less Air Temperature correction (added fuel).

The inputs shown in the table below can be used as a baseline.

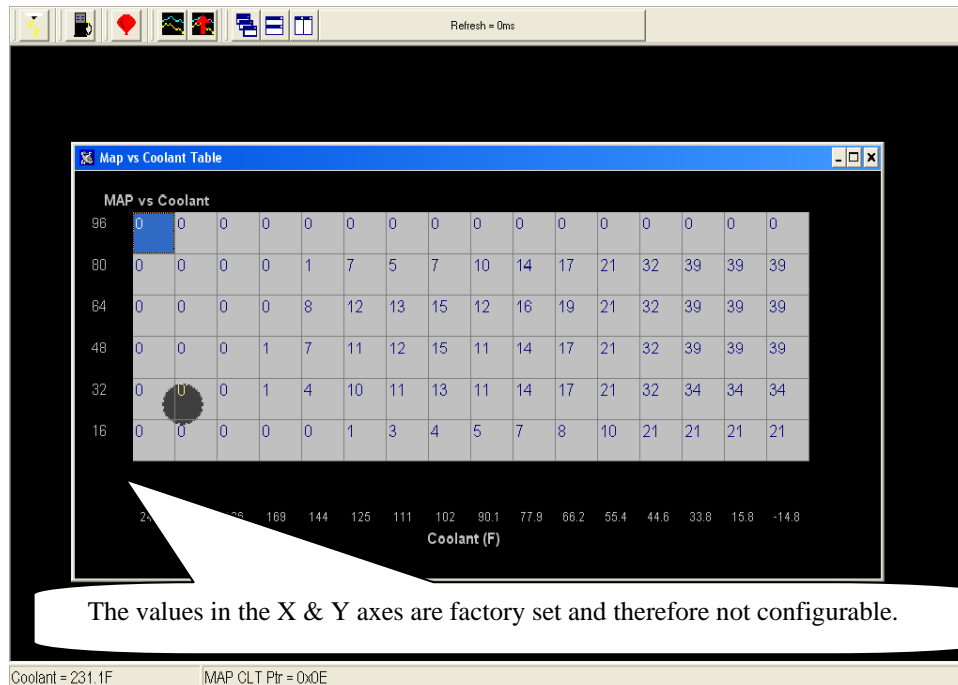


47. MAP vs. Coolant

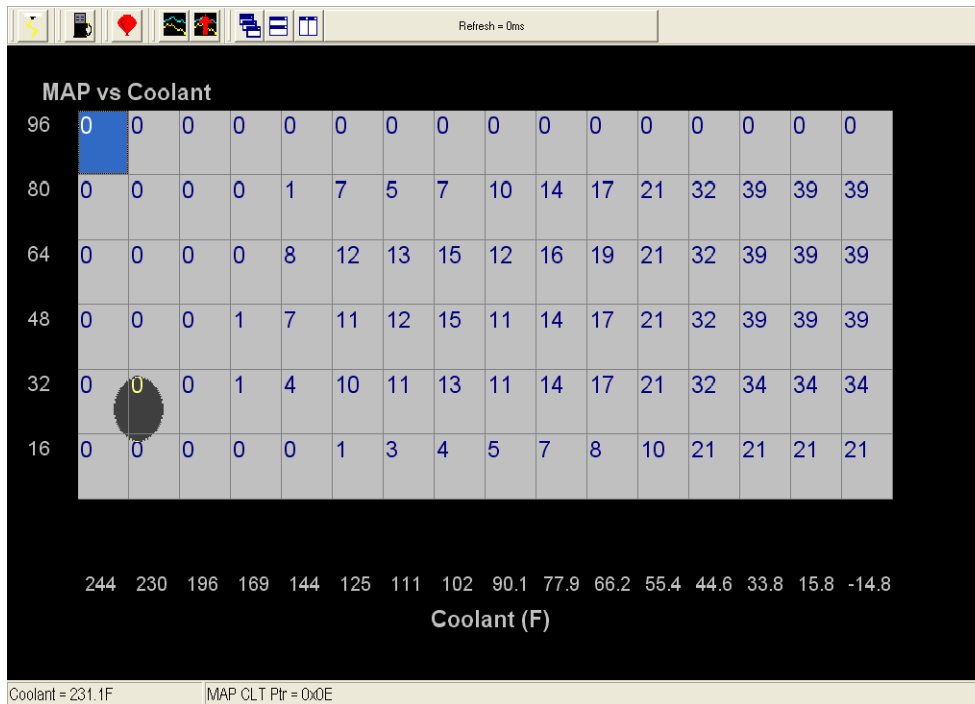
The GEN3 ECU’s MAP vs. Coolant table offers an improved warm up routine. The table applies a fuel correction (a % increase or decrease to the base pulse width) as a function of both Load (MAP) and coolant temperature. The cells in the table represent ninety six (96) different MAP and coolant temperature combinations.

The same calibration technique should be used with this table as was employed with the base fuel map. This table should be calibrated after the base fuel map.

To change a value in the **MAP vs. Coolant** table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change.



Same screen as above with the window maximized. The values shown in the table below can be used as baseline.



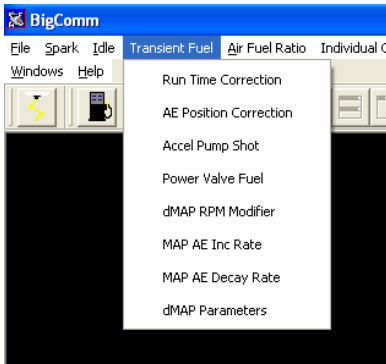
48. TRANSIENT FUEL

Transient Fuel is the fuel added to the engine during non-steady state conditions as a function of $dTPSdt$ and $dMAPdt$. Transient Fuel is applied relative to a rate of throttle change ($dTPS$) and a rate of MAP change ($dMAP$). TPS transient fuel is added asynchronously. Asynchronously means fuel added between the regularly scheduled injector pulses. MAP transient fuel is added synchronously to increase or decrease the base fuel pulse width.

MAP Transient Fuel: MAP (+) Transient Fuel can be compared to a carburetor's power valve. It is used to increase the base fuel pulse width when the manifold pressure increases significantly for a slight change in throttle opening. MAP (-) Transient Fuel is used to decrease the base fuel pulse width when the manifold pressure decreases significantly as a result of the throttle blades being closed.

The MAP (+) and (-) Transient Fuel control is comprised of 5 primary tables and 1 secondary table. Each of the tables play an integral role as to how the base fuel pulse width will be increased or decreased for a given change in manifold pressure. Below, is a description of how and when each of the tables is used by the ECU.

From the tool bar on Main Menu screen, left click on "**Transient Fuel**". The screen below will open. The following paragraphs will describe how to calibrate each of the Transient Fuel drop down selections.



49. Power Valve Fuel (F10 – “Quick Key”)

The first table is **Power Valve Fuel**. It is used to determine the percent fuel correction, either positive or negative, for a change in manifold pressure (dMAPdt). The ECU calculates the change in manifold pressure every 52 milliseconds (ms) as long as the throttle is moving. The ECU will increase or decrease the base pulse width relative to the dMAP Correction table’s % correction value (i.e. 100%). Changes in MAP need to be compensated for by increasing or decreasing fuel synchronously to the base fuel pulse width. Each cell in the input table represents eight (8) kPa increments.

While the engine is running, a “real-time Ellipse” will move within the **Power Valve Fuel** table relative to the current % Correction “operating point”!! Use it as a point of reference to help calibrate the **Power Valve Fuel** table.

To change a value in the **Power Valve Fuel** table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change.

 A screenshot of the 'Power Valve Fuel Table' window. It displays a grid of dMAP Correction values. The x-axis represents kPa increments from -14 to 16, and the y-axis represents dMAP Correction values from -50 to 191.

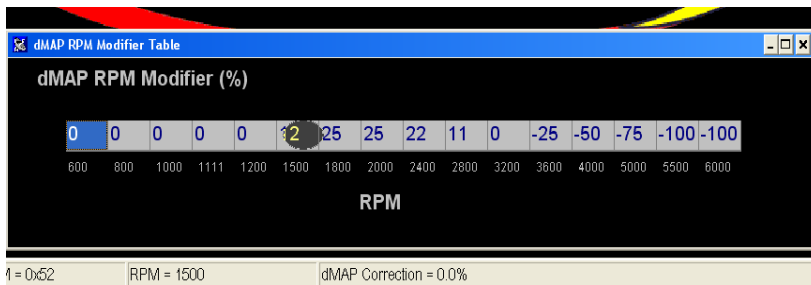
dMAP Correction															
-50	-44	-34	-25	-16	-9	-3	0	75	141	162	162	172	172	181	191
-14	-12	-10	-8	-6	-4	-2	0	2	4	6	8	10	12	14	16
kPa															

50. dMAP RPM Modifier (F10 – “Quick Key”)

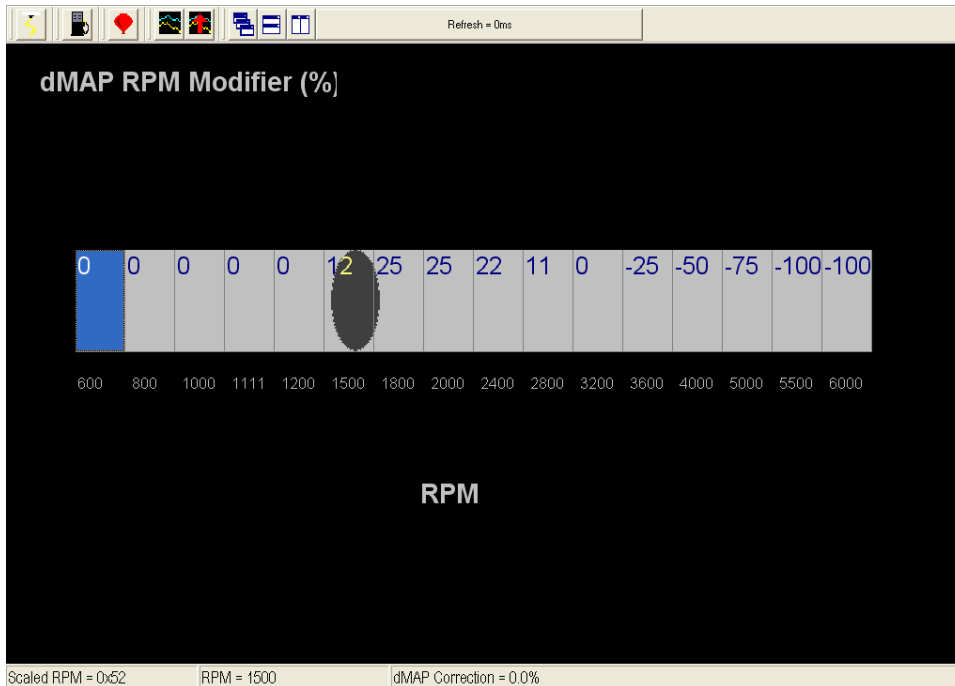
The second table used to calibrate the MAP Transient Fuel is the **dMAP RPM Modifier** table. Inputs to the table are used to increase or decrease the dMAP correction as a function of engine RPM. The positive or negative value inputted into the table is the percent (%) applied to the **dMAP Correction** table relative to the RPM (see below).

While the engine is running, a “real-time Ellipse” will move within the **dMAP RPM Modifier** table relative to the current RPM “operating point”. Use it as a point of reference to help calibrate the **dMAP RPM Modifier** table.

To change a value in the dMAP RPM Modifier table, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change.



Same screen as above with the window maximized.



51. MAP AE Decay Rate

The third table is **MAP AE Decay rate**. It is used to determine how quickly to decrease the **Positive** dMAP correction value after **accelerating** (throttle tip-in) the engine at a given coolant temperature. The ECU decrements the dMAP correction by the MAP AE Decay Rate. A MAP AE Decay Rate of 6 represents a decrease of the dMAP Correction by 6% every crank interrupt until it reaches zero. In other words, if you input the number 6 into the table, after 1 crank interrupt the dMAP Correction will decrease 6%. The 6% per interrupt continues until the dMAP correction reaches zero.

The **MAP AE Decay rate** table's fixed values (x-axis) represent coolant temperature, which increase from left to right. The **MAP AE Decay rate** input values need to increase as coolant temperature increases. The larger the value in the table, the quicker the fuel is taken out or decayed.

While the engine is running, a “real-time Ellipse” will move within the **MAP AE Decay rate** table relative to the current engine Coolant Temperature “operating point”. Use it as a point of reference to help calibrate the **MAP AE Decay rate** table.

To change a value in the **MAP AE Decay rate** table, move the cursor using the PC's mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change.

The inputs shown in the table below can be used as a baseline.

MAP AE Decay Rate	8	7	6	5	4	3	2	2
Coolant (F)	-14.8	33.8	55.4	77.9	102	125	169	230

52. MAP AE Inc Rate

The fourth table is **MAP AE Inc Rate**. It is used to determine how quickly to increase the **Negative** dMAP correction value after **decelerating** (throttle tip-out) the engine at a given coolant temperature.

A MAP AE Inc Rate of 3 represents 3 crank interrupts per 1 step increase of the dMAP Correction until it reaches zero. In other words, if you input the number 3 into the table, after 3 crank interrupts the dMAP Correction will increase 1 step. This 3 interrupt for 1 step process continues until the dMAP correction reaches zero.

The fixed axis values in the **MAP AE Inc Rate** table represent coolant temperature, which increases from left to right. The **MAP AE Inc Rate** table's input values need to increase as coolant temperature increases. The larger the value in the table, the slower the fuel is added.

While the engine is running, a “real-time Ellipse” will move within the **MAP AE Inc Rate** table relative to the current engine Coolant Temperature “operating point”. Use it as a point of reference to help calibrate the **MAP AE Inc Rate** table.

To change a value in the **MAP AE Inc Rate** table, move the cursor using the PC's mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change

The inputs shown in the table below can be used as a baseline.

MAP AE Inc Rate	3	6	6	6	9	15	22	33
Coolant (F)	-14.8	33.8	55.4	77.9	102	125	169	230

53. Run Time Correction

The fifth table is **Run Time Correction**. It **only** influences the **Positive** dMAP and dTPS Correction Values for a short period of time after the engine is running. (i.e. up to 8 minutes). The Run Time

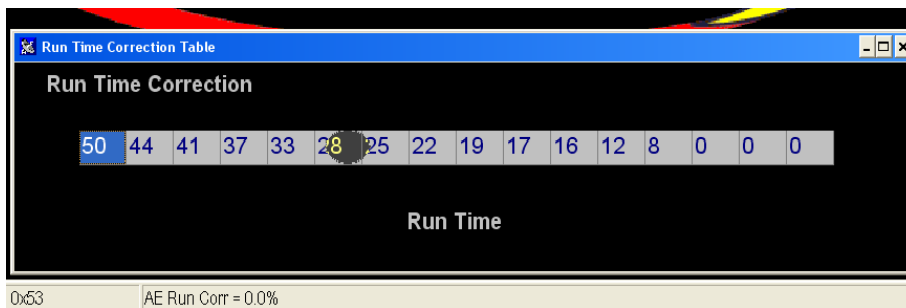
Correction table's value is used to increase the positive dMAP Correction value. Therefore, if the current dMAP correction value is 200% and the Run Time Correction value is 25%, the ECU will increase the dMAP 200% correction value by 25%, relative to the time at which the acceleration event occurred.

The amount of **Run Time Correction** fuel is decreased as time transpires and the engine warms up. The first cell in the table, all the way to the left, represents the first ½ minute of engine run time. The cell all the way to the right represents the end or eighth minute of engine run time. The **Run Time Correction** table's input values need to decrease as you work from the left to right.

While the engine is running, a “real-time Ellipse” will move within the **Run Time Correction** table relative to the current Run Time Modifier “operating point”. Use it as a point of reference to help calibrate the **Run Time Correction** table.

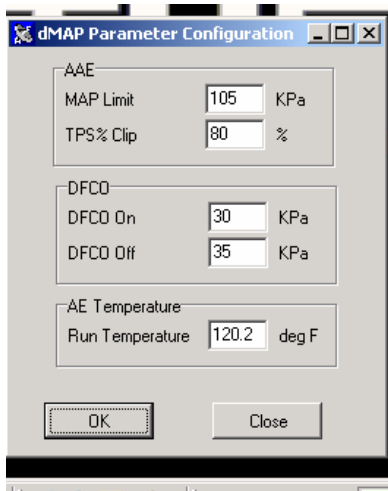
To change a value in the **Run Time Correction** table, move the cursor using the PC's mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change

The inputs shown in the table below can be used as a baseline.



54. dMAP Parameters

The Secondary Transient Fuel table is **dMAP Parameter Configuration**. This table is used to control auxiliary MAP and TPS transient and base fuel functions.



The first entry of the dMAP Parameter Configuration table is Asynchronous Acceleration Enrichment (AAE). It is used to set the MAP transient fuel thresholds relative to MAP (kPa) and TPS (%) values. Below, is a brief description of each.

- **MAP Limit:** Establishes the MAP value in kPa at which the dMAP transient fuel is disabled. For example, if the MAP Limit value is set to 80 kPa, the dTPSdt transient fuel will be disabled above MAP values of 80 kPa.
- **TPS % Clip:** Establishes the TPS value, as a percentage, at which the dMAP transient fuel is disabled. For example, if the TPS % Clip value is set to 80 %, the dMAP transient fuel will be disabled above TPS values of 80 %.

The second entry of the dMAP Parameter Configuration table is Deceleration Fuel Cut Off (DCFO). It is used to calibrate when the Base Fuel Map pulse width fuel is turned off and on relative to MAP (kPa) values. Below, is a brief description of each.

- **DCFO On:** Establishes the MAP value in kPa at which the Base Fuel Map pulse width is momentarily disabled. It is used to calibrate deceleration drivability. For example, if the DCFO On value is set to 30 kPa, the base pulse width will go to zero, 2.5 seconds after falling below a MAP value of 30 kPa, with the throttle closed. The Base Fuel Map pulse width is turned back on based upon the DCFO Off value (see DCFO Off).
- **DCFO Off:** Establishes the MAP value in kPa at which the Base Fuel Map pulse width is re-enabled. It is used to calibrate deceleration drivability. Typically, the DCFO Off value is set to 5 kPa above the DCFO On value. For example, if the DCFO On value is set to 30 kPa the DCFO Off value should be set to 35 kPa. Once the MAP value exceeds 35 kPa, the Base Fuel Map pulse width is turned back on.

The third and final entry of the dMAP Parameter Configuration table is Acceleration Enrichment (AE) Temperature. It is used to disable the affect of the Run Time Correction multiplicative scalar value has on the Positive dMAP Correction and dTPS Transient fuel values relative to an engine coolant temperature (deg F). Below, is a brief description of the AE Temperature “Run Temperature” setting.

Run Temperature: Establishes the engine coolant temperature in deg F at which the Run Time Correction multiplicative scalar term no longer influences the Positive dMAP Correction or TPS Transient fuel values. Therefore, if the Run Temperature value is set to 120 °F, the Run Time Correction multiplicative scalar term will no longer influence the Positive dMAP Correction or TPS Transient fuel values at engine coolant temperatures above 120 °F.

To change a value in these tables, move the cursor using the PC’s mouse or arrow keys to the cell to be changed and input the desired value. Then click on OK to save the changes.

TPS Transient Fuel

The TPS transient fuel control is comprised of 2 primary tables. Each of the table’s play an integral role as to how the TPS Transient Fuel requirements are calibrated for abrupt throttle changes that causes the engine to accelerate. TPS transient fuel is asynchronously injected relative to a rate of throttle change (dTPSdt). The asynchronous pulse can be modified relative to the throttle position



where the acceleration event occurred (**AE Position Correction**). Below, is a description of how the TPS Transient Fuel requirements are calibrated using the dTPSdt and AE Position Correction tables.

55. Accel Pump Shot

The first TPS Transient Fuel control table is **Accel Pump Shot** and as the name insinuates it can be compared to a carburetor's accelerator pump shot. The ECU uses the **Accel Pump Shot** table value to compute the size of the Asynchronous Pulse Width (APW) for a given rate of throttle change. It does so by sensing the rate of the throttle change and then using the corresponding **Accel Pump Shot** table value to calculate the size of the asynchronous pulse width. For example, if the ECU detected a throttle change of 10 degrees / second (dTPSdt), it would immediately look up the corresponding **Accel Pump Shot** table value of let's say 2ms. After the asynchronous pulse is looked up, the ECU then uses **AE Position Correction** table (see below) to modify the asynchronous pulse size relative to the throttle position at which the dTPSdt event occurred. If the **Accel Pump Shot** pulse width is less than the injector opening time, the fuel will not be delivered asynchronously. Instead, it will be accumulated and added to the next synchronous pulse width.

Note: The value in the first cell (the cell all the way to the left) must always be zero (0).

Working from left to right, each input cell in the **Accel Pump Shot** table represents a 1% change in throttle angle for a total percent change of 15%. This is plenty of resolution since the ECU looks for changes every 20 milliseconds. As a reference point, it typically takes approximately 250 milliseconds for a person to slam the throttle open.

While the engine is running, a “real-time Ellipse” will move within the **Accel Pump Shot** table relative to the current **Accel Pump Shot** “operating point”. Use it as a point of reference to help calibrate the **Accel Pump Shot** table.

To change a value in the **Accel Pump Shot** table, move the cursor using the PC's mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change. The values need to be larger as you work from the left to right. The greater the throttle angle rate of change, the larger the **Accel Pump Shot** table value needs to be.

Accel Pump Shot Table														
Pulse Width (ms)														
0.00	2.02	2.02	2.02	2.02	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Throttle Rate														

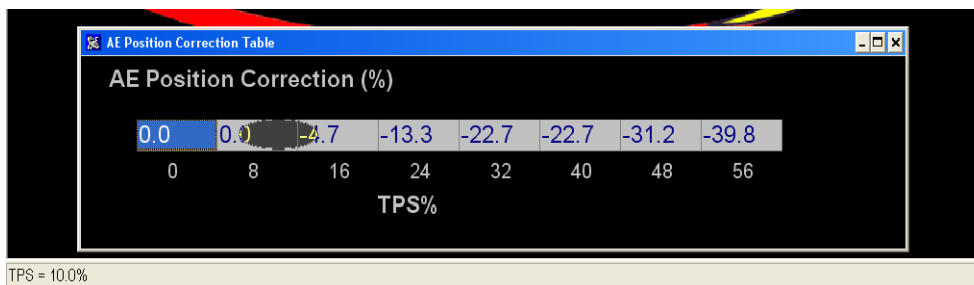
56. AE Position Correction

The second TPS transient fuel control table is **AE Position Correction**. It can be compared to a carburetor's accelerator pump “cam” profile. The ECU uses the AE Position Correction table value to modify the size of the Asynchronous Pulse Width (APW) relative to the throttle position at which the dTPSdt event occurred. For example, if a 10°/second dTPSdt event occurred (resulting in a look up of

2.0 ms) at a 24% throttle position, the ECU would immediately look up the corresponding AE Position correction value of let's say -13%. The ECU will then decrease the 2.0 ms pulse by 13% and output a 1.74 ms pulse. If the same 10°/second dTPSdt event occurred at a 48% throttle position and the corresponding AE Position Correction value was -31% the APW would then be 2.0 ms – 31% or 1.38 ms.

While the engine is running, a “real-time Ellipse” will move within the **AE Position Correction** table relative to the current TPS % “operating point”. Use it as a point of reference to help calibrate the **AE Position Correction** table.

To change a value in the **AE Position Correction** table, move the cursor using the PC's mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change. The greater the TPS %, the larger the **AE Position Correction** table value needs to be. The inputs shown in the table below can be used as a baseline.

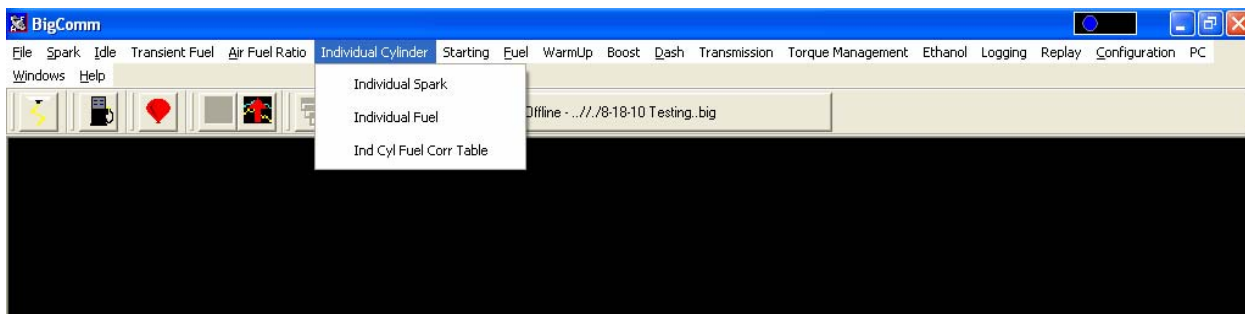


57. Individual Cylinder

Individual cylinder control allows the user to define the amount of fuel (positive and negative) and spark advance/retard correction for each cylinder. This feature is used to “calibrate out” intake manifold inefficiencies.

Note: A cam input (cam sync) is required for individual spark control, and injector phasing to be operational. Without a cam sync the GEN3 system still injects fuel sequentially and allows for individual fuel control per cylinder. All coil-on-plug systems **must** have the cam input (cam sync) hooked up and operational. For additional information on how to set up and configure a cam sync, go to the BigStuff3 website, then to How To/Help/Ignition system Setup Tutorial. The link is: <http://bigstuff3.com/pdf/Ignition%20Guide%20rev%201.2.pdf>.

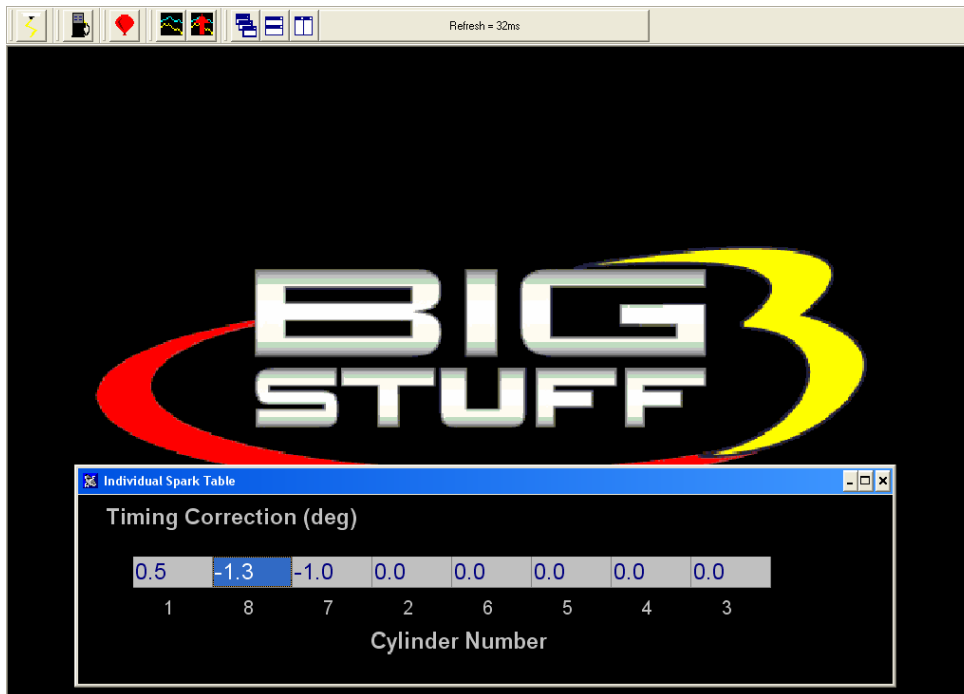
From the Main Menu screen Tool Bar, left click on **“Individual Cylinder.”** The screen below will open. The following paragraphs will describe how to calibrate each of the Individual Cylinder drop down selections.



58. Individual Cylinder - Spark

The fixed inputs in the table below represent the firing order configured during the firing order configuration process ([Firing Order Config](#)). The input cells allow the user to define the amount of timing retard (up to 10°) for or each cylinder in the table. Timing corrections are made to the values in the Spark Table.

Note: The GEN3 LS1 Coil-on-Plug (COP) and the “Stand-alone COP” systems are the only GEN3 systems with bi-directional timing compensation.

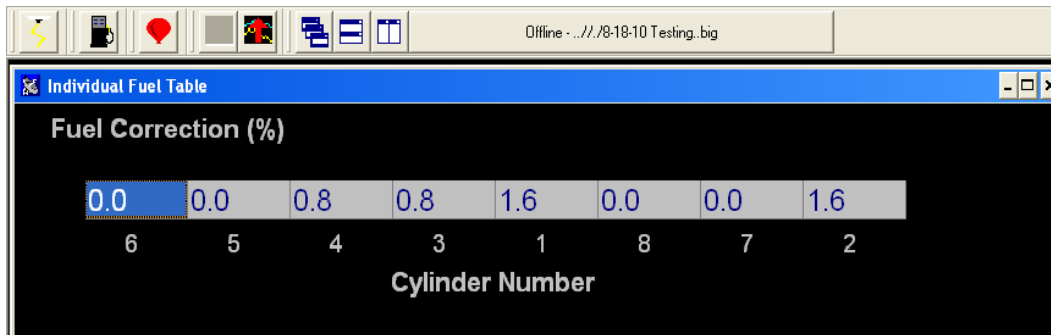


59. Individual Cylinder - Fuel

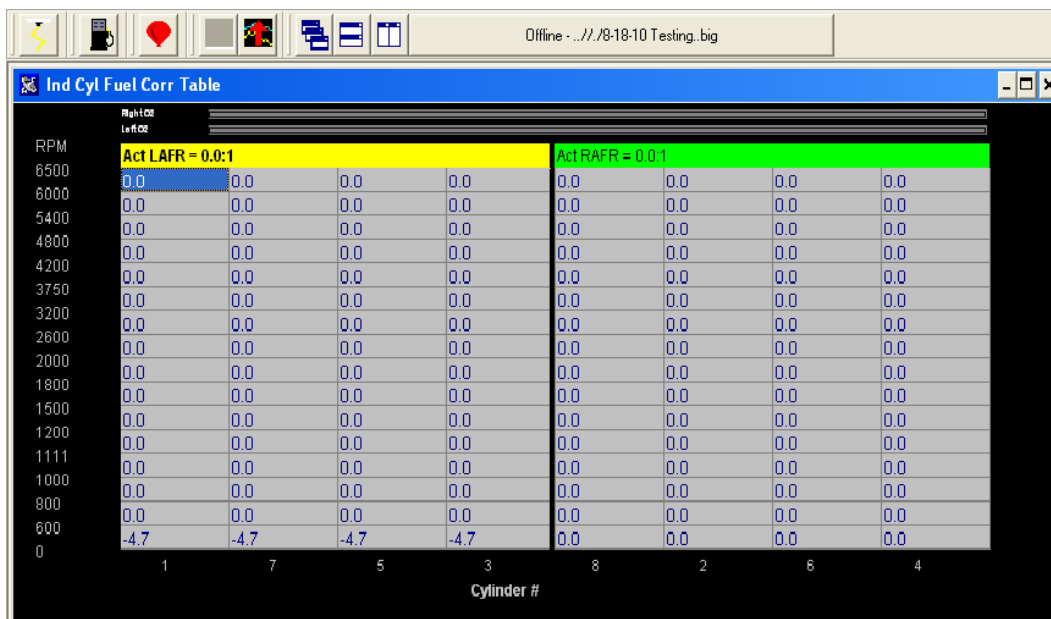
The fixed inputs in the table below represent the firing order configured during the firing order configuration process ([Firing Order Config](#)). The input cells allow the user to define the percent of fuel to be increased or decreased (up to 25%) for or each cylinder in the table. The individual fuel correction values modify the base pulse width in the Fuel Table.

To change a value in these tables, move the cursor using the PC’s mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change.

Individual Cylinder Fuel Correction Table – Base Systems



Individual Cylinder Fuel Correction Table – Upgraded Systems with Advanced Firmware



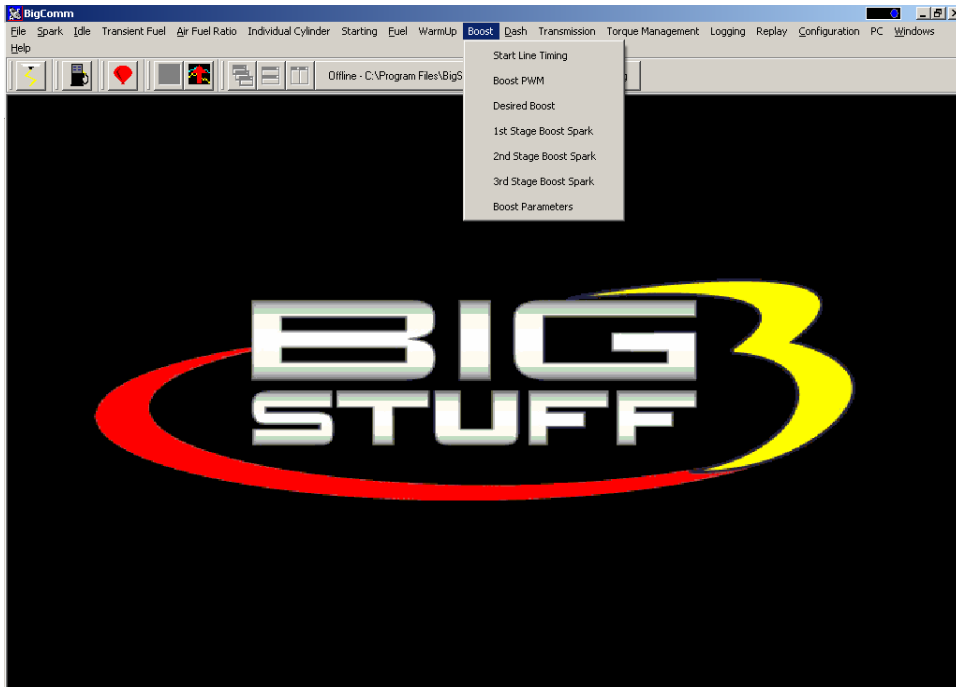
60. Boost

The GEN3 ECU allows the user to control boost parameters. Two boost strategies can be employed.

1. A Pulse Width Modulated (PWM) valve can be used to control boost as a function of engine RPM. The duty cycle of the valve can be changed as a function of engine speed.
2. A “staged” boost strategy can also be used. Up to three stages of boost can be switched on (using solenoid valves) in a user defined, timed sequence. The vehicle can be configured to come out of the hole with one stage applied and as time (distance down the track) expires, the second and third stages of boost can be turned on.

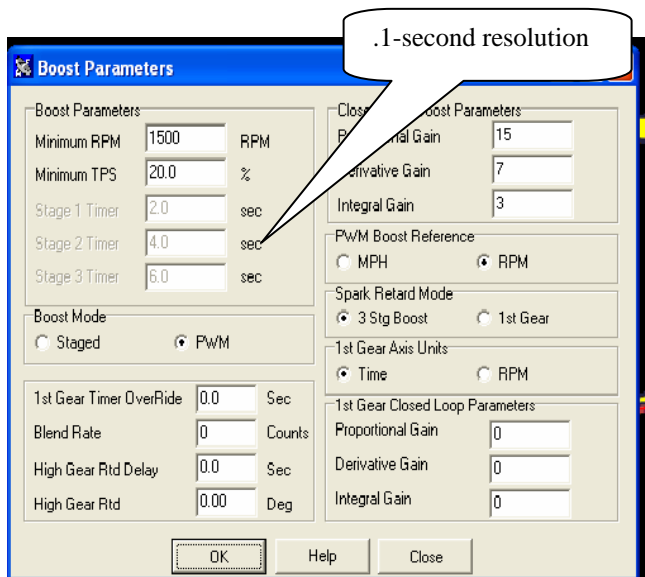
The “**Boost Parameters**” can be configured from the Main Menu screen Tool Bar. Left click on “**Boost.**” The following screen will open.





Keep the left mouse button depressed and slide the mouse pointer down until “**Boost Parameters**” is highlighted. Release the left mouse button. The screen below will open.

61. Boost Parameters



The GEN3 ECU allows the user to control boost parameters in two (2) modes: **Staged** or Pulse Width Modulated (**PWM**).

Staged mode turns on boost stages (solenoid valves) in a user defined, time sequence. **PWM** mode assumes the boost system is configured with a PWM boost valve. When the **PWM** mode is enabled the Stage 1 – 3 timer input windows are made inactive, as shown in the screen print above. When **Staged** mode is selected, the Stage Timer input windows are active as shown in the screen print below.



The **Stage** timer starts once the following criteria are satisfied:

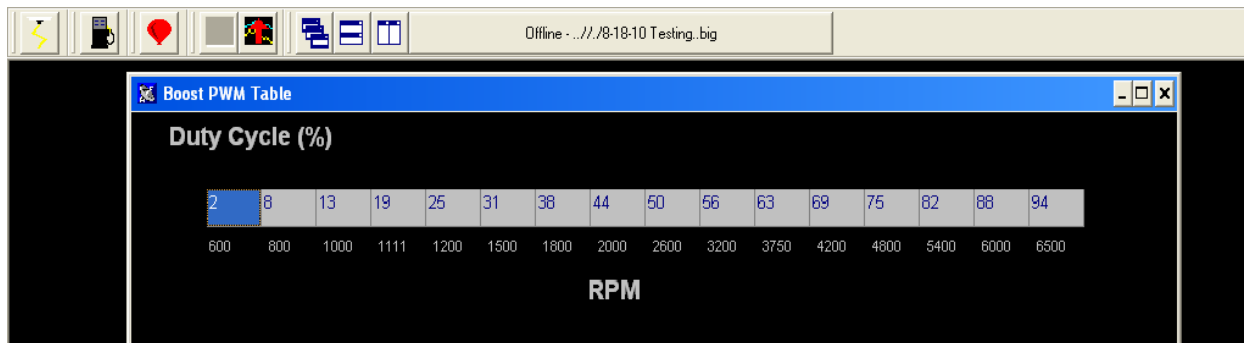
Minimum RPM – This input establishes the minimum RPM the engine must reach to initiate the boost timing sequence.

Minimum Throttle Position Sensor (TPS) – This input establishes the minimum throttle position the TPS sensor must reach to initiate the boost timing sequence.

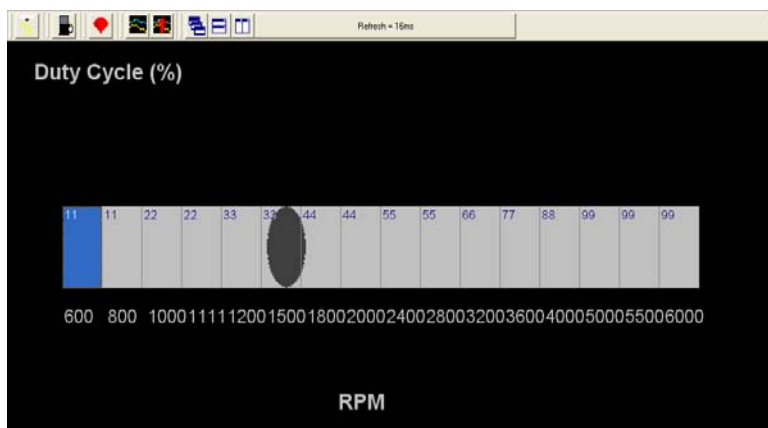
Both the Minimum RPM and Minimum Throttle Position inputs must be satisfied before the boost timing is initiated.

62. Boost PWM

Before this table becomes active, PWM needs to be selected in the Boost mode window of the boost configuration table. The values inputted into the PWM window below represent the percent (%) duty cycle of the boost valve. The PWM boost function will run continuously when this mode is enabled. The solenoid valve used must be a Normally Closed (NC) valve. The valve is T'd into the line from the turbo compressor to the bottom of the waste gate diaphragm. The solenoid valve resistance must not be lower than 14 ohms w /14 volt supply (1 A). One end of the solenoid valve is connected to Switched Ignition and the other to the Boost Connector, Pin B. See [Boost Connector Pin Out](#).



Same as screen above with window maximized.



To change a value in the **Boost PWM** table, move the cursor using the PC's mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change.

63. Boost Staged

When “Staged” mode is selected the time intervals between the boost stages need to be configured. In the **Boost Parameters** table above, these inputs are defined as Stage 1, Stage 2 and Stage 3. Before the staged boost sequence can be enabled, 12 Volts needs to be present at the “**Timer Enable**” pin, which is Pin A of the 4-way Boost connector on the main wire harness [Boost Connector Pin Out](#). A clutch switch or trans brake button should be wired between the timer enable pin and a 12-volt source. A toggle switch can be added between the 12V source and the clutch switch or transmission brake button to allow the timer enable pin to be turned on and off (see the illustration below)

In the example table below once 12V is applied to the “**Timer Enable**” wire, Stage 1 will be activated one half (.5) seconds, Stage 2 will be activated after two (2) seconds, and Stage 3 will be activated three and one half (3.5) seconds.

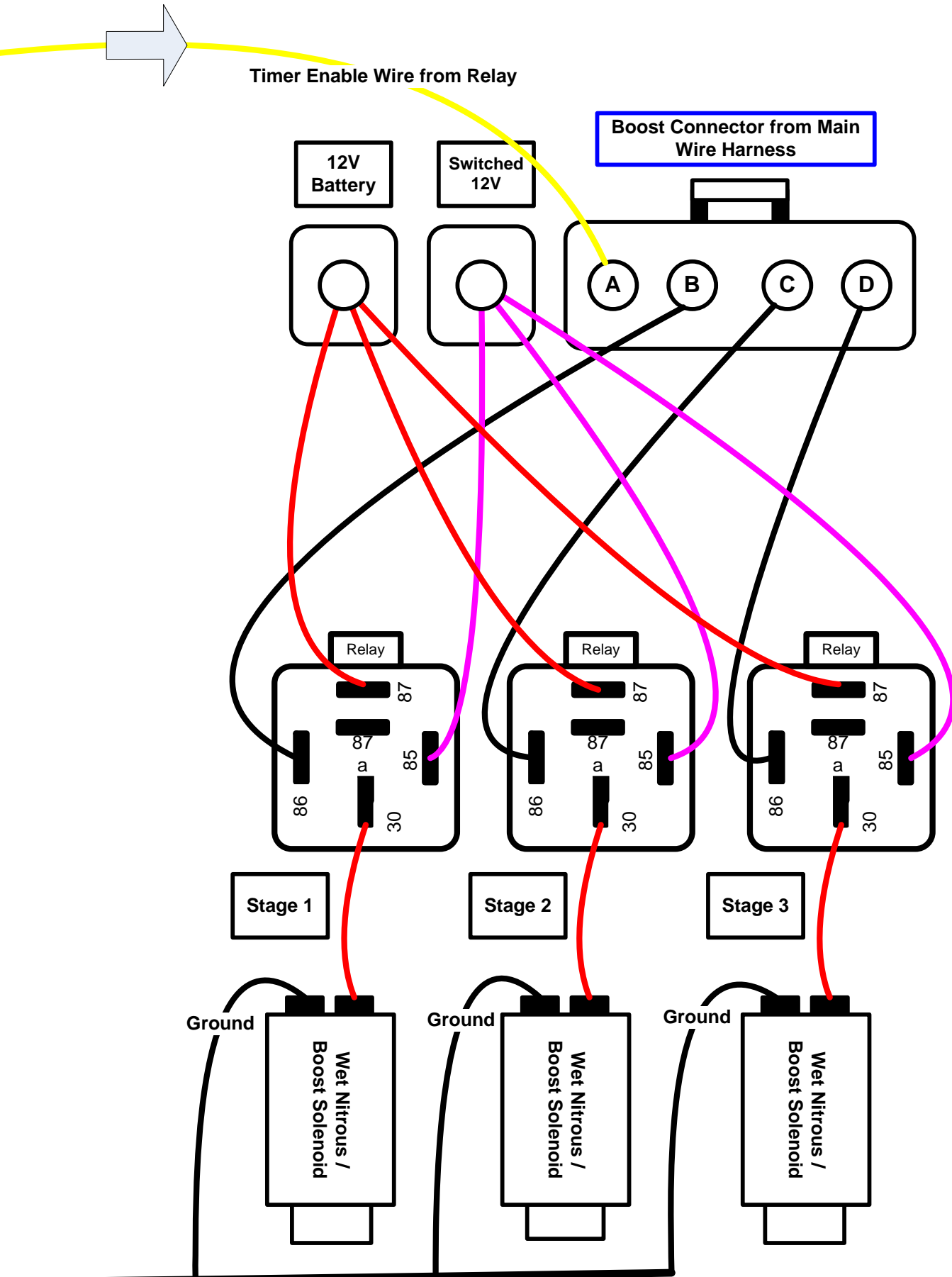
Note: Once the stages are turned on, they stay on until the TPS and/or RPM criteria are no longer true or the Timer Enable goes low/off.

Note: The “Timer” sequence will be reactivated, every time the throttle is closed and then opened again, since the “Minimum RPM and Minimum TPS criteria are re-satisfied.

Boost Parameters		Closed Loop Boost Parameters	
Minimum RPM	3000 RPM	Proportional Gain	15
Minimum TPS	50.0 %	Derivative Gain	7
Stage 1 Timer	.5 sec	Integral Gain	3
Stage 2 Timer	2.0 sec	PWM Boost Reference	
Stage 3 Timer	3.5 sec	<input type="radio"/> MPH <input checked="" type="radio"/> RPM	
Boost Mode		Spark Retard Mode	
<input checked="" type="radio"/> Staged <input type="radio"/> PWM		<input checked="" type="radio"/> 3 Stg Boost <input type="radio"/> 1st Gear	
1st Gear Timer OverRide		1st Gear Axis Units	
0.0	Sec	<input checked="" type="radio"/> Time <input type="radio"/> RPM	
Blend Rate	0 Counts	1st Gear Closed Loop Parameters	
High Gear Rtd Delay	0.0 Sec	Proportional Gain	0
High Gear Rtd	0.00 Deg	Derivative Gain	0
		Integral Gain	0

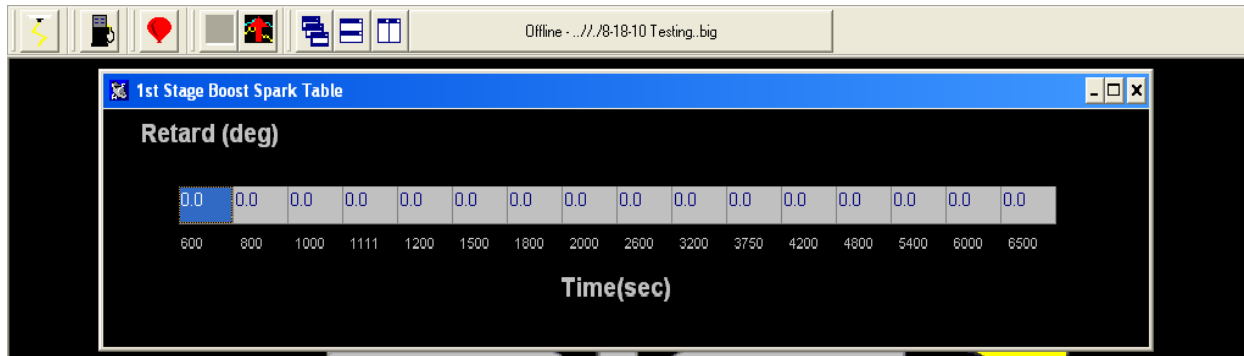
OK Help Close

BigStuff3 3 Stage Boost (Solenoid) Wiring



Boost Spark Tables 1, 2 & 3

The Boost spark tables allow the user to set the spark retard (degrees) timing as a function of RPM for each stage. The retard timing for each stage is not additive. In other words, when the second stage comes on it replaces the timing values of the first stage and when the third stage comes on it replaces the timing values of the first and second stage.



To change a value in the **Stage 1 Boost Spark** table, move the cursor using the PC's mouse or arrow keys to the cell to be changed. Input the desired value and hit **“Enter”** to save the change.

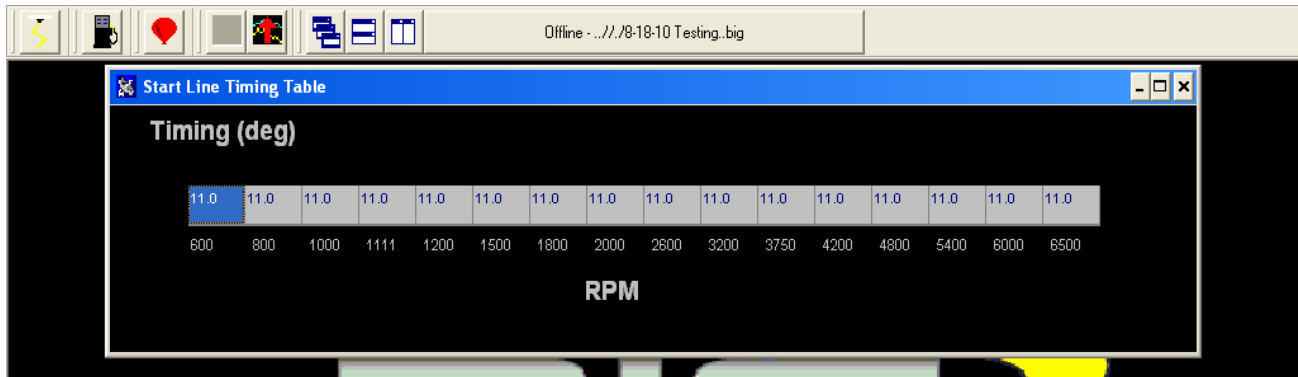
64. Start (Starting) Line Timing

The GEN3's Starting Line Timing feature is primarily focused at stick shift and turbo charged vehicles (turbo cars with stick or automatic transmissions). This feature allows the engine to build boost at the starting line. The Starting Line Timing feature can be used in conjunction with the 2-Step to maximize starting line performance!

How to Use With Stick Shift Cars - For stick shift cars, the ignition timing needs to be retarded in order for the engine to build boost at the starting line (with the clutch in).

If this feature is used with the 2-Step, make sure that [Boost Parameters](#) RPM input is set 1,500 RPM below the 2-Step RPM enable point. Once the TPS and RPM Boost Parameters criteria are satisfied (and there is 12 volts supplied to the two step wire), the ECU will use the timing values from the Starting Line Timing table. If the RPM and TPS criteria are not met (and/or 12 Volts is not supplied to the two-step wire), the ECU will default to the timing values in the main spark map. The values in the main spark map may not allow the engine to build boost, so it is important to properly configure the relationship between the Boost Parameters RPM and TPS criteria and the 2-Step RPM. It takes +12V to activate the 2-Step.

How to Use With Automatic (transmission) Cars – For automatic cars, the ignition timing should not be retarded. You want to use whatever ignition timing values the engine requires to build boost and make the car leave hard.



Note: The timing values, inputted into the Start Line Timing table, are the **absolute** values the ECU will use when the Boost Parameters minimum RPM and TPS are reached! If you enter zero (0) in the table, there will be no starting line timing.

Boost Connector Pin-out Configuration

Connector Pin	Function
A	Timer Enable
B	Stage 1 / PWM Output
C	Stage 2
D	Stage 3

65. Dash

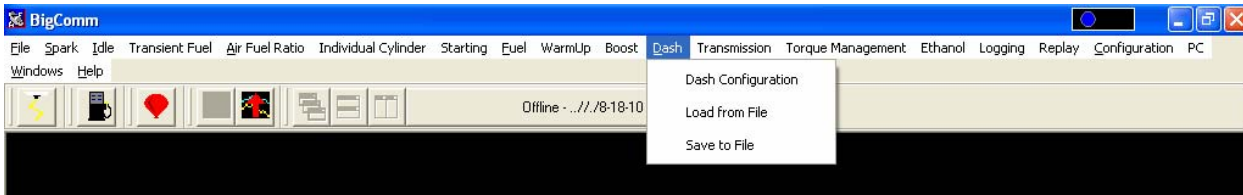
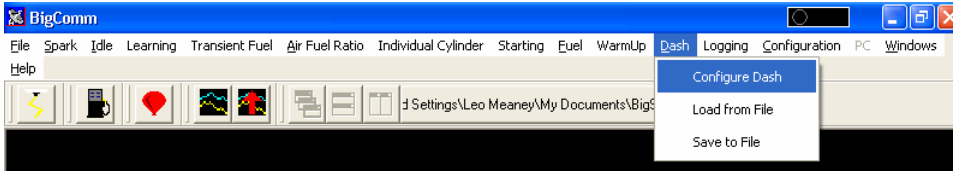
A Dash, (short for Dashboard) can be configured and displayed at the bottom of most of the “Operating Screens” within the BigComm software. A Dash needs to be selected, configured and saved as a default before it will appear at the bottom of a BigComm software “Operating Screen”. Up to thirty-one (31) individual Dashes’ can be configured to display various engine parameters also referred to as [Signals](#).

When the BigComm software is launched, it uses the “Default Dash” (which contains the 31 separate dash’s) from the **C: Program Files/BigStuff/BigComm folder**. The “Default Dash” is actually a compilation of the 31 available dash’s.

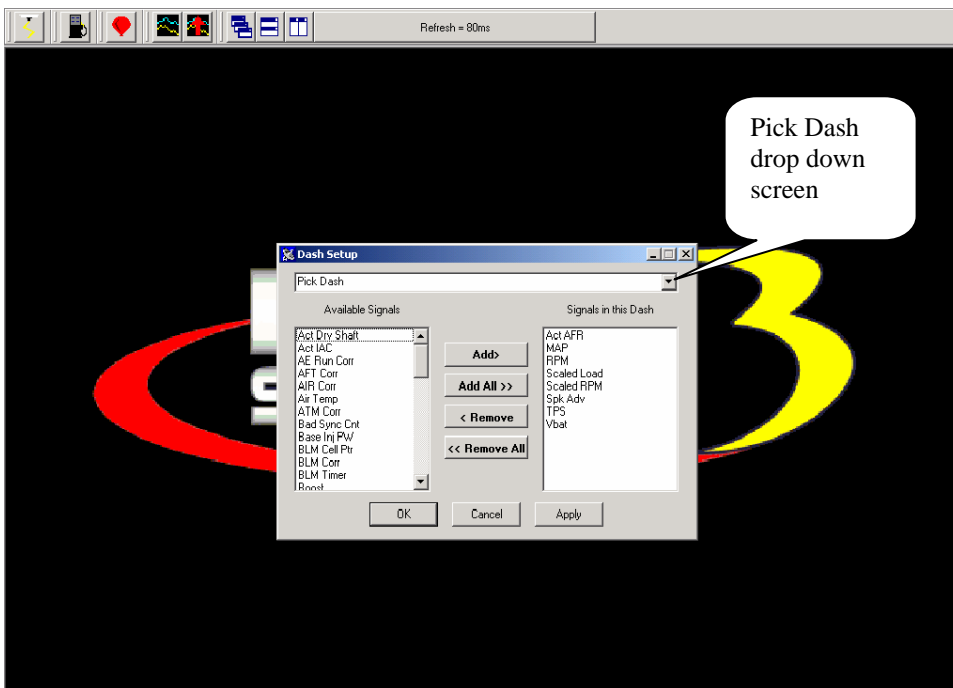
The recommended way to configure the “Default Dash” is to configure each of available dash’s, or most frequently used dash’s, to your liking and then save them as the “Default Dash”. This way, every time you open the BigComm software, the dash’s will be open to the preferred configuration.

66. Configure Dash

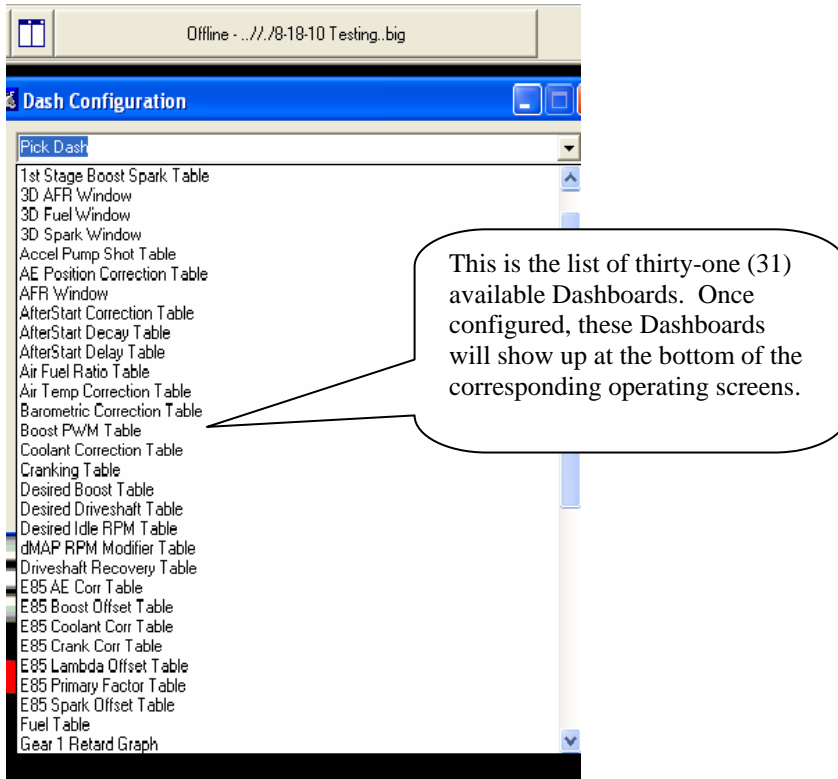
To configure a Dash, go to **Dash** on the Tool Bar. Left click on “**Dash**” and the drop down screen shown below will open. Keep the left mouse button depressed and slide the mouse pointer down until “**Dash Configure**” is highlighted.



Release the left mouse button. The screen below will open. Left Click on the “Pick Dash” drop down screen.

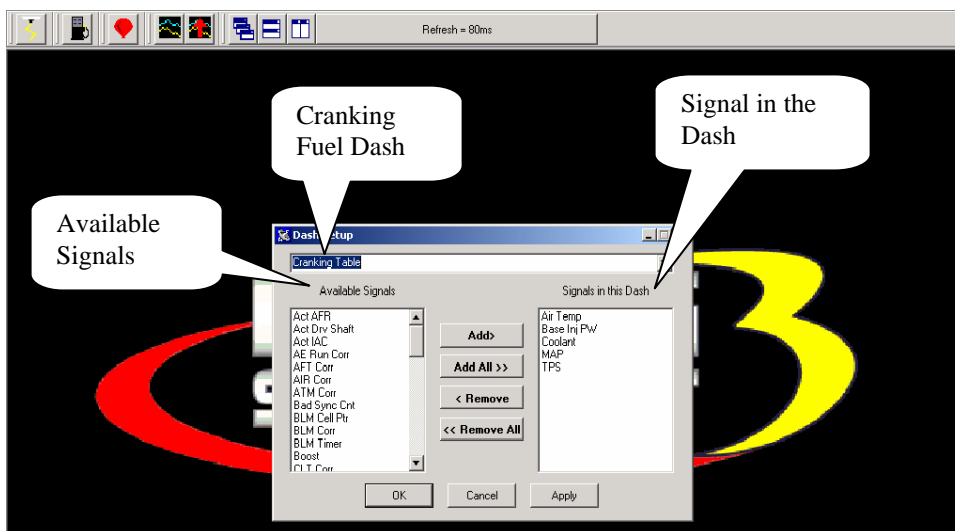


The screen below will appear.

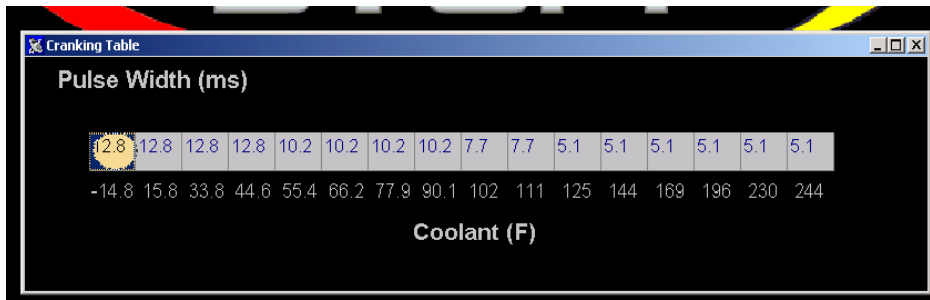


After selecting a Dash to configure, “**Signals**” need to be selected and added to the Dash. After the Signals are selected, added and saved, they will be displayed in the Dash at the bottom of the relevant BigComm software screens. The left side of the drop down screen below shows the “Available Signals”. The right side of the drop down screen below shows the “Signals in the Dash”. To add Signals to the Dash, highlight a desired Signal on the left and click Add. The Signal will move to the right side of the screen (Signals in the Dash). All Signals shown under “Signals in the Dash” will now appear in the Cranking Fuel screen when that screen is used to calibrate the Cranking Fuel.

In the Cranking Fuel example below, Air Temp, Base Injector Pulse Width, Coolant, MAP and TPS were selected and added to “Signals in the Dash”.



In the screen print below notice that the same “Signals” appear in the Dash at the bottom of the Cranking Fuel screen.



67. Save a Dash

Again, the recommended way to configure the “Default Dash” is to configure each of available dash’s, or most frequently used dash’s, to your liking and then save them as the “Default Dash”.

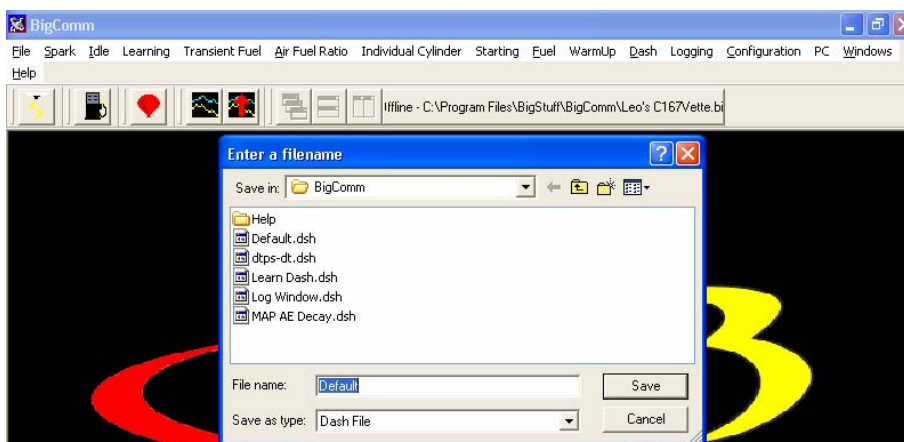
This way, every time you open the BigComm software, the dash’s will be open to the preferred configuration.

Once the “Default Dash” has been saved, individual dash’s can be changed and saved again as part of the compilation of dash’s referred to as the “Default Dash”.

The steps for saving a reconfigured Dash, so that it becomes part of the “Default Dash”, are outlined below:

- After configuring a Dash hit OK at the bottom of the Dash Setup window. The window will close.
- Go back to **Dash** on the Main Window tool bar and Select **Save To File** from the Dash drop down list. The screen below will open

Note: Before saving the Log Window dash for the first time, you need to navigate to the **C: Program Files/BigStuff/BigComm** directory. This step only occurs the very first time any Dash file is saved. Subsequent Dash file saves will automatically be saved to the **C: Program Files/BigStuff/BigComm** folder.

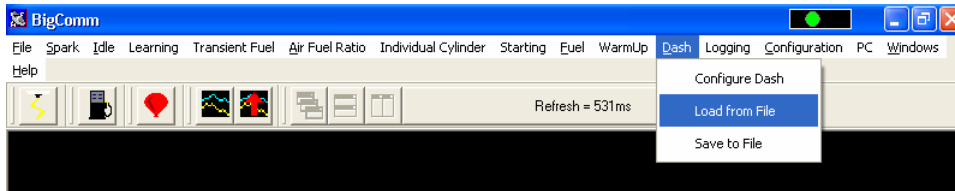


Name the file “Default” and hit **Save**. By selecting “Default” as the file name, the Log Window dash becomes part of the compilation called “Default Dash”. Again, the file will be saved to C:/Program Files/BigStuff/BigComm directory.

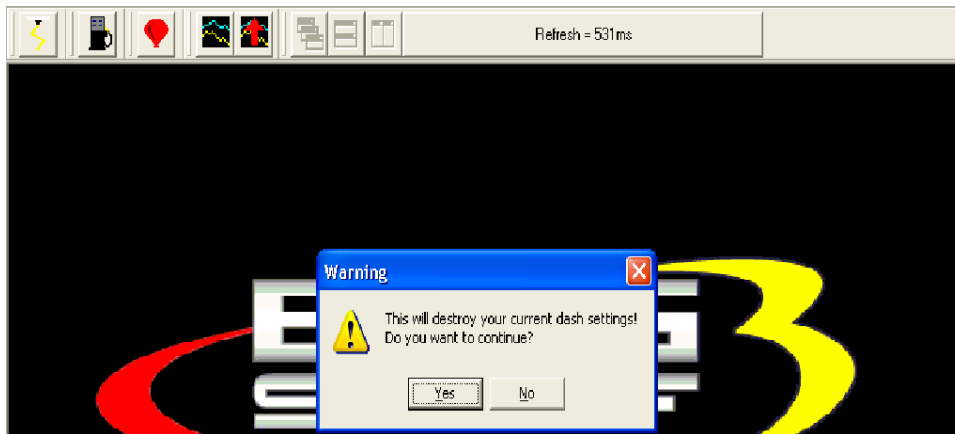
- A unique file name can also be assigned by typing the name in the “File Name” sub-window and clicking on **Save**.

68. Load From File

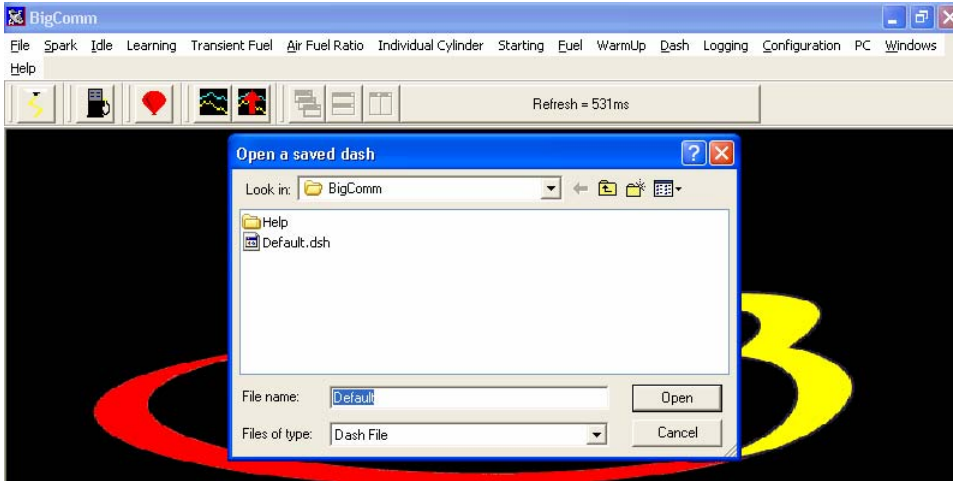
In addition to the “Default Dash” unique dash’s can be configured and used, e.g. Turbo Car dash. To view a previously saved unique dash, go to **Dash** on the Main Menu screen. Left mouse click on Dash and slide the cursor down to “Load from File”.



Release the left mouse button and the following screen will open with a message that reads, “This will destroy your current Dash setting.” “Do you want to continue”?



Select “Yes”. The screen below will open. All the previously saved log files will be listed. Select the file to be opened by double clicking the left mouse button. The selected logged file will open.

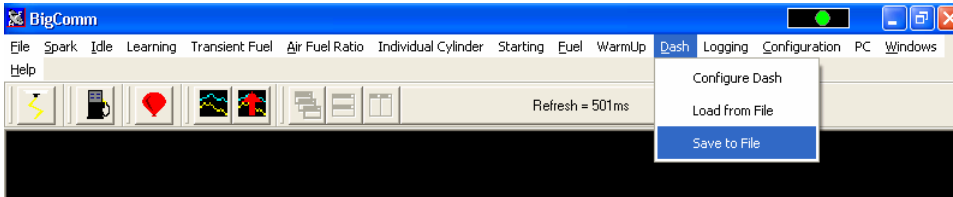


The next time the BigComm software is opened it will automatically load and run the “Default Dash” compilation, while retaining your unique dash in the **C: Program Files/BigStuff/BigComm** folder.

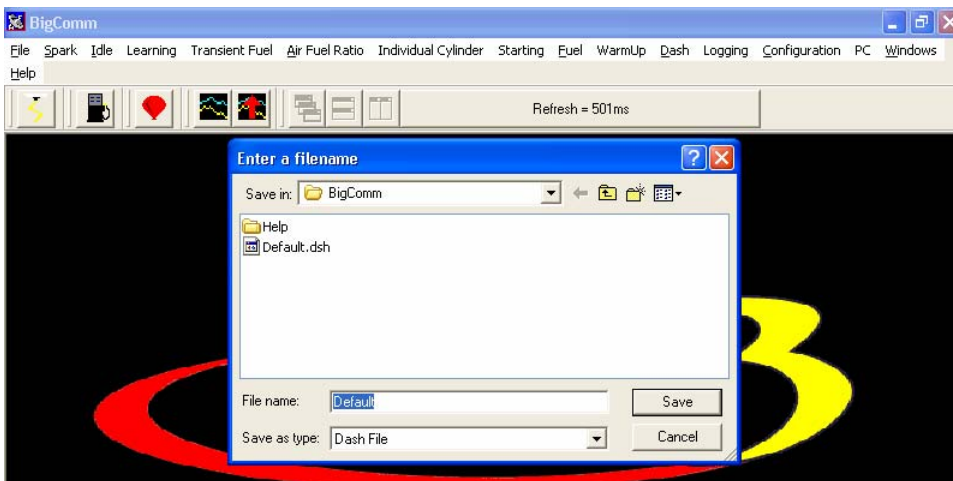
69. Save to File

Section 69 above described how to configure the 31 available Dash’s. The steps for saving a reconfigured dash in the “Default Dash” or unique dash compilation are outlined below.

To save a Dash, go to **Dash** on the Main Menu screen. Left mouse click on Dash and slide the cursor down to “Save to File”.



Release the left mouse button and the following screen will open.



Name the Dash to be saved in the “File Name” sub-window and hit **Save**. The dash will be saved.

70. BigStuff3 Data Acquisition

As an option, the GEN3 ECU is capable of supporting both internal (internal to the GEN3 ECU) and external (to a remote personal computer) data logging. The **GEN3's internal data logging eliminates the need for a PC in the car!!**

"Logging" files and "Replay" files are automatically saved to the BigComm folder. Logging files are saved with a .csv suffix. Replay files are saved with a .csv (replay) suffix. When you look at the BigComm folder using Windows Explorer, you can see both file types. When using the Replay function and want to view a Replay file, the only files shown will be Replay (.csv replay) files. When using the Logging function and want to view a Log file, the only files shown will be Log (.csv) files.

Logging vs. Replay

Logging – A very basic data acquisition system that requires all data to be recorded to an external source, thus requiring a PC in the car. Only base system engine operating parameters can be recorded. The more parameters selected to be recorded, the slower the sample/transfer rate. Also, only the parameters selected to be recorded are saved for future reference. The Logging feature is often used and very useful for dyno tuning.

Replay – The GEN3 “Replay” system (\$200 upgrade) is an advanced data acquisition system that records all engine and vehicle operating parameters internal into the GEN3 ECU. No PC is required in the car! All base system operating parameters and any engine/vehicle operating parameters that are part of GEN3 system upgrades are also recorded. The GEN3 ECU has 128k of on board RAM for internal data logging up to 52 user selectable channels, twenty two (22) 16 bit channels & thirty (30) 8 bit channels), with 10-bit resolution. The system operated at a 50Hz acquisition rate, or 20 times per second! Understanding that it takes about 150 milliseconds to slam the throttle to the flow, a 50Hz acquisition rate is pretty good. All of the data recorded is available for future reference!

71. Logging (External)

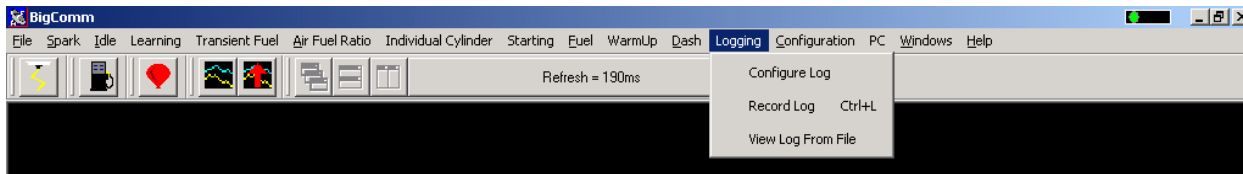
This section, titled **Logging**, describes the external data-logging feature. The internal data-logging feature, titled [Replay](#), is described in the following chapter.

The BigComm software allows the user to log data while the engine is running. The data is captured by an external PC during the logging event and can be subsequently reviewed “On-Line” (connected to the ECU) or “Off-Line” (PC only).

Note: The Dash for the Log Window needs to be configured so that all of the logged data is captured and displayed in the Dash at the bottom of the Log window. Refer to the Dash/Logging procedure outlined at end of the Logging section. Also see [Dashboard](#) for information on how to configure other Dashes.

From the tool bar on Main Menu screen, left click on “**Logging**”. The drop down screen below will open.





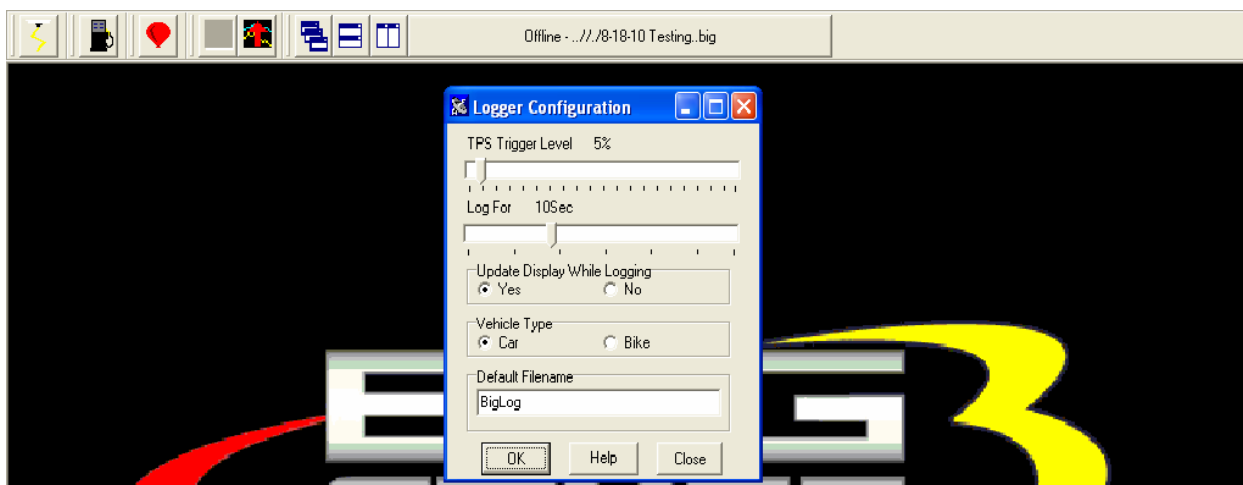
From this drop down screen, the following data Logging events can be configured:

- Configure Log – Instructs the ECU to:
 - Start logging when user defined TPS percent (%) is reached.
 - How long to Log data for.
 - Whether the display will update while data is being logged.
 - Set the default file name for the series of data to be logged.
- Record Log – Starts logging data.
- View Log From File - View logged data from a user defined file name.

The logging options are further explained below.

72. Configure Log

From the tool bar on Main Menu screen, left click on the “**Logging**”. When the drop down screen opens, hold the left mouse button down and slide the mouse until **Configure Log** is highlighted. Release the mouse button. The screen below will open.



Using the Throttle Position Sensor (TPS) as a Load input, the user can automatically trigger the BigComm software’s data-logging feature. Place the left mouse cursor on the “TPS Trigger Level” slide bar. Depress the left mouse button and slide it to the desired TPS % value or threshold. The logging feature will automatically start once the selected % TPS value is exceeded.

Before exiting this window the following, additional logging parameters should set:

- “**Log-For**” **Setting** – This setting dictates how long the ECU will log the data (Zero (0) to thirty (30) seconds). To set the data Log period, place the mouse cursor on the “Log For” slide

bar. Keep the left mouse button depressed, and move the slide bar left or right to achieve the desired data log time frame.

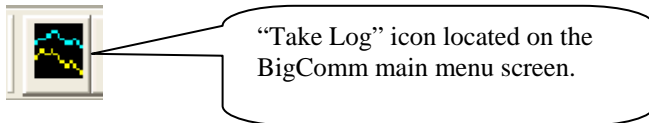
- **Update Display While Logging** – Determines whether or not the logged data will be displayed in the Log Window screen. Select Yes to display or No, not to display.
- **Set Default File Name** - The default file name for the data being logged. A default file name needs to be established and saved. Once a default file name is set, the ECU will automatically include number extensions for all subsequently saved files under the same default file name.

Once the desired changes have been made, click OK at the bottom of the window. Your changes will be saved.

73. Record Log (F8 – “Quick Key”)

The “Record Log” function is another way to initiate a data Logging event. To use this method, go to the tool bar on Main Menu screen and left click on “**Logging**”. When the drop down screen opens, hold the left mouse button down and slide the mouse until “**Record Log**” is highlighted. Release the mouse button. A blank Log screen will open. To start logging data, depress the space bar on the laptop keyboard once.

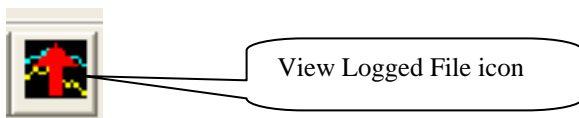
A data-logging event can be initiated by simultaneously depressing and holding the “Control” (Ctrl) and “L” keys on the PC’s keyboard. Left mouse clicking on the “Take Log” icon from the BigComm Main Menu screen will also start a logging event.



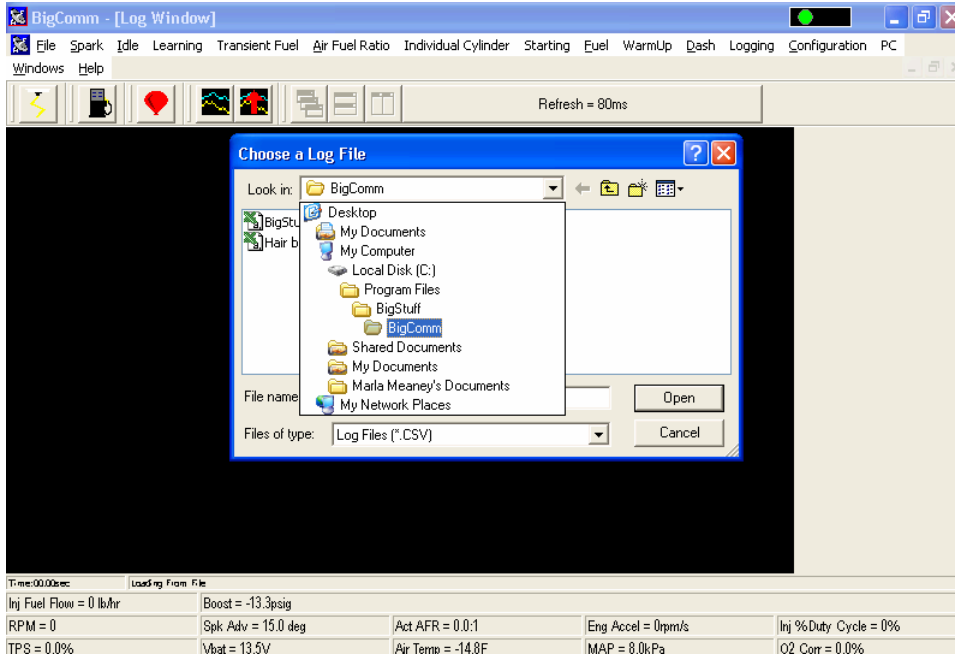
The ECU will log data for the time period defined in the Logger Configuration screen outlined above. Once the logging event is complete, the ECU automatically stores the logged event as a file, using the default file name, which was set up. The file should be saved in the Program Files\BigStuff\BigComm folder. If not, navigate to this folder location. The next time the BigComm will automatically save the logged file to this location.

74. View Log from File

To view a logged file go to the BigComm main menu and click on the “**View Logged File**” icon.

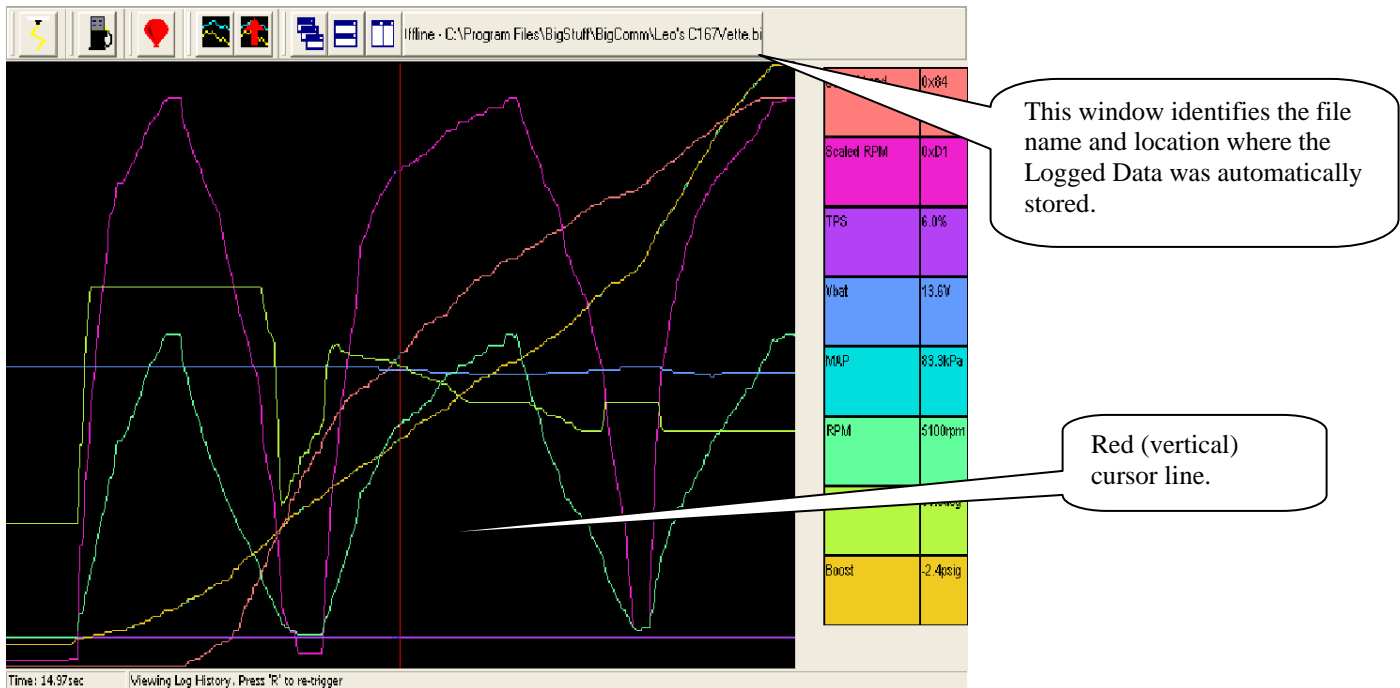


The following window will open. Choose the desired file to view by double clicking the left mouse button on the file. The logged file will open.



An example log screen is shown below. In this example, the Log Window [Dashboard](#) was setup to collect and display Scaled Load, Scaled RPM, TPS, V bat MAP, RPM, Spark Advance and Boost, as shown on the right side of the screen.

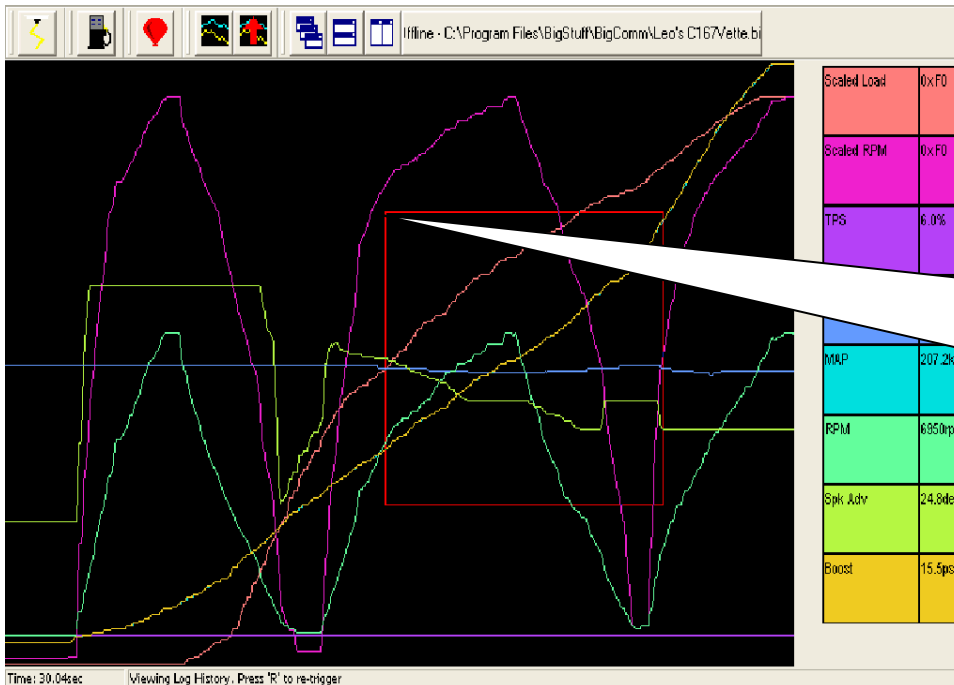
The left and right arrow keys on the keyboard can be used to move horizontally across the logged data graph. As the vertical, red “cursor-line” is moved across the graph, the Log Dash displays the actual engine operating parameters recorded at each point in the graph.



The user can also “zoom-in” on a particular area of the logged data in the graph. To “zoom-in” on a particular area of the graph, depress and hold the left mouse button. Drag the mouse to cover the desired area. A red box is created around the selected area, as shown in the screen print below.

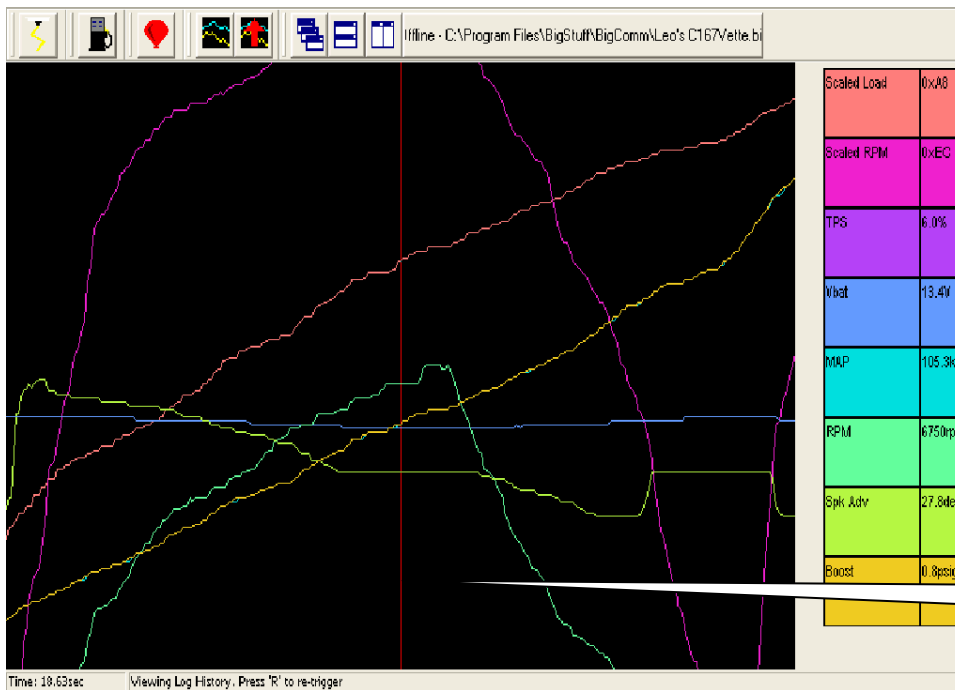


Release the left mouse button and the selected graph area will fill the screen. Again, the left and right arrow keys on the keyboard can be used to display the actual engine operating parameters recorded at each point in the graph.



Red "Zoom In" box created when left mouse button is depressed in the upper left hand corner and dragged down and across to create a box over the desired area.

Once the left mouse button is released the graph area inside the red box above will fill the screen as shown below.



Red cursor line

The left and right arrow keys on the keyboard can be used to move the red cursor line to display the actual engine operating parameters recorded at each point in the graph. Click the right mouse key to get back to original Log Window screen.

75. Dash/Logging procedure to record Data Log session

1. Select **Dash** from the Main Window tool bar.
2. Select **Configure Dash** from the Dash drop down list.
3. Select **Log Window** from the **Pick Dash** drop down selection window.
4. Select the **Available Signals** that you want to appear in the **Log Window** dash. The selected signals will also be logged when **Record Log, Record Log Icon** or **F8** quick key are selected. Be sure to select **Scaled Load & Scaled RPM** if you want to use the **Trace** function to assist with the calibration of the Base Fuel and Spark Maps.
5. After selecting the Available Signals hit **OK**.
6. Select **Dash** again from the Main Window tool bar to save the Log Window dash.
7. Select **Save To File** from the Dash drop down list.
8. Before saving the Log Window dash, you need to navigate to the **C: Program Files/BigStuff/BigComm** directory. **Note:** Step 8 only occurs the very first time any Dash file is saved. Subsequent Dash file saves will automatically default to the C: Program Files/BigStuff/BigComm directory.
9. Once you are in the C: Program Files/BigStuff/BigComm directory, you can save the Log Window dash. You can assign a unique file name by typing the name in and clicking on **Save** or save it as the “Default Dash” by clicking on **Save** with **Default** highlighted as the file name. By selecting Default, the Log Window dash becomes one of the new dash’s in the “Default Dash” compilation.
10. Next select **Logging** from the Main Window tool bar to configure the data log parameters.
11. Select **Configure Log** from the Logging drop down list.
12. Select the **TPS Threshold** (0 – 100% TPS), **Log for** (0 – 30 seconds) & **Update Data While Logging** (yes or no) settings. Next **type** in a Log File name and hit **OK**. **Note:** Once the initial Log File name is entered, the BigComm software automatically increments, with number extensions, and saves the subsequent Log Files, associated with the initial file name. You will need to create a new Log File name to initiate another log data session that is not related to the initial file name.
13. After entering a Log File name, a Record Log session can be initiated. Again, there are several ways to initiate a log session. Below are the different log initiation options.
 - Option 1: Hit the **F8** key.
 - Option 2: Select the **Record Log Icon** in the Main Window tool bar. When the log window opens, hit the PC’s space bar to start the logging event.
 - Option 3: Select **Logging** from the Main Window tool bar. Then select **Record Log** from the Logging drop down list.

Note: Steps 1 through 13 can be configured off-line or on-line. However, you need to be on-line to record a data log session.
14. After selecting one of the above Record Log options, the Log Window Dash will be displayed. Hitting the PC’s Space Bar or exceeding the TPS Threshold setting can initiate the Record Log session.
15. Once the Record Log session is initiated, the BigComm software will begin to record the Log Window Dash signals. The logged signals will be displayed in the Dash at the bottom of the screen as well as on the right hand side of the Log Window Dash screen. The signals will be recorded for as long as the Record Log Time setting (0 – 30 seconds). **Note:** After the Record Log session has timed out, the Log Window Dash signals will continue to be displayed, in real time, at the bottom of the screen (assuming that the engine is still running). Also, if power is turned off before the Record Log session has timed out, the Log File data will be lost.

16. Once the Record Log session has timed out, you can either view the Logged data file (see step 17) or initiate another Record Log session by hitting the **R** key. Once triggered, hitting the PC's Space Bar or exceeding the TPS Threshold setting can initiate another Record Log session.
17. There are a couple of ways to access the Record Log data file. Below are the options.
 - Option 1: Select the **View Log File Icon** from the Main Window tool bar.
 - Option 2: Select **Logging** from the Main Window tool bar. Drag the mouse to **View Log File** from the Logging drop down list.
18. After selecting one of the above View Log File options, select the Log File you want to view and click on **Open**. Once opened, the Log File data will appear in the Log Window. Refer to the [Logging](#) section of the BigComm instruction manual to learn how to navigate the Log Window screen.
19. The Trace function can also be used in the on-line or off-line mode to help calibrate the Base Fuel and Spark Maps in the "Record Log" files. "Calibrating with the Trace Function" is outlined in the next chapter of the manual.

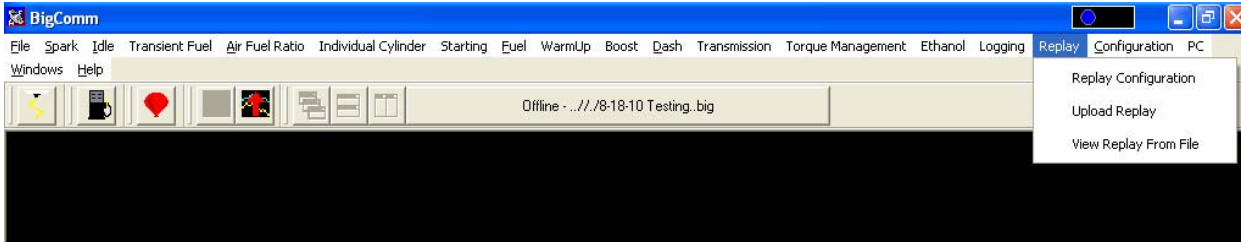
76. Replay - Internal Data Acquisition to GEN3 ECU - **Optional Feature**

The GEN3 ECU's optional internal data logging capability is called "**Replay**". **Replay** eliminates the need to keep your PC in the car while going down the track. The **Replay** internal data acquisition system is capable of sampling fifty-two (52) channels of data, fifty (50) times per second! The Replay option is available in two configurations; the "Original" Replay option records for up to 18 seconds, the "Extended" Replay option records for up to five (5) minutes. Both "Replay" options are described in the sections below.

The matrix below outlines the engine, and vehicle operating parameters that can be recorded with the GEN3's internal data acquisition system. The column titled "**Base Feature or Optional System Upgrade**" indicates whether the operating parameter can be recorded with the internal data acquisition system supplied with the base system or as part of a system upgrade. It also shows the parameters available with the "Original" and "Extended" Replay options

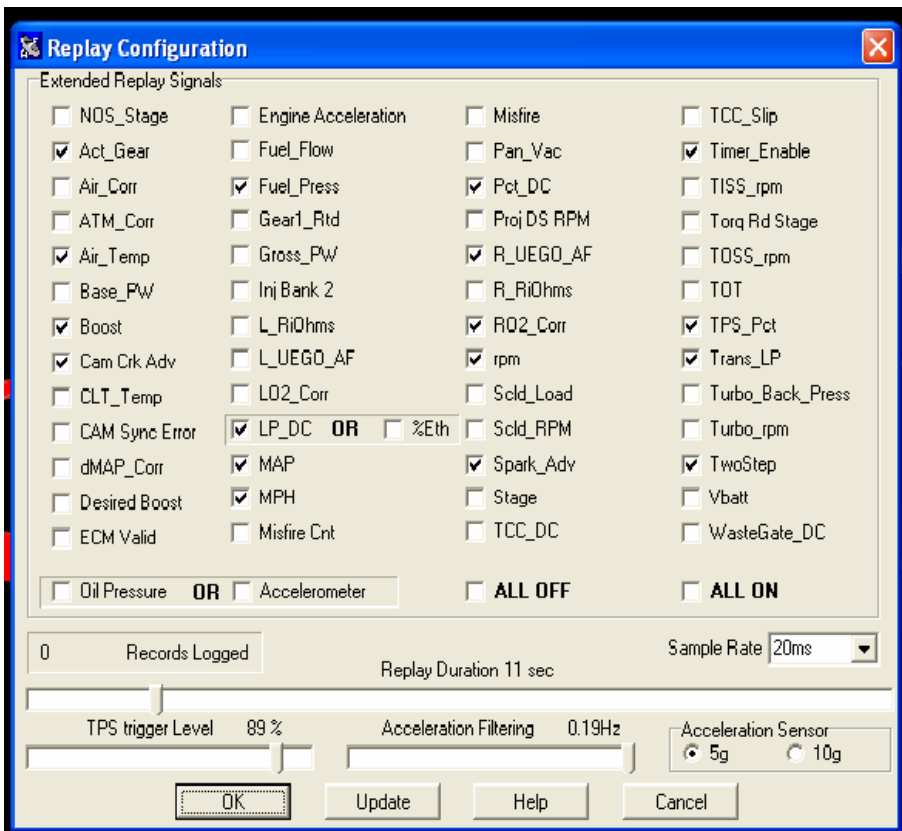
In order to record data to the internal RAM, the Timer Enable pin, **Pin A** of the 4-way Boost connector on the main wire harness [Boost Connector Pin Out](#) and the TPS threshold setting must be met. A toggle switch should be wired between the 12 Volt source and the timer enable pin to allow the replay function to be turned off. After a pass (with the ignition off) the data will be maintained in the ECU's internal RAM for 30 minutes. After thirty minutes the data will be lost so it needs to be uploaded to a PC within this time. Once you've verified the data is good, turn off the Timer Enable pin (via toggle switch) for the next logging event. Remember to turn the toggle switch back on prior to staging the car. **Note:** Even if the TPS is satisfied again (clear flood to restart on the return road) none of the data will be lost. You can only record another run by turning the toggle switch (connected to the data log trigger wire) off and then back on.

Inside the "**Replay**" drop down there are three (3) submenus. Each submenu will be described in the paragraphs below. To get to the **Replay** drop down screen, go to the main Tool Bar and left click on **Replay** and the screen below will appear. Hold the left mouse down and drag it to the desired input screen and release the mouse button.



77. Configure Replay

To configure Replay, open the Configure Replay drop down screen as shown above. The following screen will open.



Signals Displayed – Select the signals you would like logged and displayed by checking the box next to the desired signal. Check the “ALL OFF” or “ALL ON” toggles the bottom of the table to turn all the signals off or on respectively. Any signal checked will be logged and displayed.

Replay Duration – The length of time the GEN3 ECU will log data, once initiated by the TPS Trigger Level setting. The data logging duration can be set from one (1) to eighteen (18) seconds.

TPS Trigger Level – The throttle position (TPS position in degrees) that will trigger the GEN3 ECU to begin logging data internally.

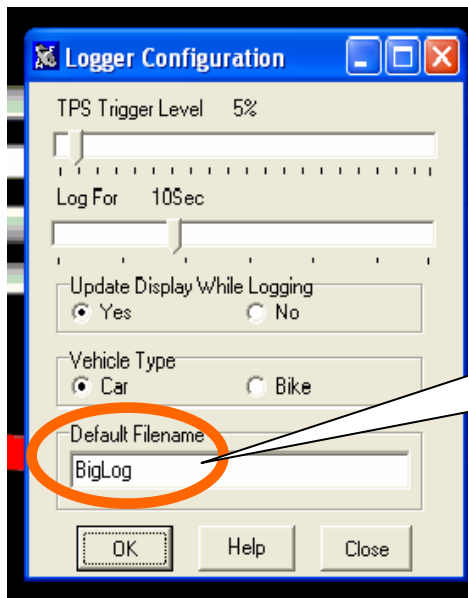
Sample Rate – If the GEN3 system is equipped with the “Extended Replay” option, up to 4 different sample rates/recording times can be selected as follows:

Sample Rate	Record Time (seconds)
20ms	76
40ms	152
60ms	228
80ms	304

During a Logging event, the GEN3 ECU automatically logs fifty two (52) parameters (referred to as Signals). After an event has been logged, hitting the letter “C” on the keyboard will open the “Replay Configuration” screen above. Signals can be selected or de-selected then graphed. This feature allows the user to control the number of parameters (Signals) displayed in a graph.

Naming Replays

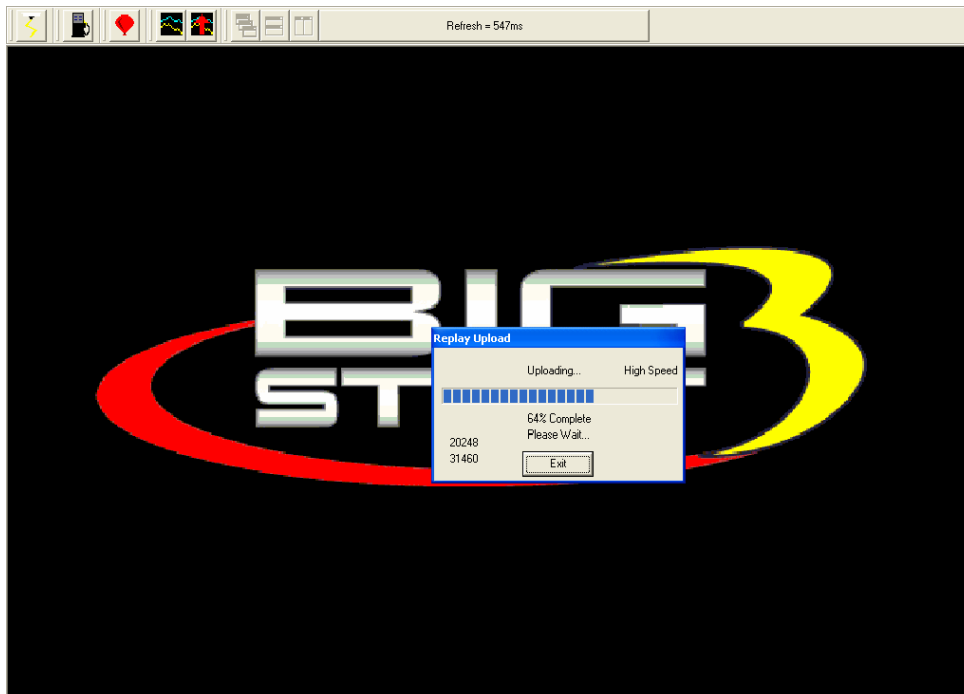
Replays are named using the **Logger Configuration** window shown below. The system is set up this way because the GEN3 system allows the user to record a Log (external) and Replay (internal) at the same time. Allowing two different names to be assigned to the same logging event would be problematic. Since Logging” is a base feature that exists in every GEN3 system sold, the name for each data record has to be established within in the Logger Configuration. Once a default file name is set, the ECU will automatically include number extensions for all subsequently saved files under the same default file name. For example, a Replay file name Vegas2010 will record the first Replay as Vegas2010_000. The second Replay of the day will be recorded, and automatically saved, as Vegas2010_001



All Logs & Replays are named using the Logger Configuration window. From the main tool bar go to Logging, then Logger Configuration

78. Upload Replay

Upload is the high-speed GEN3 ECU-to-PC data transfer process. When the **Upload** drop down is selected a progress bar will open displaying the progress of the data being transferred.



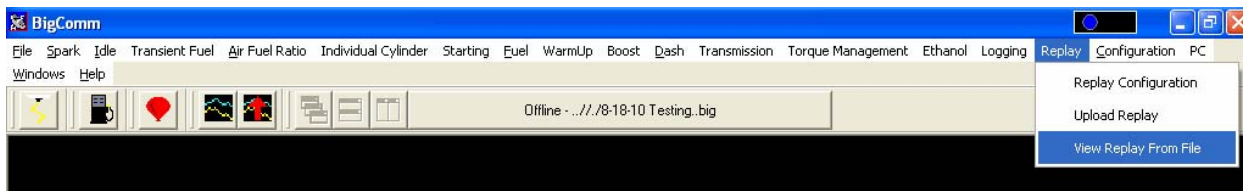
Once 100% of the data has been transferred, a file is automatically written to the folder hierarchy: **C: Program Files/BigStuff/BigComm**.

Note: The Replay file must be downloaded from the GEN3 ECU to a PC within thirty (30) minutes from when the ignition switch is turned off. After thirty (30) minutes the “Replay” data will be lost.

Note: The Replay data could be lost if the battery cut-off switch is turned off. If the GEN3 main wire harness, positive battery lead, is connected to the battery cut-off switch (strongly recommended), and the switch is turned “OFF” before the Replay data is uploaded, the data will be lost.

79. View Replay from File

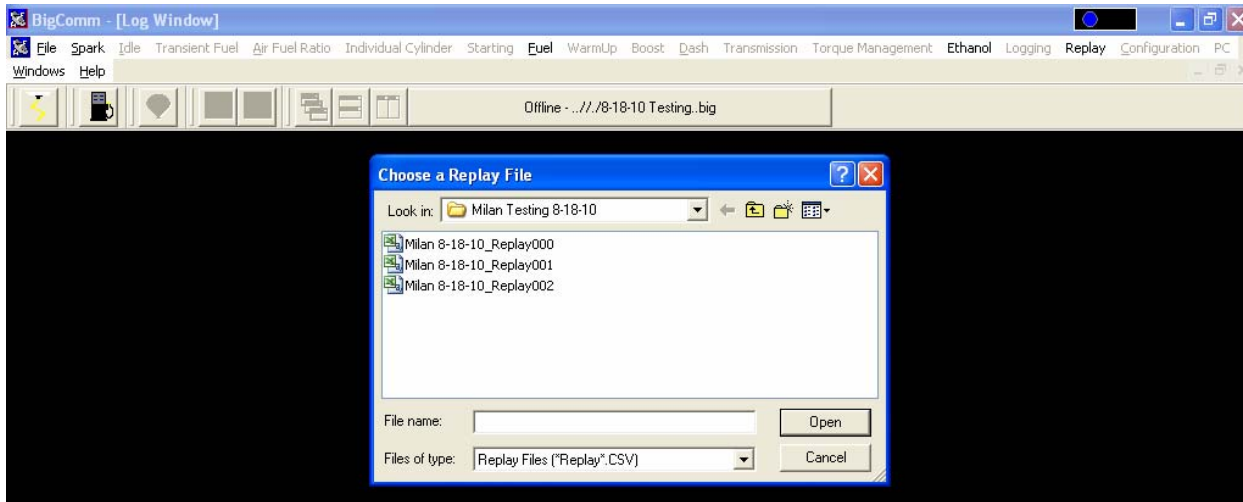
Once data has been logged and transferred to a PC it can be viewed in the same way as externally Logged data. To view Replay (logged) data, go to Replay on the Main Menu bar. Left click on Replay and drag the mouse down until View Replay From File is highlighted.



Release the mouse button and the screen below will open showing the available Replay logged files. The file can also be accessed using the same method as externally logged files are accessed.

The Trace function can also be used with Replay (internal data logger) logged files. For more information on how to use the Trace function go to the next chapter titled [Calibrating with the Trace Function](#).





EXTENDED REPLAY FIRMWARE – IMPORTANT NOTICE!

Please read carefully if your GEN3 system is being upgraded to any of the following optional systems: This section does not apply if the GEN3 system was originally purchased with any of these optional systems.

- SR2
- SR2 with ETM
- NTK WBO2 for methanol
- CAN EGT

Prior to the above mentioned upgrades, the GEN3 ECU was configured with “Original Replay” internal data logging capability (it recorded for up to eighteen seconds). The system upgrades mentioned above include the “Extended Replay” functionality, which increases the number of signals that can be recorded, and increases the record time up to five (5) minutes, based on the sample rate selected.

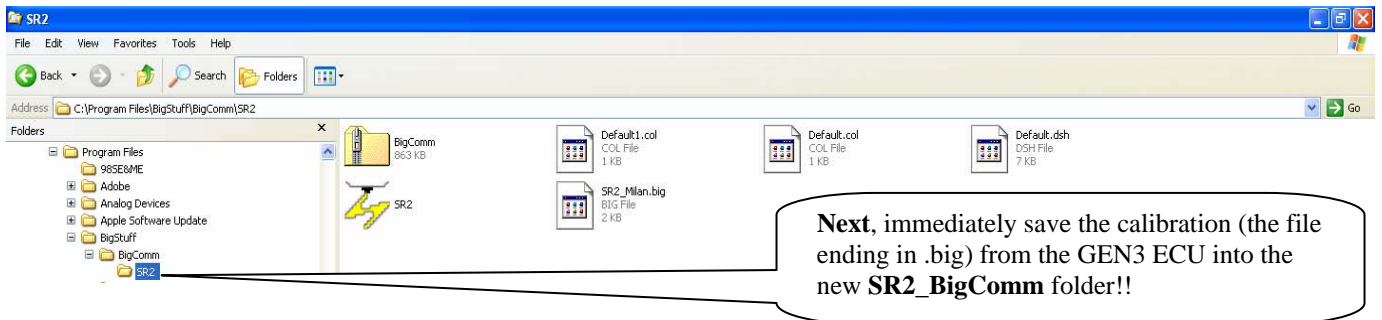
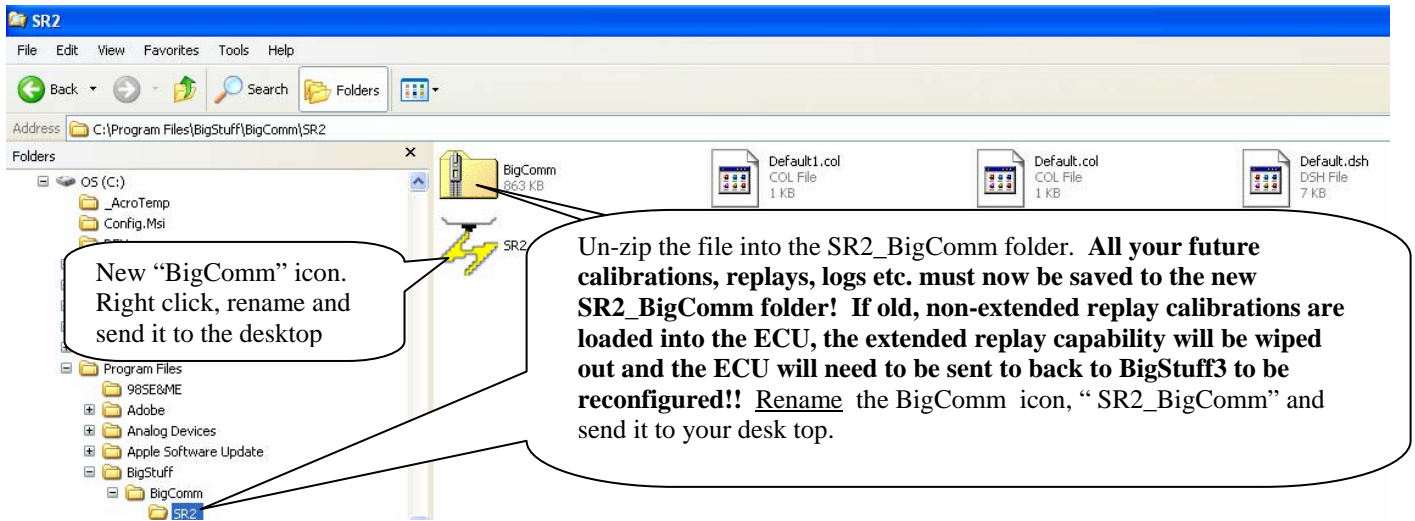
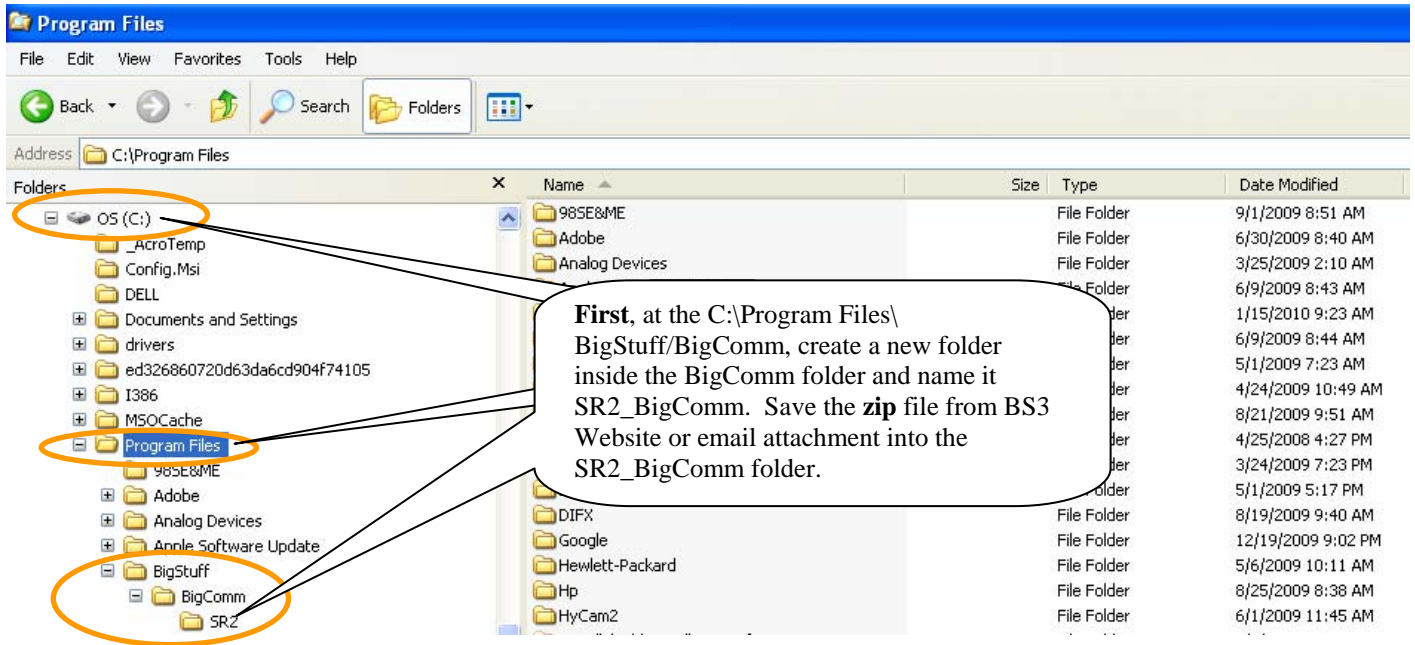
The “Extended Replay” firmware requires that a new folder be created inside of the BigComm folder, so that the internal data logging or “Replay” functionality is not affected.

First, create a new folder inside of the BigComm folder and name it **SR2_BigComm** so that the file hierarchy is: C:\ProgramFiles\BigStuff\BigComm\SR2_BigComm. Next, save, and then unzip the latest BigComm software, from the BigStuff3 website, into the new **SR2_BigComm** file folder.

Lastly, **and most importantly** connect your PC to the GEN3 ECU and immediately save the calibration from the BS3 GEN3 ECU into the new SR2_BigComm folder! This calibration must be used as your baseline moving forward. Previously created calibrations must not be used or the “Replay” functionality will be affected! If old, non-Extended Replay calibrations are loaded into the ECU, the new extended replay capability will be wiped out. The ECU may need to be sent back to BigStuff3 to be reconfigured!! **Call BigStuff3 if this situation occurs.**

See the screen prints below for the file setup details.





DAE – (Data Acquisition of External)

BigStuff3’s Data Acquisition External (DAE) system is a very popular upgrade. The DAE system user’s manual is available on the BigStuff3 website. The link to the manual is: <http://bigstuff3.com/pdf/DAE%20Users%20Manual.pdf>. Examples of key DAE parameters that can be logged (via the Replay feature) are as follows:

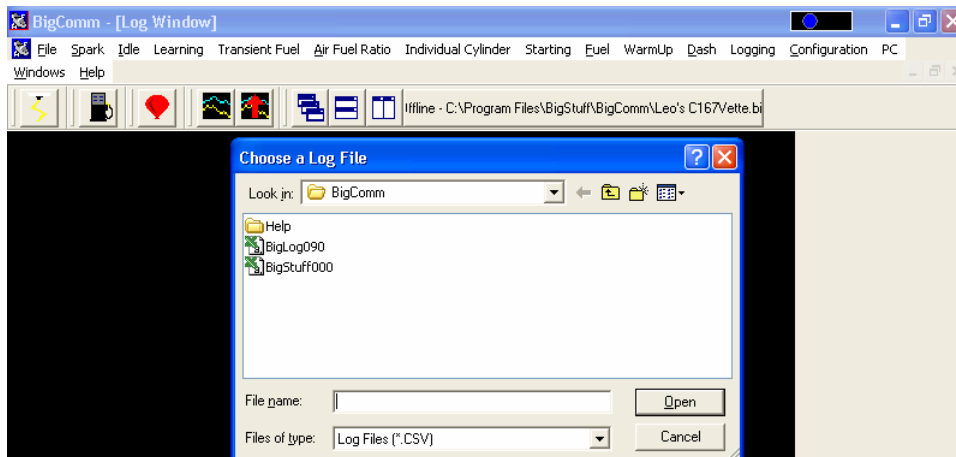


- **Pan Vacuum** – The oil pan vacuum or pressure can be logged using a GM 2 Bar MAP, which will read and record the pan vacuum/pressure in inches of mercury. A negative number represents vacuum and a positive number represents positive pressure in the crank case.
- **Fuel, Oil and Turbo Back Pressure** – Using a 1/8” pipe thread, 0 – 150-psi pressure transducer (available as an option from BigStuff3), the fuel, oil and turbo back pressure can be independently logged. Logging the fuel the rail pressure is particularly import in boosted applications where rail pressure needs to increase with boost pressure. The logged fuel pressure data provides the user important insight into whether the fuel pump(s) is capable of maintaining a constant fuel pressure differential during critical boost events.
- **Transmission Input Shaft Speed (TISS)** - The GEN3 ECU can accommodate input wheels with 1, 2, 4, or 31 teeth. Calculates a 16 bit rpm. This is an optional feature within the DAE system.
- **Transmission Output Shaft Speed (TOSS)** – The GEN3 ECU can accommodate input wheels with 1, 2, 4, or 40 teeth. Calculates a 16 bit rpm.
- **Torque Converter Control (TCC) Slip Percent (%)** – Calculates the slippage between the engine and the drive shaft and displays the result as a percentage (%) slip. This is an optional feature within the DAE system.

80. Calibrating with the Trace Function

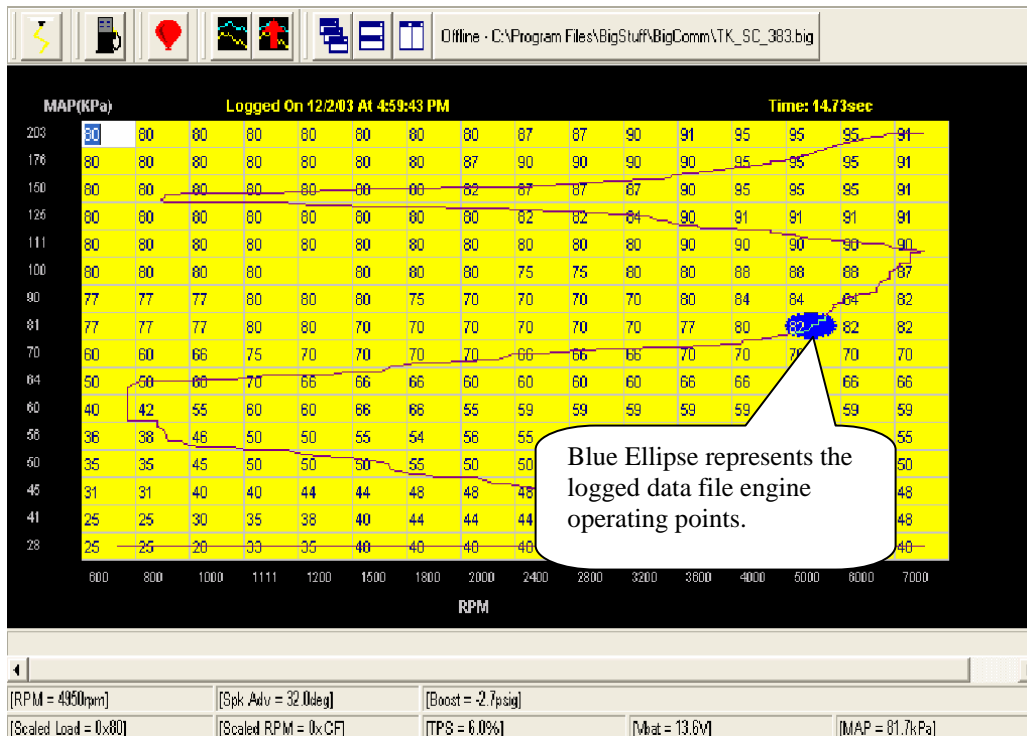
The BigComm software includes a very powerful calibration tool called the “**Trace Function**”. The “**Trace Function**” allows the user to calibrate Fuel and Spark Tables, using a Logged data file, “On-Line” or “Off-Line”.

To use the Trace function, open the Fuel or Spark Table. Once opened, hit the **T** key on the PC keyboard and the screen below will open.



The “Choose a Log File Screen” (shown above) will open and display the available, previously logged, files. Select and open the desired log file. Once opened, the Fuel or Spark table will turn yellow indicating that the Trace function is enabled. A trace line, representing the logged data file, will superimpose itself over the fuel or spark table.

Note: Scaled RPM (Sclد_RPM) and Scaled Load (Sclد_Load) must be logged in order to support the “Trace” function.

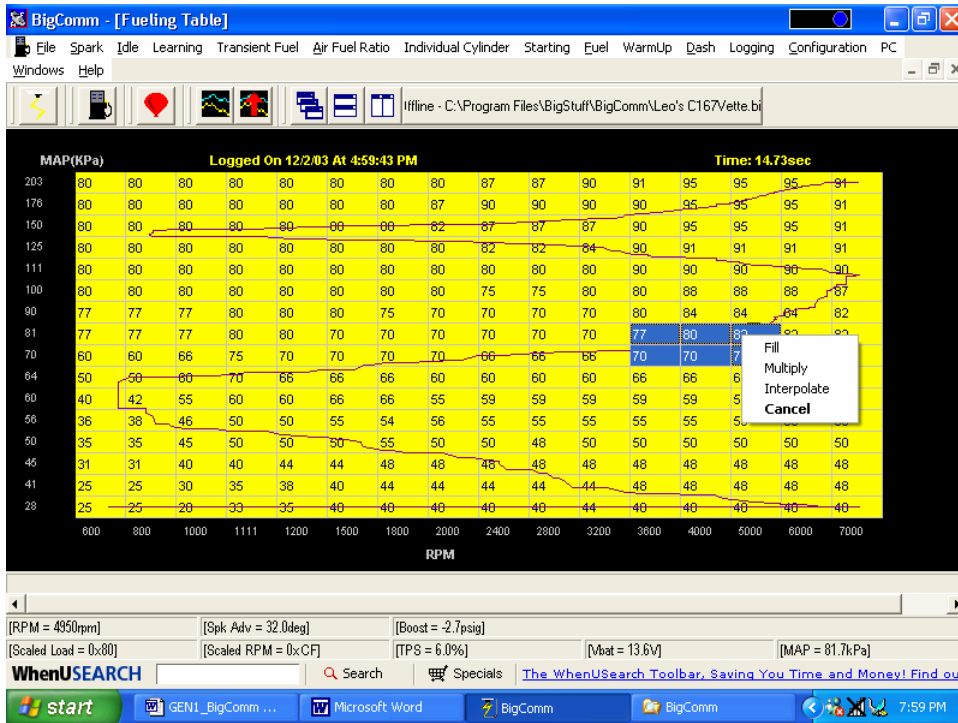


A Blue Ellipse will appear along the trace line highlighting the logged engine operating points. To navigate the ellipse along the trace line, depress and hold the “Alt” key while simultaneously depressing the left or right arrow keys. As the blue Ellipse moves along the trace line, the logged engine operating parameters will be displayed in the Dash.

The values displayed in the Dash can be used to calibrate the Fuel or Spark tables. For example, assuming the O2 Correction Signal was selected as a Dash display item, the user can see how much fuel the ECU had to add or subtract at every point (cell) along the trace line. The values in the cells along the trace line can be increased or decreased, in the Trace screen, by the amount of the O2 correction % shown in the Dash. The values in the cells next to and surrounding the trace line can also be increased or decreased.

To change the Fuel or Spark Table values, while in the Trace screen, simply left click on the desired cell, input the new value and hit the **“Enter”** key. Continue this process for all of the “traced cells”.

To make changes to multiple cells simultaneously, left mouse click and drag the cursor across the cell range to be changed. Release the left mouse button and a secondary drop down screen will appear outlining three potential “cell fill” options.



- **Fill** – Choosing “Fill” will open a secondary drop down- screen which allows the selected cells to be changed to the value inputted into the window.
- **Multiply** – Choosing “Multiply” will open a secondary drop down-screen which allows the values of the selected cells to be changed by the ” Multiply” value inputted into the window. For example, if the values in the cells selected are 13 and the inputted “Multiply” value was 80%, the new cell values would be 10.4.
- **Interpolate** – If a series of cells in the same row are selected and the “Interpolate” “cell-fill” option is selected the ECU will use the value in the cell all the way to the left and the cell value all the way to the right and interpolate the numbers in between so that the values are linear.

Cell Changes using the “Page Up” & “Page Down” Keys (Fuel and Spark Tables)

Multiple cell values can also be changed simultaneously using the “Page Up” and “Page Down” keys. This approach offers a quick alternative to using the mouse. Use the keyboard arrow keys (up/down/left/right) to maneuver to area of the map where the desired cell changes will be made. Next, depress and hold the keyboard “Shift” key. Now, use the arrow keys, to maneuver through the cells to be changed. As the cells are being selected they will become highlighted. Once the desired cell range has been highlighted, release the “Shift” key. Depress the “Page Up” key to increase the cell values and the “Page Down” key to decrease the cell values. The cell values will increase or decrease by a value of one (1) for every keystroke. To exit this mode, depress any one of the arrow keys.

Once complete, the new calibration can be saved and then loaded into the ECU.

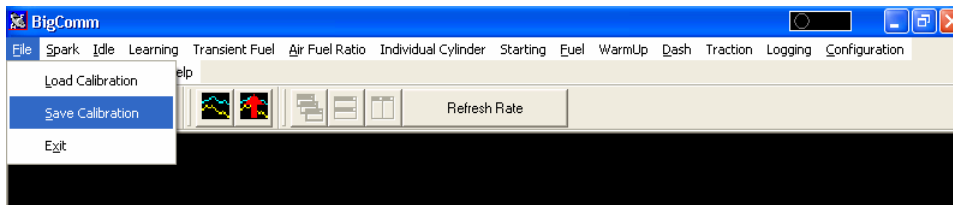
Note: See [Save Calibration](#) to ensure calibration changes made “On-Line” are properly saved.

81. Loading and Saving Calibration Files

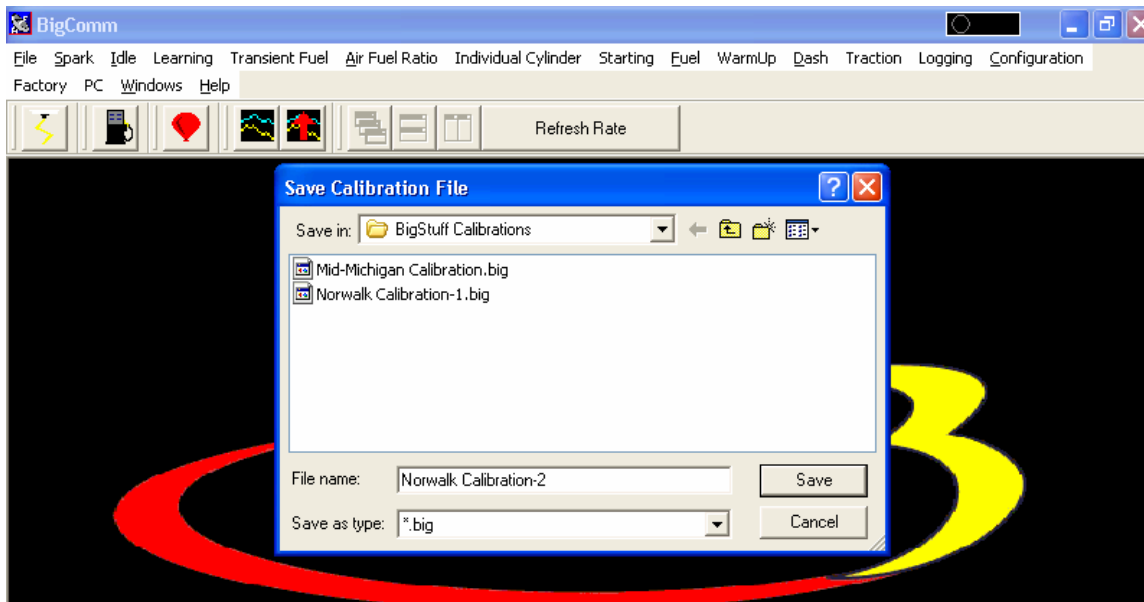
Calibration files can be saved to a file folder or loaded from an existing file in one of two ways. In “off-line” mode, a calibration file can be saved to the PC so changes can be made “off-line” and saved to a disc (the hard drive or flopping disc). In “on-line” mode, calibration changes are made and sent directly to the GEN3 ECU while the ECU is “live”.

82. Save Calibration (F12 – “Quick Key”)

To save a calibration file go to **File** on the Tool Bar. Left click on **File**. The following drop down will appear. While holding the left mouse button down, drag the mouse down until **Save Calibration** is highlighted. Release the mouse button. Alternatively, hit the F12 “Quick-Key”



The following screen will appear. Name the file, in this example Norwalk Calibration-2, and hit the PC’s **“Enter”** key or left click on the **Save** button.



When using the BigComm software with GEN3 ECU, special care must be taken to properly save “On-Line” calibration changes. [Working On Line](#) means the BigStuff3 ECU is powered up (the ignition is on) and is connected and communicating with the PC. A green ball will be seen moving back and forth in the upper right hand corner of the screen as long as an operating window is open with a dash selected. See [Green Sliding Ball](#) for more details. GEN3 “On-Line” or “real time” calibration changes are temporarily stored in the ECU’s Random Access Memory (RAM). Once the desired calibration changes are made, they are not permanently saved to the GEN3 ECU’s “Flash” memory until the **engine is turned off**, and **the ignition switch remains in the “Off” position for fifteen (15) seconds**. If further calibration changes are going to be made, the ignition switch must be turned back

to the “On” position. The ECU cannot be programmed and changes will not be saved with the ignition switch is in the “Off” position.

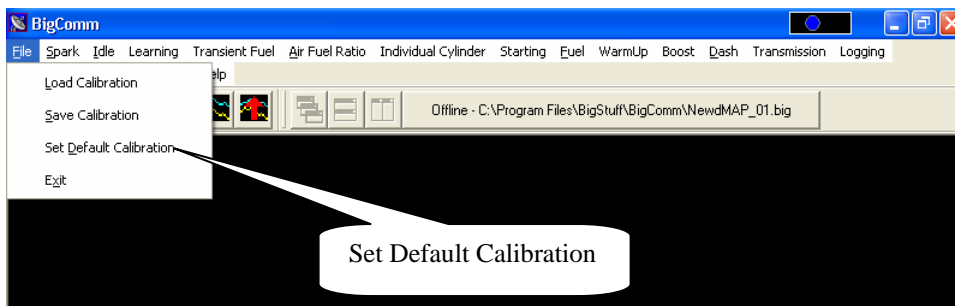
The best way to detect that the calibration changes have been saved from RAM to the GEN3’s Flash memory is to watch the green communication ball in the upper right corner of the BigComm software screen. After the ignition switch is turned off, the green sliding ball will continue to move back and forth for approximately fifteen (15) seconds. After approximately fifteen (15) seconds, **the green ball will momentarily stop**, indicating that the ECU’s calibration RAM has been permanently saved to the ECU’s Flash memory. **DO NOT TURN THE IGNITION SWITCH ON OR CRANK THE ENGINE WHILE THE CALIBRATION IS BEING SAVED!**

Notes:

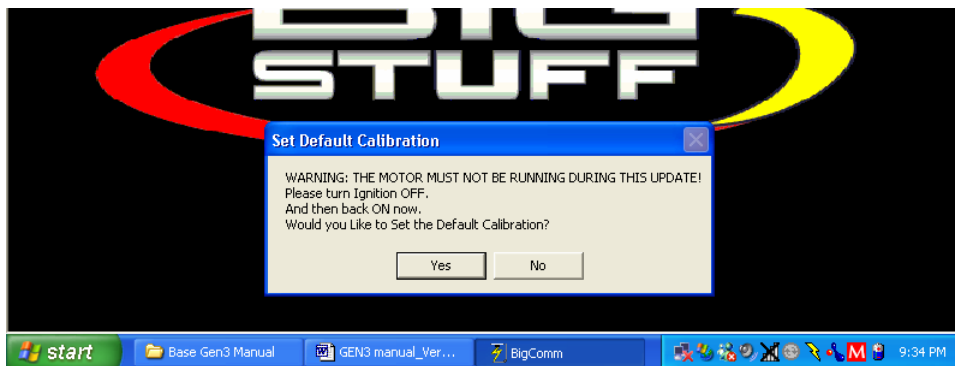
- The ECU stays alive for thirty (30) minutes after vehicle ignition is off to allow for DAI uploads from the GEN3 ECU to a PC.
- The ECU cannot be programmed when the vehicle ignition is off.
- The Flash memory is only updated when calibrations changes are made.

Saving a Default Calibration

Once the ECU’s calibration RAM changes have been saved to the ECU’s Flash memory and you are satisfied with the calibration, BigStuff strongly recommends that a “Default” calibration be saved to the ECU to safeguard against system crashes. With the engine off (no engine rpm) and the vehicle ignition in the “On” position, go to the main tool bar and left click on File as shown below. A drop down screen will open. Left click on “Set Default Calibration”.

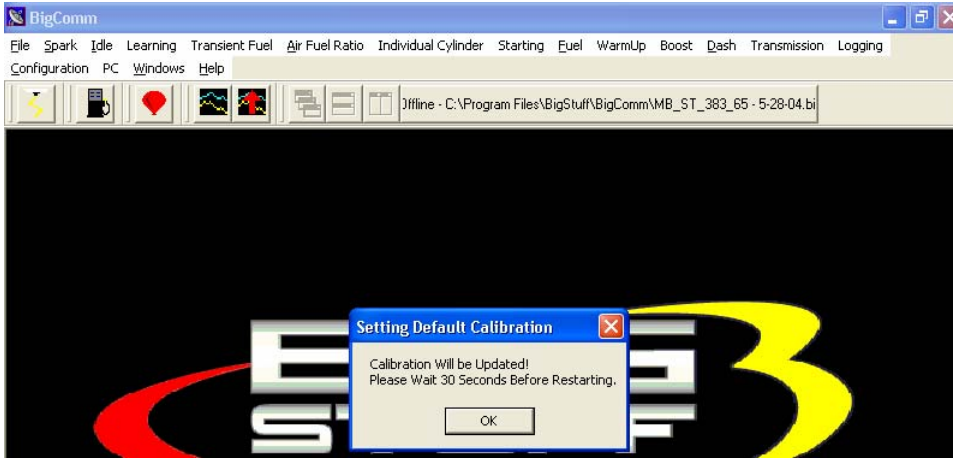


The following screen will open. Select “Yes” to save the default.



The following screen will open indicating that a delay (worst case 30 seconds, typically less than 2 seconds) is required to set the default calibration.



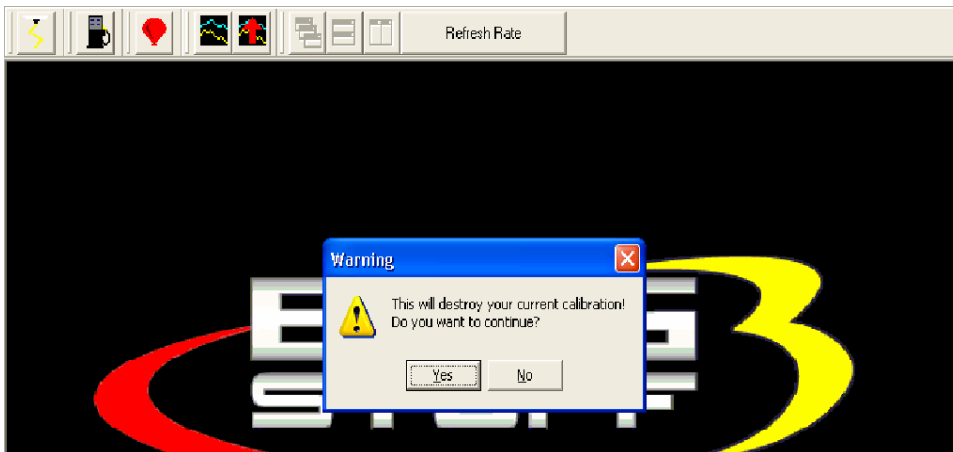


83. Load a Calibration

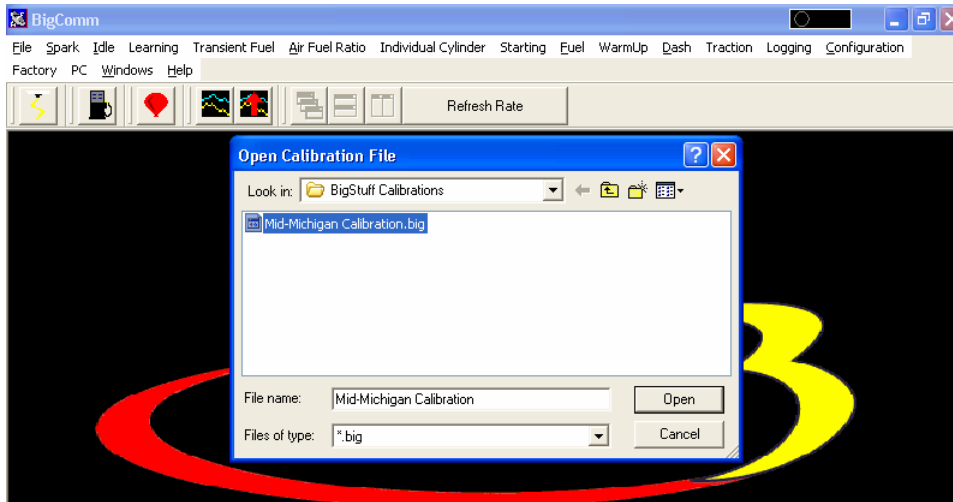
To load a calibration file, previously saved to the PC's hard drive or external disc, go through the steps above except select **Load Calibration** from the drop down screen.

Note: The GEN3 ECU must be powered ON to load a calibration file into it.

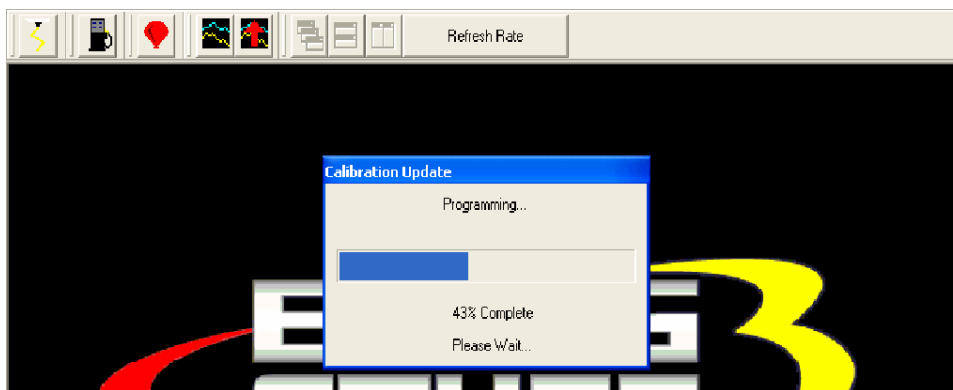
The following screen will appear warning that loading a new calibration will overwrite the ECU's current calibration. Left click on **Yes** to continue loading the selected calibration file.



The following screen will appear listing all the available calibration files. In this example, only one calibration is listed (Mid-Michigan Calibration.big). Left click on the file (It will be highlighted in blue) and click **Open**.



The following screen will open showing the status of the file loading. Once the file finishes loading, the selected calibration will be loaded into the GEN3 ECU.



84. Acronym Definition

SEFI – Sequential Electronic Fuel Injection

AFR – Air Fuel Ratio

MPH – Mile Per Hour

EMI – Electro-Magnetic Interference

ROM – Read Only Memory

WOT - Wide Open Throttle

TCC - Torque Converter Clutch.

APW – Asynchronous Pulse Width

85. Control Keys

Control S = Spark Table

Control F = Fuel Table

Control A = Air/Fuel Ratio Table

Control L = Take Log Command

Control V = View Log

86. Function or “Quick Keys”

F1 = Cranking Table
 F2 = View Lambda Screen
 F3 = Fuel Table
 F4 = Spark Table
 F5 = Operating Parameters Table (opens all operating parameter tables)
 F6 = Coolant Correction Table
 F7 = Open Key
 F8 = Record Log Window
 F9 = Upload Replay
 F10 = Power Valve Fuel Table and dMAP RPM Modifier Table
 F11 = Air/Fuel Ratio (AFR) and AFR Parameters Configuration Tables
 F12 = Save Calibration Folder

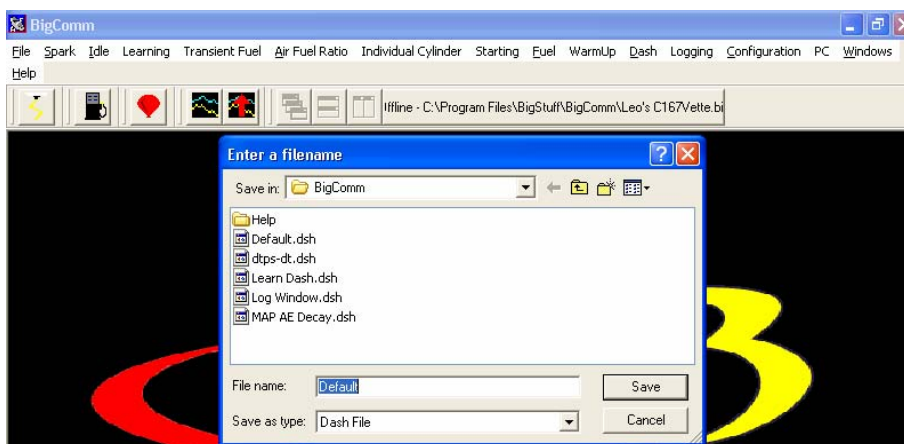
87. Key Notes Summary (from this manual)

- Note: Additional components such as relays and special connectors may be required to complete your specific installation. Contact your dealer for further details.
- Note: The 4 BAR MAP sensor sold by BigStuff3 will read pressure up to 52 PSI.
- Note: The GEN3 ECU will never deliver a spark timing value below 6°. There are exceptions to this, when the GEN3 system includes one of the optional traction control systems.
- Note: If “Starting Line Timing” control is used in conjunction with the optional 2-Step or 3-step control, make sure the minimum RPM (under Boost Parameters) is 1,500 RPM below the 2-Step LO RPM (under Operating Parameter Configuration/Rev Limit/2 Step RPM LO) enable RPM.
- Note: If the engine cranks, but does not start make sure the battery voltage is at or above 12V during cranking. Low battery voltage conditions must be fixed before trying to start the engine. Battery voltage (especially during cranking) is even more critical with coil-on-plug applications.
- Note: The 2-step functionality **is not** a base feature on distributor ignition based systems! **It is** a base feature on all coil-on-plug systems. 3-step control is an option on all GEN3 systems.
- Note: If the GEN3 system has both 2-step and 3-step functionality, and only one of the two starting line rev limiters will be used, BigStuff3 recommends using the 3-step (two-step high) control.
- Note: The internal (or optional external) data logger trigger wire (describe in the Boost section below) must be enabled (12V supplied to the data trigger wire) for the 2-step and/or 3-step to function.
- Note: The “Timer” sequence will be reactivated, every time the throttle is closed and then opened again, since the “Minimum RPM and Minimum TPS criteria are re-satisfied.
- Note: The three (3) stage Boost control feature can be used to just retard the timing (without switching solenoids on) if the criteria outlined in the section directly above are met.
- Note: If mounting bolts, other than the factory installed isolation grommets, are used to mount the ECU, the bolt used **must not** extend beyond the ¼” factory installed depth. Using bolts, or threaded rods, that are longer than ¼” **will damage the ECU and void the warranty!** Also, the isolators are not used for any type of electrical grounding.



- Note: A CD ROM disk is no longer supplied with a CD ROM software Disc, but one can be purchased from BigStuff3.
- Note: BigStuff3 recommends checking all of the settings in the configuration tables to ensure the system as supplied will operate correctly.
- Note: The air fuel ratio will still be displayed and recorded while in “Open Loop” mode.
- Note: It is important to have the TPS (%) setup correctly. The TPS sensor (on the throttle body) and software need to be setup properly to ensure that the full resolution (1% to 100%) of the sensor can be utilized
- Note: Make sure that the correct type of TPS (GM or Ford) is selected during the hardware configuration process outlined above.
- Note: **The engine may not run if there is no band between the On and Off (rev limiter) limits or the RPM inputs are reversed!** For example, if the “Rev Limit On” is set for 7,100 RPM and the “Rev Limit Off” is set at 7,300 RPM the engine will not run.
- Note: The Static Timing Test must be run with the engine RPM at 2,500 or above.
- **Note:** Do not forget to uncheck the Static Test Timing box once the test is complete, although the “Test Timing” value becomes invalid once the TPS exceeds the Clear Flood TPS for safety reasons (in case it is accidentally not disabled)
- Note: The RPM values, at the bottom of the dwell-time input table, are established when the Load vs. RPM Axis table is configured.
- **Note:** If the fuel map VE values, around peak torque, are above 125, there is a good chance the injector flow rates, inputted into the Operating Configuration/ Fueling Parameters table, are too low. The opposite can also be true. If the VE values near peak torque are below 80, there is a good chance the injector flow rates, inputted into the Operating Configuration/Fueling Parameters table, are too high.
- Note: Be sure the ECU is properly configured, and the Base Fuel and Spark Tables are calibrated before configuring and calibrating any of the following engine operating parameters.
- Note: If the throttle is opened to position greater than what was set in the **Clear Flood TPS %** setting, the ECU will not add fuel.
- Note: Idle spark control is only active when the actual throttle position (the TPS % value shown in the dash) **is below the Max TPS for Idle value inputted into TPS the set up cell.**
- **Note: A cam input (cam sync) is required for individual spark control, and injector phasing to be operational.** Without a cam-sync the GEN3 system still injects fuel sequentially and allows for individual fuel control per cylinder. All coil-on-plug systems **must** have the cam input (cam sync) hooked up and operational.
- Note: The GEN3 LS1 Coil-on-Plug (COP) and the “Stand-alone COP” systems are the only GEN3 systems with bi-directional timing compensation.
- **Note:** The GEN3 ECU base system supplies 12 Volts (sources current) to the injectors vs. providing a ground path (sinking current), as is the case with some competitive systems. This approach provides better noise immunity and less power dissipation (heat) in the ECU!
- Note: Once the stages are turned on, they stay on until the TPS and/or RPM criteria are no longer true or the Timer Enable goes low/off.
- **Note: The “Timer” sequence will be reactivated, every time the throttle is closed and then opened again, since the “Minimum RPM and Minimum TPS criteria are re-satisfied.**
- Note: The timing values, inputted into the Start Line Timing table, are the **absolute** values (not timing retard values) the ECU will use when the Boost Parameters minimum RPM and TPS are satisfied! If zero (0) is entered into the table, no starting line timing will be applied.

- **Note:** The inputs from this table are used by the ECU if “Alpha N” was the control algorithm selected during the Main Configuration set up. If the “Speed Density” the control algorithm was selected, the ECU ignores inputs from this table.
- **Note:** Before saving the Log Window dash for the first time, you need to navigate to the **C: Program Files/BigStuff/BigComm** directory. This step only occurs the very first time any Dash file is saved. Subsequent Dash file saves will automatically be saved to the **C: Program Files/BigStuff/BigComm** folder.
- **Note:** The Dash for the Log Window needs to be configured so that all of the logged data is captured and displayed in the Dash at the bottom of the Log window.
- **Note:** The Replay file must be downloaded from the GEN3 ECU to a PC within thirty (30) minutes from when the ignition switch is turned off. After thirty (30) minutes the “Replay” data will be lost.
- **Note:** If the GEN3 main wire harness, positive battery lead, is connected to the battery cut-off switch (strongly recommended), and the switch is turned “OFF” before the Replay data is uploaded, the data will be lost.
- **Note:** The Scaled RPM (Sclد_RPM) and Scaled Load (Sclد_Load) signals must be logged in order to support the “Trace” function.
- **Note:** See [Saving On Line Calibration Changes](#) to ensure calibration changes made “On-Line” are properly saved.
- **Notes:**
 - The ECU stays alive for thirty (30) minutes after vehicle ignition is off to allow for DAI uploads from the GEN3 ECU to a PC.
 - The ECU cannot be programmed when the vehicle ignition is off.
 - The Flash memory is only updated when calibrations changes are made.
- **Note:** The GEN3 ECU must be powered ON to load a calibration file into it.



88. ECU Header Connector Pin-outs

Specific header connector pin-out detail, for the various GEN3 Systems and available options, can be found on the BigStuff3 website at www.BigStuff3.com. Under the How To/Help section.

- Base System Main Wire Harness - http://bigstuff3.com/pdf/JMI-006-014-CC_REV_F_GEN3_PRO_SEFI_BASE_MWH.pdf.

- GM LS1 (24x crank wheel) System Main Wire Harness - http://bigstuff3.com/pdf/JMI-006-016-CC_REV_B_GEN3_PRO_SEFI_LS1_MWH.pdf.
- Ford Modular Motor Main Wire Harness - http://bigstuff3.com/pdf/JMI-006-031-CC_REV_C_GEN3_PRO_SEFI_MOD_MWH.pdf.
- GM LS7 (58x crank wheel) Main Wire Harness - http://bigstuff3.com/pdf/JMI-006-034-CC_REV_B_GEN3_PRO_SEFI_LS7_MWH.pdf

The following additional system wire harnesses are also available in How To/Help section.

- DAE System Wire Harness
- 16 Injector System Wire Harness
- 24 Injector System Wire Harness
- NTK WBO2 for Methanol System Wire Harness
- GM Transmission System Wire Harness
- Injector Wire Harnesses for GM (Chrysler)/Ford/Buick applications
- Coil Wire Harnesses for the LS1 style and BigStuff3 “Hot” coils

89. Frequently Asked Questions

- What does working “On line” vs. “Off line” mean?
 - Working “Off-line” = The BigStuff3 ECU is not powered up (PC Only). – The **red** ball is moving in the upper right hand corner of the BigComm software.
 - Working “On-line” = The BigStuff3 ECU is powered on, the communication cable is connected between the GEN3 ECU and a PC, and the two are communicating with each other – The **Green** ball is moving in the upper right hand corner of the BigComm software.
- The changes I make to cells in the table do not stay. What’s wrong?
 - The PC’s **“Enter”** key must be depressed for changes to be temporarily saved. To permanently save changes go to [Save Calibration](#) section above.
- Should I use the camshaft position input (cam sync) with my distributor based GEN3 system?
 - Without the camshaft position input (cam input connector in the main wire harness) hooked up, the GEN3 system still provides sequential fuel injection and individual fuel control per cylinder, but injector phasing (where the fuel is injected) and individual spark control will not function.
- How can the GEN3 system provide sequential fuel injection and individual fuel control per cylinder without the cam camshaft position input hooked up?
 - When the engine starts cranking over, the GEN3 ECU begins firing the injector drivers, assigned to each injector, in the firing order inputted into the software. What the GEN3 system cannot do without the cam camshaft position input hooked up is to determine where to inject fuel (the position in crankshaft degrees, relative to TDC, for each cylinder). Since the GEN3 system was designed with one injector driver per cylinder (for up to 24 injectors!) it’s easy to see how individual fuel control per cylinder is achieved.
- Why is the spark timing recorded in the Replay different from the timing configured in the spark map?
 - The Staged Boost control is active and there are spark retard values in one or more of the three (3) spark retard tables under Boost Control.
 - A similar situation will occur if the idle spark control is active at idle.



- Will the GEN3 ECU drive high and low impedance injectors?
 - Yes, it can drive both high and low impedance injectors. The GEN3 ECU can even drive both injector types of injectors simultaneously with the 16 or 24 injector options. The GEN3 ECU auto-detects the type of injector being used, so no set up is necessary.
- At what injector duty cycle % are my injectors considered out of control, or static?
 - Loss of injector control does not occur at 100% duty cycle, but at approximately 85% duty cycle. At 85% duty cycle the injectors are most likely not opening and closing in a controlled fashion. This condition is termed “static” (vs. dynamic) control. An example why this condition is undesirable is if the GEN3 ECU demands more fuel (demanding a larger pulse width) and the injector is already static. The only way to move more fuel through the injector would be to increase the fuel pressure. Increasing the fuel pressure at the 1/8th mile marker is not possible, so things go bad quickly. Also, teetering on and off at the static point is also undesirable. Lastly, running the injectors drivers static for long periods of time can damage them.
- How do I set up my ignition system with the GEN3 system?
 - For more information on ignition system setups, beyond what is available in this manual, go to the How To/Help section on the BigStuff3 website, and then Ignition System Setup Tutorial. The link is: <http://bigstuff3.com/pdf/ignition%20Guide%20rev%201.2.pdf>. There are nine (9) ignition system setups outlined. There is also information on the setting up the Ford TFI, GM HEI, GM Opti-spark & MSD8 ignition systems in the How To/Help section of the website..
- Where can I find wiring harness information on the BS3 power-train system and optional systems?
 - Information on most of our wiring harnesses is available on our website at www.bigstuff3.com. Go to the How To/Help section on the website. The first fourteen (14) files listed in this section are wiring diagrams. The link is: <http://bigstuff3.com/how-to-help/>.
- My engine will not start. What should I check?
 - Make sure the harness side header connectors, interfacing with the GEN3 ECU, are attached and tightened to no more than 15 – 20 **inch lbs.**
 - Make sure the battery voltage is at, or above, 12V **during cranking.** Low battery voltage conditions must be fixed before trying to start the engine. Battery voltage (especially during cranking) is even more important with coil-on-plug applications.
 - Make sure you can see an RPM signal in the Dash. While turning the engine over, you should see at least 100 – 150 RPM. If no RPM signal is present, check that the crank input (crank trigger or distributor) signal wire is connected to the red wire in the BS3 “Crank” connector. Swap the 2 wires and try again.
 - For distributor ignition based applications, make sure the BS3 points wire is connected to the ignition system points input terminal/wire. **Applying 12V directly to the BS3 points wire will immediately damage the GEN3 ECU!!**
 - For COP engines (LSx and other standalone COP engine) the cam input cannot occur at the same time as the crank input!!! If this is the case, the engine will not start. The cam synch pulse must occur before a crank pulse. Ideally, 10⁰ before the crank pulse. For more information on ignition system setups, go to the How To/Help section on the BS3 website, then to Ignition System Setup Tutorial.
 - With all coil-on-plug engines, make sure the coil ground eyelet is securely fastened to the cylinder head or engine block. No other grounds locations should be used.

- For Ford Modular COP engines the UEGOR value in the Dash must read 28. If a number other than 28 is being reported, the cam pulse is occurring at the same time as the crank pulse. For more information on how to resolve this issue contact BigStuff3.
- The ECU may be in Clear flood Mode. Make sure the TPS sensor reads near 1-2% when the throttle is closed and near 100% when fully opened. If it reads near 100% when closed, the ECU is in clear flood mode and is not injecting fuel. Swap TPS pins A & C in the TPS connector.
- Make sure the crank sensor is connected.
 - The LS1 Cam sensor connections are:
 - A – Signal
 - B – Ground
 - C – 12V
 - The LS2 cam sensor connections must be (terminals A & C are swapped):
 - A – 12V
 - B – Ground
 - C – Signal
- The rev limiter (Engine Saver) On & Off values are not correctly set. The engine may not run if there is no band between the On and Off limits, or the RPM inputs are reversed! For example, if the “Rev Limit On” is set for 7,100 RPM and the “Rev Limit Off” is set at 7,300 RPM the engine will not run
- My engine timing does seem right, what should I check.
 - Make sure the firing order is correct.
 - Both the BS3 GEN3 main wiring harness and the MSD ignition system must be connected directly to the battery!! If not, ground loop issues are likely to occur.
 - For coil-on-plug applications, make sure the cam pulse is occurring at least 10° before the crankshaft pulse. To determine what the crank shaft timing relationship is between the cam and crank sensors; add the CamCrkAdv signal to the Dash. Make sure a value greater than 1° exists (a minimum of 6° but ideally a 10° window is needed). Additionally, you can view past Replays (DAI) to check if a Cam Synch Error occurred and what the CamCrkAdv relationship was during the pass. If the Replay indicates Cam Synch Error “ON”, the cam pulse is occurring at the same time as the crank pulse. For more information on how to resolve this issue go to the How To/Help section on the BS3 website, then to Ignition System Setup Tutorial or contact BigStuff3.
 - Make sure your pulses per rev in the Operating Configuration table is correct for your application. For example, a four (4) magnet MSD crank trigger setup should have a value of 4. An LS1 engine should have 24, a Ford Mod Motor should have 36, and LS2/7 should have 60.
 - For LSx COP engines, make sure the cam synch override box is **not** checked. The Ford Mod Motor COP system **must** have the “Override Cam Sync Test box, checked.
- How can I check if my cam sensor input is setup correctly?
 - From the main BigComm tool bar, go to the Individual Cylinder, then Individual Spark table. In the cell for cylinder #1, type in the number 10, this represents 10° of spark retard for cylinder number 1. With a timing light, check cylinder #1 timing. It should be 10° less than the other cylinders at that RPM.
- What are the steps I need to take to make sure three (3) stage timing retard/boost control functions correctly?
 - There must be a value in each of the three timer cells
 - Each value for the three boost stages must be higher than the prior stage.
 - The DAE trigger wire must have 12V applied to it

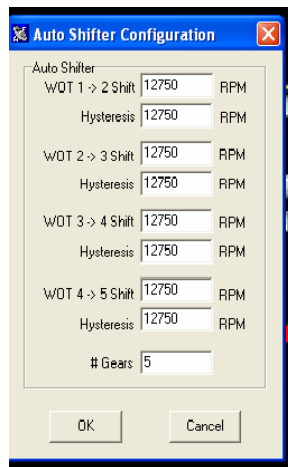


- The Timer Enable wire must be used.
- If there is a zero (0) timing retard value in any of the cells in the 3 timing retard tables, the ECU will automatically revert to the base timing map.
- Can I use my three (3) stage Boost control feature to just retard the timing?
 - Yes, but the criteria directly above must be met.
- I can't get my LSx engine started. I'm using an LS2 sensor in the front of the engine.
 - Swap pins A & C in the cam input connector around.
 - In the Operating Configuration table, make sure you have correct pulses/rev value inputted for your engine. LS1 engines have 24. LS2/7 engine have 60. Check with your engine builder to be sure.
- My TPS sensor reads 100% when the throttle is closed and 0% when the throttle is fully opened.
 - Swap the wires A & C in the TPS connector. The engine may not start since the ECU senses that the Clear flood Mode has been invoked.
- When I look at my replay, it shows timing values different from what is in my spark map. How can this be?
 - There may be values in the Boost timing retard tables. If there is 12V applied to pin A of the boost connector (to enable DAI/Replay and the Timer Enable) the ECU will invoke the timing retard values in the Boost timing retard tables.
- It seems like the timing I have inputted into my spark map, is not be realized when I make a pass. What can be causing this?
 - There may be values in the Boost timing retard tables. If there is 12V applied to pin A of the boost connector (to enable DAI/Replay and the Timer Enable) the ECU will invoke the timing retard values in the Boost timing retard tables.
- If I am tuning in Alpha/N mode (Hardware Configuration, then Control Algorithm) can I use my 1 Bar MAP sensor for barometric compensation?
 - Yes, the automatic barometric compensation is hard-coded in the ECU. Leave the MAP sensor vacuum port exposed to the atmosphere. Do not plug the MAP vacuum port to the intake manifold.
- How come I cannot see the active obelisk in my AFR, Spark, or Fuel maps?
 - Both the Scaled Load and Scaled RPM signals must be selected in the Dash for each of these tables.
- I have a new Windows Vista machine, and unlike my old XP machine, I cannot see the green or red ball in the upper right hand corner of the BigComm screen. Why is this?
 - Your PC must be running Window Vista Office Edition or higher, and Windows "Transparency" box must not be checked (uncheck the box). The "Transparency" check box is found in the Window Color and Appearance section. Go to Start/Control Panel/Appearance & Personalization/Personalization/Window Color and Appearance.
- What do I need to do to make sure my 3-step works correctly? (assumes your system is configured with the optional 2-Step and 3-Step)
 - 12V must be applied to the DAE wire (Hdr 2, wire Y2)
 - Apply 12V to the 2-step wire (Hdr 1, wire B2) via a line lock (manual trans), foot brake or trans brake switch.
 - With your foot still on the brake (assuming the foot brake switch is used to invoke the 2-step), Apply 12V to the 3-step wire Hdr 2, wire W1 (+ turbo speed wire in the DAE harness). 12V is must be applied to this wire the moment the trans-brake is activated.
 - Lastly, if you are planning to activate a traction control, staged timing retard or turn on boost or nitrous solenoids in a timed sequence, 12V must be applied to the "Timer enable the instant the trans brake is released. See [Three Step Relay Wiring](#) above.

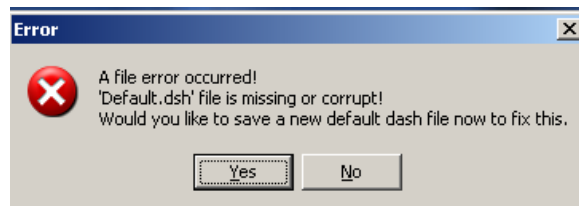
- I do not think my injectors are pulsing. What can I check?
 - Make sure the BS3 and MSD systems are grounded directly to the battery.
 - Plug a “noid” light into each injector position in the injector wire harness. Turn the engine over and see if the light pulses for each injector location.
- I do not think my COP coils are firing. What can I check?
 - Make sure the BS3 main wire harness ground is wired directly to the battery.
 - Make sure the coil ground wire is grounded to the engine block or cylinder head. No other ground location will work!
- Since my DAI enable wire is also the timer enable wire (the Boost connector Pin A, pink wire), how can I trigger my timing events (e.g. 3 stage timing retard tables) and data log (Replay) at the same time. See [Data Trigger Replay Relay Wiring](#) above.
 - Connect the DAI/Timer Enable wire to an inverted signal from the trans-brake. See an example on how to invert the signal via a relay in the Boost section of this manual.
- Can I use a 5 Bar MAP sensor? Yes, but you will need to know what the transfer function of the sensor is. Once determined, call BigStuff3 for the final determination. Note: The 4 BAR MAP sensor sold by BigStuff3 is good to 52 PSI.
- How to use starting line timing retard. See the [Start Line Timing](#) section above
- Why is the Replay feature better than using my laptop to log data? See the section above in this manual titled “Data Acquisition”, then the paragraph titled Logging vs. Replay.
- Why are my “Replays” all are distorted?
 - Calibrations based on the Original replay firmware cannot be loaded into ECU’s with “Extend Replay” firmware and vice versa. If your GEN3 system includes the ETM, EGT or NTK WBO2 options, it also includes “Extended Replay” firmware and can only accept calibrations from other ECU’s with any one of these optional system. If you loaded an “Original” replay calibration into a GEN3 ECU that has the ETM, EGT or NTK WBO2 options, your Replay function will be corrupted and the ECU may need to sent back to BS3, so that it can be reconfigured. If you load a calibration with Extended Replay firmware into an ECU with Original Replay firmware, you will need to reset it by going to Configuration/Check Replay Type. When the next screen opens, click on the box which says, “Set to Original Type”. Save your changes, and then turn the ignition off for 20 seconds. Lastly, take all power (disconnect the battery) away from the GEN3 ECU momentarily. If this fails, contact BigStuff3.
- How do I know if my Bosch WBO2 sensor is bad?
 - First make sure the sensor to main wire harness connection is good.
 - Add the UEGOR signal to the Dash. Turn the ignition on. The UEGOR value should count down from 255 to a value close to 80. If it does not the heater is bad. The sensor should also read 15.9 in the open air.
 - Also, if the O2 sensor is stuck at 14.7 for gasoline, the sensor is not connected or it’s defective.
- How can I check if my NTK WBO2 Methanol sensor is working?
 - First check the control circuitry by disconnecting the sensor from the harness. Turn the ignition to the BS3 ECU on. The AFR value in the Dash should read 6.4. Key off and reattach the sensor to the harness. Turn the ignition to the BS3 ECU back on. The sensor should read 6.9. Also, check your last Replay. The ECM Valid should read “On” to indicate the sensor is working. **Always** wire you the NTK WBO2 on a separate supply switch and **always** turn the sensor on after the engine is started.
- What caused my O2 sensor to fail?
 - Being dropped
 - Running leaded fuel



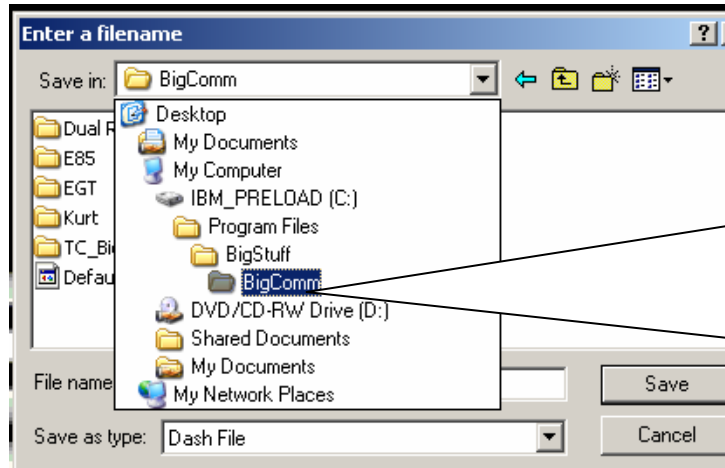
- Running rich at idle
- A combination of the above items
- Is there anything special about using the BigStuff3, GEN3 system with the three (3) valve Ford Modular Motor?
 - Yes, these engines have three (3) cam interrupt ribs. You must find the rib that lines up with cylinder # 1 TDC, and then modify (remove) the other two ribs so that they do not send cam pulses to the ECU.
- I already have DAE and want to add the ETM with 3-step option. What wire in my DAE harness do I use for the 3-step enable?
 - The Turbo Shaft Speed (+) wire becomes the 3-step enable wire.
- Can BS3 activate a transmission air shifter?
 - Yes, BigStuff3 offers an optional transmission auto-shift feature. The system will shift up to five (5) speeds with independent shift RPM and Hysteresis points (see screen print below). Once the system is configured for the auto-shift feature, a wire from ECU Header 2 location, M2 must be run to the ground side of the shift solenoid. The shift solenoid coil must be 70 Ohms.



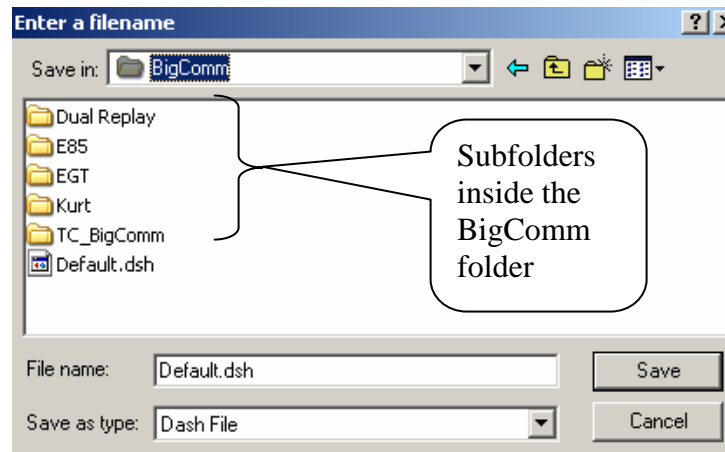
- Why does the following file error screen appear?



Each “default dash” created must be saved in the same BigComm folder, or BigComm sub folder, that the calibration being used is saved in.

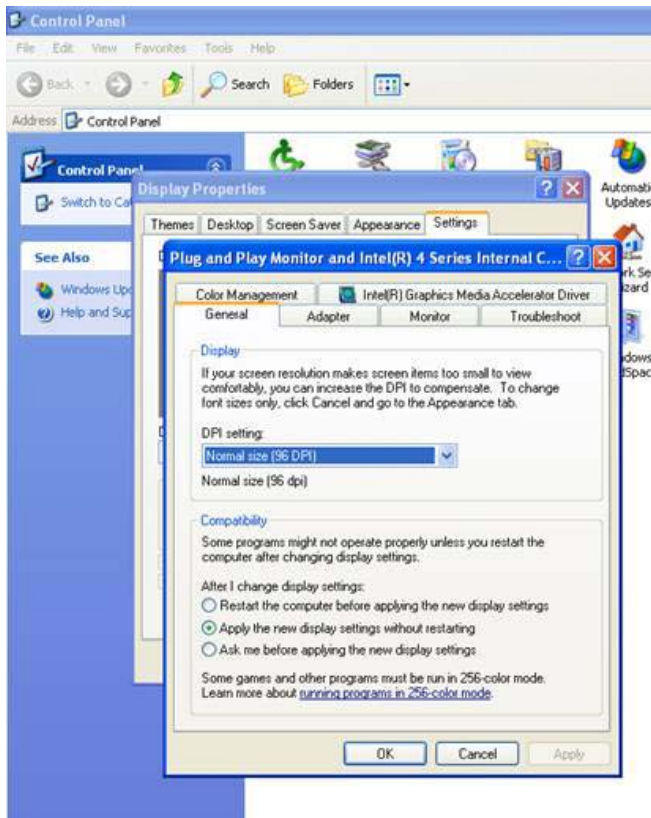


After changing a Dash's configuration, make sure to immediately save it. The Dash must be saved in the BigComm folder or a sub folder that the calibration is saved in.



Subfolders inside the BigComm folder

- I cannot see 100% of the BigComm tables. What should I do?
 - Make sure the screen is set to 96 dpi as shown below. Go to Windows Control Panel.



- What dwell times should be used with the LS1 coils sold with my system?
 - With a 12V charging system.
 - From idle to approximately 4,000 RPM? Use about 3.0 milliseconds near idle and no more than about 4.0 milliseconds at approximately 4,000 RPM.
 - From approximately 4,100 - Max RPM? Use no more than about 6 milliseconds of total dwell time at max RPM.
 - With a 16V charging system.
 - From idle to approximately 4,000 RPM? Use about 2.0 milliseconds near idle and no more than about 3.0 milliseconds at approximately 4,000 RPM.
 - From approximately 4,100 - Max RPM? Use no more than about 4.5 milliseconds of total dwell time at max RPM.
- For LSx COP engines, make sure the cam sync override box in the “Operating Configuration” drop down is **not** checked.
- The Ford Mod Motor COP system **must** have the “Override Cam Sync Test box, checked.