GEN3 PRO SEFI System

Modifying an LS1 Coil-on-Plug (COP) System to Use an External 24X Wheel and Sensor

This tutorial outlines the steps necessary to reconfigure the BigStuff3 GEN3 LS1 system to run BigStuff3's external 24X crank wheel and sensor.

The external 24X crank wheel and sensor upgrade includes:

- Adding a second header connector to the GEN3 ECU to support the new data log trigger wire in hed2, Y2. A header connector, with the data trigger wire is provided.
- A firmware upgrade that allows a 2-wire VR crank sensor to be used, and the cam and crank sensor relationship (CamCrkAdv) to be recorded, via the "Replay" function.
- A crank sensor and 24X wheel shown below.

Quick Setup Guide

1. The LS1, 3-wire crank sensor connector, on the main wire harness lead, will need to be replaced with a Packard 2-wire crank sensor connector supplied by BigStuff3 as part of the 24X wheel and sensor upgrade.

2. Relocate the crankshaft signal wire from header connector 1, terminal location J3 to terminal location A3.

3. The external 24X wheel firmware, which is part of the upgrade, requires that the internal data logger be triggered from ECU header 2, terminal Y2. The internal data logger was previously triggered from ECU header 1, terminal L2. The pink wire in header 1, L2 wire will remain as the timer enable trigger. See the GEN3 User Manual, "Replay" section for more information.

   Note: As is the case with all BigStuff3 GEN3 systems, the internal data logger trigger wire must be enabled (12V supplied to the wire) for the 2-step and/or 3-step to function.

4. Install the 24 tooth wheel and sensor assembly

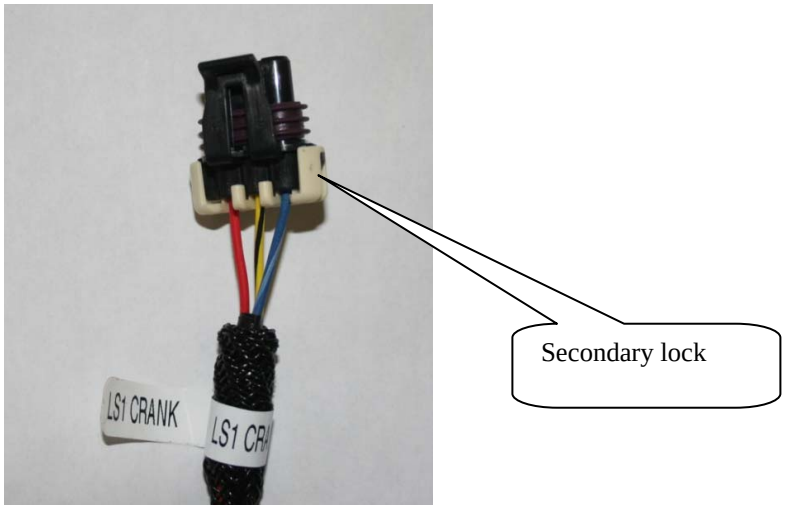
5. Set the COP Crank Advance.

A detailed explanation of these steps is outlined in the paragraphs below.

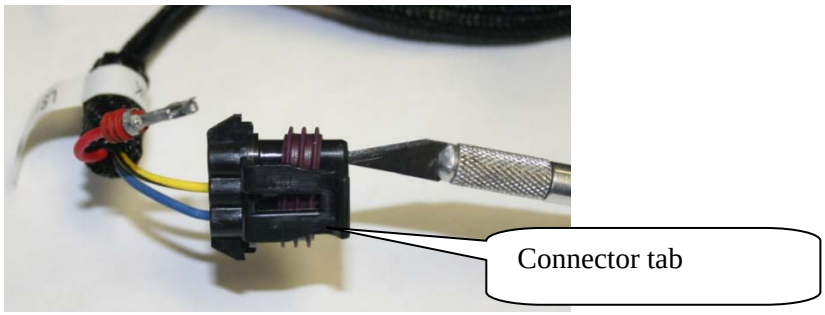
Main Harness Crank Connector Modifications

If converting from the stock, internal LS1 crank wheel and sensor to the BigStuff3 external 24X wheel and sensor, the following modification will be required.

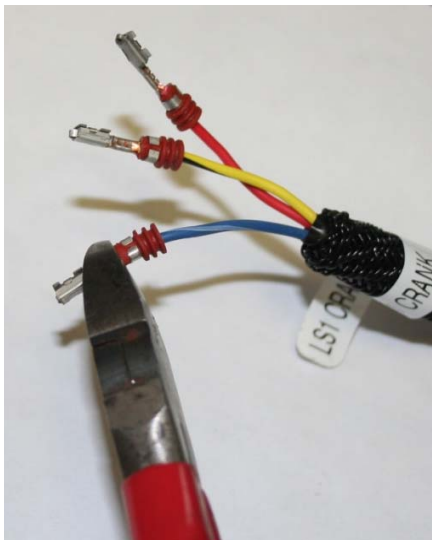
The LS1 crank connector on the LS1 Main wire harness.



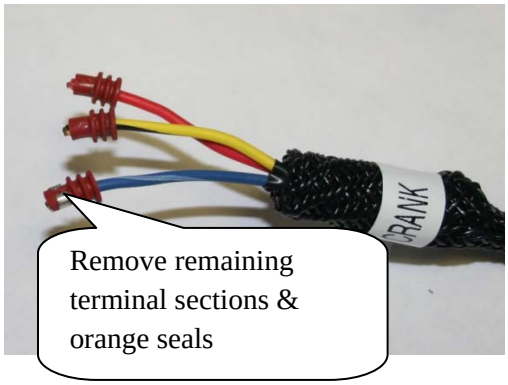
Pull the white secondary lock off the back of the connector and then slide a thin knife blade into the top side of the terminal. The top side being the side closest to the connector tab.



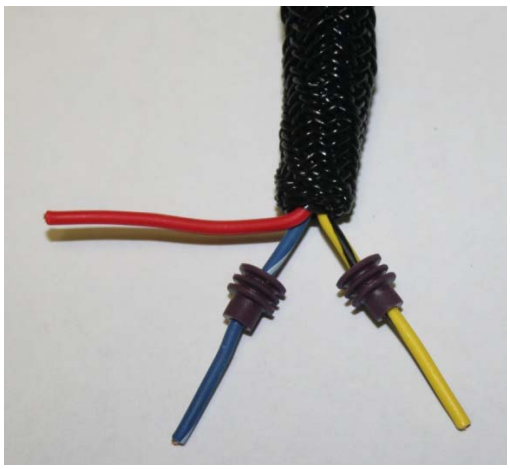
In order to maximize the amount of wire exposed, snip the original terminals off directly in front of the terminal seals.



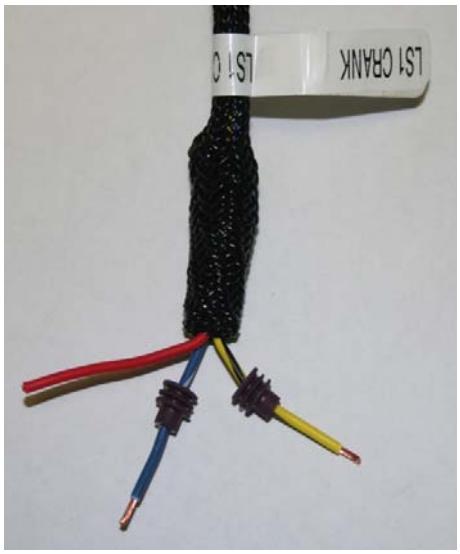
Remove any sections of the terminal that remain, along with the orange/brown seals.



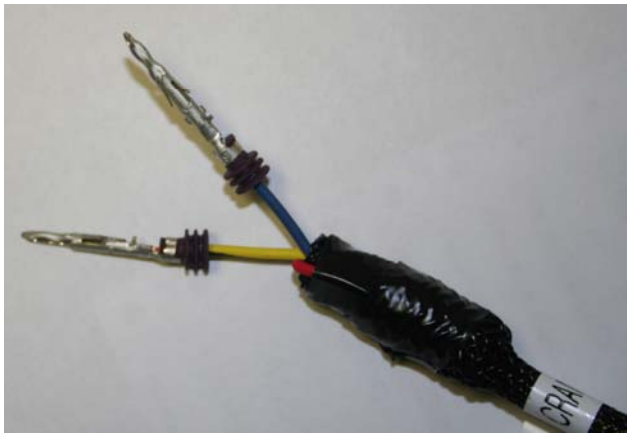
Install the purple seals on the blue and yellow wires before stripping the isolation.



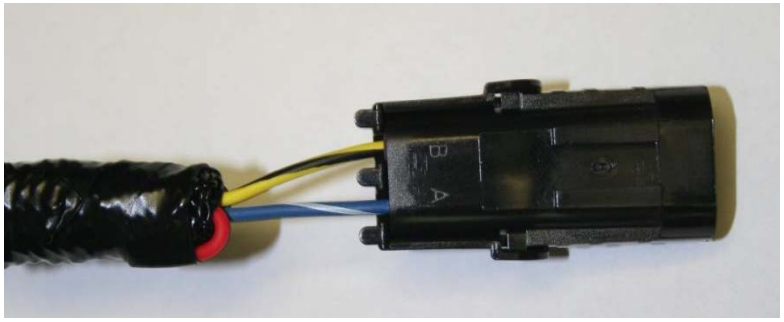
Strip 1/8” of the isolation off the yellow and blue wires.



Install the male terminals provided with the connector kit.



The red wire must be shortened, taped and shrink wrapped. The red 12V wire will not be used, but this wire will continue to have 12V supplied to it, so it must be properly isolated!!!

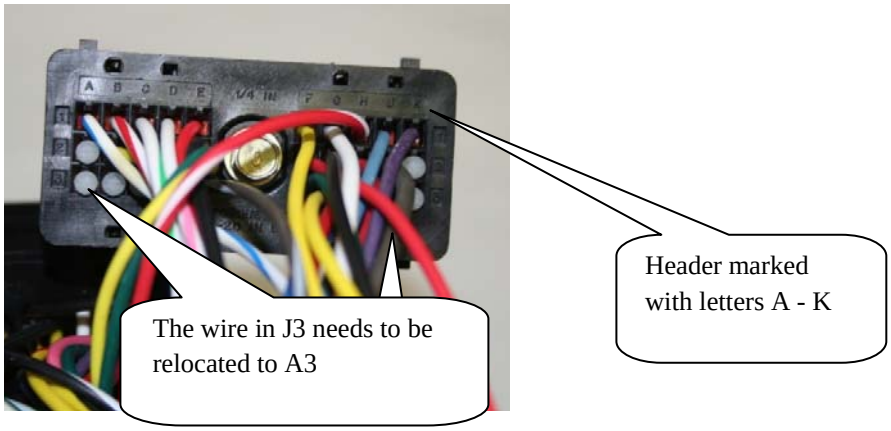


Put both wires into the female connector at the same time making sure that the blue wire with the white stripe is inserted into connector location A and then slide both wires into the cavity until they snap in place. Pull-test both wires to ensure they are seated and locked in place correctly.

Note: If wire correctly, the white crank sensor wire should be across/connected to the blue wire with white stripe from the main harness.

Header Connector Terminal Relocation

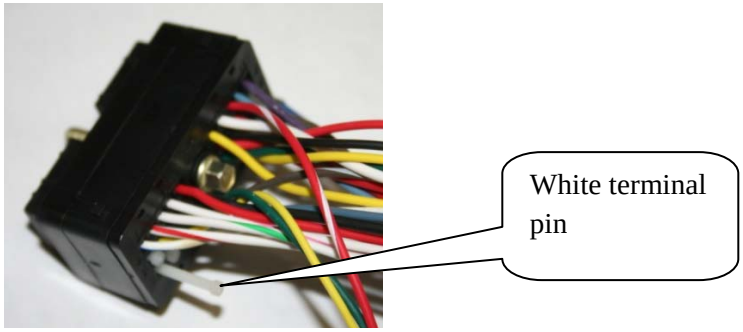
The light blue wire in the wire harness header 1, terminal J3 must be moved to header 1, location A3.

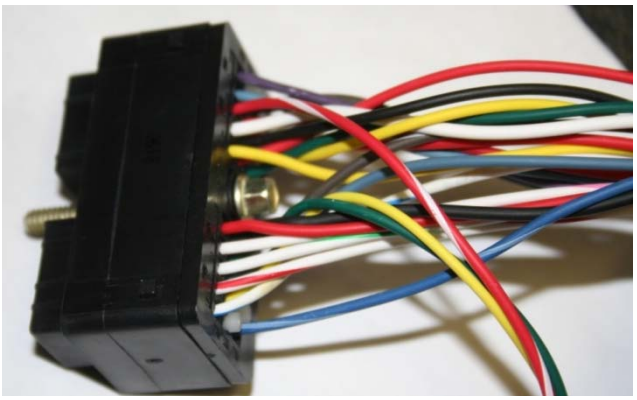


Remove the white secondary lock from the ECU side of the harness header connector. Look at the harness side of the connector for the header with letters A- K.

Remove the J3 terminal and wire, by carefully inserting the end of a paperclip into the harness side of terminal location J3. Angle the paper clip downward (the topside of the connector is the side with the terminal lettering) and carefully press in and down until you hear/feel the terminal release.

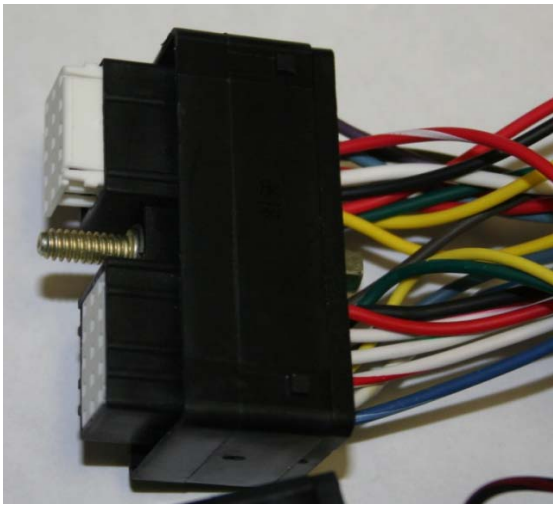
Next, slide the white pin out of terminal location A3.





Slide the blue wire with the white strip, which was removed from terminal location J3, into A3. There is a correct orientation, so do not force the wire into place. When in the correct orientation, the wire will slide smoothly into place. Push the wire in until it snaps in place. Pull test the wire to make sure it is properly seated and locked into place.

Install the white secondary locks back into the face of the header connector.



The sensor and wire harness are now ready to be used with the 24X wheel and 2-wire VR crank sensor.

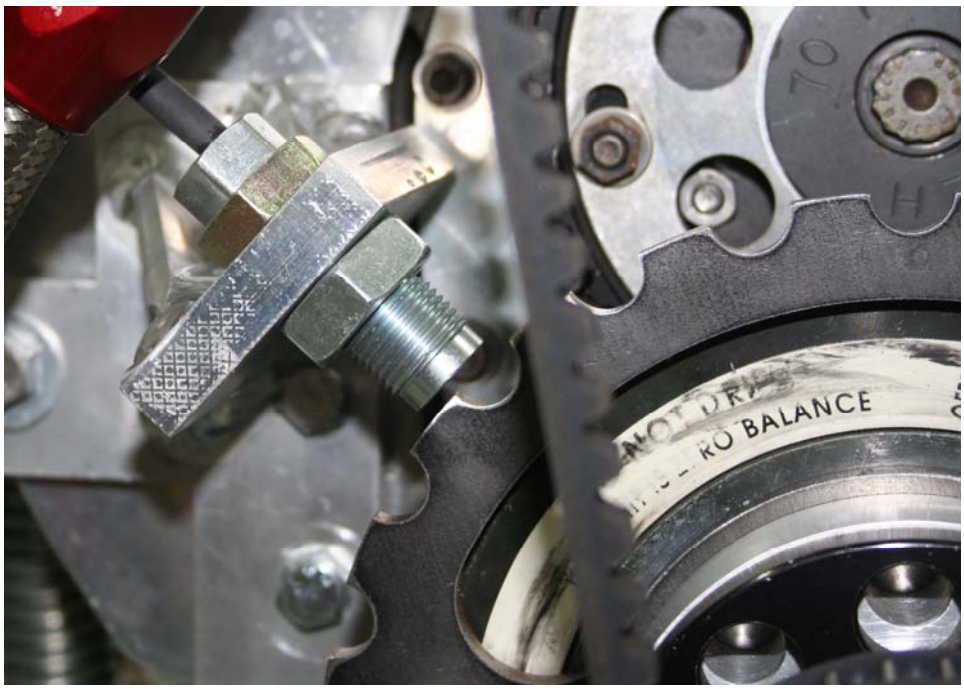
Installing the 24X Wheel and Sensor Assembly

The outside dimension of BigStuff3's 24X wheel is the same outside dimension as MSD's 8" Flying Magnet crank wheel assembly, thus allowing MSD's sensor bracketry to be used to mount the BigStuff3's 2-wire VR crank sensor.

Bigstuff3 strongly suggests indexing (machining the backside) the 24X wheel so that it accurately locates onto the slightly raised center section of the dampener. Also, use ARP or equivalent bolts, and Loctite for securing the wheel to the dampener.

Note: The Crankshaft sensor can be mounted in any location around (360^{o}) the circumference of the 24X wheel. Make sure the bracket purchased, or fabricated to hold the sensor, allows the sensor to be moved at least 1.5" along the radial edge of the 24X wheel (see the picture below). Also note that the sensor face should be centered on the (¼" thick face) radial edge of the 24X wheel. Initially install the crank sensor so it is located between any two teeth on the crank wheel. The air gap should be set to between .045 and .100". .080" seems to work best on most applications.

Illustration of a Robust Crank bracket Design



Data Log Trigger Wire Relocation

BigStuff3's external 24X crank wheel and sensor upgrade includes an additional harness side header connector with a single wire coming from terminal location Y2 (see photo below).

This header connector must be installed in ECU header 2. The wire coming from terminal location Y2 is the new internal data logger trigger wire. This wire must have 12V supplied to it in order to trigger the internal data acquisition system. See the GEN3 User's Manual, "Replay" section for more information. The GEN3 User's Manual is available on BigStuff3's website (www.bigstuff3.com)

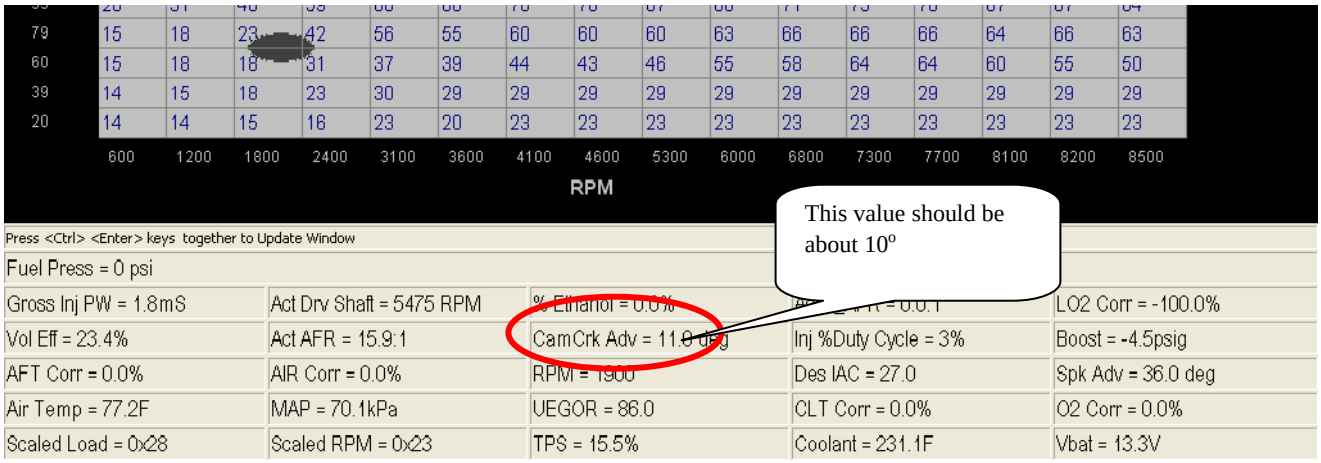
If the system was ordered (or upgraded) with the optional 3-step, a second wire will be present in terminal location W1. This wire must have 12V supplied to it for the 3-step to work. See the GEN3 User's Manual, "2-Step" section for more information.

Note: As is the case with all BigStuff3 GEN3 systems, the internal data logger trigger wire must be enabled (12V supplied to the wire) for the 2-step and/or 3-step to function.

Setting the CAM/Crank Advance Value to 10°

The next step is to dial in the Cam/Crank Advance (CamCrkAdv) to about 10^{O} by moving the crank sensor on the adjustable bracket. The CamCrkAdv signal (see screen print below) in the Dash indicates the number of crank shaft degrees the cam falling edge occurs before the crank signal. The CamCrkAdv signal may need to be added to the "Dash". Also, the engine may need to be turned on and off several times to adjust the crank sensor (up or down on the bracket) until the cam/crank advance reads 10^{O}. First, start the engine and note the cam/crank advance reading. Turn the engine off and move the sensor in one direction. Restart the engine to determine if moving the sensor in the direction chosen resulted in the CamCrkAdv signal being closer or further from the desired 10^{O}. Again, it may take several iterations of turning the engine on and off and moving the crank sensor up or down until the cam/crank advance in the Dash reads 10^{O}. Once 10^{O} is dialed in, securely tighten the sensor to the bracket.

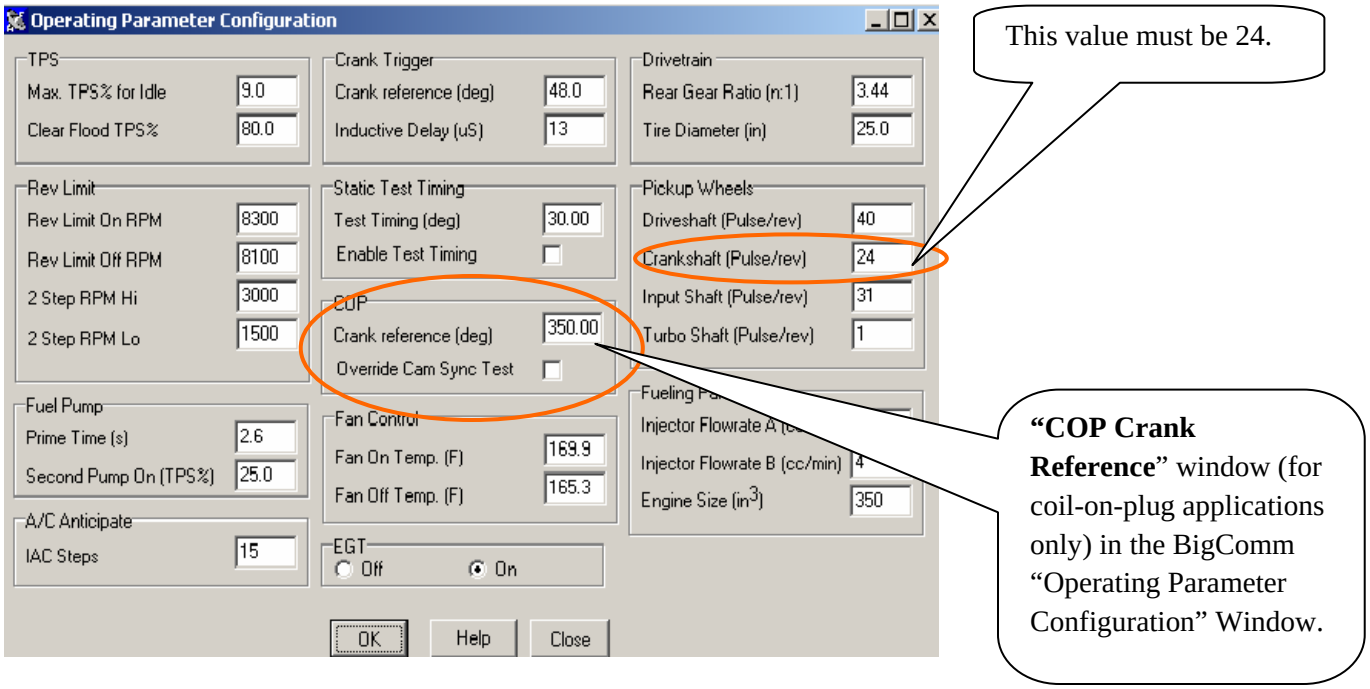
Note: An important feature, associated with the external 24X wheel firmware upgrade, is that the CamCrkAdv relationship will now recorded, via the Replay function. Further adjustments to the crankshaft sensor position are necessary if the Replay shows that the CamCrkAdv value went below 3^{O} or above 13^{O}. Ideally, the CamCrkAdv value should stay between 7^{O} and 11^{O}.



Setting the Crank Reference for Coil-0n-Plug Engines

The Cam/Crank advance (described in the paragraph directly above) must be set before setting the crank reference!!

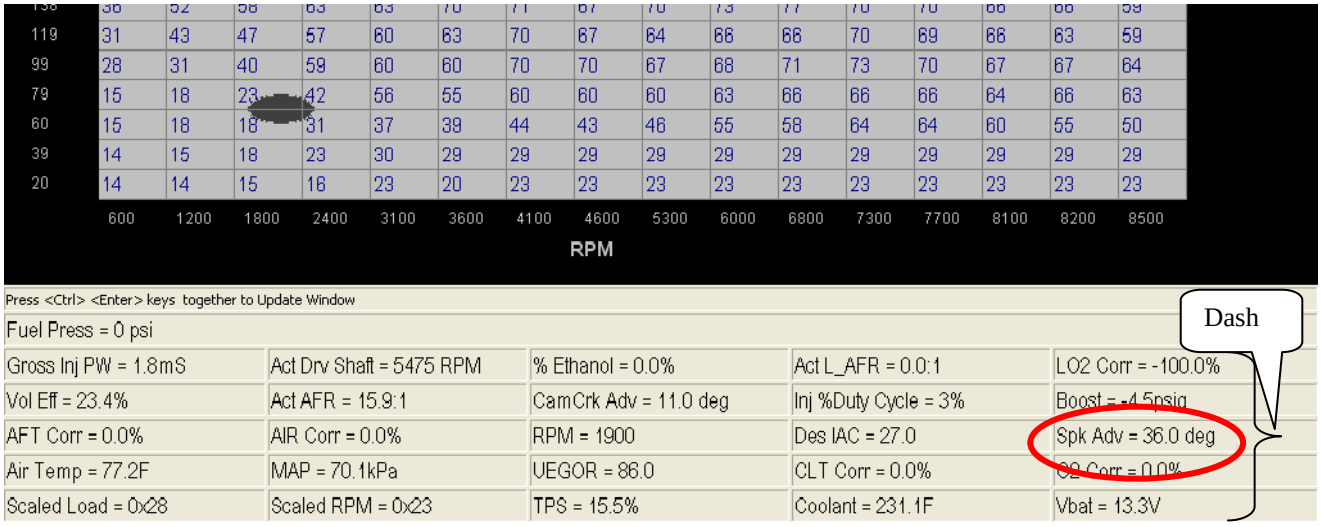
The crank reference value of a stock LS1 COP system should fall somewhere between 350^{o} and 370^{o}. BigStuff3 recommends starting with a COP Crank Reference value of 350^{o}.



Make sure the Crankshaft (pulses/rev) value (shown above) is set at 24.

Next, use a timing light to confirm that the 350° value inputted into the "**COP Crank Reference**" (in the COP window, not the Crank Trigger window) results in an exact match between the spark value seen in the "Dash" and the spark value seen at the crankshaft. If they do not match, change the value (move the **COP Crank Reference** up or down) in the "Crank Reference" window until the value in the "Dash" window exactly matches the crank dampener value exactly. Perform this operation with the engine at or above 2,500 RPM.

"Dash" Window



Refer to the GEN3 User's Manual on BigStuff3's website (www.BigStuff3.com) for all other system configuration information.