



**BigStuff3 - GEN3**

**Engine Torque Management (ETM) System**

Rev 1.1

## Table of Contents

	Section	Page(s)	Hyperlink
1	The System Description	1	<a href="#">System Description</a>
2	What is Included	1	<a href="#">What the System Includes</a>
3	What Else is Needed	2	<a href="#">What Else is Needed</a>
4	How to Install the ETM System	2	<a href="#">How to Install the ETM System</a>
5	How to Configure the ETM System	4	<a href="#">How to Configure the ETM System</a>
6	-Desired Drive Shaft Speed Table	5	<a href="#">Desired Driveshaft Speed Table</a>
7	-Drive Shaft Error Table	6	<a href="#">Driveshaft Error Table</a>
8	-Torque Parameters (Six-shooter)	6	<a href="#">Torque Parameters</a>
9	-Misfire Configuration	6	<a href="#">Misfire Configuration</a>
10	-Torque Control (enable/disable)	6	<a href="#">Torque Control</a>
11	Steps to Launching the Car	8	<a href="#">How to Use the ETM System</a>
12	The Initial Calibration	9	<a href="#">The Initial Calibration</a>
13	Interpreting the Replay Graphs	9 - 12	<a href="#">Interpreting Replay Graphs</a>

### System Description

The GEN3's ETM system works to control drive shaft speed for an eight (8) second time period using a patent pending, 32 level torque management control strategy.

### What the System Includes and its Capabilities

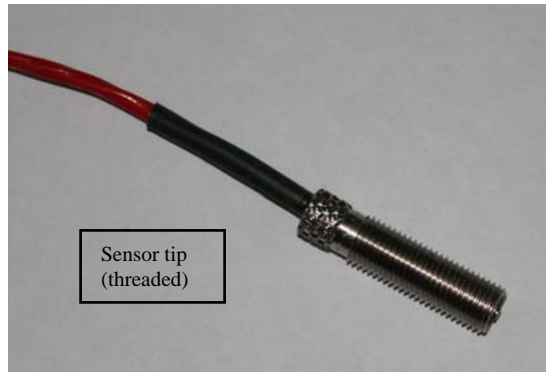
- An Engine Torque Management Module [not included (not required) with GEN3 coil-on-plug systems].
- The ETM Harness.
- Imbedded control software to control engine torque.
- The following user defined, system control and configuration tables, located in the main tool bar under "Torque Management":
- A "Three-Shooter" timing retard control system. This feature helps control engine torque during the critical period between the vehicle launch, through the one-two gear shift. \*Note: May not be implemented in all firmware. A six-shooter and twelve shooter retard system is available as an option. Call BigStuff3 for details.
- An integrated two-step and optional three-step rev limit controller. The system never misfires the same cylinder two times consecutively, resulting in more uniform EGT's and higher boost while staging.
- Extended Data Acquisition "Replay" parameters (described in more detail below) to capture the following events:
  - A Misfire Flag to indicate where in time the ETM system was active (MisFire).
  - A Misfire Counter to count the total number of mis-fire events during the eight (8) second run (MisfireCtr).
  - Torque Reduction Stage indicator (TorqRdStg).
  - TISS Speed – Displays the desired driveshaft RPM.
  - TOSS Speed – Displays the actual driveshaft RPM.

Note: With the ETM functionality the "Replay Mode" is now "Extended Mode", which means there are an additional 12 variables/flags that are now part of the Replay for the traction control.

## What Else is Needed?

**If using a MSD8 CD ignition box, a pullup resistor needs to be installed between the ignition (+12V) post and Mag + post on the side of the MSD8 ignition box! A minimum of a 900 Ohm min (to 1K max), .125 Watt min (to 2 Watt max) resistor is needed.**

BigStuff3's ETM system requires, but does not include provisions for sensing driveshaft speed. If you purchased the GEN3 system with transmission control for the GM 4L60E or 4L80E automatic transmissions, a driveshaft speed sensor is not required. For all other applications provisions for detecting the driveshaft speed will need to be made. BigStuff3 offers a driveshaft speed sensor assembly under part number JMI-007-014 (see photo below) or you can use MSD PN 8159.



In addition to the driveshaft speed sensor, a pick-up wheel and sensor mounting bracket are required. BigStuff3 suggests using Mark Williams' four (4) magnetic (driveshaft) ring. Link <http://www.markwilliams.com/driveshaftPickups.aspx?CategoryID=266>. Note: Make sure all of the magnets in the magnetic ring are all installed in the **SAME** direction. A 0.100" air gap between the sensor and magnetic ring is recommended. A sensor mounting bracket will need to be purchased or fabricated to mount the sensor.

You'll also need the 2 way Metric-Pack connector Packard# 12103784 w/terminal PN 12089188.

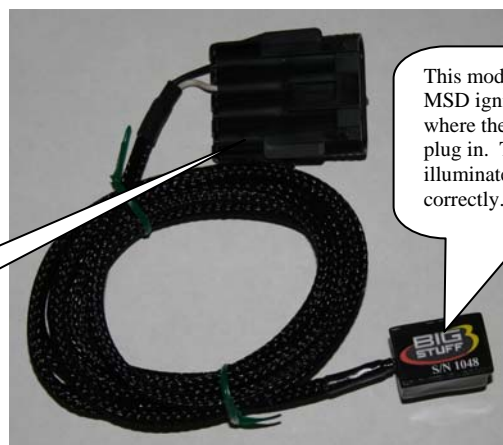
## How to Install the System

- The Bigstuff3 ETM module plugs into the following MSD ignition modules, where the rev limit chips plug in.

Note: These are the only MSD ignition systems supported to date by BS3.

- MSD 8

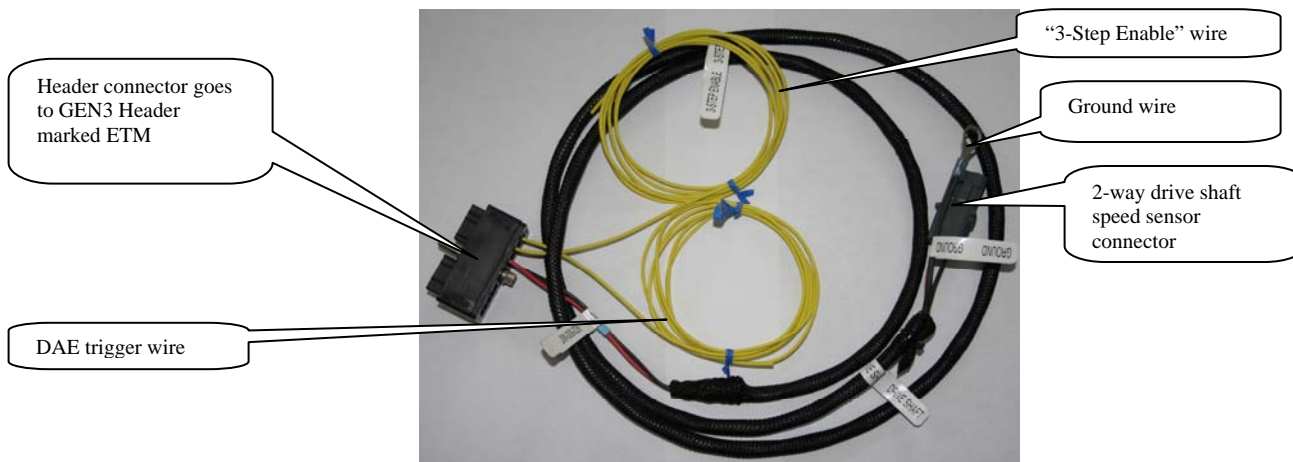
This connector plugs into the connector in the main BigStuff3 wire harness labeled "GM HEI".



- MSD 7AL-2
- MSD 6AL
- MSD Mag44 points box.

Note: The ETM system, for BigStuff3's GEN3 coil-on-plug systems (COP), does not require the ETM module, since all the necessary ETM hardware is resident in the GEN3 ECU.

- The ETM Harness



- Connect the harness header connector into the GEN3 module header connector marked “ETM”.
- Connect the two-way connector labeled “Drive Shaft” to the drive shaft speed sensor (not supplied with the system). See the “What else is Needed” section above for more details. Install the 2 way Metri-Pack Packard connector PN 12103784 (w/terminals PN 12089188) onto the driveshaft sensor and plug it into the ETM harness. If the TOSS trace is erratic switch the wires!
- Connect the “Ground” wire to the frame near the drive shaft speed sensor along with the sensor ground.
- Connect the DAE trigger Wire (from ECU header connector Hdr2 Y2) to a 12V switched source. **There must be 12 Volts applied to this wire, for the 2 step and 3 step functions to work!**
- Connect the 2 Step Enable wire (Hdr1 B2) to the footbrake and /or trans-brake depending upon options. The 2-step and 3-step functions are independent of each other, except that when the 3-step is engaged (12 Volts applied to the “3-step Enable” wire) the 3-step will override the 2-step.
- Connect the 3 Step Enable wire (Hdr 2 W1, TSS+) to the trans-brake switch. (If you have this option). If you have the DAE option, the red turbo shaft speed wire in the DAE harness (also Hdr 2 W1) is used for the 3-step enable function. 12 Volts must be applied to this wire (via the trans brake, for example) for the 3 step to work. **Also, there must be 12 Volts applied to the DAE trigger wire, for the 2 step and 3 step functions to work.** When 12 Volts is applied to the “3-step Enable” wire, the 3-step will override the 2-step.
- Timer Enable wire - connect to a relay to invert the trans-brake signal (see wiring diagram below). This wire must have 12 Volts applied to it once the trans-brake is released to start the timers in the ECU.

## Trans-brake Logic Inverter – Relay Wiring

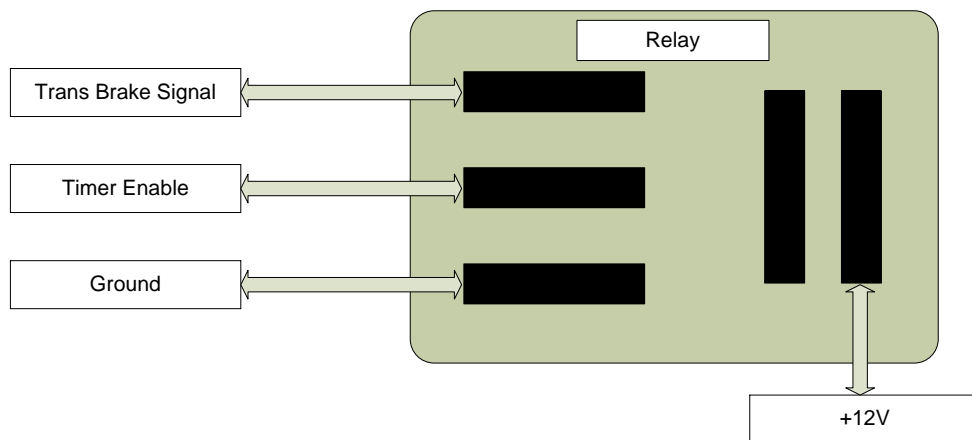
Use a Bosch style 30 Amp relay (part number 0332201107). Wire as follows:

Pin 1 - Ground

Pin 2 - Trans-brake signal

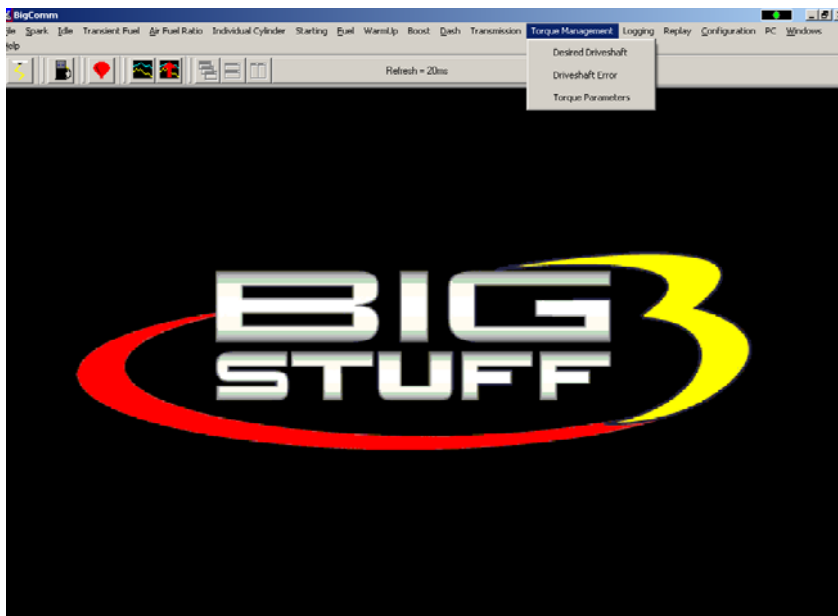
Pin 3 - +12V

Pin 4 - Timer Enable (Hdr. 1 Pin L2 or 4 way Boost connector pin A)

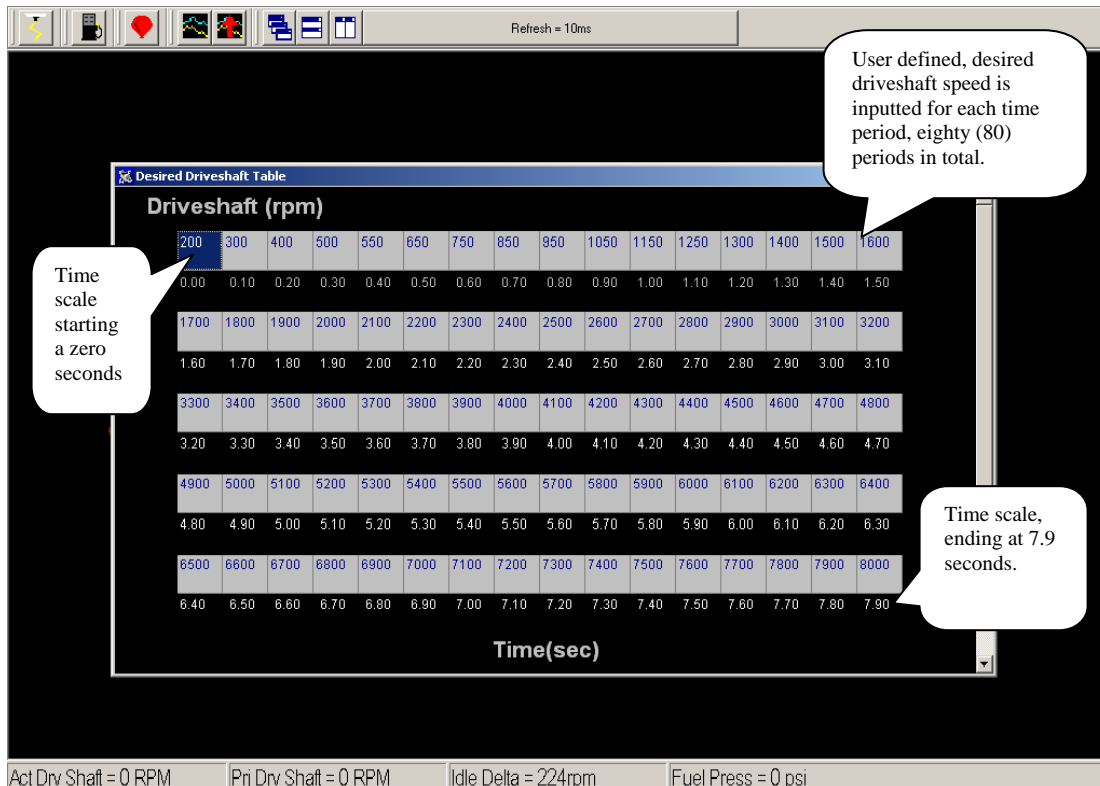


### How to Configure the ETM System

The ETM “Torque Management” configuration screens can be accessed from BigComm’s main tool bar as shown below.

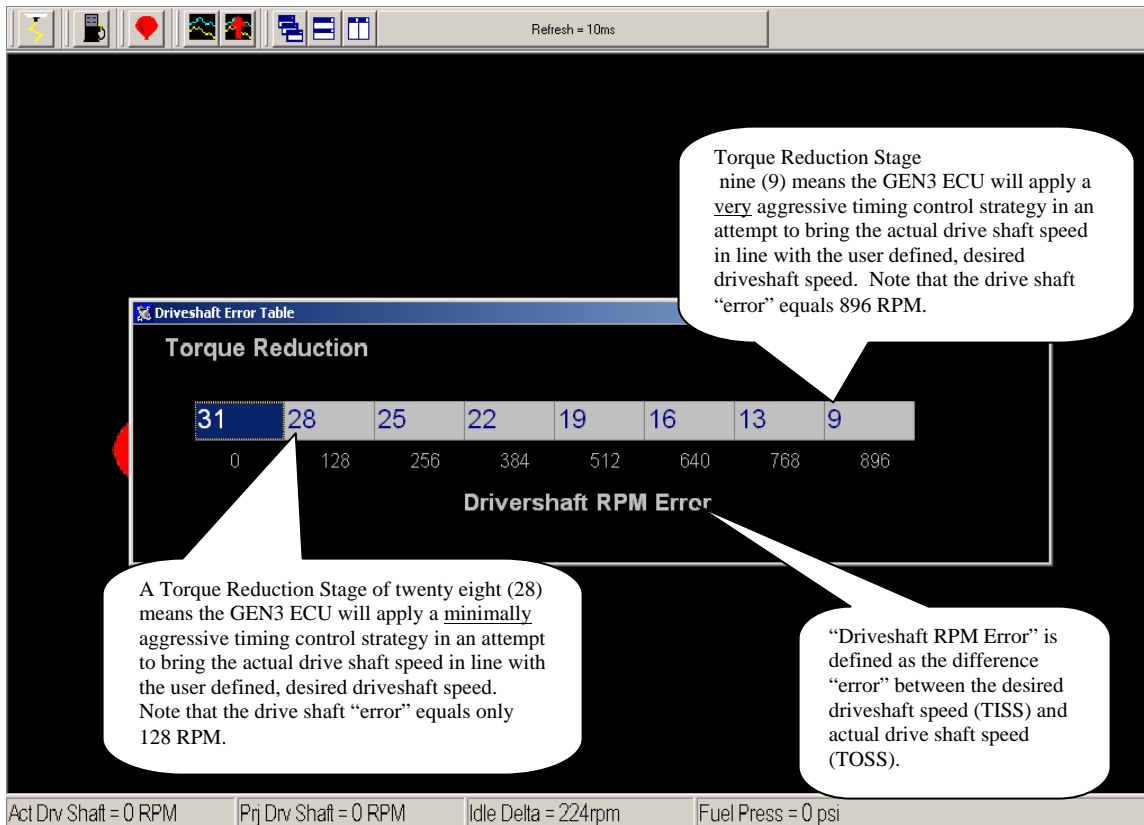


A user defined driveshaft speed is inputted into the GEN3's "Desired Driveshaft Table". The eight second (8) time period is broken up into 80 cells each representing 1/10 of a second. In each of the eighty (80) cells, the user can define the desired drive shaft speed. The desired driveshaft curve should be 100- 200 RPM above the "best" driveshaft curve possible. All the usual editing features are employed (Fill, Interpolate, etc...) in the table as well, but only a row at a time. Remember to hit the "Enter" key to guarantee the change takes place if changing the cells independently.



Once the desired driveshaft speed is defined, the GEN3 ETM system uses a patent pending 32 level torque management control strategy to ensure the actual driveshaft speed follows the desired driveshaft curve. A Torque Reduction Stage of thirty one (31) means that all the cylinders are firing. A Torque Reduction Stage of zero (0) means none of the cylinders are firing.

The difference between the "actual" and "desired" drive shaft speed is called "Driveshaft Error". A "Drive Shaft Error" table is also used to define the level of control applied as a function of driveshaft error. The GEN3 ECU has an eight (8) cell "Driveshaft Error" table for the user to define the torque reduction stage needed for different degrees of drive shaft error. For example, if the GEN3 ECU determines (from sensors used in the system) that the driveshaft error is 800 rpm, the ECU will apply a very aggressive torque reduction stage, lets say a level nine (9). The driveshaft RPM error range in the table goes from zero (0) RPM error to 896 RPM error. Each cell covers 128 RPM of driveshaft error. A linear interpolation is used between rpm cells. The GEN3 data acquisition "Replay" system will provide a graph of the amount of torque management using the variable called TorqRdStg.

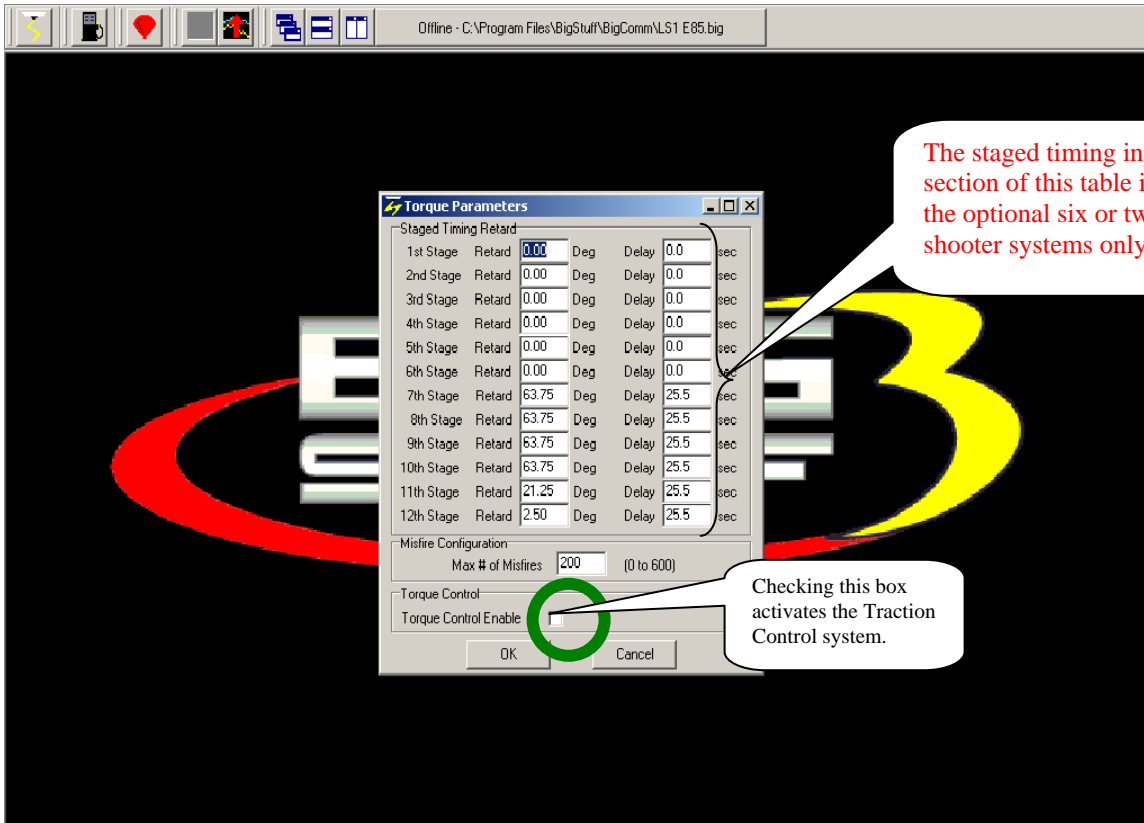


### ***Misfire Configuration***

The TC Parameters table allows the user to define the maximum number of misfire events during the eight (8) second run. Note: Currently not used.

### ***Torque Control (enable/disable)***

Traction Enable: When this box is checked, the torque management system is activated. It is advised not to enable this until a good "Desired Driveshaft Speed" curve is determined. It is best to verify this with a Replay first before activating it.

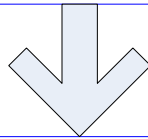




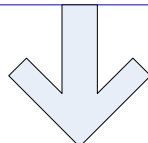
## Steps to Launching the Car with the 2 & 3 Step ETM

After the burn-out, [flip on the DAE/DLTRIGR switch](#) (requires 12V to activate) used for the GEN3's data acquisition system. **12 Volts must be applied to this wire (the DAE/DLTRIGR switch must be turned on) for the 2-step & 3- step to work! Go to page 3 in this manual for more details.**

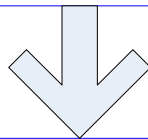
If you already have the DAE option, use it as usual. If you do not have the DAE option, use the DAE trigger wire that is supplied with the ETM upgrade kit (see photo above)



[Apply foot brake and press the throttle.](#) At 25% TPS (required to activate) and 250 RPM below the value inputted into the "2 Step RPM Lo" input box (in the BigComm "Operating Parameter Configuration Table"), the rev limiter will begin to operate. If the first 2-step doesn't come on, make sure the ETM chip module is installed in the MSD ignition box correctly. There is a red LED in the ETM module that will illuminate if it is installed properly. The first 2-step wire runs from the ECU header 1, pin B2. Requires 12V to activate. **12 Volts must be applied to the "2-step Enable" wire and the "DAE Trigger" wire for the 2-step to work. Go to page 3 in this manual for more details.**



[Creep the car forward into the staging beams and bring the second bulb on. Depress the trans-brake button.](#) This will activate the second 2-step (A.K.A. "3-Step"). Again, at 25% TPS (required to activate) and 250 RPM below the value inputted into the "2 Step RPM Hi" input box (in the BigComm "Operating Parameter Configuration Table"), the "3-Step" rev limiter will begin to operate. **12 Volts must be applied to the 2-step Enable wire and the DAE Trigger wire for the 2-step to work. Go to page 3 in this manual for more details.**

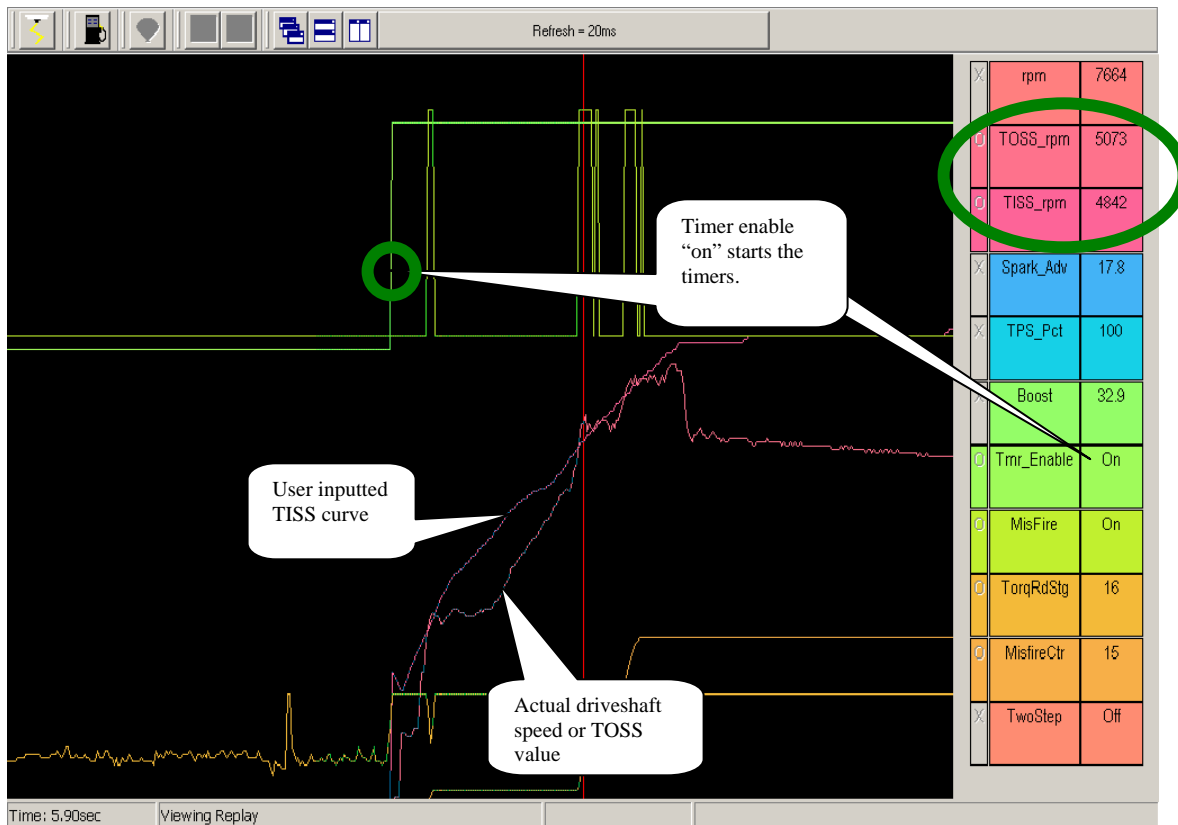


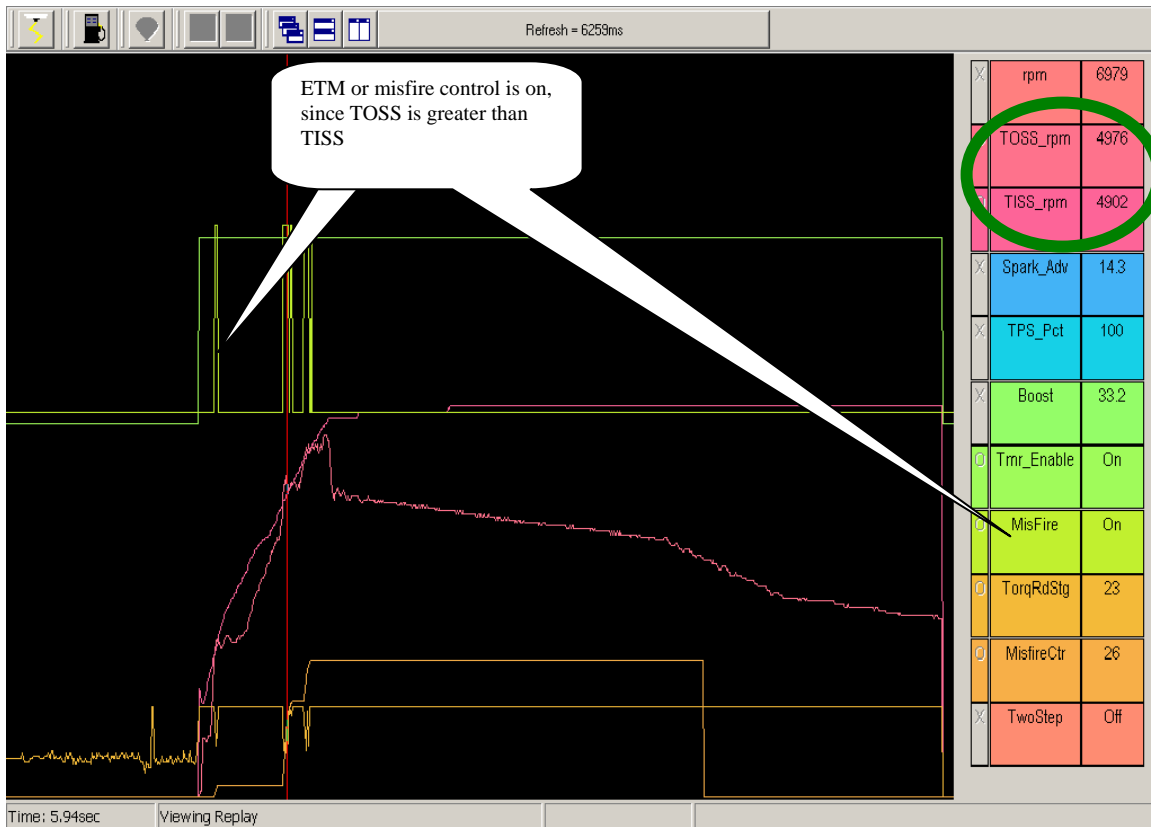
Once the trans-brake/clutch is released, the Timer Enable pin (Header, 1 L2) must go high (it requires 12V to activate). The "Timer Enable" wire must be connected to a relay to invert the trans-brake signal (see wiring shown earlier). When the trans-brake is released the timers begin to run. The boost stages and retards become active as well as the TISS projected driveshaft speed curve. **See page 4 of this manual for information on how to invert the trans-brake signal. The Timer Enable wire does not need to be hooked up and active for the 2-step and 3-step to work, but the staged boost control will not function without 12V to the Timer Enable wire.**

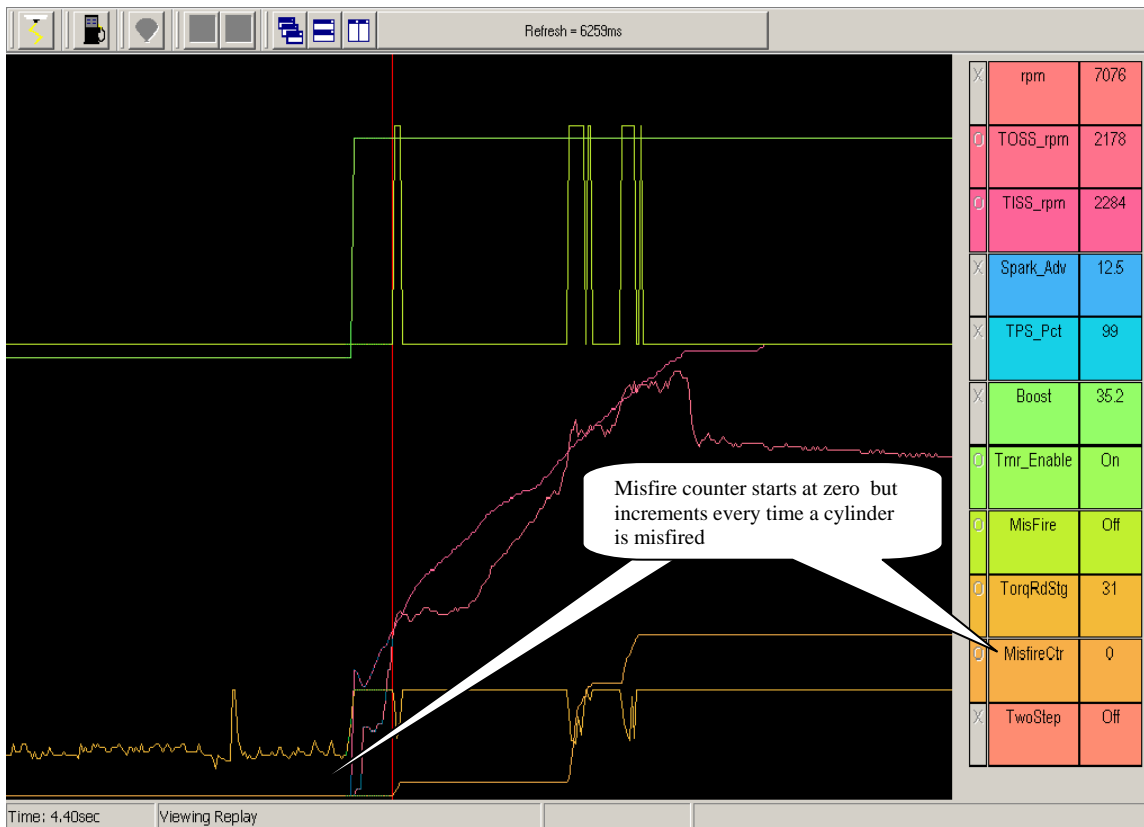
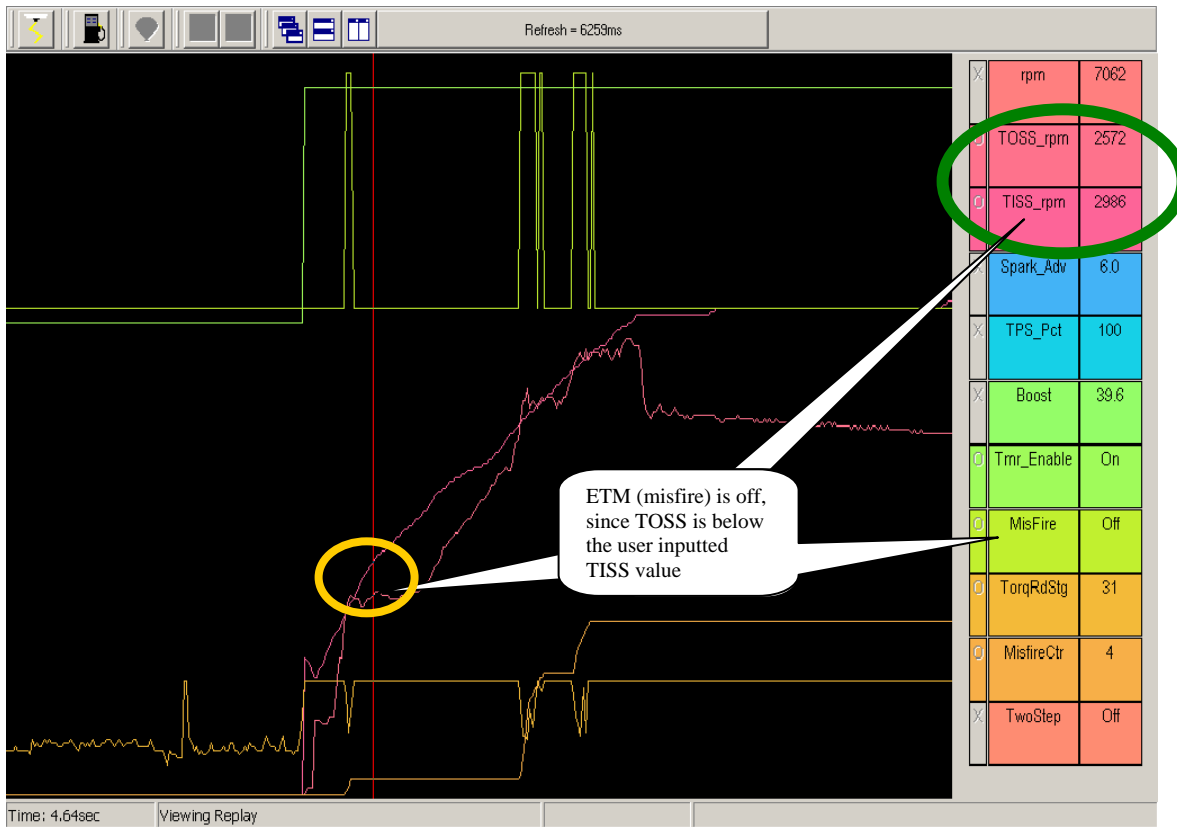
## The Initial Calibration (**READ BEFORE USING THE SYSTEM**):

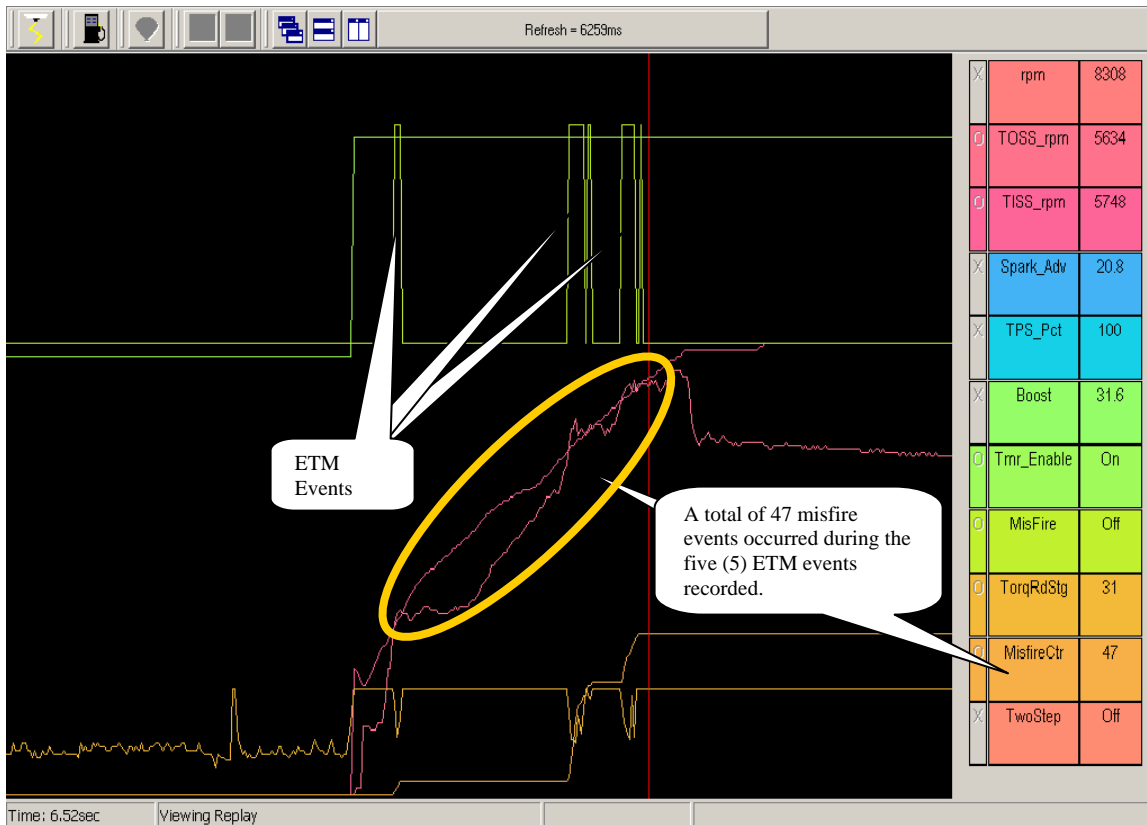
- Make sure the driveshaft speed sensor is installed and functioning correctly.
- **Disable the Torque Management** system w/ [ETM\\_Disable](#). Make sure the box titled “Torque Control Enable”, in the Torque Parameters table is not checked. See Torque Parameters screen print above.
- Following the “How to Use the ETM System procedure directly above, collect data from a pass.
- In the [Desired Driveshaft Table](#), input desired driveshaft speed values 200 RPM greater than the actual driveshaft speed data collected in the initial pass.

## Interpreting ETM Replay Graphs









The Two-Step flag displays the state of either or both the 2 step and 3 step inputs in the Replay screen.

