# TC88A Ignition

What is the difference between EX and race versions?

The new EX version of our TC88A has been given Air Resources Board Executive Order (ARB E.O.) D-641-1. This makes the TC88A EX exempt from the prohibitions of the California Vehicle Code and 50 states street legal. The maximum spark advance curve in the EX version is more conservative in the lower RPM range. The figure below compares the maximum advance curves (advance slope set to 9) at wide open throttle for the two versions.
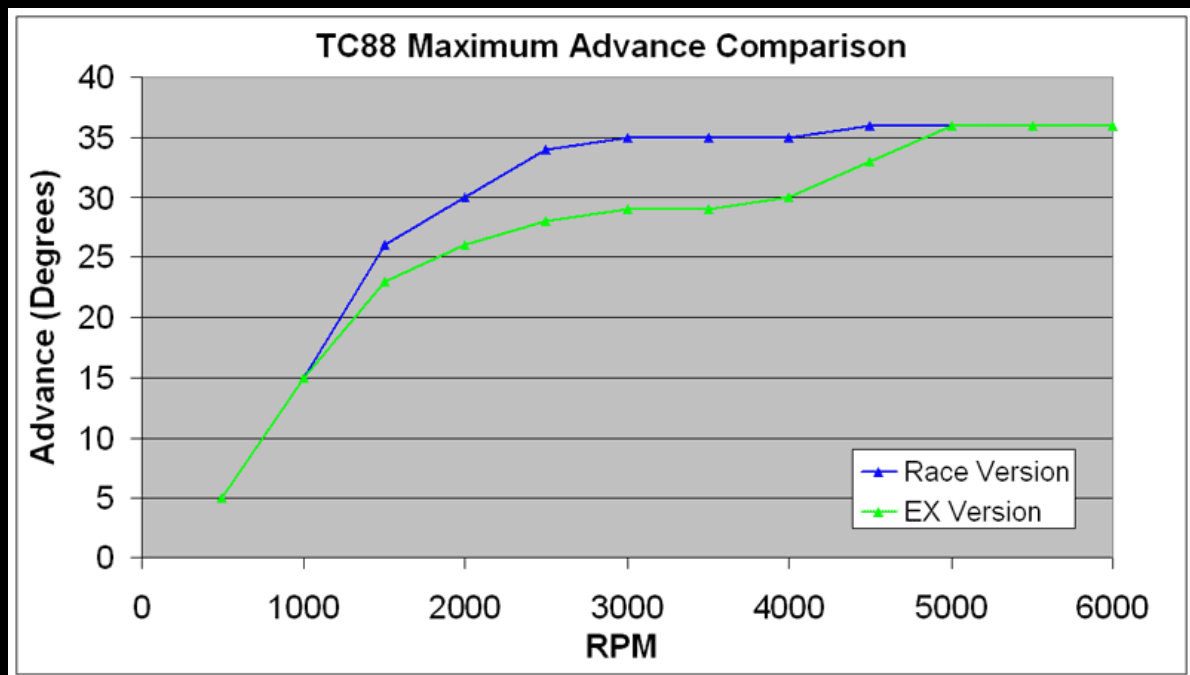
The EX version is suitable for all street driven applications, including large displacement and high compression engines where spark timing must be retarded from stock settings to avoid destructive engine detonation. As a compliance criteria, the Air Resources Board allows products such as the TC88A EX to advance ignition timing up to 4 degrees beyond the original equipment module. Thus the maximum advance curve in the TC88A EX is still very aggressive and allows a performance improvement when using 92-93 octane gasoline with stock engines.

The maximum advance curve for the race version is only suitable for true race engines where a long duration/high overlap camshaft reduces cylinder pressure in the lower RPM range and high octane race gasoline is used.

Both the EX and race versions of our TC88A have sufficient advance adjustment range for most applications using the advance switch settings. When used with our PC Link TC88 software, both the EX and race versions allow creating a custom advance curve and no limitation exists on retarding the spark timing to solve a detonation problem which is the most common reason for creating a custom curve.

What is the difference between TC88 and TC88A ignitions?

The TC88 is for 1998-2003 carbureted Twin Cam 88[®] models that have an ignition module with two 12 pin connectors. The TC88A is for 2003-2006 carbureted Twin Cam 88[®] and Sportster[®] models that have an ignition module with a single 12 pin connector. Sportster[®] models changed from an internal ignition to the new TC88A style ignition in 2003. All 2004 and later carbureted Twin Cam 88[®] models use the new TC88A style ignition.

However, H-D[®] appears to have also shipped a limited number of 2003 carbureted Twin Cam 88[®] models with the new style ignition. If you have a 2003 Twin Cam 88[®], you need to check the ignition module.

The TC88A supports the J1850 data bus used on 2003 and later models for communications between the ignition module, turn signal/security module (TSM/TSSM), instrument cluster, and scan tools.

What is the J1850 data bus?

The J1850 data bus is a **Society of Automotive Engineers** (SAE) standard. J1850 has two implementations; one used by GM/Delphi and the other by Ford. The GM/Delphi version is referred to as variable pulse width (VPW). Since H-D uses Delphi electronics, H-D$^®$ models come with this VPW version of the J1850 data bus.

J1850 is used for communications between the engine controller (ignition module or carbureted models), turn signal/security module (TSM/TSSM), instrument cluster, and scan tools. J1850 is intended for robust communications in a noisy automotive environment. The data rate is relatively slow and the J1850 bus cannot directly interface to a PC.

If the ignition module does not support the J1850 data bus, the speedometer, odometer, tachometer, and self canceling turn signals are all inoperative.

How does the TC88A communicate with a PC?

The TC88A uses same type of RS-232 serial PC link as used in our other products. RS-232 is a computer industry standard that allows use of an inexpensive cable for high speed communications. Most laptop PCs have a 9 pin D-sub connector for RS-232 communications. For those laptop PCs that lack an RS-232 port, USB or PC card adapters are readily available.

There are two reasons why we didn't use the J1850 data bus for PC communications:

1. J1850 cannot directly interface to a PC. An expensive adapter, essentially a PC based scan tool, would be required. This type of adapter would cost the end user substantially more than our present PC link cable.

2. J1850 is relatively slow. Our RS-232 based PC link communicates at 56 kBaud (56,000 bits/second). J1850 has a raw data rate of only 10.4 kBaud. J1850 data is organized into complex frames with a significant overhead for addressing and error detection that reduces the actual data rate to about 1/10 that of our RS-232 based PC link.

Will the TC88A solve my hot starting problems?

Some Twin Cam 88$^®$ engines are prone to hot starting problems. When cranked after a short hot soak, the engine may "kick back." Over time, this will cause damage to the ring gear and starter pinion.

The TC88A module uses an improved starting algorithm that includes a programmable cranking delay. The TC88A module is shipped with a zero cranking delay: it fires on the first recognized compression stroke. This works best on stock and mildly modified engines.

High compression engines may exhibit a "dieseling" phenomena after a hot soak. This can be verified by temporarily disconnecting the 3 terminal coil primary connector to disable the ignition. If the engine still kicks back or runs for several revolutions after cranking, the problem is dieseling. The only solution is to install compression releases. When compression releases are installed, best starting results will be obtained by programming the TC88A module for a 1-2 revolution cranking delay. This can be done by means of the PC Link TC88 software and optional interface cable.

What coil is recommended for use with the TC88A ignition?

The TC88A is intended for applications that use an original equipment coil with .5 ohm primary resistance. You cannot use any coils with higher resistance. All available aftermarket coils for, including our P/N 2008, have the same electrical characteristics as the original equipment version. Unless your original coil fails or you suspect that it has become degraded, there is no valid reason to replace it.

Can I recalibrate the the speedometer and odometer to accommodate tire and gear changes?

Yes! This feature is a freebie with the TC88A. You don't need to buy a separate speedometer calibrator such as the S&S unit. With the new H-D$^®$ models, the ignition module converts signal pulses from the VSS (vehicle

the S&S unit. With the new H-D™ models, the ignition module converts signal pulses from the VSS (vehicle speed sensor) to data that is transmitted to the instrument cluster. Scaling (in terms of VSS frequency/speed) varies slightly between models depending on tire size and gear ratio. You can use PC Link TC88 software to change the default scaling and recalibrate the speedometer/odometer.

How do I wire up a custom bike?

At this point in time, most aftermarket companies do not support 2003-2006 models using the new J1850 data bus. If you are building a custom bike, you will face significant difficulties integrating aftermarket instruments, as there are no discrete signals available in the H-D® wire harness to drive a conventional speedometer or tachometer. If you use H-D® instruments intended for a J1850 application, you will not have any problems.

The TC88A was designed with custom bike applications in mind. The TC88A will operate correctly and will not set any diagnostic trouble codes if you disconnect the H-D® turn signal/security module (TSM/TSSM) or vehicle speed sensor. If you are using a custom wiring harness, you also have more flexibility as far as aftermarket instruments. You can use an aftermarket speedometer that directly interfaces to the vehicle speed sensor. Click on the link below for the drawing of a wire harness suitable for use with the TC88A on a custom bike.

TC88A Wire Harness Drawing

Can I use an aftermarket tachometer with the TC88A?

Yes! TC88A units with firmware revision 2.0 and higher provide an optional 12 volt square wave tach signal (one pulse per revolution) that is compatible with most tachometers intended for 1999-2003 Twin Cam 88® applications. This allows you to retrofit a wide range of tachometers to newer 2004-2006 models. Please download the TC88A installation instructions for details on tach hookup. If you plan to use the optional tach hookup, you will require the PC link cable and software to enable the tach output. TC88A units with firmware revision lower than 2.0 can be factory reprogrammed to add the tach output feature (please call for details).
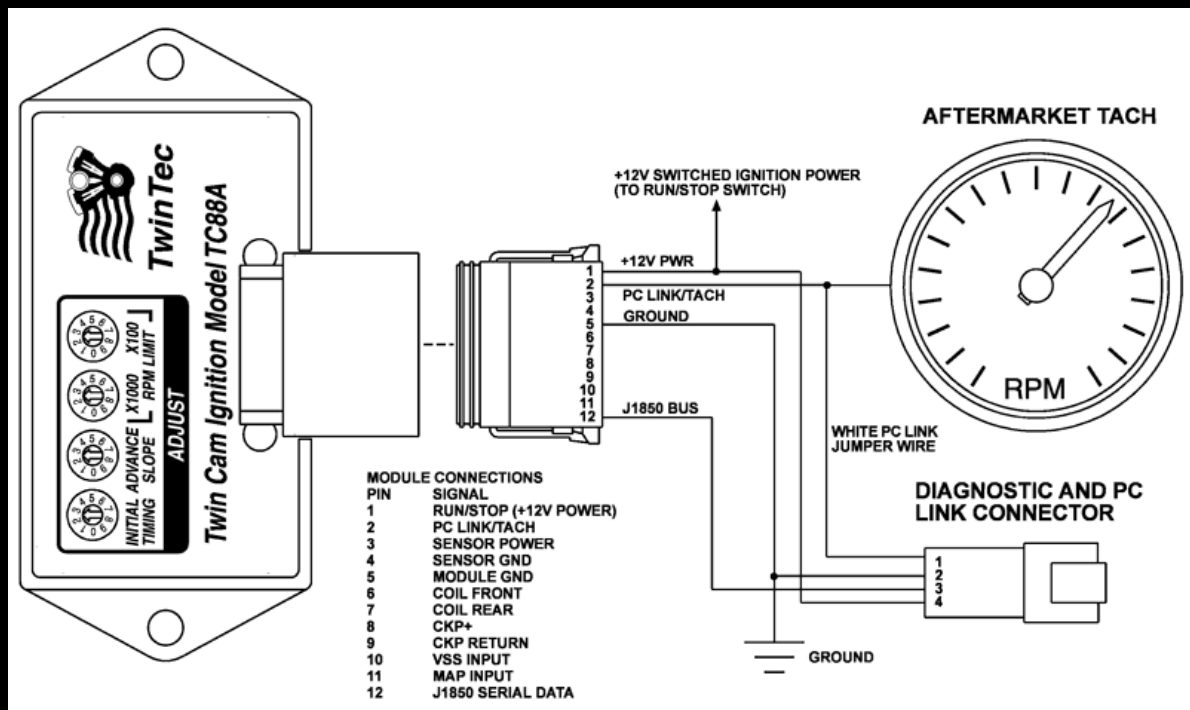
Why not just connect the tachometer direct to the coil?

You will not always get an accurate RPM indication. Most aftermarket tachometers for H-D® applications can be connected directly to the ignition coil. The tachometer usually has a jumper that allows you to select one or two crank revolutions per trigger pulse for compatibility with dual and single fire ignitions. Twin Cam 88® (and 2003 and later Sportster®) engines are nominally single fire, so you can connect an aftermarket tachometer to one of the coil windings and get a correct reading - *most of the time*. The problem is that the ignition systems (both original equipment and aftermarket) use a complex algorithm to synchronize cylinder firing during cranking. This doesn't always succeed. If the ignition system cannot determine which cylinder is on the compression stroke, it reverts to wasted spark mode and fires twice - once on compression and again on exhaust. Wasted spark mode rarely occurs, perhaps only once in 100 starts. However, in wasted spark mode, the tachometer will indicate

rarely occurs, perhaps only once in 100 starts. However, in wasted spark mode, the tachometer will indicate twice the actual RPM.

Can the TC88A be used with new American IronHorse® motorcycles that have a crank triggered ignition?

Yes. We have a special TC88A-IH version for 2004-2007 American IronHorse® models. Please refer to the **TC88A-IH Installation Instructions** for further details. You can also download a custom advance table for modified high compression IronHorse® applications provided courtesy of Proven Performance.

TC88A-IH High Compression Advance Table

The advance table is saved as ZIP archive file that you can download by clicking on the link above. You will require PKZIP to unzip the archive. If you do not have PKZIP installed on your computer, you can download it from the PKWARE Inc. website.

Accept no compromises, choose only ignition system parts.