Twin Tec Installation Instructions for TC88 EX Twin Cam Ignition

CAUTION: CAREFULLY READ INSTRUCTIONS BEFORE PROCEEDING.

OVERVIEW

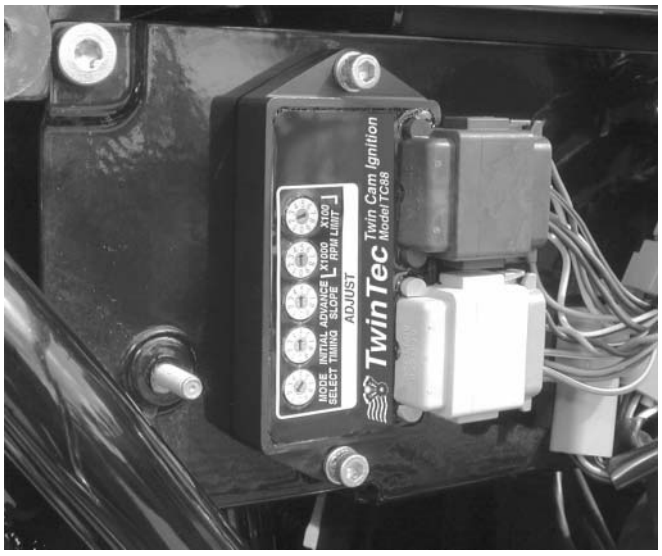
The Twin Tec TC88 EX ignition replaces the original equipment (OE) ignition module and is 50 states street legal (ARB E.O. No. D-641-1) on 1999-2003 Harley-Davidson® motorcycles with carbureted Twin Cam 88® 1450cc engines. The TC88 EX offers adjustable advance and adjustable RPM limit settings in 100 RPM increments.

Twin Tec PC Link software and an optional USB interface cable (P/N USB-INTF) that connects to the OE data link connector allow the use of a laptop computer to program individual units with a custom advance table and other engine parameters.

INSTALLATION

1. Turn off the ignition switch and disconnect the battery ground cable before proceeding.
2. Find and remove the OE ignition module. The OE module is usually located under the seat or under a side cover. You may need to use a small flat screwdriver to press on the connector locking tabs.

Figure 1 - Typical Installation



3. Install the new Twin Tec module. Figure 1 shows a typical installation under a side cover. You can reuse the original mounting hardware.
4. Reconnect the battery ground cable.

OPERATING MODES

A single 10 position rotary switch is used to select the operating modes. Switch settings are as follows:

0 Multi-spark disabled

1 Multi-spark enabled

2-7 Not used

8-9 Reserved factory settings

We recommend that you use mode switch setting 1 (multi-spark enabled). When multi-spark is enabled, a continuous series of sparks is fired from the advanced timing point until TDC. Most air-cooled engines use relatively cold spark plugs to prevent detonation under high load. Multi-spark reduces the consequent tendency for plug fouling at idle.

Switch settings 8-9 are reserved for factory programming and test. The unit will not operate with these settings.

RECOMMENDED TIMING SETTINGS

The Twin Cam 88® engine utilizes a non-adjustable crankshaft position sensor. Thus no mechanical means exist for adjusting the timing. The TC88 EX module overcomes this limitation. The initial timing switch allows you to shift the entire advance table. Switch setting 5 corresponds to nominal timing. Lower switch settings decrease (retard) the initial timing in one degree steps. Initial timing settings higher than 5 are ignored by the TC88 EX version.

The TC88 EX module accommodates a wide range of engine applications. The advance slope switch allows you to control the aggressiveness of the ignition advance. Figures 2-4 show the effect of advance slope switch settings. Each figure shows advance curves for various manifold pressure values. Higher switch settings result in more aggressive

advance. The effect is more pronounced at high manifold pressures. Note that 30 In-Hg manifold pressure represents wide open throttle (WOT) and 16 In-Hg represents deceleration conditions. Advance slope switch setting 5 is recommended as a starting point.

Tuning a particular engine setup always requires some trial and error experimentation, but maximum power is usually obtained by using the highest advance settings possible without audible spark knock. Some recommended starting points are given below:

For engines run on normal pump gas (87-89 octane), use initial timing setting 5 and advance slope setting 5.

For engines run on 92 or higher octane gas, use initial timing setting 5 and advance slope setting 7.

If you experience spark knock only at low RPM, you can try reducing the initial timing switch setting while maintaining an aggressive advance slope for maximum power at high RPM by increasing the advance slope switch setting. If spark knock is a problem at high RPM, decrease the advance slope switch setting.

TUNING TIP: Excessively lean air/fuel ratio (AFR) increases the tendency for spark knock. Test the motorcycle on a dyno with an exhaust gas sniffer to check AFR and make sure the carburetor is jetted to factory specifications.

RPM LIMITER SETTING

You can set the RPM limit from 3,000 to 9,900 RPM in 100 RPM increments by means of two rotary switches. The RPM limit is X100 switch setting (i.e. 57 = 5,700 RPM). Inadvertent settings below 3,000 RPM are ignored and result in a 3,000 RPM limit.

The TC88 EX module uses a newly developed RPM limiting algorithm that has been highly optimized for odd firing V twin engines. When the engine is held against the RPM limit, cylinder firing is always paired. This eliminates a torque couple and results in very smooth operation compared to random or sequence type RPM limiters.

Set a safe RPM limit that is appropriate for your engine. Most Twin Cam 88® engines with OE valvetrain components should not be run over 5,700 RPM.

TWIN CAM 88® 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 TC88 EX module uses an improved starting algorithm that includes a programmable cranking delay. The TC88 EX module is shipped with a zero cranking delay: it fires on the first recognized compression stroke. This works best on most engines.

Some 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 TC88 EX module for a 1-2 revolution cranking delay. This can be done by means of the PC Link software and optional USB interface cable.

GENERAL RECOMMENDATIONS

The TC88 EX is designed to be used with the H-D® OE coil. Twin Cam 88® engines require a coil with primary resistance less than one ohm. All aftermarket coils intended for Twin Cam 88® engine applications have electrical output characteristics similar to the OE coil and do not offer any particular advantage.

Due to the short lengths involved on motorcycle applications, energy losses in spark plug wires are insignificant. OE carbon core suppression cables will deteriorate after several years. For a more durable replacement, we suggest spiral core type spark plug cables.

CAUTION: Do not use solid copper spark plug cables or non-resistor type spark plugs. The unit may misfire.

The TC88 EX generates a trigger signal that is compatible with the H-D® OE tachometer and all aftermarket tachometers intended for Twin Cam 88® applications. Note that the tachometer is not connected to the coil. If your motorcycle was not originally equipped with a tachometer and you need hookup instructions or the tachometer is inoperative, refer to the motorcycle service manual for more information.

CHECK ENGINE LED DIAGNOSTICS

The TC88 EX has a diagnostic routine that communicates fault conditions by means of the check engine LED located on the instrument cluster. When the ignition switch is first turned on, the check engine LED illuminates. The LED will remain on until the engine is started. If a diagnostic fault is detected, the LED will flash a number of times and then pause for several seconds. The number of flashes indicates the fault condition as follows:

1 Flash. Crankshaft position (CKP) sensor signal lost. This fault occurs if the engine stalls while the ignition is on. It may also indicate a defective CKP sensor or intermittent wire harness connection.

2 Flashes. Security system (TSSM) or bank angle sensor fault. This fault occurs if the security system (2001 and later models only) is activated or the bank angle sensor indicates a "tipped over" condition. It may also indicate a defective TSSM or bank angle sensor module or intermittent wire harness connection.

3 Flashes. Manifold pressure (MAP) sensor rationality check failure. The MAP sensor signal is outside the expected range. The sensor may be defective or have an intermittent wire harness connection.

4 Flashes. Low battery voltage. This fault warns that the battery is almost totally discharged. The most likely cause is a defective voltage regulator, alternator, or battery. This fault may occur immediately after cranking if the battery is weak but should be cleared within several minutes if the charging system is functioning.

5 Flashes. High battery voltage. The most likely cause is a defective battery or voltage regulator or loose battery connection.

PC LINK CABLE AND SOFTWARE

The new Twin Tec USB Interface (P/N USB-INTF) provides PC connectivity for all of our engine controls (ignition and fuel injection systems) and eliminates the requirement for multiple cables or a separate USB adapter. Two Windows based programs are available for use with the Twin Tec module: PC Link TC88 for programming custom advance curves and other engine parameters and Operating Statistics for viewing engine operating data.

PC Link TC88 software will not allow you to exceed the values shown for the maximum advance curves in Figure 4 when programming custom advance curves for EX units.

The latest versions of our software are always available for download on our website. The software is free and will work in demo mode without a Twin Tec module attached. Refer to the software documentation for details.

The optional USB interface cable connects to the OE data link connector. This is a four terminal Deutsch connector usually found near the ignition module. The PC link can access the TC88 EX module when the ignition is turned on and the engine has not yet been started. Once the engine is started, the PC link is disabled. Note that no damage occurs if the engine is inadvertently started while the PC link is still attached.

TROUBLESHOOTING FLOWCHART

Follow the troubleshooting flowchart on page 6. Experience has shown that most units returned for warranty are OK and another problem, such as a defective coil, is later identified.

Figure 2 - Graph Representing Advance Slope Setting 0 (Least Aggressive)

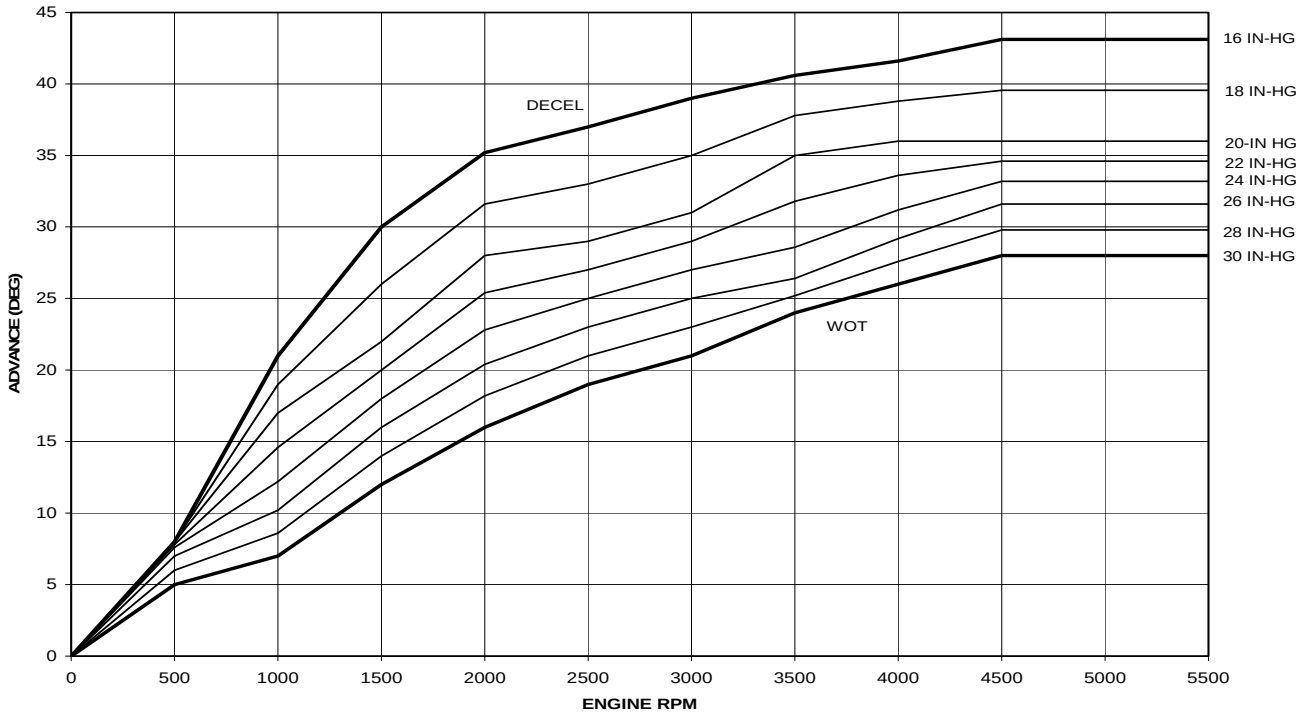


Figure 3 - Graph Representing Advance Slope Setting 5 (Nominal)

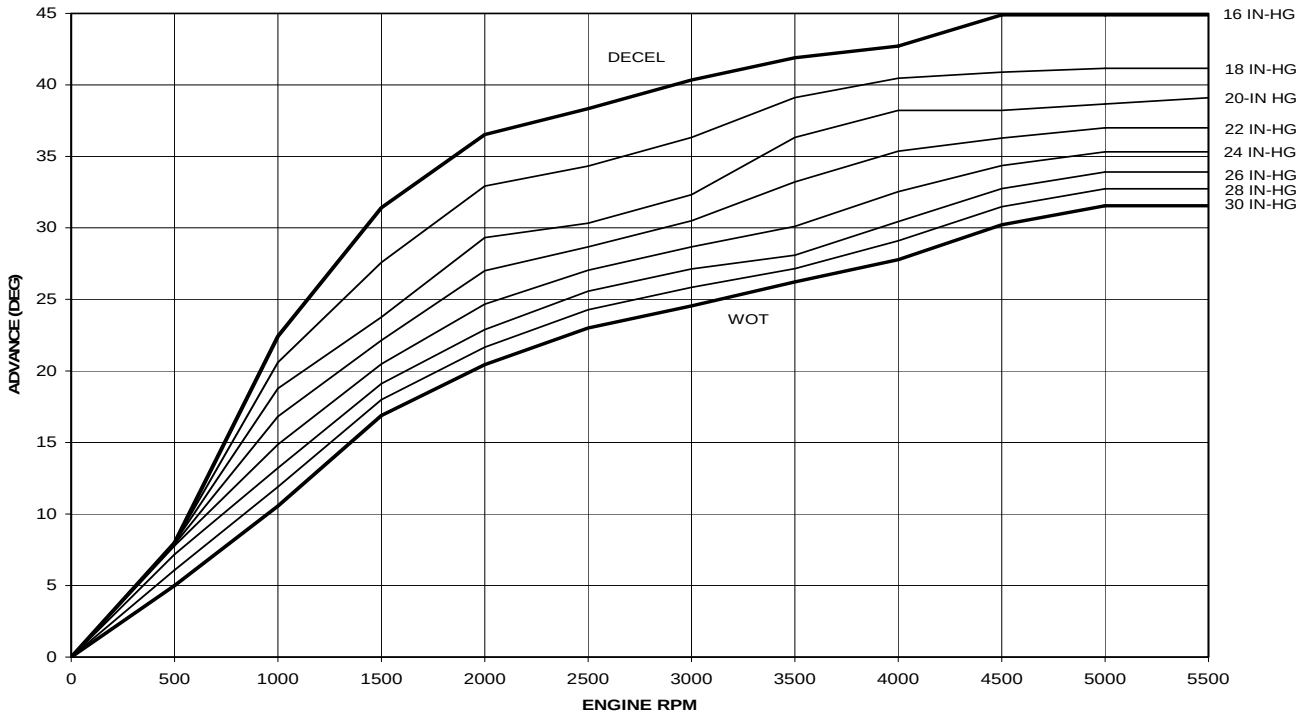
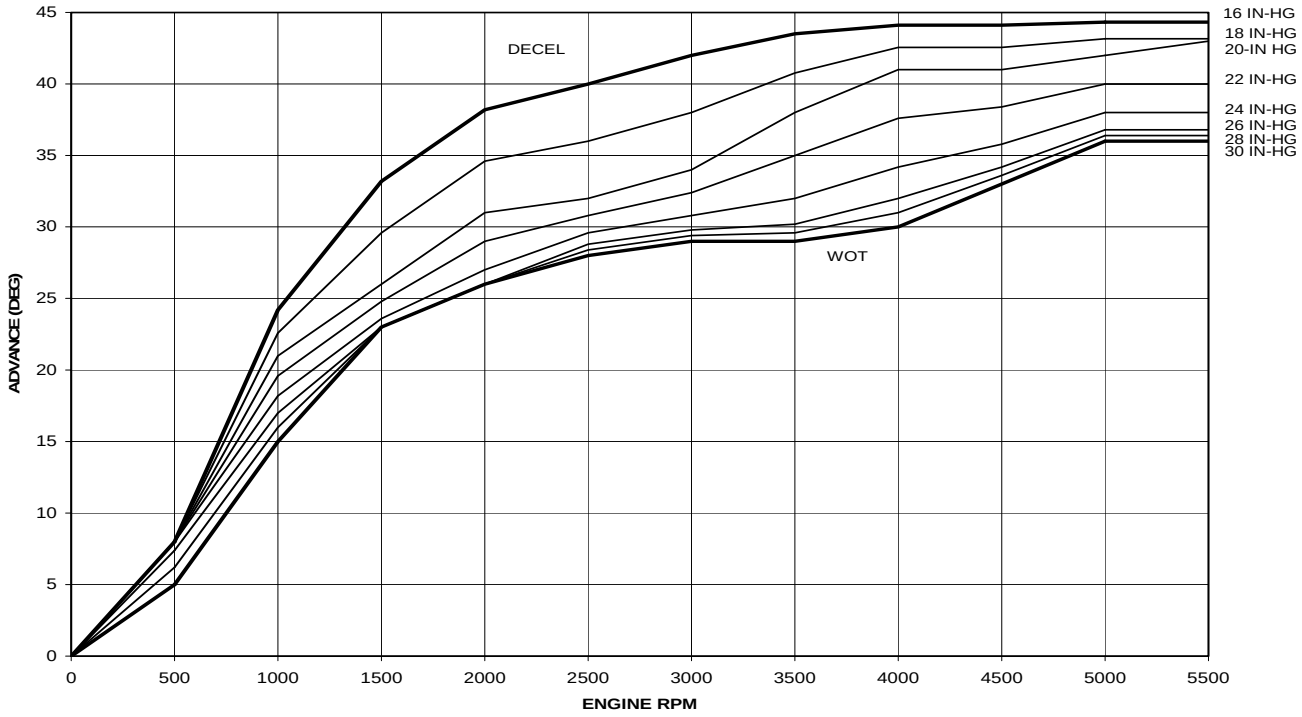


Figure 4 - Graph Representing Advance Slope Setting 9 (Most Aggressive)



Troubleshooting Flowchart