Twin Tec — Installation Instructions for TC88A EX Twin Cam Ignition

CAUTION: CAREFULLY READ INSTRUCTIONS BEFORE PROCEEDING.

OVERVIEW

The Twin Tec TC88A EX ignition replaces the original equipment (OE) ignition module and is 50 states street legal (ARB E.O. No. D-641-1) on 2004-2006 Harley-Davidson® motorcycles with carbureted Twin Cam 88® 1450cc engines. The TC88A EX offers adjustable advance and adjustable RPM limit settings in 100 RPM increments.

New H-D® motorcycles use the SAE J1850 data bus for communications between the ignition module, instrument cluster, turn signal/security module (TSM/TSSM), and diagnostic scan tools. The TC88A EX fully supports this new J1850 data bus including the use of H-D® compatible scan tools to read sensor data and clear diagnostic codes.

The TC88A EX features built-in data logging that stores data for the last 30 minutes of engine operation including RPM, vehicle speed, manifold pressure, ignition advance, and battery voltage. Engine builders will find the data logging feature highly useful for diagnosing problems and reducing unjustified warranty claims.

Twin Tec PC link software and an optional USB interface cable (P/N 18014) allow the use of a laptop PC to program a custom advance curve and download data logged by the unit The USB interface cable plugs into the existing H-D® diagnostic connector on the motorcycle wiring harness.

Figure 1 – TC88A EX Ignition Module

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.

3. Install the new Twin Tec module. You can reuse the original mounting hardware.

4. **PC link jumper wire. If you are not planning on using the optional USB interface for PC link communications, you can skip this step.** Install the supplied white PC link jumper wire between pin 2 of the ignition module connector (12 pin Deutsch) and pin 1 of the OE diagnostic connector (4 pin Deutsch). Remove and carefully tape up the existing wire on pin 2 of the ignition module connector. Refer to the factory service manual for connector location and disassembly techniques.

5. Reconnect the battery ground cable.

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 TC88A 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 TC88A EX module accommodates a wide range of engine applications. The advance slope switch allows you to control the aggressiveness of the ignition advance. Figures 3-5 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

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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. **Setting the RPM limit switches to zero will disable the module.**

The TC88A 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 TC88A EX module uses an improved starting algorithm that includes a programmable cranking delay. The TC88A 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 TC88A 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.

TACHOMETER CONSIDERATIONS

Like the H-D® OE module, the TC88A EX sends RPM data to the OE tachometer over the J1850 data bus. TC88A EX units also 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.

Refer to Figure 2 for optional tach hookup. Module pin 2 is used for both PC link communications and the optional tach signal. The PC link can access the module when the ignition is turned on and the engine has not yet been started. Once the engine is started, the tach signal appears. Note that no damage occurs if the engine is inadvertently started while the PC link is still attached.

If you plan to use the optional tach hookup, you must use PC Link TC88 software to enable the tach output. When you enable the tach output, real time data display with TC88A Log software is not available.

GENERAL RECOMMENDATIONS

The TC88A 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.

CUSTOM ADVANCE TABLE

PC Link TC88 software allows you to program a custom advance table and modify certain engine control parameters.

PC Link TC88 software will not allow you to exceed the values shown for the maximum advance curves in Figure 5 when programming custom advance curves for EX units.

An optional USB interface cable (P/N 18014) is required. For more details, refer to the PC Link TC88 documentation. The latest versions of Twin Tec software and documentation are always available for download on our website. The software is free and will work in demo mode without a TC88A EX module attached.

DIAGNOSTICS AND DATA LOGGING

When the ignition switch is first turned on, the check engine LED illuminates. The LED will go out when the engine is started. If a diagnostic fault is detected, the LED will illuminate.

The TC88A EX provides support for H-D® compatible scan tools. You can connect a scan tool, display the system ID, display and clear trouble codes, and monitor real time data. Since the TC88A EX uses the same diagnostic trouble codes as the OE module, you can use the troubleshooting flowcharts in the factory service manual. The TC88A EX features built-in data logging that stores data for the last 30 minutes of engine operation including RPM, vehicle speed, manifold pressure, ignition advance, and battery voltage. Engine builders will find the data logging feature highly useful for diagnosing problems and reducing unjustified warranty claims. An optional USB interface cable (P/N 18014) and TC88A Log software are required to access the data logging feature. TC88A Log software also allows you to view engine data in real time and display operating statistics and historical diagnostic codes. For more details, refer to the TC88A Log documentation. The latest versions of Twin Tec software and documentation are always available for download on our website. The software is free and will work in demo mode without a TC88A EX module attached.

REINSTALLING THE OE MODULE

You can temporarily reinstall the OE ignition module without concern for the PC link jumper wire (step 4 of the TC88A EX installation procedure on page 1). However, if you plan to permanently remove the TC88A EX, you should also remove the PC link jumper wire and restore the original connections.

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 or user error, is later identified.

Figure 2 – Optional Tach Hookup

AFTERMARKET TACH

+12V SWITCHED IGNITION POWER
(TO RUN/STOP SWITCH)

+12V PWR
PC LINK/TACH
GROUND

J1850 BUS

WHITE PC LINK
JUMPER WIRE

RPM

**DIAGNOSTIC AND PC
LINK CONNECTOR**

GROUND

TwinTec
Twin Cam Ignition Model TC88A

INITIAL ADVANCE / TIMING SLOPE
RPM LIMIT X1000 X100
ADJUST

MODULE CONNECTIONS

PIN	SIGNAL
1	RUN/STOP (+12V POWER)
2	PC LINK/TACH
3	SENSOR POWER
4	SENSOR GND
5	MODULE GND
6	COIL FRONT
7	COIL REAR
8	CKP+
9	CKP RETURN
10	VSS INPUT
11	MAP INPUT
12	J1850 SERIAL DATA

Figure 3 - Graph Representing Advance Slope Setting 0 (Least Aggressive)

DECEL

WOT

16 IN-HG
18 IN-HG
20-IN HG
22 IN-HG
24 IN-HG
26 IN-HG
28 IN-HG
30 IN-HG

ADVANCE (DEG)

ENGINE RPM

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Figure 4 - Graph Representing Advance Slope Setting 5 (Nominal)

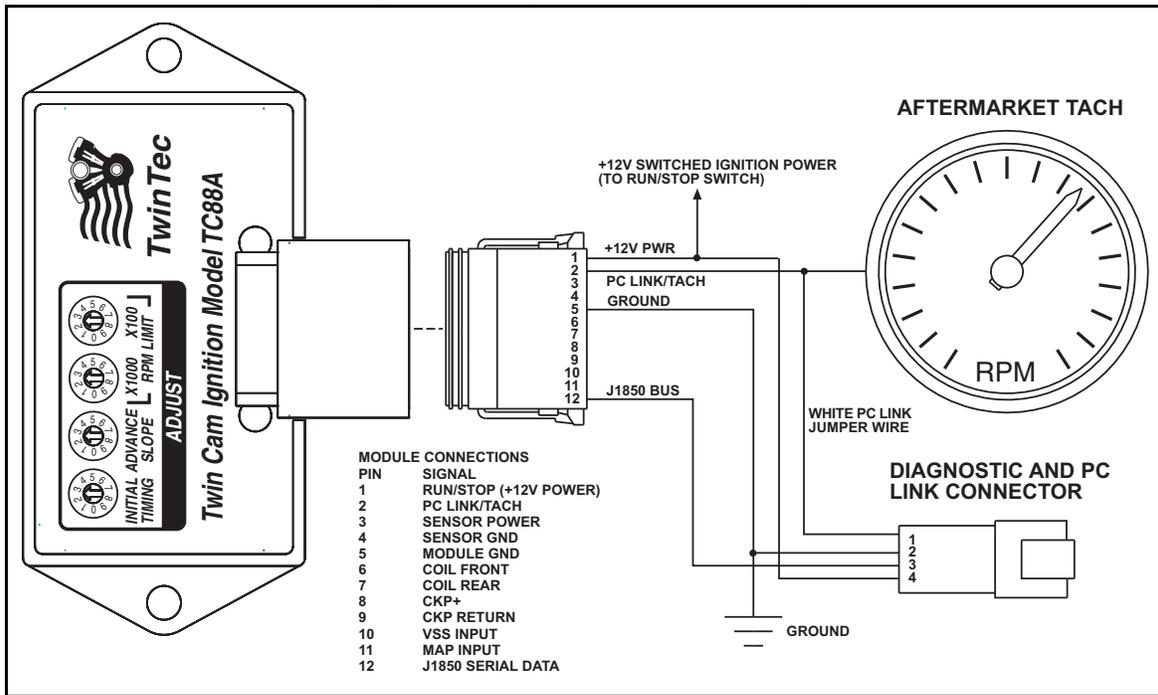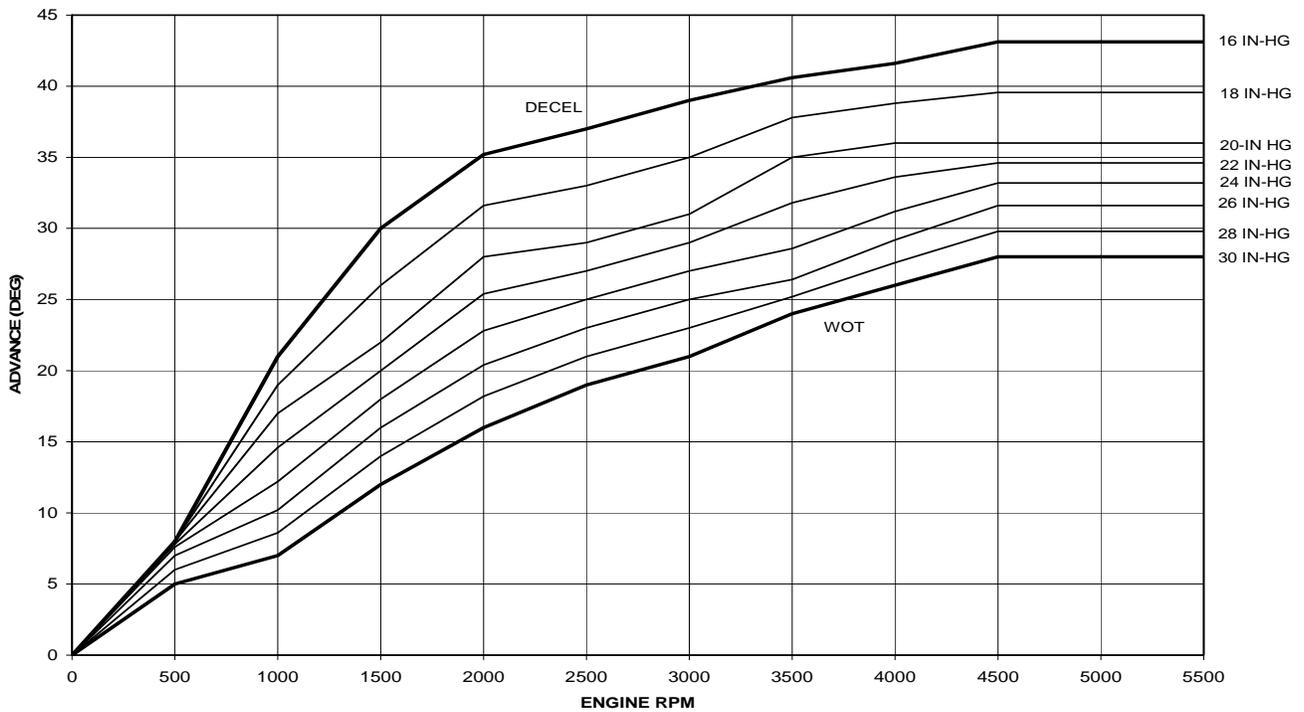Figure 4 - Graph Representing Advance Slope Setting 5 (Nominal)

Figure 5 - Graph Representing Advance Slope Setting 9 (Most Aggressive)

Figure 5 - Graph Representing Advance Slope Setting 9 (Most Aggressive)
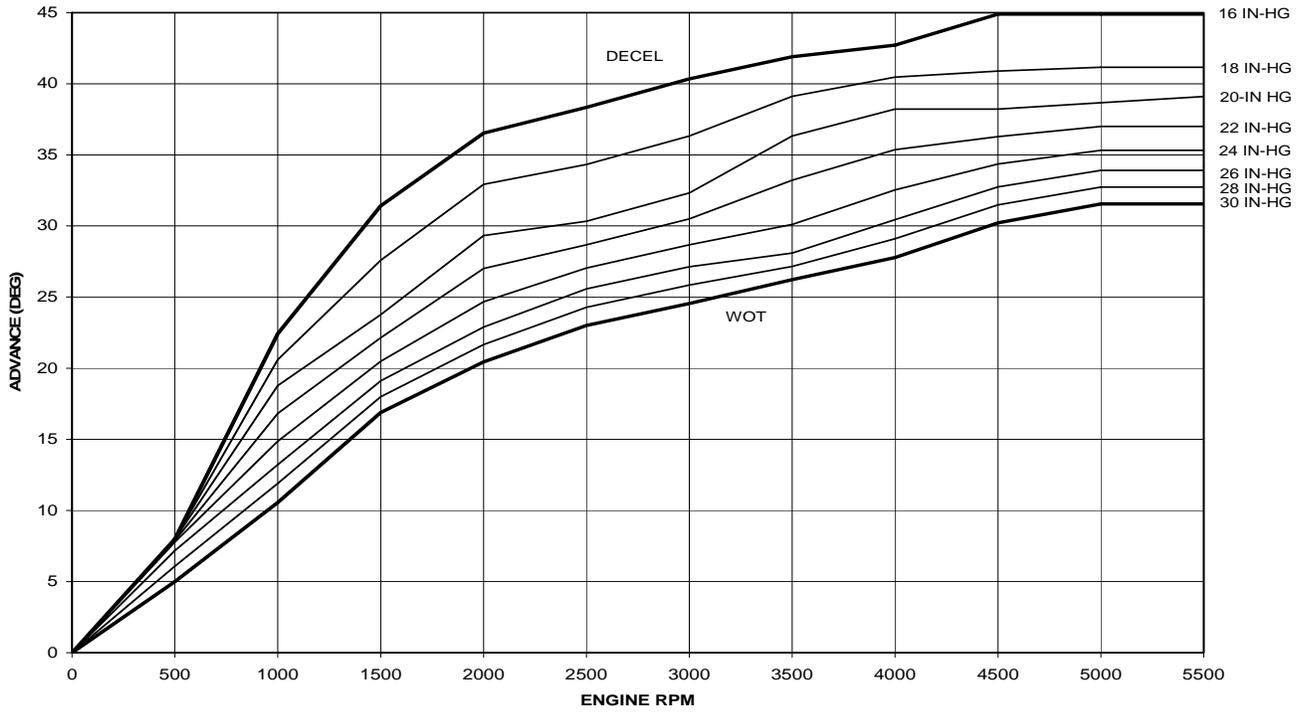
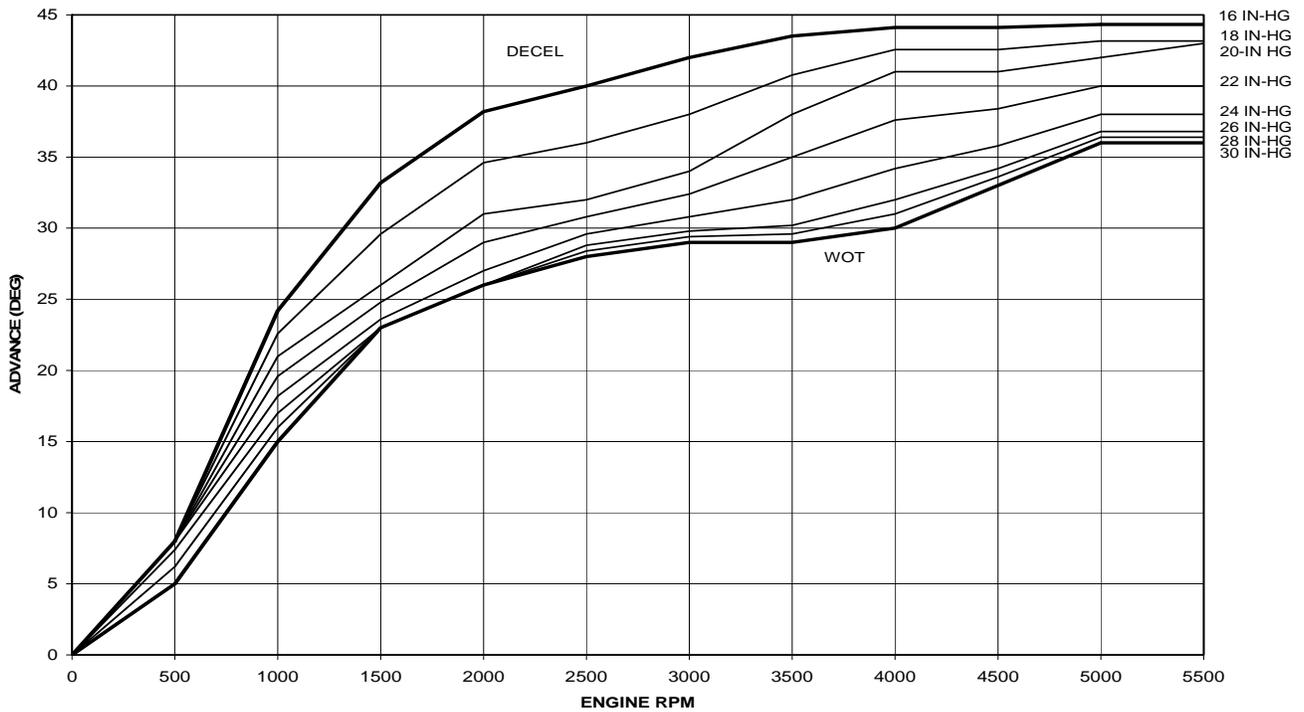Daytona Twin Tec LLC, 933 Beville Road, Suite 101-H, S. Daytona, FL 32119   TC88A EX
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Troubleshooting Flowchart

STARTING POINT

REPLACE TC88A EX WITH OE MODULE OR ANOTHER KNOWN GOOD MODULE. DOES ENGINE START?

- YES → REINSTALL TC88A EX
- NO → REPAIR UNDERLYING PROBLEM BEFORE INSTALLING TC88A EX. REFER TO MOTORCYCLE SERVICE MANUAL

DOES ENGINE START?

- NO → REPLACE TC88A EX
- YES → DOES CHECK ENGINE LED STAY ON? (INDICATES DIAGNOSTIC CODE SET)

DOES CHECK ENGINE LED STAY ON? (INDICATES DIAGNOSTIC CODE SET)

- YES → REFER TO TC88A EX DIAGNOSTICS SECTION. FIX APPLICABLE PROBLEM.
- NO → DOES ENGINE STOP OR DROP CYLINDER AFTER SEVERAL MINUTES OF RUNNING?

DOES ENGINE STOP OR DROP CYLINDER AFTER SEVERAL MINUTES OF RUNNING?

- YES → REPLACE COIL. IS PROBLEM FIXED?
  - YES → DONE
  - NO → REPLACE TC88A EX
- NO → DOES ENGINE MISFIRE UNDER LOAD?

DOES ENGINE MISFIRE UNDER LOAD?

- YES → REPLACE SPARK PLUGS, SPARK PLUG WIRES, AND COIL IS PROBLEM FIXED?
  - YES → DONE
  - NO → REPLACE TC88A EX
- NO → DOES ENGINE MISFIRE AT PART THROTTLE OR WHILE COLD?

DOES ENGINE MISFIRE AT PART THROTTLE OR WHILE COLD?

- YES → CHECK FOR INCORRECT CARB JETTING OR INTAKE LEAK. IS PROBLEM FIXED?
  - YES → DONE
  - NO → REPLACE TC88A EX
- NO → FOR MISC PROBLEMS, CALL TECH SUPPPORT.