



Twin Tec *Installation Instructions for TCFI IID Fuel Injection Controller*

**CAUTION: CAREFULLY READ INSTRUCTIONS BEFORE PROCEEDING.
NOT LEGAL FOR USE OR SALE ON POLLUTION CONTROLLED VEHICLES.**

OVERVIEW

The Twin Tec TCFI IID fuel injection controller replaces the original equipment (OE) 36 pin Delphi® controller on 2001-2008 Harley-Davidson® motorcycles with fuel injected Twin-Cam series engines. **The term TCFI is used throughout this document as a generic term and refers to the new TCFI IID controller unless otherwise noted.**

The TCFI is intended for 95 CID and larger high performance race engines that are expected to produce over 100 HP. The TCFI solves tuning problems with highly modified engines. Competitive “band-aid” products that interface to the Delphi® controller still rely on speed-density fuel control. Long duration/high overlap camshafts wreak havoc with manifold pressure - especially at idle and cruise RPM. Speed-density based fuel control simply can't cope.

High-end automotive racing systems use alpha-N (throttle position and RPM based) fuel control. Alpha-N eliminates any dependence on manifold pressure and is unaffected by long duration/high overlap camshafts. The TCFI brings this proven technology to the H-D® marketplace.

The TCFI IID kit includes the new WEGO IIID dual channel wide-band exhaust gas oxygen sensor interface that allows simultaneous front and rear cylinder auto-tuning during actual riding conditions. The WEGO IIID interface uses low cost Bosch LSU 4.2 wide-band sensors.

The TCFI has the same ignition control as our proven TC88 Twin Cam ignition system with fully programmable advance curves. Idle air control including idle RPM and cold start characteristics are also fully programmable. This facilitates the use of aftermarket throttle bodies with increased airflow.

The TCFI includes extensive diagnostic capabilities and built-in data logging. The unit is compatible with standard H-D® scan tools. Engine data is logged for the last 15 minutes of operation. A PC link cable and Windows compatible software allow the use of a laptop PC for programming and data analysis. The PC link cable plugs into the existing diagnostic connector on the motorcycle wiring harness.

ADDITIONAL REQUIRED PARTS

The TCFI will require initial setup and tuning of the fuel tables. The USB interface (P/N USB-INTF) is required for setup. The wide-band oxygen sensor interface (P/N WEGO3D) is required for auto-tuning fuel tables.

PRE-INSTALLATION CHECKS

Make sure that the OE Delphi® system is functioning correctly (other than tuning issues) before attempting TCFI installation. If the OE Delphi® system is setting diagnostic codes, find and correct any underlying problems first.

Correct adjustment of the throttle position sensor (TPS) and idle stop screw, along with free operation of the throttle linkage, are all critical for proper operation of the TCFI system. The voltage at pin C (typically green/violet wire) of the TPS must be in the range of 0.30-0.80 volts at idle. You can use TCFI Log software to check the idle TPS voltage. Refer to the TCFI IID Tuning Manual for details. With alpha-N fuel control, the TPS is critical. The TPS has a resistance element similar to the volume control on a radio. In time, it will wear out and become noisy. We recommend replacing the TPS after 10,000 miles.

INSTALLATION

1. If motorcycle is equipped with security system (TSSM module), make sure system is disarmed. Turn off the ignition switch and disconnect the battery ground cable before proceeding.
2. Find and remove the Delphi module. The OE module is usually located under the seat or under a side cover.
3. Install the TCFI module. Figure 1 shows a typical installation under a seat. Most applications can reuse the original mounting hardware. Some models use a mounting bracket with #10-32 studs. The TCFI housing has insufficient clearance to accommodate the OE nuts with captive lock washers. You will have to substitute #10-32 small pattern nuts, washers, and conventional lock washers. If you cannot obtain the required

hardware locally, please contact our tech support and we will send you a set at no cost.

On some Dyna™ models, the electrical caddy must be modified to provide clearance for the TCFI. Use a die grinder or Dremel motor tool to remove interfering plastic ribs.

Figure 1 - Typical Installation



4. **2006 and later models only (skip ahead to step 5 for 2001-2005 models).** The TCFI parts bag includes a green PC link jumper wire with a male Deutsch terminal on one end and a small female Delphi Micro-Pack terminal on the other end. Install this wire between pin 1 of the Delphi connector that mates with the TCFI module and pin 1 of the OE diagnostic connector (four terminal Deutsch). Refer to the factory service manual for connector location and disassembly techniques.
5. Install the WEGO IID system. Follow the instructions supplied with the WEGO IID.
6. Reconnect the battery ground cable. **Do not attempt to start the engine until you have completed the initial setup.**

INITIAL SETUP

The TCFI requires initial setup, using PC Link TCFI IID software, before running the engine for the first time. Setup establishes module parameters such as engine displacement, injector size, and appropriate ignition and fuel control tables. If you are using an aftermarket throttle body, you must also adjust the

throttle stop and throttle position sensor setting at idle. Refer to the TCFI IID Tuning Manual for details.

WARNING: You must use the new version 10.0 or higher PC Link TCFI IID software for setup and tuning. You cannot use the original PC Link TCFI software. To access all data, you must also use the new version 10.0 or higher TCFI Log software.

WARNING: You must carefully read the TCFI IID Tuning Manual and the instructions for the PC Link TCFI IID and TCFI Log software. If you do not follow all the instructions, you will probably damage your engine.

ENGINE STARTING PROCEDURE

With alpha-N fuel control, the proper engine starting procedure must be followed. When the run/stop switch is turned on, the TCFI reads the TPS voltage to establish zero percent throttle position. If the throttle is not fully closed at this point, all subsequent fuel control will be incorrect.

The throttle body is affected by thermal expansion. If the engine has cooled down or the motorcycle has sat overnight, we suggest that you momentarily open and then release the throttle before turning the run/stop switch on. Make absolutely sure that the throttle is fully closed before turning the run/stop switch on.

The throttle friction adjustment screw may prevent the throttle from fully closing. We suggest that you always leave this screw fully counterclockwise.

When the run/stop switch is turned on, the idle air control motor will move to the starting position and the fuel pump will be energized for several seconds, making an audible buzz. Do not press the starter button until the check engine light goes out and the fuel pump stops buzzing.

When you turn the run/stop switch off, the idle air control motor requires several seconds to return to its home position. After turning the run/stop switch off, you must wait for 5 seconds before turning the switch on again. If the engine stalls, we suggest that you cycle

the run/stop switch off for 5 seconds and then on again before attempting a restart.

Let the engine idle for about 20-30 seconds before operating the motorcycle. This allows the closed loop idle air control system to stabilize idle RPM.

If you make any changes or adjustments to the throttle body, disconnect the battery, swap out the TCFI unit, or upload new data or firmware, you must also cycle the run/stop switch, as explained above, in order to properly initialize the idle air control motor.

GENERAL RECOMMENDATIONS

The TCFI is designed to be used with the H-D® OE coil. Fuel injected Twin-Cam engines require a special coil with low primary resistance and an additional terminal for ion-sensing. Do not attempt to use any aftermarket coil.

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 TCFI unit may misfire.

The TCFI generates a trigger signal that is compatible with the H-D® OE tachometer and all aftermarket tachometers intended for Twin-Cam 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.

ENGINE DIAGNOSTICS

The TCFI IID version has extensive diagnostics and is compatible with H-D® scan tools that connect to the OE diagnostic link.

When the ignition switch is first turned on, the check engine LED illuminates. The LED goes out when the system initialization is complete.

If a diagnostic fault is detected while the engine is running, the LED will illuminate. Diagnostic codes can be read with a scan tool or by means of the TCFI Log software. Most of the diagnostic codes are the

same as those used by H-D® and the H-D® Electrical Diagnostic Manual for your model should be employed as a primary troubleshooting reference. Certain diagnostic codes that are unique to the TCFI or require special consideration are listed below:

P0373 CKP Signal Lost. This code will appear if the engine stalls. Customers are often confused about the meaning of the term “trips” associated with codes, especially P0373. This is an industry standard terminology. If code P0373 shows 40 trips, it means that the code was set 40 engine start cycles ago, not that the code has been set 40 times and that the crankshaft position sensor is defective.

P0122 TPS Low or P0123 TPS High. If these codes appear on a new installation, the TPS idle adjustment is probably incorrect. Refer to the TCFI IID Tuning Manual for details.

P0505 Loss of Idle Speed Control. If this code appears on a new installation, the throttle body idle stop setting is probably incorrect. Refer to the TCFI IID Tuning Manual for details.

P0132 Rear Oxygen Sensor High, P0134 Rear Oxygen Sensor Low/Open, P0152 Front Oxygen Sensor High, or P0154 Front Oxygen Sensor Low/Open. These codes indicate a problem with the WEGO IIID unit. P0134 and/or P0154 will be set if the WEGO signal connection (white and blue wires) or WEGO power is lost. These codes may also be set if a Bosch sensor fails or becomes contaminated by leaded gasoline.

AFTERMARKET TACHOMETER

Like the Delphi® module, the TCFI sends RPM data to the instrument module over the J1850 data bus for 2004 and later models. The TCFI also has a conventional 12 volt square wave tach signal (one pulse per revolution) available on pin 3. This tach signal is compatible with most aftermarket tachometers and other RPM activated accessories intended for H-D® racing applications.

REINSTALLING THE DELPHI® CONTROLLER

If you reinstall the Delphi® controller, turn the ignition key on and cycle the run/stop switch before starting the engine. This initializes the idle air control motor. With the exception of models with OE oxygen sensors, removal of the white and blue WEGO signal wires and green PC link jumper wire is not required.

For models with OE oxygen sensors, you must remove the WEGO white and blue wires and reinstall the original oxygen sensor wires at pins 8 and 23.

tuning issues with new installations. Experience has shown that most units returned for warranty are OK and another problem, such as user error including improper setup or tuning, an intermittent wire harness connection, or defective coil, fuel injector, or sensor is later identified.

TROUBLESHOOTING FLOWCHART

Follow the troubleshooting flowchart shown below. **Please note that the troubleshooting flowchart does not relate to incorrect setup or**

Troubleshooting Flowchart

