Twin Tec

--TCFI Gen 7 & M8FI Racing EFI-- Startup Guide and System Installation

CAUTION: CAREFULLY READ INSTRUCTIONS BEFORE PROCEEDING. DESIGNED FOR RACING. NOT LEGAL FOR SALE OR USE IN CALIFORNIA OR ON POLLUTION CONTROLLED VEHICLES.

OVERVIEW – CONCEPT

Our Racing EFI system has been designed for **offroad racing use** in the "King of the Baggers" racing series. Each Racing ECU has been designed to plug directly into the factory HD harness.

- 17800 - TCFI7 → 2014-2016 Twin Cam Ultra/Touring - Natural Aspiration Engines (Utilizes OE 1 Bar)
- 17801 - TCFI7 → 2014-2016 Twin Cam Ultra/Touring - Turbo Engines (Utilizes DTT 2 Bar Sensor)
- 17802 - TCFI7 → 2014-2016 Twin Cam Ultra/Touring - Turbo Engines (Includes DTT 3 Bar Sensor)
- 17803 - TCFI7 → 2016-2017 Twin Cam Softail Models -NA Engines (Utilizes OE 1 Bar)
- 17804 - TCFI7 → 2016-2017 Twin Cam Softail Models - Turbo Engines (Utilizes DTT 2 Bar Sensor)
- 17805 - TCFI7 → 2016-2017 Twin Cam Softail Models - Turbo Engines (Includes DTT 3 Bar Sensor)
- 17808 – M8FI → 2017-2020 M8 Ultra/Touring - Natural Aspiration Engines (Utilizes OE 1 Bar)
- 17809 - M8FI → 2017-2020 M8 Ultra/Touring - Turbo Engines (Utilizes DTT 2 Bar Sensor)
- 17810 - M8FI → 2017-2020 M8 Ultra/Touring - Turbo Engines (Includes DTT 3 Bar Sensor)
- 17811 - M8FI → 2018-2020 M8 Softail Models - Natural Aspiration Engines (Utilizes OE 1 Bar)
- 17812 - M8FI → 2018-2020 M8 Softail Models - Turbo Engines (Utilizes DTT 2 Bar Sensor)
- 17813 - M8FI → 2018-2020 M8 Softail Models - Turbo Engines (Includes DTT 3 Bar Sensor)
- 2021-2023 M8 ECU – Coming Soon

→ M8FI and TFI7 require the use of version 20.4+ of the PC_LINK.exe tuning and version 19.91+ of the TCFI_LOG.exe logging software. V20.4/19.91 has numerous updates including storing the options in the tune file and ecu.

AUTO-TUNE is included in all of our EFI systems.

To utilize **AUTO-TUNE**, the wideband O2 sensors must be installed in the exhaust AND closed loop must be enabled in the tune. After the engine is warm and close loop becomes active, AUTO-TUNE learns fuel trim corrections. To apply the fuel corrections to the tune, the uploaded from the ECU and applied to the tune (corrections adjust the main and front fuel tables).

IMPORTANT NOTE: You must do some basic tuning before enabling the **AUTO-TUNE** feature. The tune on your motorcycle must be functioning at a basic level before using this feature**. It must start and run without popping and blowing black smoke.** Use the Real Time Data view and the build in data-logging to monitor and adjust the tune.

• **Data Logging is automatically enabled** – Anytime the engine is running, data is always recorded by the ECU in an endless loop, constantly overwriting the oldest data with the new data. Use the TCFI-M8 Data Logging software to read back the data that is automatically stored in the ECU.

• **Tuning, monitoring and data log playback** occurs via the USB Interface and the PC_LINK.exe tuning software or the TCFI_LOG.exe data log viewing software. The USB interface is the small black box; it connects between the USB port on your PC and the WEGO IIID (see the diagram labeled **TCFI7 & M8FI EFI SYSTEM DIAGRAM).**

NOTE: Even if you do not utilize the wideband sensors – the WEGO IIID unit must be installed so your PC can communicate with TCFI7 & M8FI EFI systems through the USB Interface.

The two plugs from the WEGO IIID module must also be connected on the right-hand side of the bike. These two connections allow the ECU to communicate with other modules on the motorcycle (Body Control Module & Speedometer). **Note:** The two connectors are grey and black on the Ultra/Touring Models, and both connectors are black on the Softail Models.

All codes will be read/cleared using the TCFI-M8 Datalogging software: TCFI_Log.exe.
Note: For short term testing, the wideband sensors do not need to be connected. They should be connected so you can see what the engine is doing and how it is responding to your tuning changes.

Download Software and device Drivers

- PC_LINK_TCFI.exe -- PC Software that is used to tune the ECU. This software is also used to program the VIN, Odometer and Auto-Calibrate the ETC System. When using the Auto-Tune feature – this software is used to read the learning out of the ECU and apply it to the fuel tables.
- TCFI_LOG.exe is the PC Software is used to view/clear codes, view live data as the engine is running or read and view data log files out of the ECU.
- Find the latest software at: daytona-twintec.com/software
- Run the installer: https://jmschip.com/content/DTT/Software/TCFI_Software_Installer.exe
- Run the update: https://jmschip.com/content/DTT/Software/M8FI-TCFI7_SelfInstallUpdate_204-1991__041024.exe

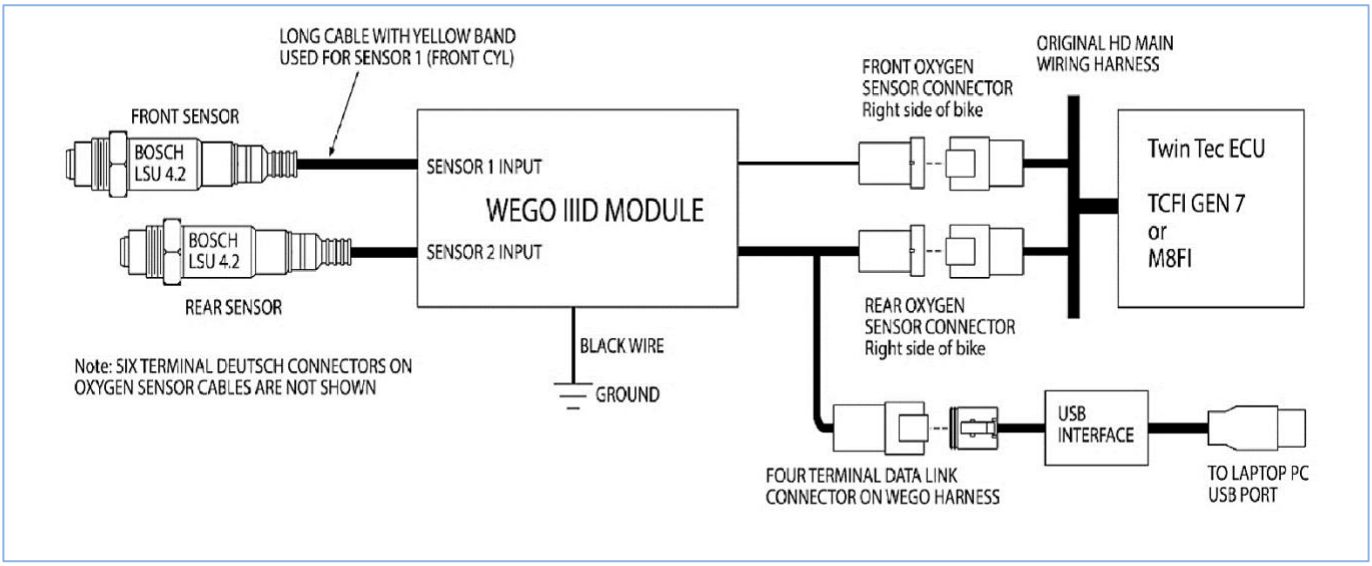
CAUTION: Tuning the M8FI or TCFI requires competency in PC operation, using Microsoft Windows based programs, and basic engine tuning and fuel injection mapping concepts. The PC Link software requires that are familiar with the Harley-Davidson® fuel injection system and that you have access to basic test equipment and factory service manuals.

THE EFI KIT

The M8FI & TCFI Gen 7 kits include the ECU, WEGO IIID dual channel wide-band exhaust gas oxygen sensor interface, 2 Bosch LSU 4.2 oxygen sensors and USB interface.

ECU, USB Interface, WEGO III Wideband, Wideband Sensors

TCFI7 & M8FI EFI SYSTEM DIAGRAM



M8FI - TCFI GEN 7 PRE-INSTALLATION CHECKS

Make sure that the original equipment (OE) engine control module (ECM) is functioning correctly (other than tuning issues) before attempting TCFI installation. If the OE ECM is setting diagnostic codes, find and correct any underlying problems first.

GENERAL RECOMMENDATIONS

The M8FI - TCFI system has been designed to be used with the H-D® OE coil. Fuel injected engines require a special coil with low primary resistance and an additional terminal for ion-sensing. **Do not attempt to use any aftermarket coil not specifically intended for fuel injection applications with ion-sensing ignition.**

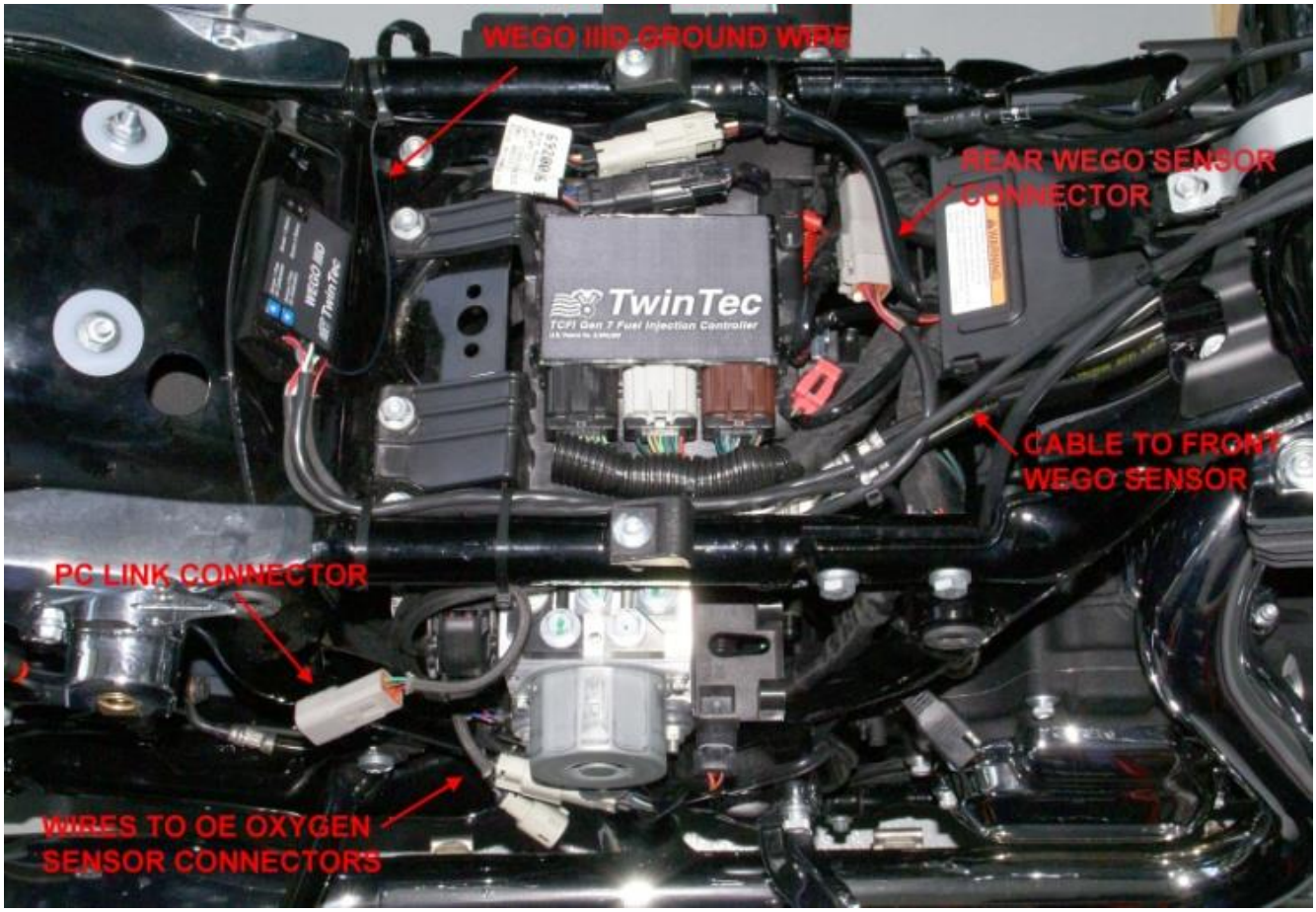
Due to the short lengths involved on motorcycle applications, energy losses in spark plug wires are insignificant. OE carbon core suppression cables will deteriorate after several years. For a more durable replacement, we suggest spiral core type spark plug cables.

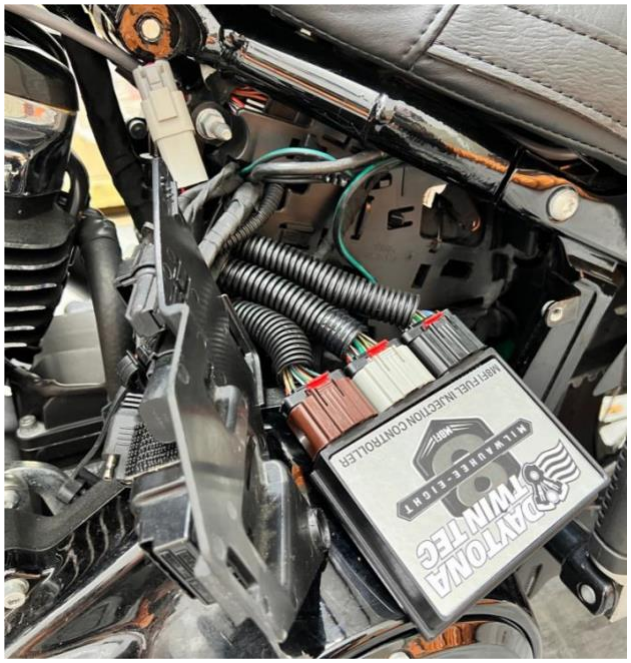
CAUTION: Do not use solid copper spark plug cables or non-resistor type spark plugs. The M8FI/TCFI unit may misfire. Aftermarket spark plug wires with excessive internal resistance have a tendency to malfunction.

TCFI GEN 7/M8FI INSTALLATION

1. If motorcycle is equipped with security system, make sure system is disarmed. Turn off the ignition switch and disconnect the battery ground cable before proceeding.
2. Find and remove the OE ECM. The OE module is usually located under the seat or under a side cover.
3. Install the TCFI module. The figure below shows a typical installation.

TYPICAL INSTALL TCFI7 & M8FI → 2014-2020 Ultra / Touring





4. **Do not reconnect the battery ground cable until you have completed installation of the WEGO IIID. Do not attempt to start the engine until you have completed the initial setup.**

WEGO IIID INSTALLATION OVERVIEW

The dual channel WEGO IIID allows simultaneous front and rear cylinder fuel auto-tuning during actual riding conditions. **The terms TCFI and WEGO are used throughout this document as generic terms and refer to the various TCFI Gen 7/M8 and WEGO IIID units unless otherwise noted.**

The WEGO system uses Bosch LSU 4.2 5-wire wide-band oxygen sensors. By utilizing miniature surface mount electronics technology, digital signal processing techniques, and a switching power supply for the sensor heater, the WEGO provides the same level of accuracy as lab systems.

The WEGO unit has dual 0-5 volt analog air/fuel ratio (AFR) outputs that are connected to the TCFI for closed loop AFR control. The WEGO IIID version included in the TCFI Gen 7 kit has a special wire harness that also provides proper connections for the four terminal data link connector used for communications between the TCFI module and our USB interface.

REPLACEMENT SENSORS AND ACCESSORIES

The WEGO uses standard Bosch LSU 4.2 sensors used on a VW production application (Bosch P/N 0 258 007 057/058 or VW P/N 021 906 262B). The proprietary VW connector is replaced with a smaller Deutsch DT-04-6P. We offer replacement sensors with the Deutsch connector installed.

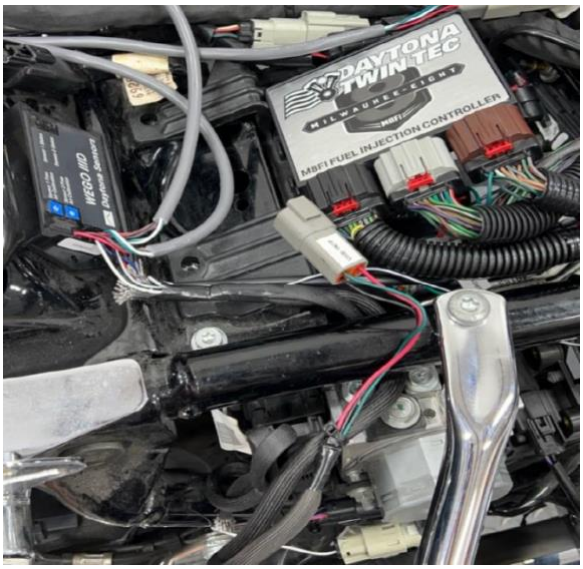
WEGO IIID INSTALLATION

1. If motorcycle is equipped with security system, make sure system is disarmed. Turn off the ignition switch and disconnect the battery ground cable before proceeding.
2. In general, the sensors should be mounted 2-8 inches from the head flange. Available clearance will usually dictate the optimum location. When choosing a mounting location, allow several inches clearance for the sensor wire harness. The wire harness must exit straight out from the sensor. Do not loop the harness back onto the sensor body.
3. You cannot use the original equipment (OE) 12 x 1.25 mm oxygen sensor mounting bosses. Remove the OE oxygen sensors and use the supplied 12 x 1.25 mm hex socket plugs to block off their mounting bosses after completing step 4.
4. 18 x 1.5 mm weld nuts must be welded onto the exhaust pipes and can be located near the smaller OE oxygen sensor mounting bosses. After welding, run an 18 x 1.5 mm tap through the threads. Failure to clean the threads may result in sensor damage.
5. Do not install the new Bosch O2 sensors until after the free air calibration procedure described in the following section. Always use an anti-seize lubricant such as Permatex 133A on the sensor threads.

DO NOT DROP or overtighten the O2 sensors – They can easily be damaged.

6. Install the WEGO unit. Suggested placement - image below.

ULTRA/TOURING – ECU/WEGO Placement (left) -- Front/Rear O2 connectors (right)



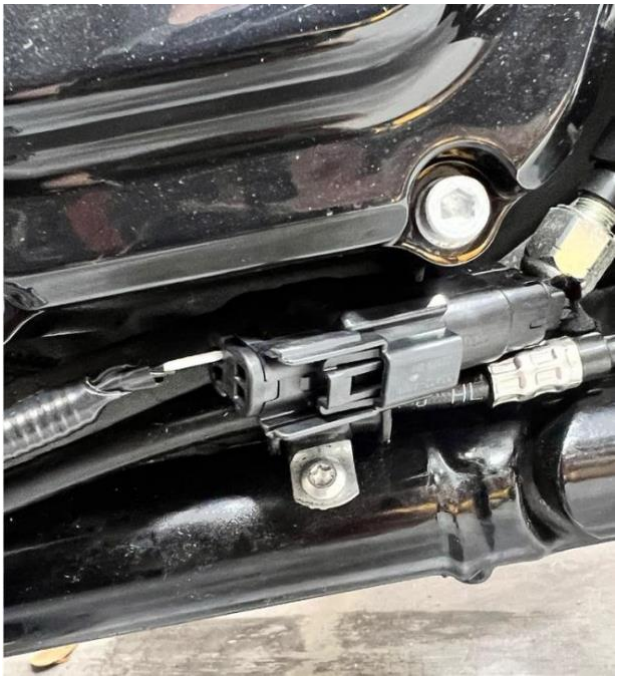
ULTRA/TOURING – Wideband O2 Placement

Typical Front Sensor Installation

Typical Rear Sensor Installation

7. Connect the Bosch sensors to the 6 pin mating connectors on the WEGO wire harness. The longer cable (with yellow band) is for sensor 1 (front). For additional protection and improved cosmetics, use Techflex 1-1/4" Black Flexo Clean Cut FR expandable sleeving over the connectors (available from www.wirecare.com).

SOFTAIL → WEGOIII Connection to Rear O2 (left) & Front O2 (right - below)



SOFTAIL Turbo → Wideband Front O2 Sensor Placement (left) -- Rear O2 (right)

8. Connect the WEGO wire harness to the front and rear oxygen sensor and data link connectors on the OE wire harness.
9. Connect the black WEGO ground wire to an existing frame ground connection point near the ECM.
10. **Reconnect the battery ground cable. Do not attempt to start the engine until you have completed the free air calibration of the WEGO and initial setup of the TCFI.**

WEGO IIID Controller – Connect to USB, Communicate with the ECU

BENCH FLASH SETUP

WEGO IIID OPERATION

The WEGO has red status LEDs for each channel. When power is turned on, the LEDs blink at a slow rate until the corresponding sensor has reached normal operating temperature.

After installation, the WEGO system requires free air calibration.

This should be done with the sensors dangling free in air. The environment must be free of hydrocarbon vapors. We suggest that you perform the free air calibration outdoors.

To adjust the free air calibration: Turn the free air calibration trim-pots located on the WEGO IIId unit to the full counterclockwise position. Turn on power to the motorcycle and wait for 60 seconds so the system can fully stabilize. After 60 seconds slowly turn each free air calibration trimpot clockwise until the corresponding LED starts flashing at a rapid rate. Try to set each trimpot at the point where its LED just starts to flash. The free air calibration procedure should be performed at reasonable intervals (every 250-500 hours) or whenever a sensor is replaced. If you cannot get an LED to rapidly flash when its trimpot is turned full clockwise, you either have a damaged sensor or very high hydrocarbon levels in your environment. If both LEDs keep blinking at the slow rate, you may have a low battery voltage condition. Try connecting a battery charger. The WEGO includes internal diagnostics for abnormal battery voltage (less than 11 volts or greater than 16.5 volts), sensor open circuit, and sensor short circuit conditions. A fault condition causes the status LEDs to blink at the slow rate.

CAUTION: Racing gasoline containing lead will quickly degrade the sensors. Under these conditions, expected sensor life is less than 10 hours. There is no warranty on sensors.

FIRST START – CHECKLIST

Several items MUST be configured prior to starting the engine:

Install Tuning/Monitoring software and Drivers:

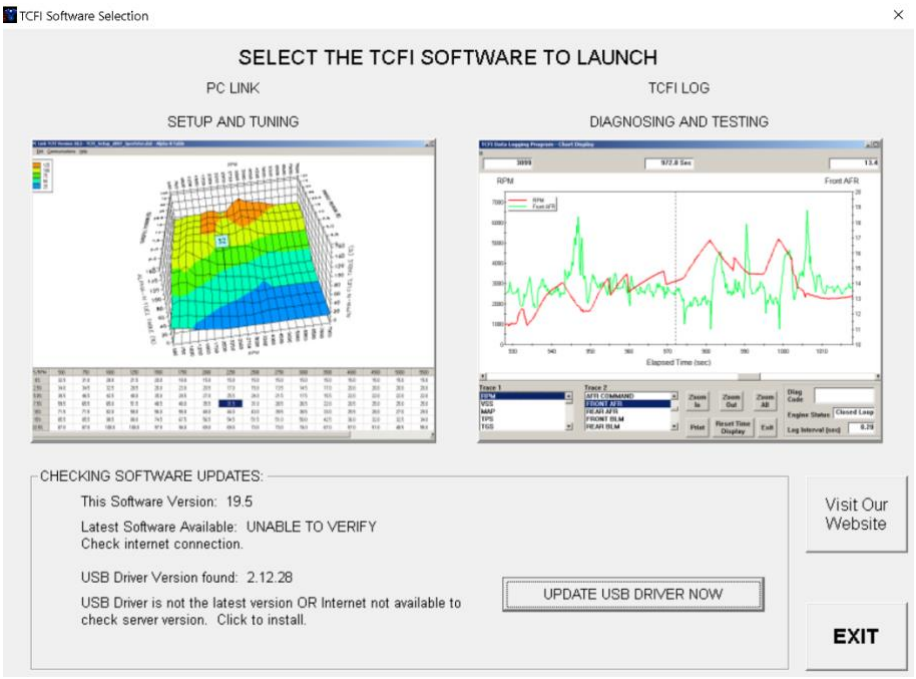
- Open PC_LINK_TCFI.exe -- TCFI7 / M8FI Tuning Software.
- Plug the USB cord in between the USB module and the PC.
- Connect the USB module into the four-terminal data-link connector on the WEGO IIID module.

Directory on the PC where the Tuning and Logging software is located at:

C:\Program Files (x86)\Daytona TwinTec\TCFI_Software

Locate in folder the TCFI Launcher.exe icon  and place a shortcut on desktop. Double click on newly created shortcut.

A window will open listing the two programs available to run:



For setup/tuning click the image to the left – **PC LINK**. For data logging and some special features, click the image on the right – **TCFI LOG**.

For the initial setup you will need **PC LINK.**

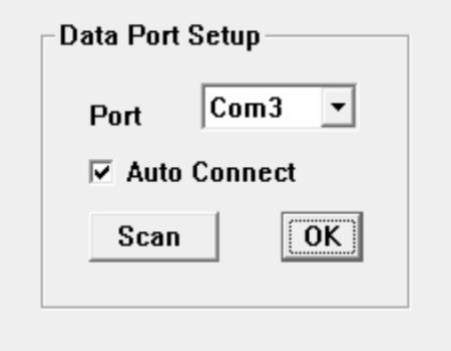
Note:

→ **M8FI** and **TFI7** require the use of version 20.4+ of the **PC_LINK.exe** for tuning and v19.91+ of **TCFI_LOG.exe** logging software. The new software includes storing the options in the tune file and ECU.

To enable communication between the PC, USB module and ECU, the power must be turned on (some bikes have an on/off grip switch and a main switch) and the WEGO IIID module must be powered on (red LEDs on) and connected to the Front/Rear O2 sensors connectors on the right-hand side of the motorcycle.

Note: The two connectors are grey and black on the Ultra/Touring Models, and both connectors are black on the Softail Models.

Verify that the ECU can connect to the PC_LINK Software under Program ECU – Port Setup (Port Setup - Communications) verify that the correct COM Port is selected – it is recommended to use the **Auto Connect** and **Scan** Option.



1) Program VIN (**Setup New ECU -> Edit TCFI or M8FI VIN**) - Enter the Vin

   Caution: The body control module (BCM) will not allow starter engagement if the ECM is programmed with an incorrect VIN. The speedometer will also display a VIN error message.

2) Program Odometer (**Setup New ECU ->Edit TCFI or M8FI Odometer Setting**) – enter the Odometer reading

Both the ECM and speedometer store accumulated odometer mileage. If you enter a value lower than what the speedometer shows, the odometer display will not function correctly until enough mileage is accumulated for the ECM to catch up.

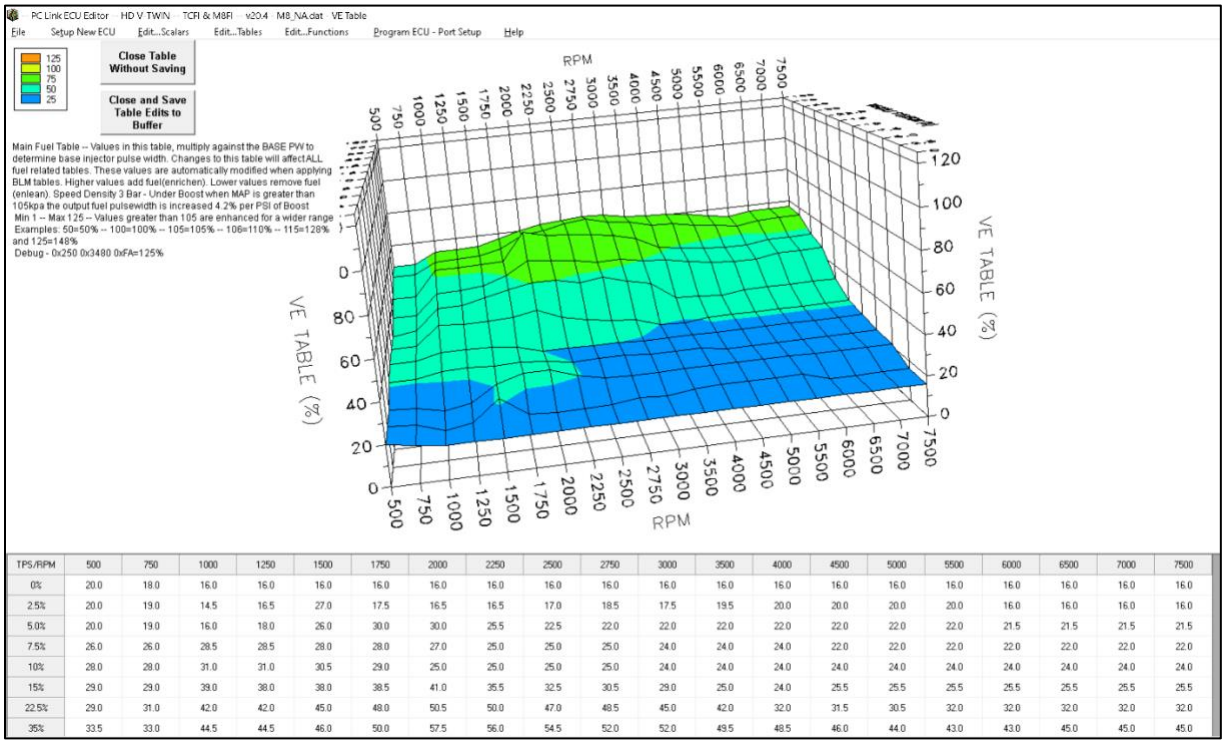
Caution: if you program a higher value, the odometer display will "learn up" to this value. If you mistakenly program a very high value, the only solution is for the Harley-Davidson dealer to replace the speedometer. If this unfortunate mistake occurs, disconnect and dispose of the speedometer BEFORE re-installing the original equipment ECM. If you reinstall the original equipment ECM with the speedometer still connected, the ECM will also "learn up" to the incorrect odometer mileage and you will have to replace both the ECM and speedometer.

3) Run the ETC auto-calibration routine (**Setup New ECU ->Calibrate ETC System**) – follow the instructions on the screen, the initial test takes about 45 seconds to complete.

4) Download the tune from the ECU to the PC (**Program ECU – Port Setup -> READ ECU…. READ ECU TUNE (Bike) → to PC**). Be sure to save this on your PC before proceeding (File -> Save As).

5) Adjust the fuel tables based on the size of your fuel injectors vs the factory injector (**important**). If you are using the same BASE PW and your fuel injectors are larger than factory injectors → you must reduce/lower the numbers in the main fuel table. Generate your scale factor: old injector size / new injector size = scale factor. Multiply the entire Main Fuel table by the scale factor. Open the Main Fuel Table -> Click on the TPS/RPM cell to select the entire fuel table and then right click and choose the option Modify – enter in the factor 75% for 0.75 or 75 percent – Save the table – Save the new tune file with a new name (File -> Save As) and then upload the modified file to the ECU (**Program ECU – Port Setup -> PROGRAM ECU…SEND TUNE → TO ECU (Bike)**). NOTE: Scaling the Main Fuel Table will only get you close – this software does not have injector breakpoint compensation built into it.

Main Fuel Table



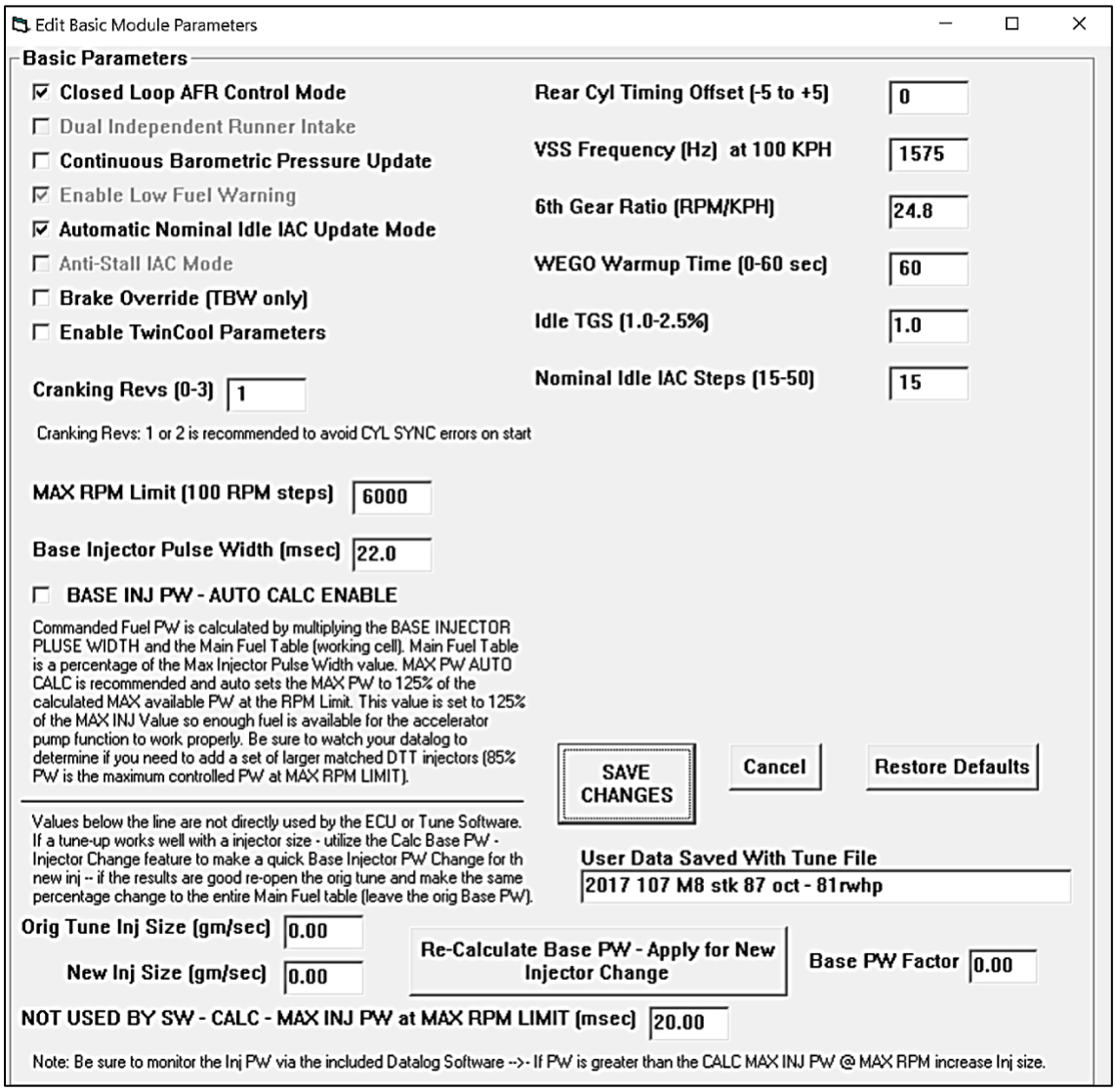
TPS/RPM	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500
0%	20.0	18.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
2.5%	20.0	19.0	14.5	16.5	27.0	17.5	16.5	16.5	17.0	18.5	17.5	19.5	20.0	20.0	20.0	20.0	16.0	16.0	16.0	16.0
5.0%	20.0	19.0	16.0	18.0	26.0	30.0	30.0	25.5	22.5	22.0	22.0	22.0	22.0	22.0	22.0	22.0	21.5	21.5	21.5	21.5
7.5%	26.0	26.0	28.5	28.5	28.0	28.0	27.0	25.0	25.0	25.0	24.0	24.0	24.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
10%	28.0	28.0	31.0	31.0	30.5	29.0	25.0	25.0	25.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
15%	29.0	29.0	33.0	38.0	38.0	38.5	41.0	35.5	32.5	30.5	29.0	25.0	24.0	25.5	25.5	25.5	25.5	25.5	25.5	25.5
22.5%	29.0	31.0	42.0	42.0	45.0	48.0	50.5	50.0	47.0	48.5	45.0	42.0	32.0	31.5	30.5	32.0	32.0	32.0	32.0	32.0
35%	33.5	33.0	44.5	44.5	46.0	50.0	57.5	56.0	54.5	52.0	52.0	49.5	48.5	46.0	44.0	43.0	43.0	45.0	45.0	45.0

Our system is **Alfa-N** or Pulsewidth based system. The main fuel table is multiplied against a MAX Base Fuel Pulse Width Value to generate the pulse width for the fuel injector. This type of system is very easy to tune and configure.

For example, if you choose a MAX BASE PW Value of 25ms and your main table is 12 → the commanded pulsewidth is 3ms. Note: Your actual value will typically be higher due to other adders that are setup to start and run/trim the engine; if all of these adders were set to zero, your actual PW will be 3ms. With the default tune that is shipped with the M8 NA ECU → when the engine is at 220F, then the rear pulsewidth will be around 3.6ms and the AFR at idle will be around 13:1.

Our recommendation is to click the check box: MAX BASE PW AUTO CALC under (**Edit…Scalars→Edit Basic Parameters**). Choosing this checkbox automatically calculates and sets the Base Fuel Pulse Width value to the maximum pulse width value that can be utilized at the **MAX RPM Limit** value (**Edit…Scalars→Edit Basic Parameters**) entered in the tune. We recommend setting this value to a high value (slightly higher than the ACTUAL maximum pulse width value at the max RPM) –> this is because on heavy tip in events → often times, it is possible to for the engine to require a larger value than the maximum pulse width.

Basic Module Parameters Dialog Page



- **Base Injector Pulse Width** – in millisecond units. Please note the base injector pulse width is a calculated value that you cannot directly edit.
- **RPM Limit** – you can enter any value from 3,000 to 9,900 RPM. Values are automatically rounded to the nearest 100 RPM.
- **Cranking Revs** - sets the number of engine revolutions before the ignitions fires the first spark. Please note that a hot engine may exhibit preignition and appear to start on the first revolution even if the Cranking Revs parameter is set to a non-zero value. The automatic compression release (ACR) system is activated during cranking if the Cranking Revs parameter is set to a non-zero value.

- **Rear Cylinder Timing Offset** – you can set the value over a -5 to +5 degree range. Leave the value at zero if you do not require a rear cylinder timing offset.
- **VSS Frequency** – this parameter sets the correct speedometer and odometer scaling. An incorrect value will also affect idle RPM control and turn signal cancellation. Please refer to the following section for more details.
- **6th Gear Ratio** – this parameter sets the RPM/KPH ratio used to detect the transmission gear and illuminate the 6th gear light. You can use the gear ratio display function in TCFI Log software data logging chart display to determine the required value for a particular application. For most models, you can use the default value of 23.
- **WEGO Warmup Time** – in seconds. This parameter determines the minimum engine run time before closed loop AFR control.
- **Idle TGS** – in percent units. This parameter determines the maximum TGS (twist grip sensor) value for closed loop idle speed control. The default value is 1.0%. For more information on this subject, please refer to the TCFI Idle Tuning Tech Note.
- **Nominal Idle IAC** – this parameter determines the nominal IAC (idle air control) value learned by the system when the engine is completely warmed up and at a stable idle condition. IAC value is in 0.1% throttle position units (higher number means more idle air).For more information on this subject, please refer to the TCFI Idle Tuning Tech Note.
- **User Data** – you can enter up to 32 characters of user data that will be saved in EEPROM memory. User data can contain comments or serial numbers.

Once you have entered the appropriate Basic module parameters, click on OK to save your edits to buffer memory. If you click on Cancel, all your edits are lost. You can click on Restore Defaults to restore default values for a stock engine.

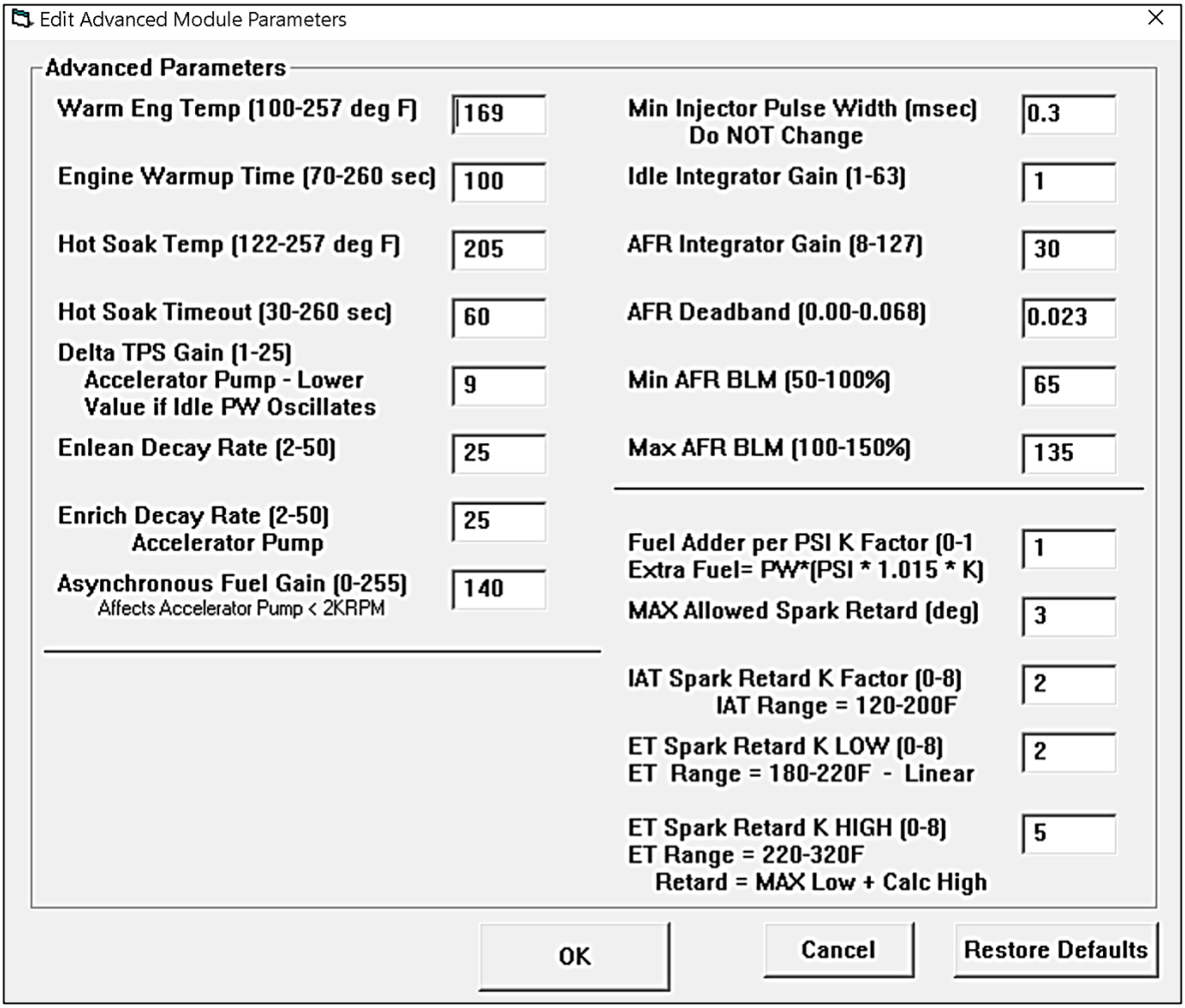
ADVANCED PARAMETERS

Advanced module parameters are displayed in a dialog box by using the **Edit Advanced Parameters** command on the **Edit…Scalars** menu.

Advanced parameters include:

- **Warm Engine Temperature** – in degree C units. This parameter determines the minimum engine (cylinder head) temperature before closed loop corrections are saved to the BLM tables. The default value is 95° C. Engine status changes from cold to warm once the warm engine temperature is reached and the engine warmup time has elapsed.
- **Engine Warmup Time** – in seconds. This parameter determines the minimum engine run time before closed loop corrections are saved to the BLM tables. The default value is 260 seconds. Engine status changes from cold to warm once the warm engine temperature is reached and the engine warmup time has elapsed.
- **Hot Soak Temperature** – in degree C units. This parameter determines the minimum engine (cylinder head) temperature before special hot soak considerations apply when the engine is turned off. The default value is 60° C.

Advanced Module Parameters Dialog Box



- **Hot Soak Timeout** – in seconds. This parameter determines the minimum engine off time (prior to a hot restart) before special hot soak considerations apply. The default value is 60 seconds.
- **Delta TPS Gain** – this parameter determines the scaling of TPS values in the delta TPS based fuel multiplier table. Do not change this parameter from the default value of 5.
- **Enlean Decay Rate** – this parameter determines the time constant of recovery from enleanment (negative delta TPS values) in the delta TPS based fuel multiplier table. Do not change this parameter from the default value of 25.

- **Enrich Decay Rate** – this parameter determines the time constant of recovery from enrichment (positive delta TPS values) in the delta TPS based fuel multiplier table. Do not change this parameter from the default value of 20.
- **Minimum Injector Pulse Width** – in millisecond units. This parameter affects linearity of the fuel tables at low values. Do not change this parameter from the default value of 0.1.
- **Idle Integrator Gain** – this parameter determines the response time of closed loop idle speed control. A higher value will result in a faster response but may cause instability (oscillation). The default value is 10.
- **AFR Integrator Gain** – this parameter determines the response time of closed loop AFR control. A higher value will result in a faster response but may cause instability (oscillation). The default value is 30.
- **AFR Deadband** – in AFR units. This parameter determines the deadband (minimum error before system response) for closed loop AFR control. A small deadband value improves closed loop stability and reduces hunting. The default value is 0.3.
- **Min AFR BLM** – in percent. This parameter limits the minimum BLM value when the system is correcting a rich condition. The default value is 75%.
- **Max AFR BLM** – in percent. This parameter limits the maximum BLM value when the system is correcting a lean condition. The default value is 125%.
- **Asynchronous Fuel Gain** – this parameter determines the amount of fuel that is immediately (asynchronously) injected when the throttle is rapidly opened. Higher values result in more fuel. A zero value disables asynchronous injection.
- **Fuel adder per PSI K Factor (0-1 Extra fuel = PW*1.015*K)**
- **Max Allowed Spark Retard (deg)**
- **IAT Spark Retard K Factor (0 - 8) IAT Range = 120 - 200F**
- **ET Spark Retard K Low (0 – 8) ET Range = 180 -200F – Linear**
- **ET Spark Retard K High (0 – 8) ET Range = 220 – 230F Retard = Max Low + calculated High**

The absolute maximum ECU pulse width value is automatically calculated by the ECU based on the MAX RPM LIMIT. For example,6000rpm = 20ms. The ECU automatically limits maximum pulse width based on the RPM limit value in your tune. When you are logging your engine be sure to size your injectors so they run at less than 85% of the maximum pulse width value.

6) Verify that the motorcycle cranks and runs.

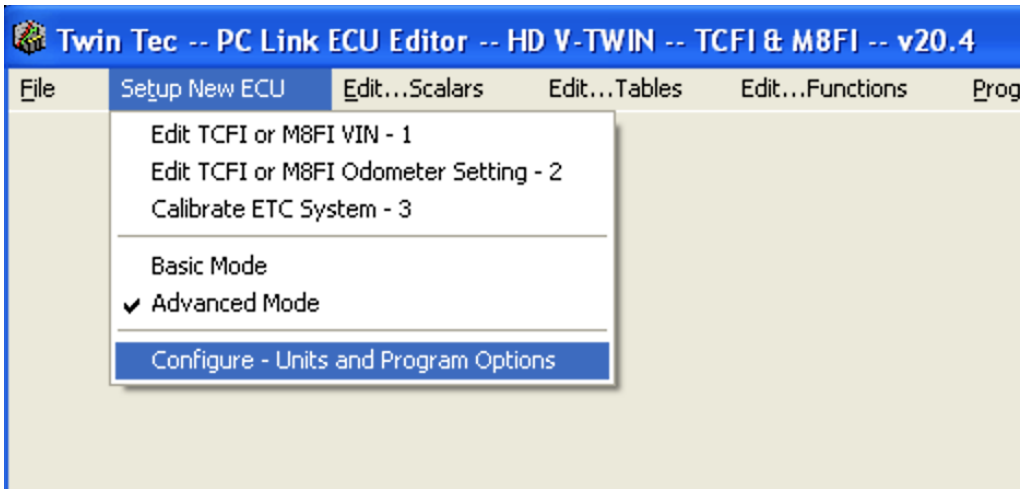
After starting the motorcycle – if you have a check engine light – use the **TCFI_Log.exe** software to view the code. Choose **View->View Real Time Data** and in the upper right-hand corner the

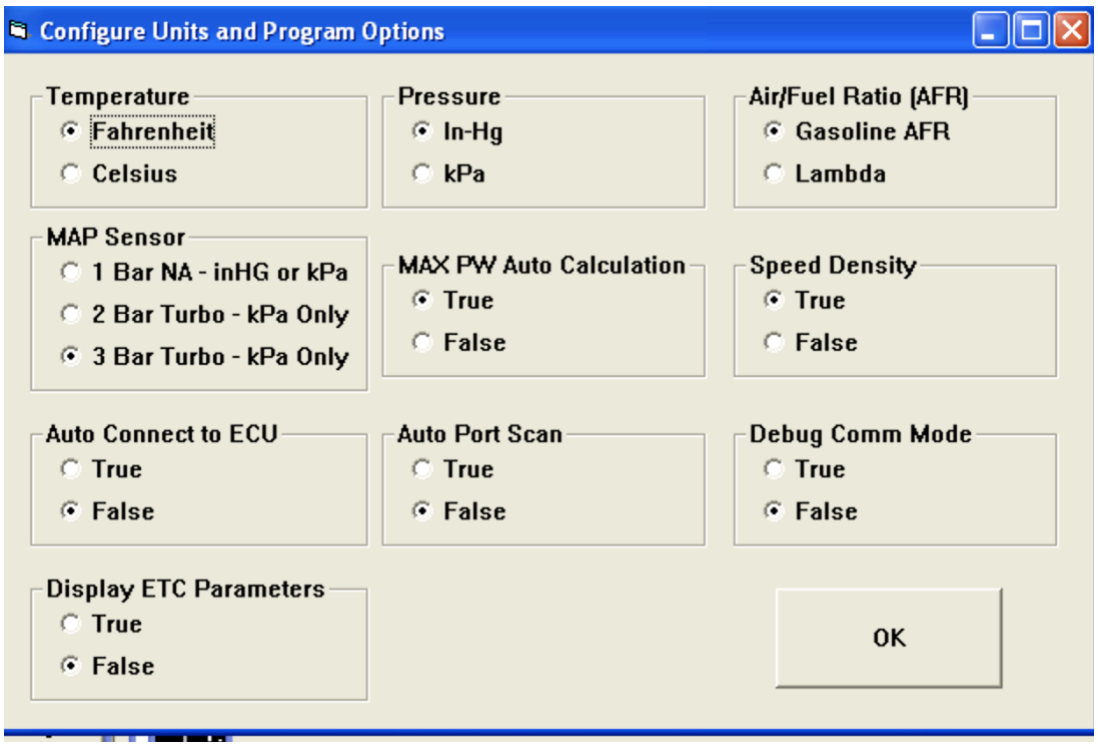
error will be displayed. If the error is a sync error – shut off the engine and wait until the lights on the **WEGO IIID** module go off and then restart the engine. Sync errors occasionally occur – they are most likely to occur after changing the tune file.

Important Notes on software configuration:

• The tuning/editing software **PC_LINK.exe** – v20.4+ no longer utilizes the configuration file.

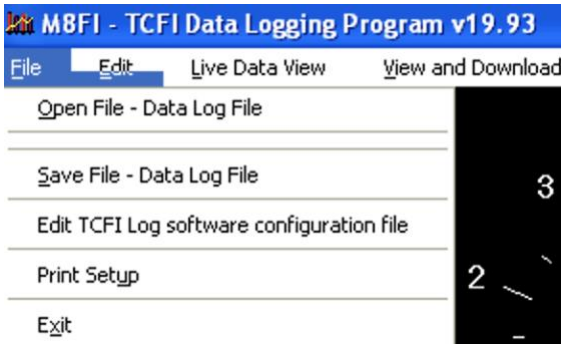
Edit and configure tuning/editing software options via → Setup New ECU → Configure – Units and Program Options.



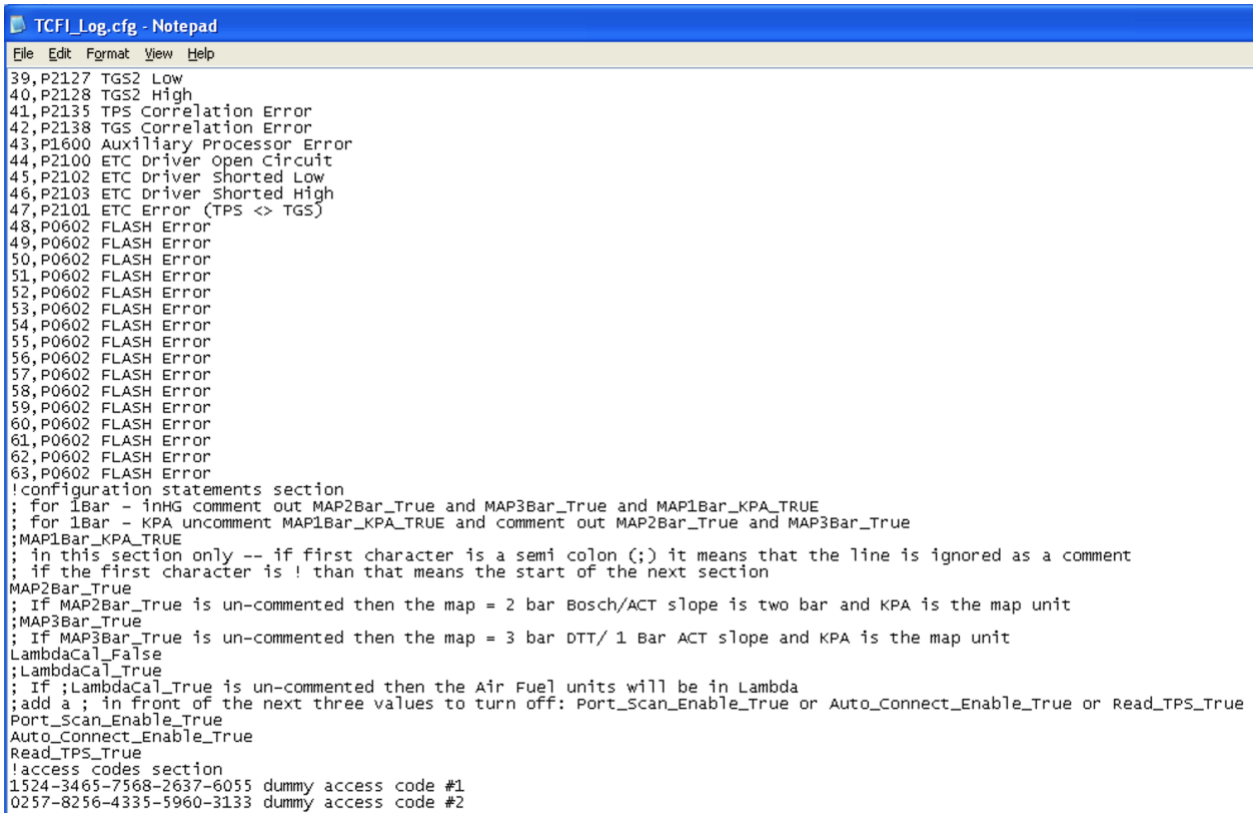


• The logging software **TCFI_LOG.exe** – v19.9+ still utilizes a configuration file.

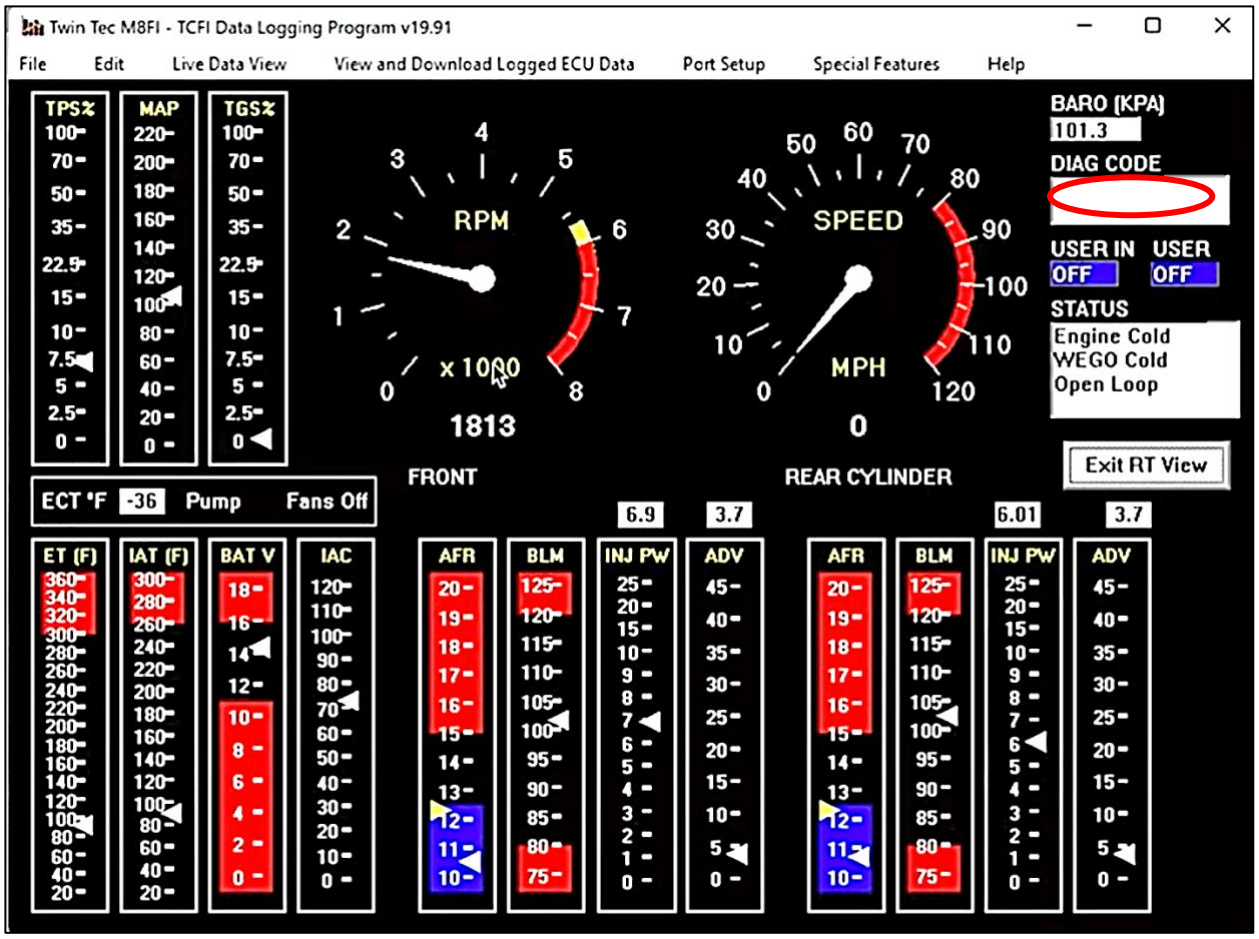
The most important item to setup/verify is the MAP Sensor configuration 1/2/3 bar.
To verify: Open the Live Data View and look for the MAP value on the gauge. Confirm that the display matches the maximum range of your MAP sensor. Map sensor ranges are: 1 Bar in-HG 10-30, 1 Bar kPA = 105, 2 bar kPA = 220, 3bar kPA = 330. To modify, edit the **TCFI Log Software configuration file.** You can easily access and edit this file using under the menu **File→Edit TCFI Log Software configuration file**.



To modify the TCFI Log Configuration file – it will automatically open in Notepad. Scroll down towards the end of the file and remove the semi-colon in front of the sensor type that you wis to log – in this example: "MAP2BAR_TRUE. Verify that a semi-colon is the first item on the other map sensor lines. Save the file, close and re-open the TCFI Log program to apply the changes.



TCFI LOG – Live Data View Display



7) Adjust the tune based on live data stream or analyzing saved data logs and other engine data (wide-band sensor/narrow-band sensor data).
For reference: typically if an engine pops on acceleration it is LEAN……..when cold---if it won't start it is usually LEAN…….otherwise if it is too rich it blows black smoke ☺.

Utilize the built-in wideband sensors and the real time data logging – **adjust the tune prior to turning on the AUTO-TUNE Feature.**

Typical SAFE Target AFR values -- IDLE: 13.0-13.3 AFR (0.88 λ - 0.9λ)

Typical SAFE Target AFR values -- CRUISE: 12.5-13.3 AFR (0.85λ - 0.9λ)

Typical SAFE Target AFR values -- WOT NA: 12.0 (0.82λ) WOT Boosted: 11.0 (0.75λ)

8) Read and Clear ECU codes by using your PC and TCFI_Log.exe software. The software uses the USB module to connect to the ECU. Use to gather data for tuning and to read/clear ECU codes.

ENGINE DIAGNOSTICS

The TCFI7 & M8FI ECU has extensive diagnostics. 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 and cleared by means of the speedometer (same as with the OE ECM) or 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.

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.

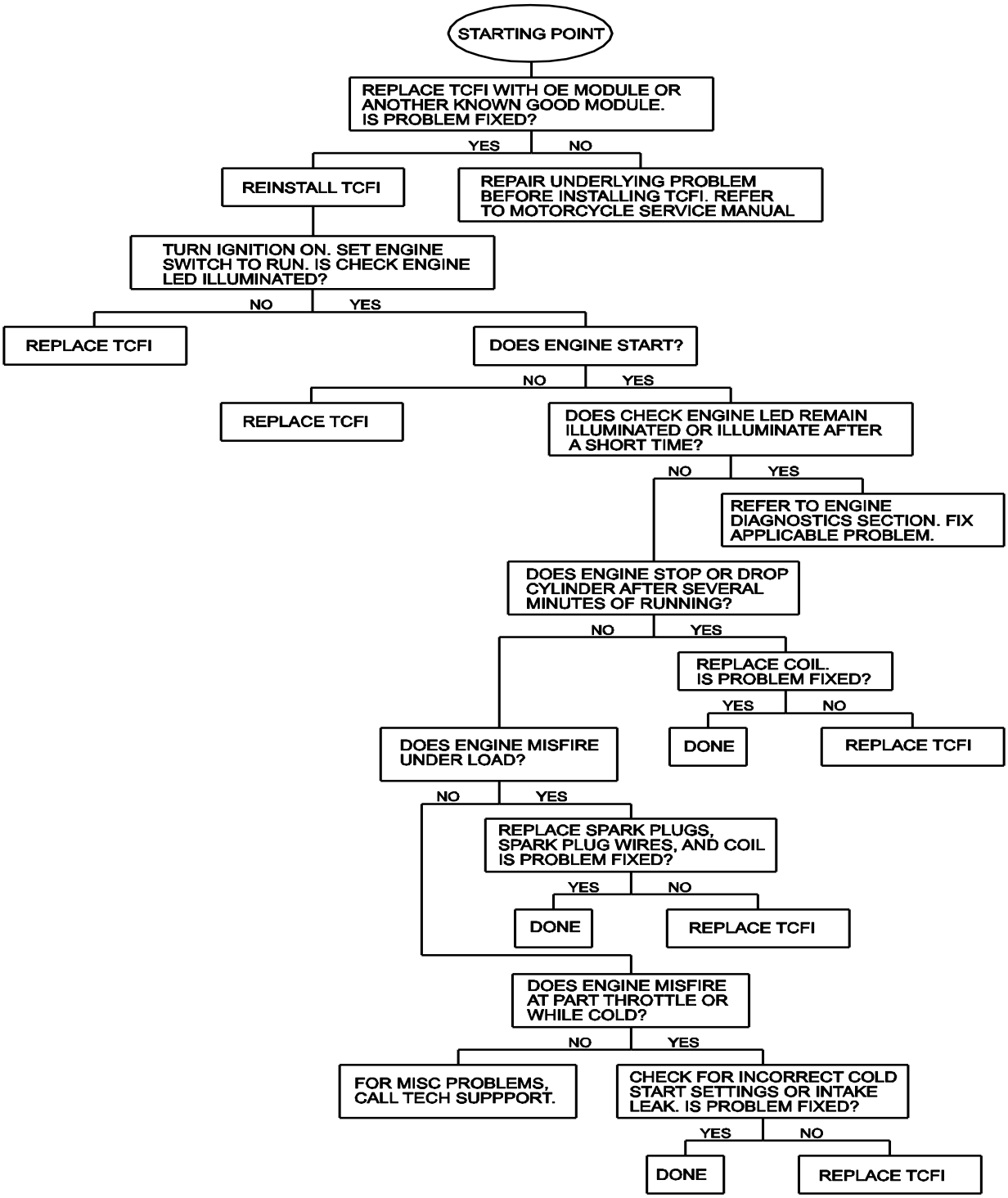
Historical diagnostic codes logged by the TCFI unit are listed along with the number of trips (engine start cycles) since the individual code was last logged. Codes are automatically cleared after 50 trips.

The meaning of the term "trips"

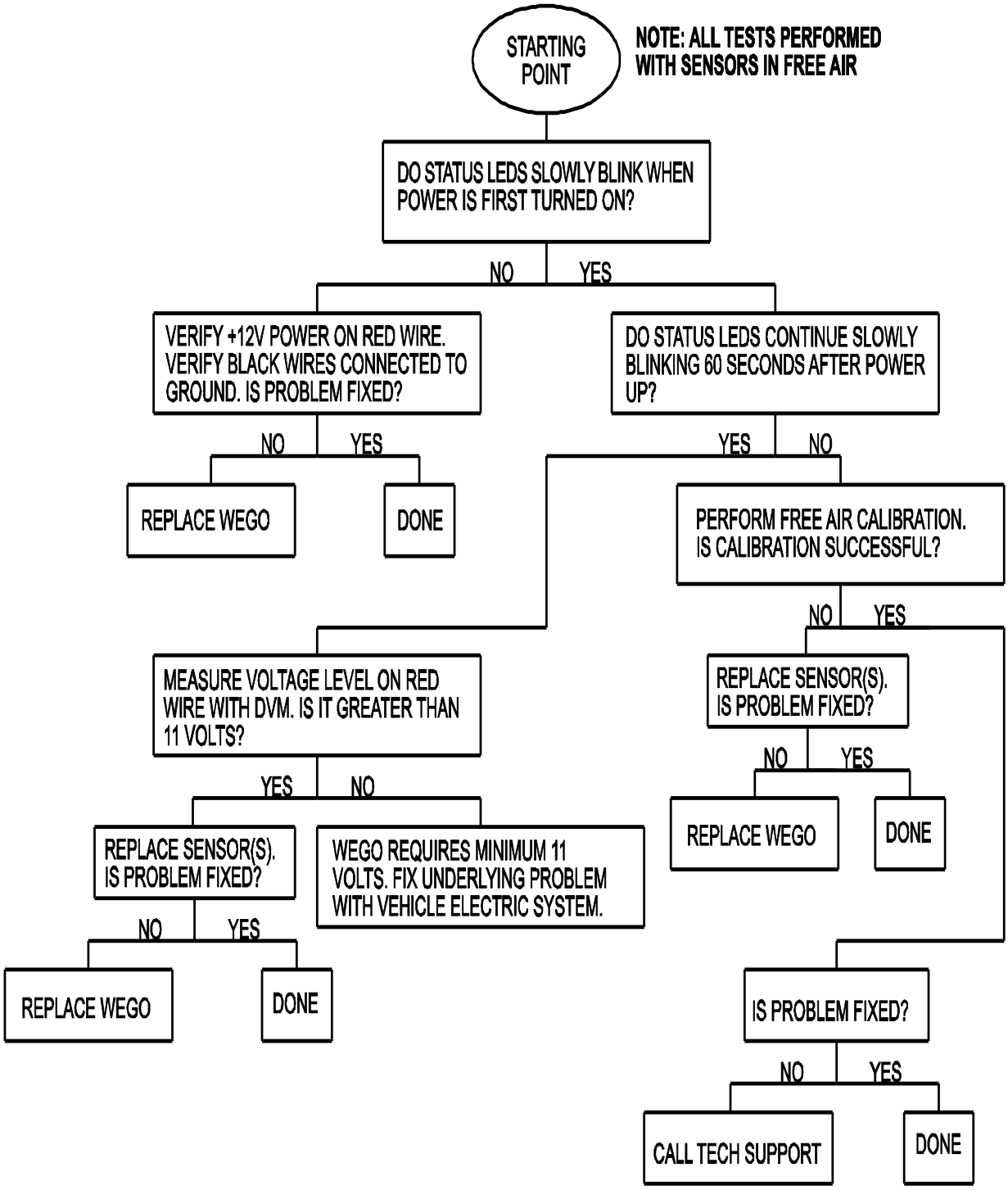
This is an industry standard terminology. If a code shows 40 trips, it means that the code was set 40 engine start cycles ago, not that the code has been set 40 times.

APPENDIX A – TROUBLESHOOTING FLOW CHARTS

FAIL to START TROUBLESHOOTING FLOWCHART



WEGO TROUBLESHOOTING FLOWCHART



COMMUNICATIUONS TROUBLESHOOTING FLOWCHART