Twin Tec User Instructions for PC Link TCFI IID Software

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

OVERVIEW

PC Link TCFI IID software runs under Microsoft Windows 98/ME/XP/Vista. The TCFI IID version of PC link software allows the user to program the new TCFI IID version of our fuel injection controller for Twin-Cam series engines with custom ignition and fuel tables and other engine parameters. **The term TCFI is used throughout this document as a generic term and refers to the new TCFI IID version unless otherwise noted.**

An optional USB Interface or PC link cable is required to connect to the existing four terminal Deutsch style data link connector on the H-D® wiring harness.

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 if your laptop is not equipped with an RS-232 serial port (9 pin male D-sub connector). The USB Interface is compatible with Windows 98/ME/XP/Vista.

If you do not have the new USB interface, you will require the original RS-232 PC link cable P/N TCFI-C also used with our new TC88A ignition. Please note that the TC88C PC link cable used with the earlier TC88 ignition will not function. The two types of PC link cables have identifying labels, but otherwise appear similar. However, the electrical connections are different and the two cables types cannot be interchanged.

After PC Link TCFI IID is launched, the main screen appears blank. You have two options for obtaining data for editing. You can open a previously saved data file by using the Open File command on the File menu or you can download data from an attached TCFI unit by using the Download Data From TCFI command on the Communications menu. Note that TCFI data files use a .dat extension. You should create a separate folder to store these files.

Once you have TCFI data, you can edit various 2D and 3D tables and engine parameters. All 3D tables are accompanied by chart displays that help visualize the data. You can also rotate the 3D chart display for a better view of a particular region. You can print the data associated with an active table or engine parameters by using the appropriate Print command from the File menu. When you open a file or download data from a TCFI module, the data is stored in a buffer memory. After editing a table, you can save the edits to this buffer memory. Once you have completed all your edits, you can save the data in buffer memory to a file or upload it back to the TCFI module by using the appropriate command from the File or Communications menu.

PC Link TCFI IID version 10.0 is only compatible with TCFI IID units with firmware revision 7.0 and higher. Files created with the original PC Link TCFI software and earlier versions of PC Link TCFI IID are automatically converted to the new file format when opened, however several tables and parameters must be edited. Please refer to the TCFI IID Tuning Manual and TCFI IID Rev 7.0 Firmware Update Tech Note for details before attempting to use old files.

TCFI SETUP

The TCFI requires setup, using PC Link TCFI IID software, before running the engine for the first time. Setup establishes module parameters such as engine displacement and injector size and appropriate ignition and fuel control tables. You should carefully read this entire instruction manual before proceeding. **Please refer to the TCFI IID Tuning Manual for detailed setup and tuning instructions.**

Setup data files are provided in the program folder for typical engine applications. Refer to the TCFI IID Tuning Manual for details.

PC REQUIREMENTS

If you are using the new Twin Tec USB Interface (P/N USB-INTF), refer to the supplied instructions for details. No additional hardware is required.

The original PC link cable connects to an RS-232 serial port by means of a female 9 pin D-sub connector. Data transfer occurs at 56 kBaud. The high baud rate limits the maximum cable length and the use of an extension cable is not recommended. Due to the cable length limitation and the need for portable access, a laptop PC is recommended. The PC must

have a free serial port (COM1-255) with a standard 9 pin male D-sub connector. If your laptop does not include a serial port, you can use a USB adapter. However, not all USB adapters will work correctly with our PC link cables. Most of the inexpensive USB adapters are intended for interfacing Palm Pilot type devices and do not support all the signals required by our PC link cables.

We sell and recommend a low cost USB adapter (P/N USBG-232) that has been tested with a wide range of system configurations. The USBG-232 adapter comes with correct and updated driver files on CDROM. After installation the USBG-232 adapter will usually appear as COM5.

We recommend a laptop with Pentium processor and super VGA display (SVGA with 1024 x 768 pixel resolution) running Windows 98/ME/XP/Vista. Data chart display is graphics intensive and a high speed Pentium processor is recommended. Processors slower than 300 MHz will exhibit sluggish program loading and response. The PC must have a CDROM drive for program loading.

PC Link TCFI IID includes print commands that print table graphics and other engine parameters. The program has been tested with Hewlett-Packard laser and inkjet printers and Epson inkjet printers. We recommend using a color inkjet printer.

SOFTWARE INSTALLATION

The software is supplied on CDROM media or in the form of a compressed file downloaded from our website. The installation process uses InstallShield. This industry standard installer is based the new Microsoft Windows Installer service that greatly reduces potential problems such as version conflicts and allows for application self-repair. Since Windows 98 systems did not originally include the Windows Installer service, the required installer software is included in the distribution media.

Before proceeding with installation, shutdown any other applications that may be running. For Windows Vista, you must disable the User Account Control (UAC) during installation. If you are not familiar with the UAC, please refer to the Vista UAC Tech Note on our website's Tech FAQ for details.

Use the Windows Explorer or the Run command from the Windows Start Menu to launch setup.exe in the PC_Link_TCFI2D folder on the CDROM or the setup.exe file downloaded from our website. InstallShield will install the software in an appropriate folder under Program Files.

Once InstallShield has completed the installation, PC Link TCFI IID will appear on the Windows Start Menu. You can then launch it just as you would any other Windows program.

PC Link TCFI IID requires the Monospace 821 BT fixed pitch printer font in order to properly align columns when printing advance tables. The Monospace 821 BT font is included in the distribution media and automatically copied to your Windows Fonts folder during installation. A backup copy is also placed in the program folder. If you accidentally delete this font, use the Install New Font command from the Fonts folder File menu. The filename associated with Monospace 821 BT is monos.ttf.

DOWNLOADING DATA

If you are using the new USB Interface, refer to the supplied instructions for details. No additional hardware is required.

If you are using the original RS-232 PC link cable, connect the cable to the OE data link connector and PC serial port. The OE data link uses a four terminal Deutsch connector that is usually found near the TCFI unit.

Turn the ignition key and engine run/stop switches on to provide power to the TCFI unit. Do not start the engine.

If the TCFI unit has been removed from the motorcycle, you can do bench top programming by using an adapter harness (P/N TCFI-ADAPT) that includes a small 12 volt DC power supply.

COM1 is used as the default port. If you are using a different COM port, use the Port Setup command on the Communications Menu.

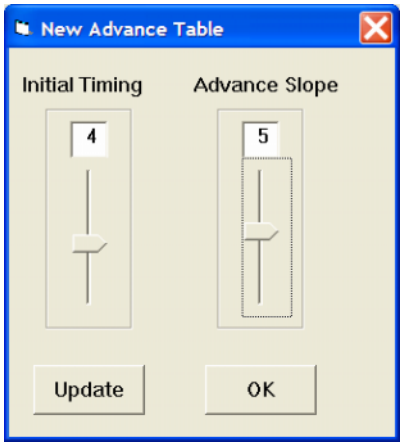
Download data by using the Download Data From TCFI command on the Communications menu. The program will display the module's firmware ID.

Data downloaded from earlier TCFI units is automatically converted to the new format. This allows downloading and saving data when updating a TCFI II unit with the new TCFI IID firmware, however, several tables and parameters must be edited. Please refer to the TCFI IID Tuning Manual and TCFI IID Rev 7.0 Firmware Update Tech Note for details before attempting to use or save old data.

CREATING A NEW IGNITION ADVANCE TABLE

Use the New Advance Table command on the Edit, Edit 3D Table, Advance Table menu. A dialog box appears and allows you to enter initial timing and advance slope settings. Settings close to 5 result in an advance table suitable for stock engines. Use lower values for high compression engines. Each time you click on Update, the corresponding advance table is displayed.

Figure 1 - Creating a New Advance Table

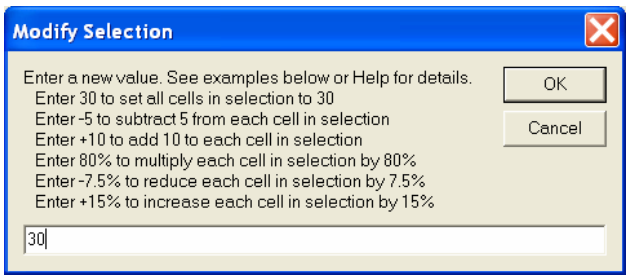


You will find the New Advance Table command useful for generating an advance table that will serve as a starting point for further edits. When you are ready to proceed with editing, click on OK. After you have edited the table, you must use the Save Table Edits To Buffer command from the Edit menu to save your edits to buffer memory. If you use the Close Table command from the Edit menu, all your edits are lost.

Editing Table Data

You can edit table data using standard Windows copy and paste operations by selecting cells and then clicking the right mouse button to pop-up the edit menu. You can select cells by dragging the mouse with left button down.

Figure 2 – Modify Command



You can also use the Modify command on the pop-up menu. When you enter a value, the presence of optional sign (+ or -) or percent (%) characters affects the outcome of the Modify command.

Chart Operations

You can rotate the 3D chart display for a better view of a particular region by dragging the mouse while holding both mouse buttons down.

PC Link TCFI IID is intended to be an open system and uses the Component One Chart 7.0 3D charting control. The adventurous user can experiment with the chart property pages by right clicking on the chart. Almost any chart property can be changed. Click on the Help button for more information. If you corrupt the chart, exit and restart PC Link TCFI IID.

Data Export and Import by Means of Drag and Drop

You might want to export or import 3D table data to or from another application such as Microsoft Excel. Arrange the program windows so that both the source and destination are visible (one on the left side of the screen and the other on the right side seems to work best). You must be able to see the information you want to drag as well as the location where you want to drop it. To export from PC Link TCFI IID to Excel, use the left mouse button to select a range of data on the spreadsheet grid. Then move the mouse cursor to an edge around the selection. Hold the left mouse button down and drag the selection into Excel. Release the left mouse button on the top left cell in Excel. When importing into PC Link TCFI IID from Excel, use the same procedure, except that Excel requires dragging and dropping with the right mouse button.

EDITING IGNITION ADVANCE TABLE DATA

Once you have advance table data (by opening an existing data file, downloading data from a TCFI unit or creating a new table as explained in the previous section), you can edit the data by clicking on and dragging individual points on the 3D chart display or you can directly edit numeric data on the spreadsheet grid.

The table consists of 20 columns from zero to 7,500 RPM and 8 manifold pressure (MAP) rows from 16 to 30 In-Hg. The 7,500 RPM advance value is used at all higher RPM levels and the 16 In-Hg MAP advance value is used at all lower MAP levels. Note that 16 In-Hg corresponds to a high vacuum deceleration or idle condition and that 30 In-Hg

corresponds to wide open throttle (WOT). Advance values must be between zero and 45 degrees.

You can shift the entire advance table up or down by holding the Shift key down while dragging any point. The chart label box shows the shift in degrees. When you release the mouse button, the chart and spreadsheet grid values will be updated. Response of the chart label box may be sluggish on slower systems due to the amount of data being updated.

After you have edited the table, you must use the Save Table Edits To Buffer command from the Edit menu to save your edits to buffer memory. If you use the Close Table command from the Edit menu, all your edits are lost.

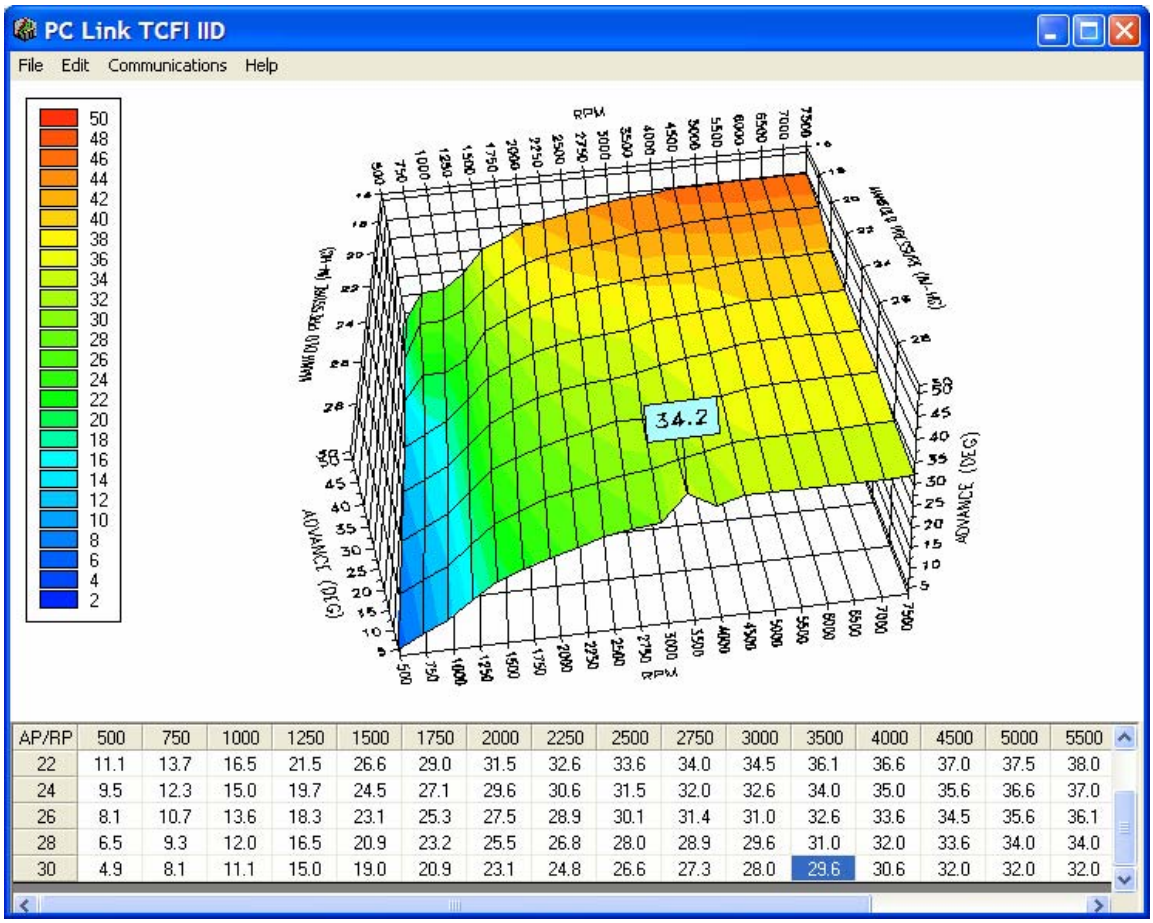
Editing Table Data

You can edit table data using standard Windows copy and paste operations by selecting cells and then clicking the right mouse button to pop-up the edit menu. You can select cells by dragging the mouse with left button down. You can also use the Modify command on the pop-up menu. When you enter a value, the presence of optional sign (+ or -) or percent (%) characters affects the outcome of the Modify command as shown in Figure 2.

Chart Operations

You can rotate the 3D chart display for a better view of a particular region by dragging the mouse while holding both mouse buttons down.

Figure 3 – Editing Advance Table Data



AP/RP	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	5500
22	11.1	13.7	16.5	21.5	26.6	29.0	31.5	32.6	33.6	34.0	34.5	36.1	36.6	37.0	37.5	38.0
24	9.5	12.3	15.0	19.7	24.5	27.1	29.6	30.6	31.5	32.0	32.6	34.0	35.0	35.6	36.6	37.0
26	8.1	10.7	13.6	18.3	23.1	25.3	27.5	28.9	30.1	31.4	31.0	32.6	33.6	34.5	35.6	36.1
28	6.5	9.3	12.0	16.5	20.9	23.2	25.5	26.8	28.0	28.9	29.6	31.0	32.0	33.6	34.0	34.0
30	4.9	8.1	11.1	15.0	19.0	20.9	23.1	24.8	26.6	27.3	28.0	29.6	30.6	32.0	32.0	32.0

PC Link TCFI IID is intended to be an open system and uses the Component One Chart 7.0 3D charting control. The adventurous user can experiment with the chart property pages by right clicking on the chart. Almost any chart property can be changed. Click on the Help button for more information. If you corrupt the chart, exit and restart PC Link TCFI IID.

Data Export and Import by Means of Drag and Drop

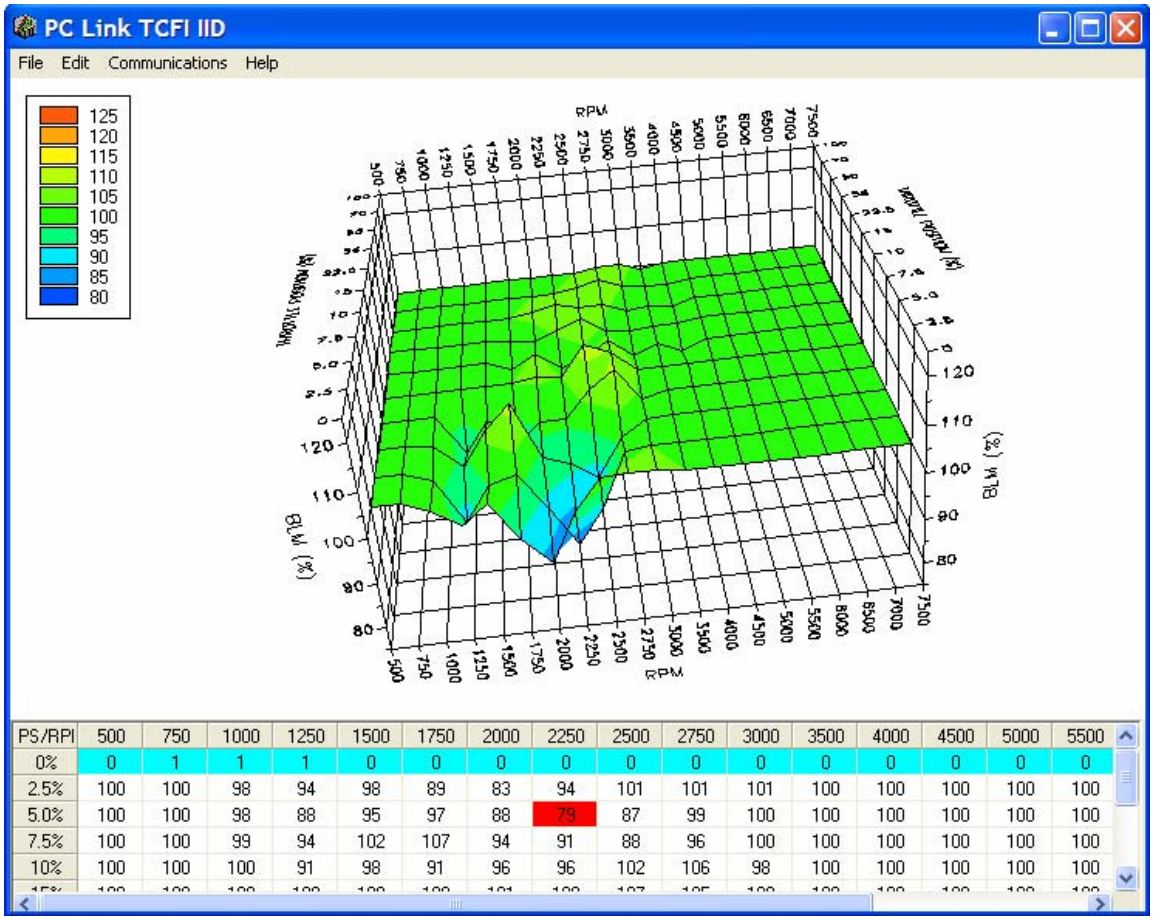
You might want to export or import 3D table data to or from another application such as Microsoft Excel. Arrange the program windows so that both the source and destination are visible (one on the left side of the screen and the other on the right side seems to work best). You must be able to see the information you want to drag as well as the location where you want to drop it. To export from PC Link TCFI IID to Excel, use the left mouse button to select a range of data on the spreadsheet grid. Then move the mouse cursor to an edge around the selection. Hold the left mouse button down and drag the selection into Excel. Release the left mouse button on the top left cell in Excel. When importing into PC Link TCFI IID from Excel, use the same procedure, except that Excel requires dragging and dropping with the right mouse button.

EDITING 3D TABLE DATA

In addition to the ignition advance table, there are five other 3D tables that you can edit: AFR (air/fuel ratio), Alpha-N (throttle position and RPM based fuel table), front cylinder trim (percent fuel trim for front cylinder), and front and rear BLM (block learn multiplier). Before you can edit one of these tables you must either open a data file or download data from a TCFI unit. Due to the somewhat irregular shape of these tables, editing data by clicking on and dragging points on the chart is not feasible. You must edit the numeric data on the spreadsheet grid.

Each table consists of 20 columns from zero to 7,500 RPM and 11 throttle position rows from 0% to 100%. The 7,500 RPM value is used at all higher RPM levels.

Figure 4 – BLM Table Showing Special Cells



PS/RPI	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	5500
0%	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2.5%	100	100	98	94	98	89	83	94	101	101	101	100	100	100	100	100
5.0%	100	100	98	88	95	97	88	79	87	99	100	100	100	100	100	100
7.5%	100	100	99	94	102	107	94	91	88	96	100	100	100	100	100	100
10%	100	100	100	91	98	91	96	96	102	106	98	100	100	100	100	100

After you have edited a table, you must use the Save Table Edits To Buffer command from the Edit menu to save your edits to buffer memory. If you use the Close Table command from the Edit menu, all your edits are lost.

Alpha-N Table

The Alpha-N table is the main fuel table (Alpha-N is the technical term for throttle position and RPM). The Alpha-N table values are in percent units. The calculated base injector pulse width (determined by engine horsepower and injector size settings on the module parameters screen) is multiplied by the Alpha-N table value to determine the theoretical injector pulse width for a 14.7 air fuel ratio. This value is then corrected for the desired air/fuel ratio (as set on the AFR table) and BLM (block learn multiplier) to arrive at the actual rear injector pulse width.

From a practical standpoint, the Alpha-N table must be within about ±20% of the required values for the TCFI system to successfully correct the injector pulse width based on closed loop feedback from an exhaust gas oxygen sensor.

AFR Table

The AFR (air/fuel ratio) table sets the desired air/fuel ratio under various operating conditions. The air/fuel ratio value is used in the rear injector pulse width calculation as explained above. Typical air/fuel ratios are 13.0 for idle, 13.8 for cruise, and 12.8 for wide open throttle. To prevent engine overheating, avoid lean air/fuel ratios exceeding 14.5 under cruise conditions.

Front Cylinder Trim Table

The front cylinder trim table values are in percent units. The calculated injector pulse width is multiplied by the front cylinder trim value to arrive at the front injector pulse width. Required front cylinder trim values are dependent on engine gas flow dynamics. The front cylinder trim table is automatically corrected when the Apply Front BLM Table command is executed. **Please refer to the TCFI IID Tuning Manual for more information about front cylinder trim and fuel injector sizing. If you exceed the horsepower limits listed in Table 1 of the TCFI IID Tuning Manual, front cylinder trim may fail.**

BLM Table

The rear BLM (block learn multiplier) table is shown in the graphic above. BLM values are in percent units and represent a correction factor required to obtain the air/fuel ratio set on the AFR table. BLM values are updated based on closed loop feedback from the exhaust gas oxygen sensor.

Some special considerations apply to the BLM tables. BLM values are limited in range from 75% to 125%. The range limits are set on the module parameters screen. When a BLM cell nears the range limit, the cell color changes to red to alert the user that the system has just about run out of correction range and that the corresponding cell in the Alpha-N fuel table must be changed.

BLM cell values 0 and 1 command special functions and these cells are highlighted in blue. Closed loop feedback is disabled in any BLM cells with value 0. This is useful in operating areas where exhaust reversion effects may cause incorrect sensor readings. Note that most BLM tables will have the value 0 in cells corresponding to decel (RPM above idle and closed throttle) where reversion effects are most pronounced.

BLM update, but not closed loop feedback, is disabled in any BLM cells with value 1. Some BLM tables may have the value 1 in cells corresponding to idle (1000-1250 RPM and closed throttle). **Please refer to the TCFI IID Idle Tuning Tech Note for more information on this subject.**

After several hours of engine operation, examine the BLM (block learn multiplier) tables. If you see red cells on a BLM table, you can use the corresponding Apply BLM Table command (on the BLM Table submenu) to automatically correct the Alpha-N fuel table and front cylinder trim table. After running the Apply BLM Table command, the BLM table cells will return to 100%. Please remember to upload the data back to the TCFI unit in order for the changes to take effect.

The Reset BLM Table command on the BLM Table submenu resets all BLM cells to 100%.

Editing Table Data

You can edit table data using standard Windows copy and paste operations by selecting cells and then clicking the right mouse button to pop-up the edit menu. You can select cells by dragging the mouse with left button down. You can also use the Modify command on the pop-up menu. When you enter a value, the presence of optional sign (+ or -) or percent (%) characters affects the outcome of the Modify command as shown in Figure 2.

Chart Operations

You can rotate the 3D chart display for a better view of a particular region by dragging the mouse while holding both mouse buttons down.

PC Link TCFI IID is intended to be an open system and uses the Component One Chart 7.0 3D charting control. The adventurous user can experiment with the chart property pages by right clicking on the chart. Almost any chart property can be changed. Click on the Help button for more information. If you corrupt the chart, exit and restart PC Link TCFI IID.

Data Export and Import by Means of Drag and Drop

You might want to export or import 3D table data to or from another application such as Microsoft Excel. Arrange the program windows so that both the source and destination are visible (one on the left side of the screen and the other on the right side seems to work best). You must be able to see the information you want to drag as well as the location where you want to drop it. To export from PC Link TCFI IID to Excel, use the left mouse button to select a range of data on the spreadsheet grid. Then move the mouse cursor to an edge around the selection. Hold the left mouse button down and drag the selection into Excel. Release the left mouse button on the top left cell in Excel. When importing into PC Link TCFI IID from Excel, use the same procedure, except that Excel requires dragging and dropping with the right mouse button.

EDITING 2D TABLE DATA

There are eleven 2D tables that you can edit. Before you can edit one of these tables you must either open a data file or download data from a TCFI unit. Each table consists of 17 columns with the upper row corresponding to the independent variable (throttle position, engine temperature, elapsed time, or IAC (idle air control) position. You can edit the numeric data corresponding to the dependent variable on the lower row of the spreadsheet grid. A typical 2D table is shown below. Some of the engine temperature cells are highlighted in red. These red cells correspond to invalid sensor readings.

After you have edited the table, you must use the Save Table Edits To Buffer command from the Edit menu to save your edits to buffer memory. If you use the Close Table command from the Edit menu, all your edits are lost.

TPS Transfer Function Table

This table determines the relationship between TPS sensor volts and TPS percent used in various 3D tables such as the Alpha-N table. Note that the table starts at .39 volts, which is the nominal TPS sensor output with the throttle closed at idle. Some aftermarket throttle bodies, such as the S&S Cycle VFI Induction System, do not use a standard Delphi throttle sensor and thus require a different TPS transfer function. **The provided setup files have the proper TPS transfer function and you should never change these values unless given specific instructions from tech support.**

Delta TPS Fuel Multiplier Table

This table consists of a fuel multiplier (percent units) that is a function of delta throttle position. Delta throttle position means change in throttle position. Fuel multipliers greater than 100% for positive delta throttle position correspond to an acceleration enrichment (similar effect to an accelerator pump on a carburetor). Fuel multipliers less than 100% for a negative delta throttle position correspond to a deceleration enleanment (useful for reducing exhaust back fire).

IAC Based TPS Adder Table

This table consists of a throttle position factor corresponding to IAC position. In an Alpha-N fuel control, IAC position must be considered. A high IAC position (high idle air flow) is the same as opening the throttle. In general the values in this table need only be edited if an aftermarket throttle body with significantly greater air flow is used. In this case, the table values should be reduced slightly.

Figure 5 – Typical 2D Table

ET (deg C)	-16	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
Idle RPM	1398	1320	1250	1172	1102	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

ET Based Priming Fuel Table

This table consists of an injector pulse width that is a function of engine temperature. The priming pulse occurs once on the initial ignition switch on event. Some of the engine temperature cells are highlighted in red. These red cells correspond to invalid sensor readings.

ET Based Cranking Fuel Table

This table consists of an injector pulse width that is a function of engine temperature. The cranking pulse width is used during engine start. Some of the engine temperature cells are highlighted in red. These red cells correspond to invalid sensor readings.

Time Based AFR Cold Start Enrichment Table

This table consists of an AFR cold start multiplier (percent units) that is a function of elapsed time since engine start. This AFR cold start enrichment is applied to the values in the 3D AFR table. The AFR values are multiplied by the time based AFR cold start enrichment and by the ET based AFR cold start enrichment. For example, assume that the AFR value in a given cell is 14.0 and that the time and ET based AFR cold start enrichment values are 50% and 15% respectively. The actual AFR value for that cell then becomes 13.0 (14/(1 + 0.5 x 0.15)). The time based AFR cold start enrichment should always taper off from 100% at zero elapsed time and must reach 0% at the maximum value of elapsed time (251 seconds). In general, the values in this table will be correct for most applications and should not be changed without consulting tech support.

ET Based AFR Cold Start Enrichment Table

This table consists of an AFR cold start multiplier (percent units) that is a function of engine temperature. This table does double duty for hot soak enrichment. Some of the engine temperature cells are highlighted in red. These red cells correspond to invalid sensor readings. In general, the values in this table will be correct for most applications and should not be changed without consulting tech support.

Time Based Fuel Cold Start Enrichment Table

This table consists of a fuel cold start multiplier (percent units) that is a function of elapsed time since engine start. The overall fuel cold start enrichment is determined as follows: calculated injector pulse width for each cylinder is multiplied by the time based fuel cold start enrichment and by the appropriate ET based front or rear cylinder cold start enrichment. The overall fuel cold start enrichment is then added to the injector pulse width. For example, assume that the calculated injector pulse width is 4 msec and that the time and ET based fuel cold start enrichment values are 50% and 25% respectively. The total injector pulse width is then 4.5 msec (0.5 x 0.25 x 4.0 + 4.0). The time based fuel cold start enrichment should always taper off from 100% at zero elapsed time and must reach 0% at the maximum value of elapsed time (251 seconds).

ET Based Front and Rear Cylinder Cold Start Enrichment Table

These tables consist of a fuel cold start fuel multiplier (percent units) that is a function of engine temperature. Individual tables are used because most engines exhibit significant differences in the characteristics of the front and rear cylinders. These tables also do double duty for hot soak enrichment. Note that a significant enrichment is required at high temperatures due to reduced injector flow. Some of the engine temperature cells are highlighted in red. These red cells correspond to invalid sensor readings. You may need to edit these two tables for optimum cold start and restart after hot soak. **Please refer to the TCFI IID Tuning Manual and TCFI IID Idle Tuning Tech Note for more information on this subject.**

ET Based Idle RPM Table

This table consists of desired idle RPM as a function of engine temperature. The ET based IAC position (see table description above) is adjusted to maintain the desired idle RPM. Some of the engine temperature cells are highlighted in red. These red cells correspond to invalid sensor readings.

ET Based IAC Position Table

This table consists of IAC (idle air control) position as a function of engine temperature. Greater IAC values result in more idle air and higher idle speed. IAC position is continuously reduced as the engine warms up, even if the engine is not idling. Some of the engine temperature cells are highlighted in red. These red cells correspond to invalid sensor readings.

ET Based IAC Start Adder Table

This table consists of IAC (idle air control) position as a function of engine temperature. The values represent additional air flow through the idle system during engine starting. Generally, more air is required for a hot start, especially after a hot soak. Some of the engine temperature cells are highlighted in red. These red cells correspond to invalid sensor readings.

Time Based IAC Start Adder Table

This table was added in Version 7.0. The table consists of a multiplier factor (percent units) that is a function of elapsed time since engine start. The multiplier factor is applied to the IAC start adder in order to compensate for time dependent characteristics of the throttle body after engine start, especially after a hot soak. The table values should always taper off from some initial value at zero elapsed time and must reach 0% at the maximum value of elapsed time (268 seconds). If the engine runs above the desired idle RPM for several seconds when first returning to idle after the motorcycle has been driven some distance, a higher initial multiplier value is required.

Editing Table Data

You can edit table data using standard Windows copy and paste operations by selecting cells and then clicking the right mouse button to pop-up the edit menu. You can select cells by dragging the mouse with left button down. You can also use the Modify command on the pop-up menu. When you enter a value, the presence of optional sign (+ or -) or percent (%) characters affects the outcome of the Modify command as shown in Figure 2.

Data Export and Import by Means of Drag and Drop

You might want to export or import 2D table data to or from another application such as Microsoft Excel. Arrange the program windows so that both the source and destination are visible (one on the left side of the screen and the other on the right side seems to work best). You must be able to see the information you want to drag as well as the location where you want to drop it. To export from PC Link TCFI IID to Excel, use the left mouse button to select a range of data on the spreadsheet grid. Then move the mouse cursor to an edge around the selection. Hold the left mouse button down and drag the selection into Excel. Release the left mouse button on the top left cell in Excel. When importing into PC Link TCFI IID from Excel, use the same procedure, except that Excel requires dragging and dropping with the right mouse button.

MODULE PARAMETERS

Module parameters are divided into two categories: basic parameters and advanced parameters. Module parameters control the overall operation of the TCFI unit. Setup and calibration of the TCFI unit will generally involve editing some of the basic parameters. Users should not modify any of the advanced parameters without first consulting tech support. Basic module parameters are displayed in a dialog box by using the Edit Basic Module Parameters command on the Edit menu.

Basic parameters include:

Closed Loop AFR Control Mode – allows BLM (block learn multiplier) table updates based on feedback from an exhaust gas oxygen sensor. Only select this checkbox if the WEGO (wide-band exhaust gas oxygen) unit is connected to the TCFI.

Dual Independent Runner Intake – you must select this checkbox if you are using a dual independent runner intake such as the BC Gerolamy Dual Flow or S&S Cycle VFI Induction System. With a standard Delphi intake system, the MAP sensor is sampled as each cylinder approaches BDC on the intake stroke. Dual independent runner intake systems have the MAP sensor connected to the front runner. When you select this checkbox, the MAP sensor is only sampled when the front cylinder approaches BDC on the intake stroke.

Continuous Barometric Pressure Update Mode – recommended for operation in mountainous terrain with elevation changes of more than 3000 feet. Barometric pressure is continually estimated from manifold pressure sampled at specific crank angle and TPS conditions. Note: only supported on TCFI Gen II.

Enable Low Fuel Warning – you should select this option for 2004-2008 models equipped with a speedometer that includes a low fuel warning LED.

Automatic Nominal Idle IAC Update Mode – recommended for most applications. The nominal idle IAC value (IAC steps once engine is fully warmed up and at stable idle condition) is automatically sampled and updated. Manual setting of the nominal idle IAC value may be required for some applications. For more information on this subject, please refer to the TCFI IID Idle Tuning Tech Note.

Anti-Stall IAC Mode – for problem applications where occasional engine stalling occurs when the clutch is pulled in. In anti-stall IAC mode, closed loop idle speed control is always active when engine RPM is below the target idle RPM. This may cause an unexpected increase in idle RPM if the engine is inadvertently “lugged” down below the target idle RPM. For more information on this subject, please refer to the TCFI IID Idle Tuning Tech Note.

Estimated HP at 6000 RPM – enter a reasonable estimate in order for the TCFI to calculate the base injector pulse width. Well tuned engines will develop slightly over one horsepower per CID. If the horsepower peak is below 6,000 RPM, use the peak

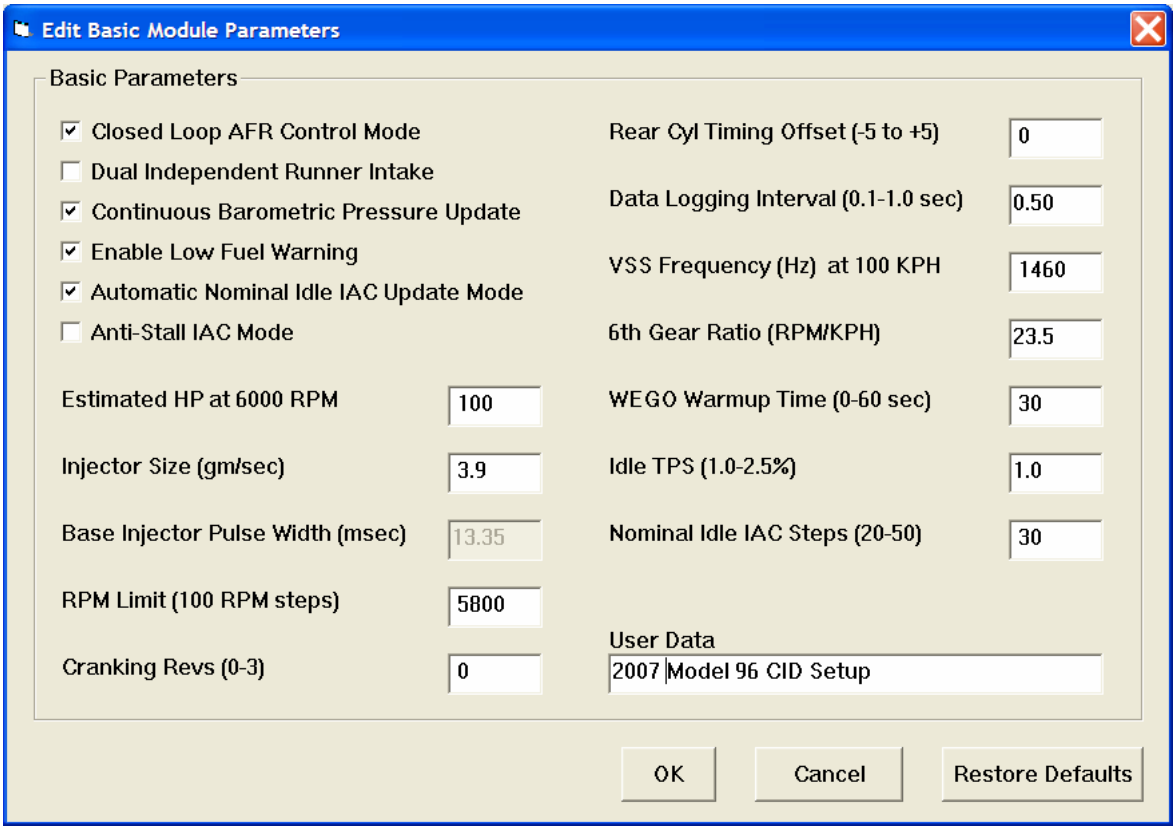
value. Multiply rear wheel dyno horsepower by 1.1 to arrive at an estimated engine horsepower figure.

Injector Size – flow rate in gm/sec units. Refer to Table 1 below. You must enter the correct injector size value in order for the TCFI to calculate the base injector pulse width. **Injector size scaling has changed to accommodate the smaller injectors used in 2006 and later applications. If you load a setup file or download data created with an earlier version of PC Link TCFI, you must reenter the correct injector size and then save the file.**

Table 1 – Injector Size for 2001-2008 Models

Model	Injector Size (gm/sec)
2001-2005 Stock Twin Cam 88®	4.22
2006-2008 Stock Twin Cam	3.91
2006-2008 Screamin Eagle® P/N 27654-06	4.89
Twin Tec TCFI-INJ-5S (fits 2001-2005 only)	6.00

Figure 6 – Basic Module Parameters Dialog Box



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. Most Twin-Cam engines will start best with a zero setting. 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.

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.

Data Logging Interval – you can set the interval from 0.1 to 1.0 seconds. TCFI data logging capacity is 1600 samples. An interval of 0.1 seconds allows the TCFI to store the last 2-1/2 minutes of operation. An interval of 1.0 seconds corresponds to about 26 minutes of data. For dyno testing, we suggest that you set the interval to 0.1 seconds. For testing at the race track, we recommend an interval in the 0.25 to 1.0 second range. If you change the data logging interval, you should also run the TCFI Log program and clear the data buffer.

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 – applicable to 2007-2008 models only. 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 2001-2006 models, you can use the default value of 23.5. Please refer to the following section and the TCFI IID Tuning Manual for more details.

WEGO Warmup Time – in seconds. This parameter determines the minimum engine run time before closed loop AFR control.

Idle TPS – in percent units. This parameter determines the maximum TPS (throttle position sensor) value for closed loop idle speed control. The default value is 1.0%. Some throttle bodies may require a higher value for reliable idle speed control. For more information on this subject, please refer to the TCFI IID Idle Tuning Tech Note.

Nominal Idle IAC steps – this parameter determines the nominal IAC (idle air control) stepper motor position. For more information on this subject, please refer to the TCFI IID 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 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 Twin-Cam engine.

Advanced module parameters are displayed in a dialog box by using the Edit Advanced Module Parameters command on the Edit 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 degree 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 degree C.

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.

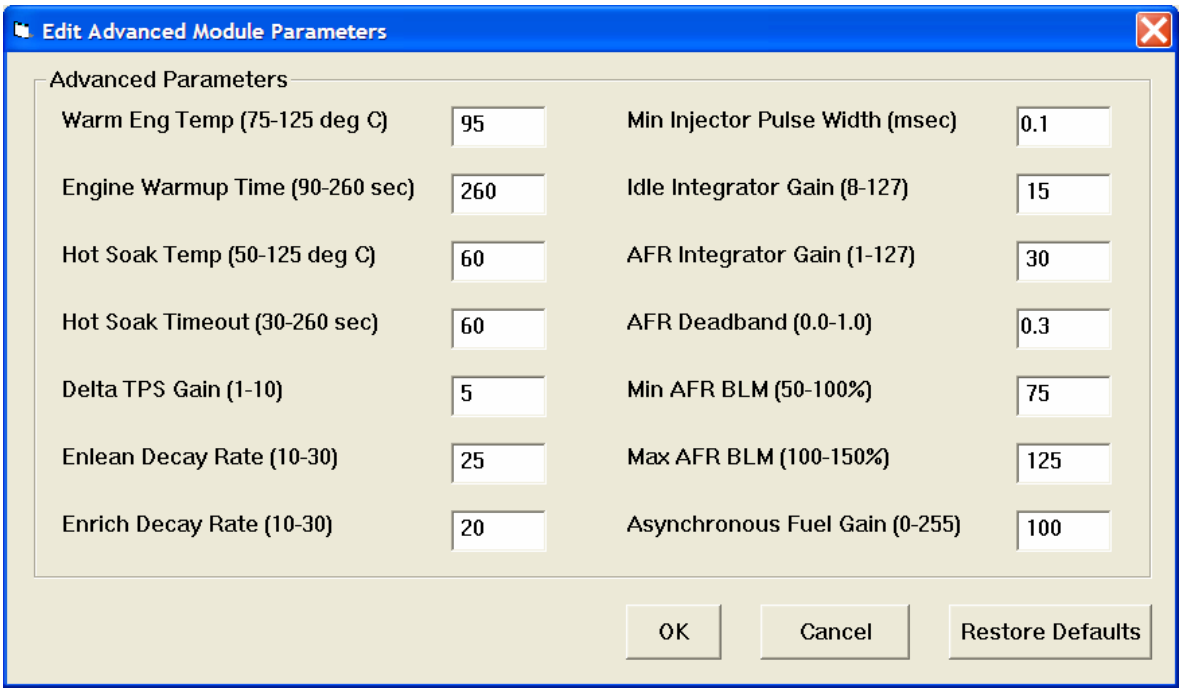
Enlean Decay Rate – this parameter determines the time constant of recovery from enleanment (negative delta TPS values) in the delta TPS based fuel multiplier table. Do not change this parameter from the default value of 25.

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.

Figure 7 – Advanced Module Parameters Dialog Box



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.

SPEEDOMETER CALIBRATION

For 2001-2003 models, the VSS scaling affects data displayed by TCFI Log and idle speed control. You must enter the value shown in Table 2 (used for all models). For 2004-2008 models with the instrument cluster on the SAE J1850 data bus, the VSS frequency parameter sets the correct speedometer and odometer scaling. You can find the exact value in the speedometer section of the factory service manual for your model. Use the frequency value at 100 KPH. Values for most 2004-2006 models are given in Table 3. Preliminary values for 2007-2008 models are given in Table 4. For models not listed, you can use TCFI Log software to examine data logged while the motorcycle was operated at a known speed in 6th gear. Use the speedometer recalibration procedure as explained below to recalculate the VSS frequency. Use the gear ratio display function and average several readings to determine the 6th gear ratio.

Table 2 – VSS Frequency at 100 KPH for 2001-2003 Models

Model	
All 2001-2003	155 Hz

Table 3 – VSS Frequency at 100 KPH for 2004-2006 Models

Model	All exc. Japan	Japan Only
Sportster 883	1431 Hz	1635 Hz
Sportster 1200	1386 Hz	1526 Hz
Dyna (exc. FXDP)	1424 Hz	1583 Hz
Dyna FXDP	1435 Hz	N/A
Softail (exc. FXSTD)	1403 Hz	1501 Hz
Softail FXSTD	1382 Hz	1506 Hz
Touring Models (exc. Police)	1375 Hz	1493 Hz
Touring Models (Police)	1435 Hz	1435 Hz

Table 4 – VSS Frequency and 6th Gear Ratio for 2007-2008 Models

Model	VSS Frequency at 100 KPH	6th Gear Ratio (RPM/KPH)
Softail	1460 Hz	23.5

Speedometer Recalibration (for 2004-2008 models only). You can easily recalibrate the speedometer (and odometer) to accommodate tire and gear changes. Run the motorcycle on a chassis dyno at a constant speed. Note the speedometer reading and the correct speed indicated on the dyno. Use the following formula to calculate the new VSS frequency parameter:

$$\text{New VSS Freq} = \frac{\text{Original VSS Freq} \times \text{Speedo Reading}}{\text{Indicated Dyno Speed}}$$

For example, if the original VSS frequency parameter was 1403 Hz, the speedometer reading is 60 MPH and the indicated dyno speed is 57 MPH, then the new VSS frequency parameter should be:

$$1476\ \text{Hz} = \frac{1403\ \text{Hz} \times 60\ \text{MPH}}{57\ \text{MPH}}$$

The speed units cancel out, so you can use either MPH or KPH units in the calculation as long as you use the same units for both the speedometer reading and dyno speed. For best accuracy, use a test speed near highway cruising speed.

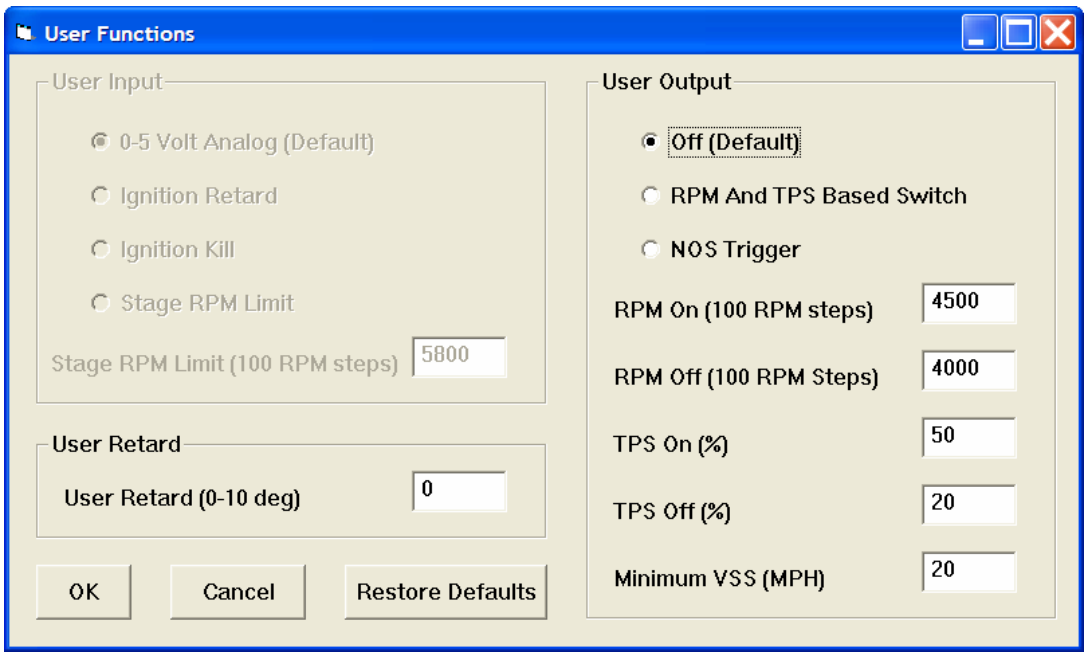
USER FUNCTIONS

User functions are displayed in a dialog box by using the Edit User Functions command on the Edit menu. User functions control the operation of the user input and user output of the TCFI unit.

The user input function is not available on TCFI IID units and all user input functions are grayed out.

The user output on pin 22 can drive a small load up to 0.5 amps and is protected against short circuits. The user output is "active low." It can be used to drive a standard automotive relay returned to +12V. When the user output is active, the pin is grounded.

Figure 8 – User Functions Dialog Box



User output functions include:

Off – default mode.

RPM And TPS Based Switch – general purpose switch function based on RPM and TPS. The user output is set on (pulled to ground) when RPM >= RPM On **AND** TPS >= TPS On. The user output then remains on until it is reset off when RPM < RPM Off **OR** TPS < TPS Off.

NOS Trigger – specifically designed to trigger an NOS system. The user output is set on (pulled to ground) when RPM >= RPM On **AND** TPS >= TPS On **AND** VSS >= Minimum VSS. The user output then remains on until it is reset off when RPM < RPM Off **OR** TPS < TPS Off **OR** VSS < Minimum VSS. As an additional safety feature to prevent engine damage, the user output is immediately tripped off if the RPM limit is exceeded and cannot be set back on again until the engine RPM drops below the RPM Off level. In NOS trigger mode, the user retard value (0 to 10 degrees) is applied whenever the user output is on.

Once you have entered the appropriate user function 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.

UPLOADING DATA

Refer to the Downloading Data section on page 2 for details about USB Interface or PC link cable hookup and COM port setup. Before uploading, make sure the module parameters are correct.

Upload data by using the Upload Data To TCFI command on the Communications menu. A status message is displayed when the upload process has been successfully completed.

If you attempt to upload data to anything other than a TCFI IID unit with correct firmware, an error message will appear and the upload will be aborted.

TROUBLESHOOTING FLOWCHART

Follow the troubleshooting flowchart shown below. Experience has shown that most communication problems are user error or PC compatibility issues.

Troubleshooting Flowchart