Twin Tec User Instructions for PC Link VRFID Software

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

OVERVIEW

PC Link VRFID software runs under Microsoft Windows 98/ME/XP/Vista. The VRFID version of PC link software allows the user to program the new VRFI D version of our fuel injection controller for H-D® VRSC engines with custom ignition and fuel tables and other engine parameters. **The term VRFI is used throughout this document as a generic term and refers to the new VRFI D 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 TCFI fuel injection controller for Twin Cam 88® engines.

Please note that the PC link software cannot access restricted private label products other than those authorized.

After PC Link VRFID 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 VRFI unit by using the Download Data From VRFI command on the Communications menu. Note that VRFI data files use a .dat extension. You should create a separate folder to store these files.

Once you have VRFI 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 VRFI 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 VRFI module by using the appropriate command from the File or Communications menu.

PC Link VRFID is only compatible with VRFI D version units. Files created with the original PC Link VRFI software are automatically converted to the new file format when opened.

VRFI SETUP

The VRFI requires setup, using PC Link VRFID 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 VRFI D Version Tuning Manual for detailed setup and tuning instructions.**

A setup data files is provided in the program folder for typical 69 CID engine applications. Refer to the VRFI D Version 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 VRFID 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_VRFID 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.

The PC_Link_VRFID.cfg file contains access codes for restricted private label products. You will only be able to access those products for which this file contains valid access codes.

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

PC Link VRFID 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 VRFI unit.

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

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

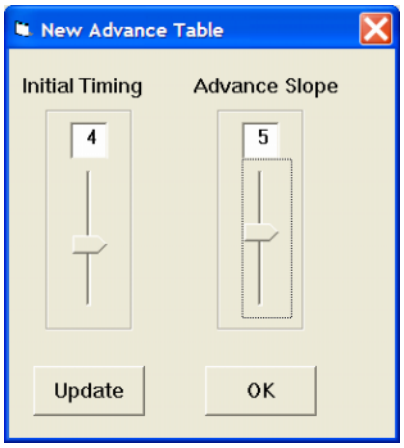
COM1 is used as the default port. If you are using a different COM port, use the Port Setup command on the Communications Menu.

Download data by using the Download Data From VRFI command on the Communications menu. If you attempt to access a restricted private label module, the program will display a warning message and abort the download process. Otherwise, the program will display the module's firmware ID.

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. 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.

Figure 2 – Modify Command

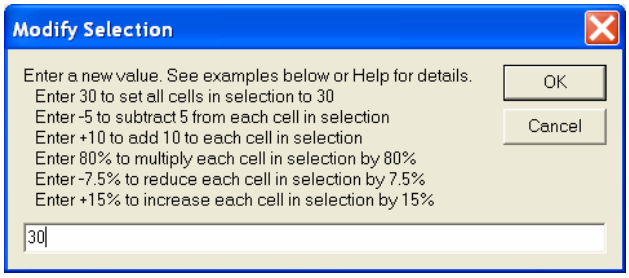


Chart Operations

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 VRFID 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 VRFID.

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 VRFID 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 VRFID 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 VRFI 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 22 columns from 1,000 to 9,500 RPM and 8 manifold pressure (MAP) rows from 16 to 30 In-Hg. The 9,500 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.

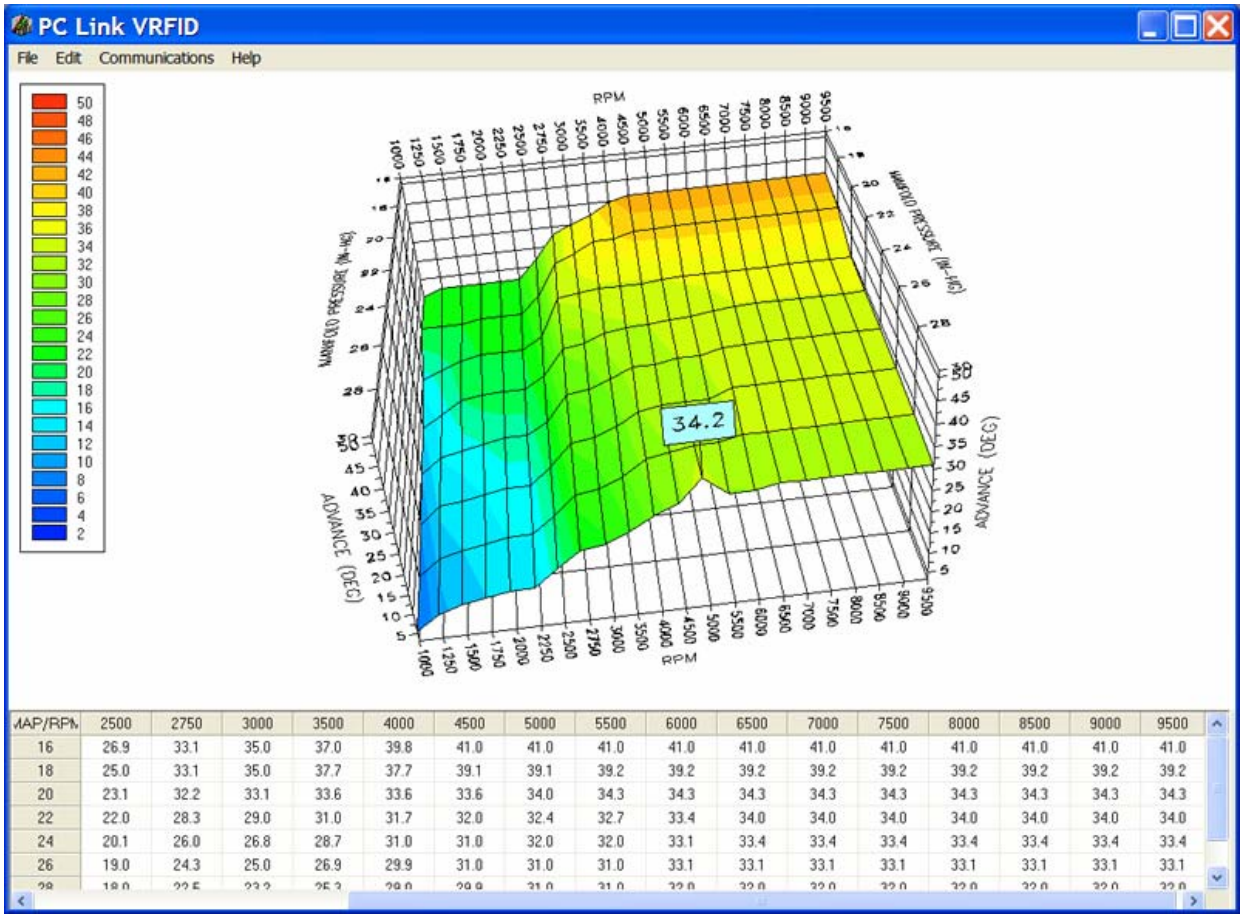
Editing Table Data

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



MAP/RPM	2500	2750	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500
16	26.9	33.1	35.0	37.0	39.8	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0	41.0
18	25.0	33.1	35.0	37.7	37.7	39.1	39.1	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2
20	23.1	32.2	33.1	33.6	33.6	33.6	34.0	34.3	34.3	34.3	34.3	34.3	34.3	34.3	34.3	34.3
22	22.0	28.3	29.0	31.0	31.7	32.0	32.4	32.7	33.4	34.0	34.0	34.0	34.0	34.0	34.0	34.0
24	20.1	26.0	26.8	28.7	31.0	31.0	32.0	32.0	33.1	33.4	33.4	33.4	33.4	33.4	33.4	33.4
26	19.0	24.3	25.0	26.9	29.9	31.0	31.0	31.0	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1

PC Link VRFID 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 VRFID.

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 VRFID 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 VRFID from Excel, use the same procedure, except that Excel requires dragging and dropping with the right mouse button.

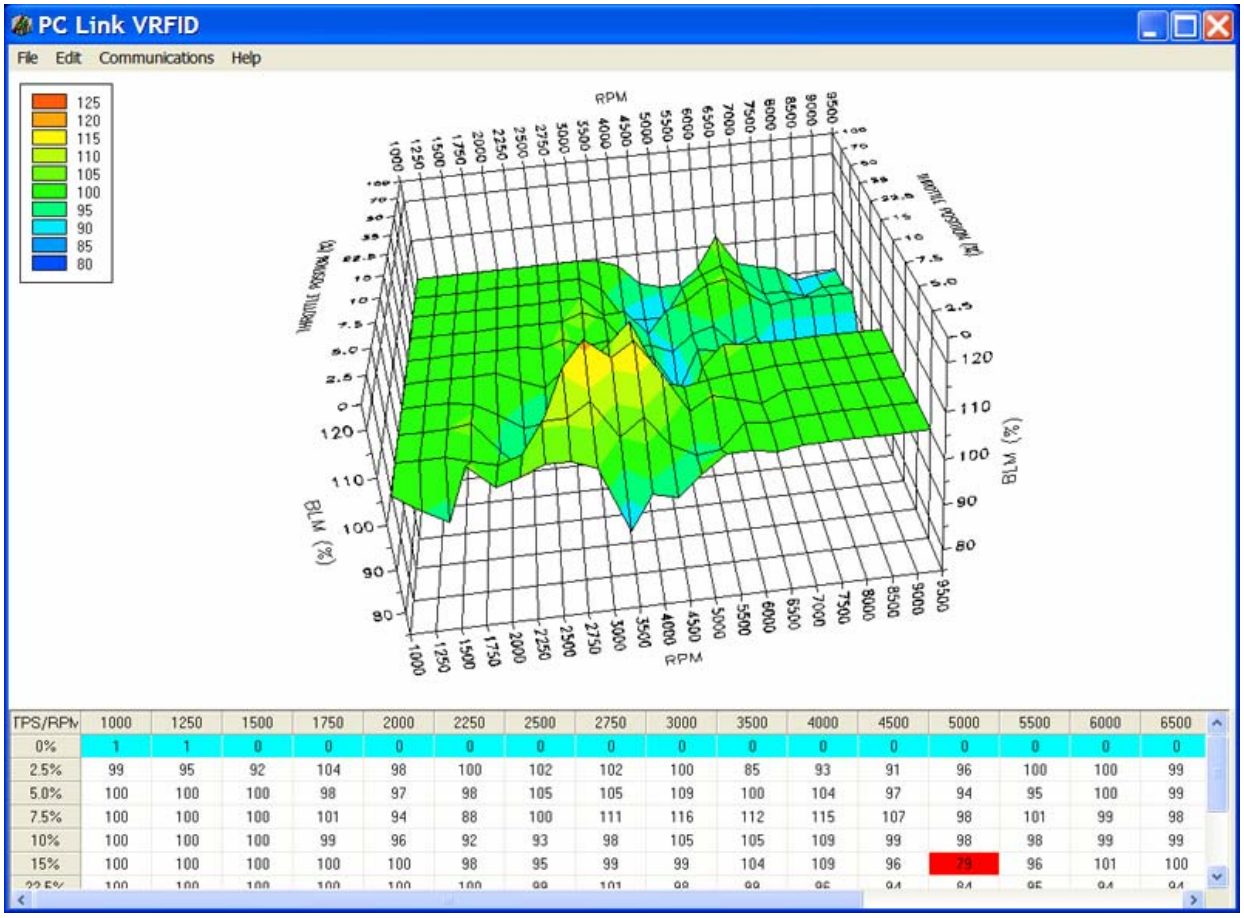
EDITING 3D TABLE DATA

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), rear cylinder trim (percent fuel trim for rear 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 VRFI 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 22 columns from 1,000 to 9,500 RPM and 11 throttle position rows from 0% to 100%. The 9,500 RPM value is used at all higher RPM levels.

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.

Figure 4 – BLM Table Showing Special Cells



TPS/RPM	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	5500	6000	6500
0%	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.5%	99	95	92	104	98	100	102	102	100	85	93	91	96	100	100	99
5.0%	100	100	100	98	97	98	105	105	109	100	104	97	94	95	100	99
7.5%	100	100	100	101	94	88	100	111	116	112	115	107	98	101	99	98
10%	100	100	100	99	96	92	93	98	105	105	109	99	98	98	99	99
15%	100	100	100	100	100	98	95	99	99	104	109	96	79	96	101	100

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 displacement 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 VRFI 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.

Rear Cylinder Trim Table

The rear cylinder trim table values are in percent units. The calculated injector pulse width is multiplied by the rear cylinder trim value to arrive at the rear injector pulse width. Required rear cylinder trim values are dependent on engine gas flow dynamics. The rear cylinder trim table is automatically corrected when the Apply Rear BLM Table command is executed.

BLM Table

The front BLM (block learn multiplier) table in 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 sensors.

Some special considerations apply to the BLM table. 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. Note that some BLM tables may have the value 1 in cells corresponding to idle (1000-1500 RPM and closed throttle). **Please refer to the VRFI D Version 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 Apply BLM Table command (on the BLM Table submenu) to automatically correct the Alpha-N fuel table and rear 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 VRFI 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.

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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 VRFID 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 VRFID from Excel, use the same procedure, except that Excel requires dragging and dropping with the right mouse button.

EDITING 2D TABLE DATA

There are ten 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 VRFI 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. **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.

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.

ET Based Cold Start Enrichment Table

This table consists of a cold start fuel multiplier (percent units) that is a function of engine temperature. This table does double duty for a 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.

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	1602	1500	1398	1301	1250	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199

Time Based Cold Start Enrichment Table

This table consists of a cold start fuel multiplier (percent units) that is a function of elapsed time since engine start. The overall cold start enrichment is determined as follows: calculated injector pulse width is multiplied by the time based cold enrichment and by the ET based cold start enrichment. The overall 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 that the time and ET based 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 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 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 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 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. Some of the engine temperature cells are highlighted in red. These red cells correspond to invalid sensor readings.

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 VRFID 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 VRFID 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 VRFI unit. Setup and calibration of the VRFI 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 optional WEGO (wide-band exhaust gas oxygen) unit is connected to the VRFI.

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.

Enable Low Fuel Warning – you should select this option for all models equipped with an instrument module 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 VRFI D Version Idle Tuning Tech Note.

Estimated HP at 8000 RPM – enter a reasonable estimate for engine horsepower in order for the VRFI to calculate the base injector pulse width. If the horsepower peak is below 8,000 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. The stock VRSC injectors flow 4.82 gm/sec. If you change injectors, you must enter the correct injector size value in order for the VRFI to calculate the base injector pulse width.

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 10,500 RPM. Values are automatically rounded to the nearest 100 RPM.

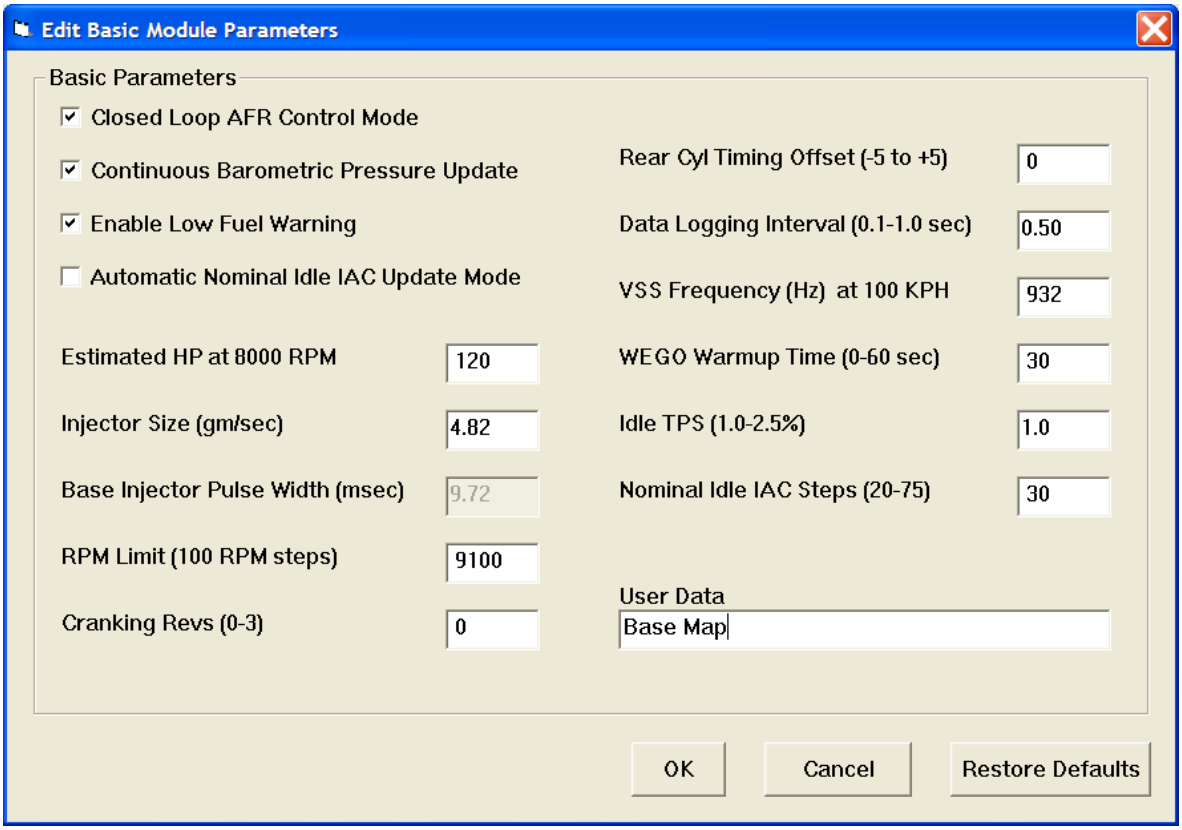
Cranking Revs - sets the number of engine revolutions before the ignitions fires the first spark. Most engines will start best with a zero setting. Please note that a hot engine may exhibit preignition and appear to start on the first revolution even if the Cranking Revs parameter is set to a non-zero 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. VRFI data logging capacity is 1600 samples. An interval of 0.1 seconds allows the VRFI 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 VRFI Log program and clear the data buffer.

VSS Frequency – this parameter sets the correct speedometer and odometer scaling. Please refer to the following section for more details.

Figure 6 – Basic Module Parameters Dialog Box



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 VRFI D Version Idle Tuning Tech Note.

Nominal Idle IAC steps – this parameter determines the nominal IAC (idle air control) stepper motor position. The default value is 30. Some throttle bodies may require a different value. For more information on this subject, please refer to the VRFI D Version 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 VRSC 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 75 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.

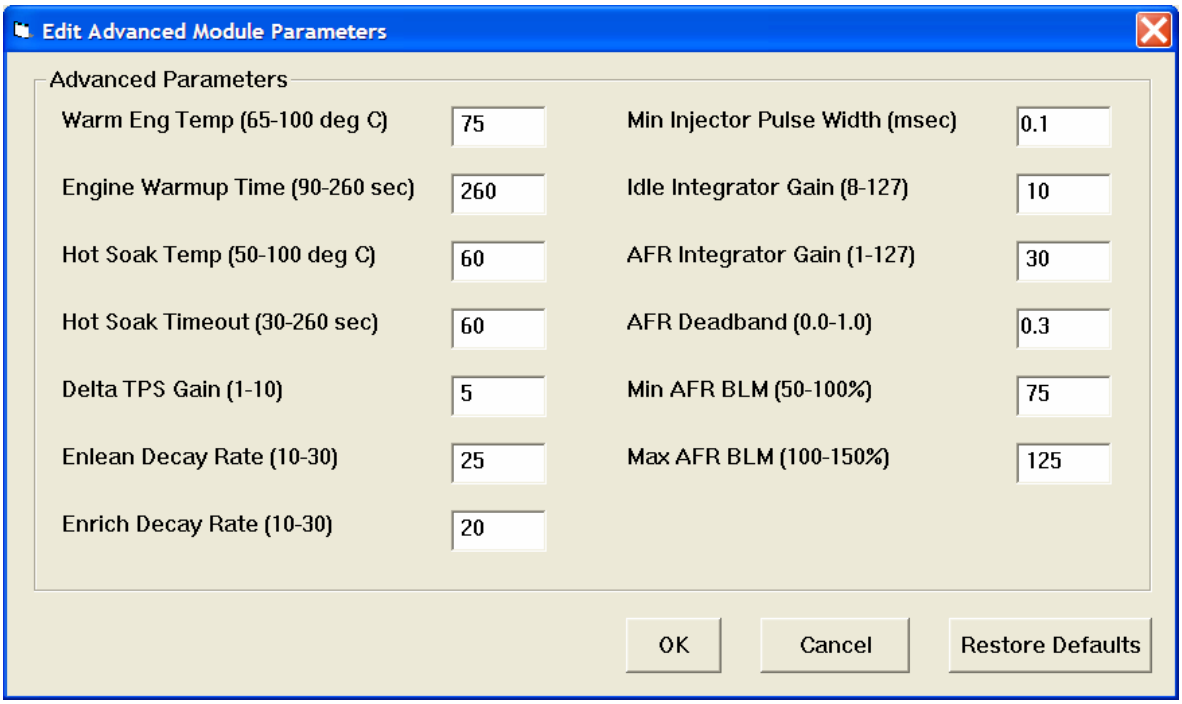
AFR Integrator Gain - this parameter determines the response time of closed loop AFR control. A higher value will result in a faster response but may cause instability (oscillation). The default value is 30.

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%.

Figure 7 – Advanced Module Parameters Dialog Box



SPEEDOMETER CALIBRATION

When you open a file or download data, the VSS (vehicle speed sensor) frequency parameter appears on the Module Parameters dialog box. You must enter the value shown in Table 1. The VSS frequency parameter sets the correct speedometer and odometer scaling.

Table 1 – VSS Frequency at 100 KPH

Model	
30T front pulley (US: 2002-2003, International: all)	870 Hz
28T front pulley (US:2004 and newer, all others with 28T kit)	932 Hz

Speedometer Recalibration. 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:

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

For example, if the original VSS frequency parameter was 932 Hz, the speedometer reading is 60 MPH and the indicated dyno speed is 57 MPH, then the new VSS frequency parameter should be:

$$981 \text{ Hz} = \frac{932 \text{ Hz x } 60 \text{ MPH}}{57 \text{ MPH}}$$

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.

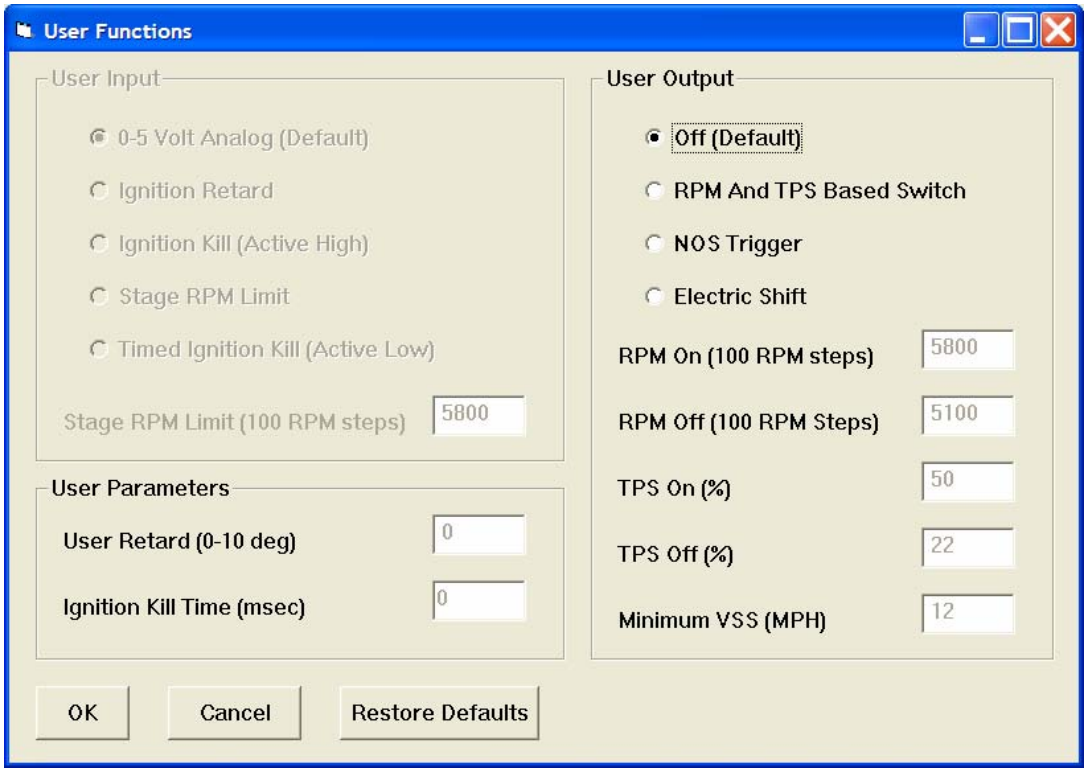
USER FUNCTIONS

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 VRFI unit.

The user input function is not available on VRFI D version 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.

Electric Shift – specifically designed to trigger an upshift with a Pingel electric shifter. The user output must be connected to the upshift input on the Pingel control module (pin 4 on the small 4 pin connector). The user output is momentarily pulsed (pulled to ground) to trigger the upshift when RPM >= RPM On **AND** TPS >= TPS On **AND** VSS >= Minimum VSS. As an additional safety feature to prevent engine damage,

selecting electric shift mode also enables the timed ignition kill feature.

Individual parameters are enabled or disabled (grayed out) based on the user input and output functions you selected. 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 VRFI command on the Communications menu. If you attempt to access a restricted private label module, the program will display a warning message and abort the upload process. A status message is displayed when the upload process has been successfully completed.

TROUBLESHOOTING FLOWCHART

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

Troubleshooting Flowchart