



Owner's Manual

SMART LINK SOFTWARE
P/N RSE4606



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CHAPTER 1 INTRODUCTION

1.1 General Information

Thunder Heart Smart Link software gives you complete control of your ignition system. The software enables the user to fine-tune the front and rear spark curves to squeeze every ounce of horsepower from your high performance V-twin engine. Rev limits and other parameters are also adjustable using the software.

1.2 System Requirements

The Smart Link software is designed to run on personal computers using Microsoft® Windows 95™ or later operating systems. The system should have at least 10MB of free hard disk space for proper operation. Connection to an RS232 serial port via a Thunder Heart Performance ASM2100C interface cable is required when editing the module settings.

Note: If your computer is not equipped with a serial port, you will need to purchase a USB-to-RS232 adapter from your local electronics retailer, such as RadioShack®

Note: Some computers equipped with a serial port may have difficulty connecting to the ignition module. If you are experiencing such difficulty, and your computer is equipped with a USB port, use a USB-to-RS232 adapter and connect to the ignition module via the USB port.

1.3 Software Installation

To install the software onto your system, complete the following steps:

1. Exit any programs you are currently running.
2. Insert the Smart Link software into the CD-ROM drive.
3. The software will automatically begin the installation process.

Note: If the software does not automatically begin to install, double-click on the “My Computer” icon. Then, double-click on the CD-ROM drive. Finally, double-click on the file named “setup.exe.”

4. The Smart Link installation wizard will now guide you through the rest of the installation.

1.4 Getting Started

Smart Link software allows you to select or create a calibration file and download it to your ignition module, or establish a communication link and modify the current calibration. Calibration files may be selected from the “File” menu, modified, and saved without connecting to a powered-up module. Once a connection to the module is made, you can download a new file, or modify the existing settings.

*Note: You can program the ignition module with the bike running, or not running. However, either way you **must have power to the ignition module.***

When the program is started the graph map line and markers are flat. This is to distinguish the “empty” default settings from an actual calibration file. At this point you have two options:

- Modify or create an ignition map off-line. In other words, edit a file residing on a disk or on the computer hard drive to be downloaded into the module at a later time. For off-line editing you do not need to be connected to the module.
- Edit the calibration programmed in the ignition module. To upload the calibration from the module, click on the “Link” icon.

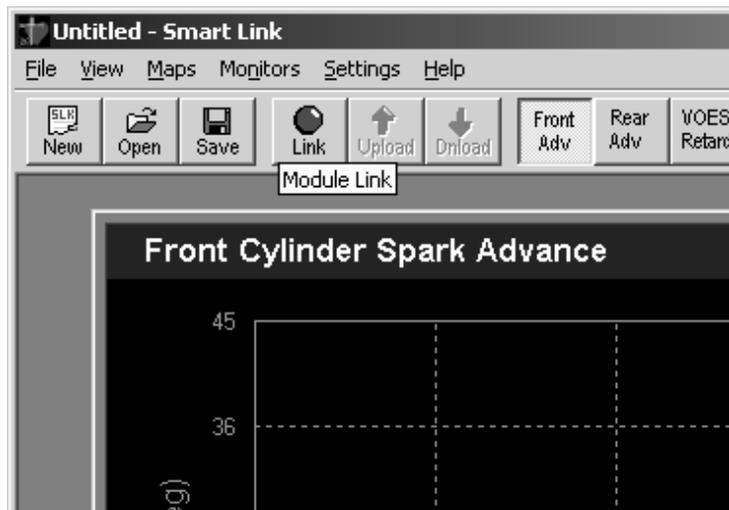


Figure 1—Module Link Button

The red light on the button turns to green after a link has been established.

Remember: You must be connected to the module via the interface cable and have 12+ volts to the module (key “ON” and the kill switch in the “RUN” position).

CHAPTER 2 MAIN MENUS

2.1 File

Open an Existing File

From the FILE menu choose OPEN, or click OPEN icon in toolbar. A listing of files with the “.slk” extension will appear. Any of these files may be opened by selecting it with the mouse.

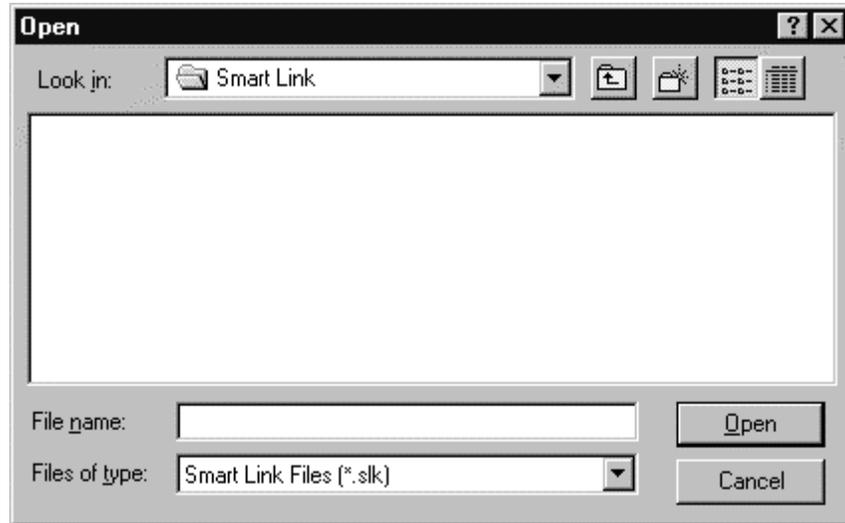


Figure 2—Open an Existing File window

Create a New File

From the FILE menu choose NEW, or click NEW icon in toolbar. All calibration settings will revert back to the original default state.

Save a Current File

From the FILE menu choose SAVE, or click SAVE icon in toolbar. The calibration file currently displayed will be saved under the current filename. Always save files that you may want to use later.



Figure 3—Save As window

Establish a Module Link

From the FILE menu choose ESTABLISH MODULE LINK, or click LINK icon in toolbar. This function allows information to pass between the host computer and the ignition module. Before a link can be established, the ignition module must be powered up and connected to the host computer via the interface cable.

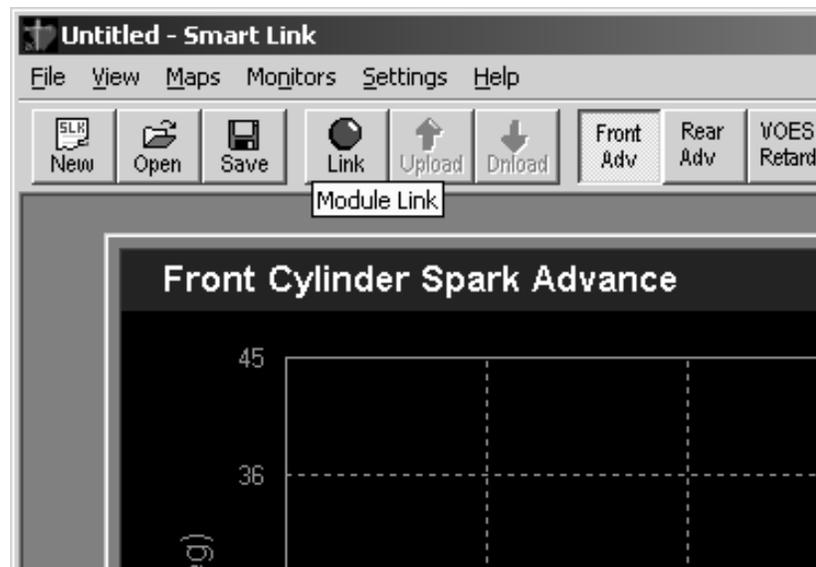


Figure 4—Module Link Button

Upload Current Module Settings

From the FILE menu choose UPLOAD MODULE SETTINGS, or click UPLOAD icon in toolbar. This function transfers calibration information from the ignition module to the computer screen where it can be analyzed, modified, or saved as a calibration file.

Download File to Module

From the FILE menu choose DOWNLOAD SETTINGS TO MODULE, or click DOWNLOAD icon in toolbar. This function transfers calibration information from host computer to ignition module.

Note: This will overwrite the current ignition module settings so it may be wise to upload from the ignition module and save it as another file first.

2.2 View

Monitor Window

This option will be “grayed out” until you have selected an option that you wish to monitor under the “Monitor” menu (See the “Monitors” section for more information).

Toolbar

When this option is selected, a checkmark will indicate that it has been selected and you will be able to view the toolbar at the top of the screen. The toolbar consists of icons that represent all the options of the drop down menus. The icons allow access to these options more quickly than the drop down menus. When this option is de-selected, the checkmark will disappear and you will not see the toolbar at the top of the screen.

Status Bar

When this option is selected, a checkmark will indicate that it has been selected and you will be able to view the status bar at the very bottom of the screen. The status bar will indicate the purpose of each icon or menu item as you point to it with the mouse pointer. When this option is de-selected, the checkmark will disappear and you will not see the status bar at the bottom of the screen.

2.3 Maps

Front Cylinder Spark Advance Map

From the MAPS menu select FRONT CYLINDER SPARK ADVANCE, or click FRONT ADV in toolbar. This is the map of spark advance (Y-axis) versus engine speed (X-axis) for the front cylinder. Higher values of spark advance can improve response, efficiency, and power until the point of detonation, which reduces power and can damage the engine.

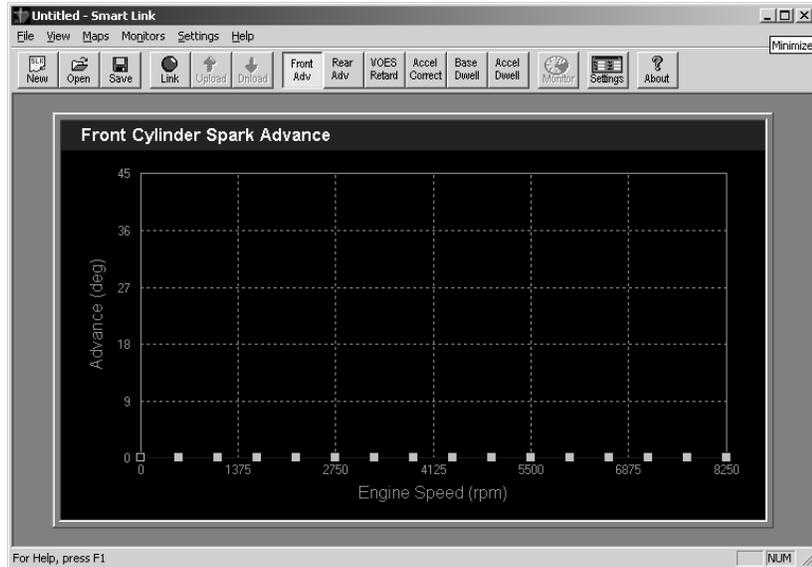


Figure 5—Front Cylinder Spark Advance Map screen

Rear Cylinder Spark Advance Map

From the MAPS menu select REAR CYLINDER SPARK ADVANCE, or click REAR ADV in toolbar. This is the map of spark advance (Y-axis) versus engine speed (X-axis) for the front cylinder. Higher values of spark advance can improve response, efficiency, and power until the point of detonation, which reduces power and can damage the engine.

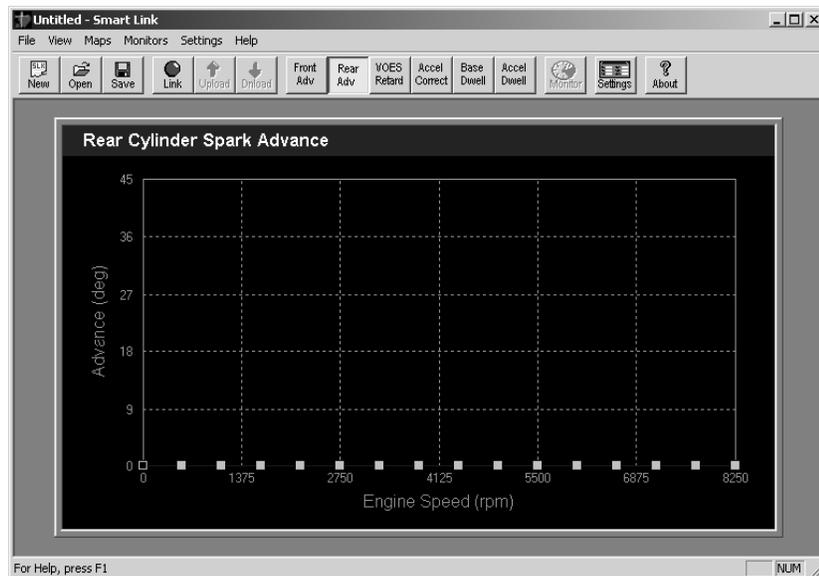


Figure 6—Rear Cylinder Spark Advance Map screen

VOES Retard Map

From the MAPS menu select VOES RETARD, or click VOES RETARD in toolbar. This map corrects the spark maps for engine load. The VOES signal is a normally open switch that closes under high load. When the switch

closes, the ignition module responds by retarding the spark advance based on the value in the VOES RETARD MAP for the current rpm. This map should be adjusted in conjunction with the front and rear spark advance maps.

First set the spark maps for best light load operation. Note that this will normally result in detonation under high load, so set the VOES map to a point just high enough to prevent detonation under high load. This combination should result in near optimum performance under all operating conditions.

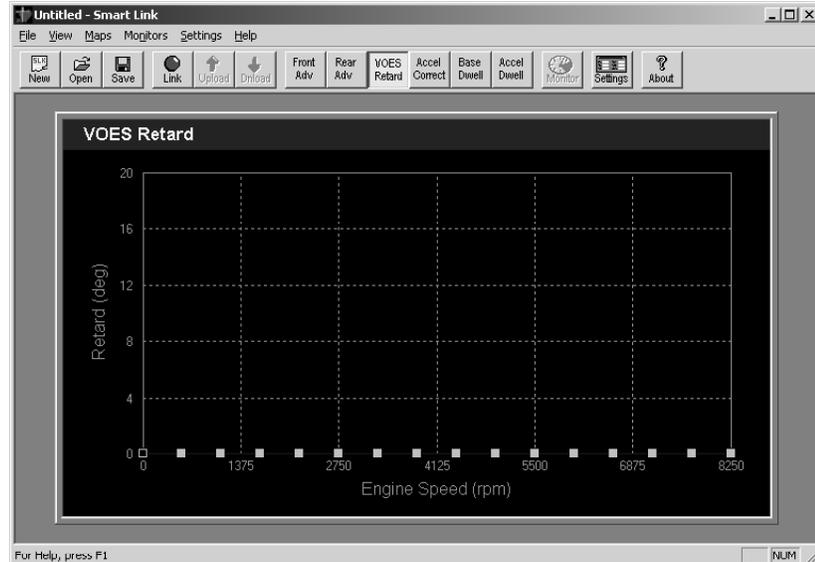


Figure 7—VOES Map screen

Acceleration Correction Map

From the MAPS menu select ACCELERATION CORRECTION, or click ACCEL CORRECT in toolbar. This map is intended for very high performance engines that can accelerate quickly enough to cause a momentarily retarded spark condition. Some overcorrecting may be beneficial, as it tends to make the engine more responsive under transients while not affecting steady operation. Care should be taken not to use much if any correction under very low acceleration rates as this can cause irregular idle and low speed operation.

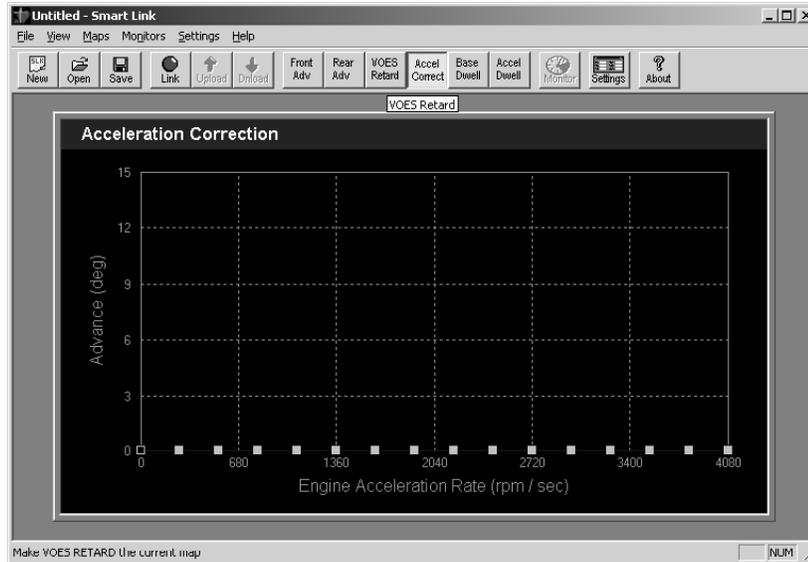


Figure 8—Acceleration Correction Map screen

Base Dwell Map

From the MAPS menu select BASE DWELL CORRECTION, or click BASE DWELL in toolbar. This map is used to optimize ignition and power consumption for different types of coils by changing the coil saturation time. NOTE: Extreme caution must be used when making changes to base dwell as damage to the coil and/or ignition module may result Do not change these settings without factory guidelines.

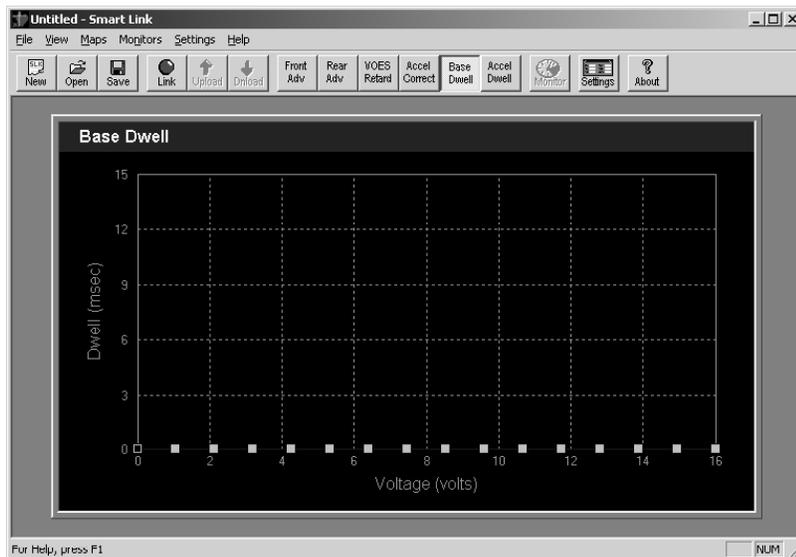


Figure 9—Base Dwell Map screen

Acceleration Dwell Correction Map

From the MAPS menu select ACCEL DWELL CORRECTION, or click ACELL DWELL in toolbar.

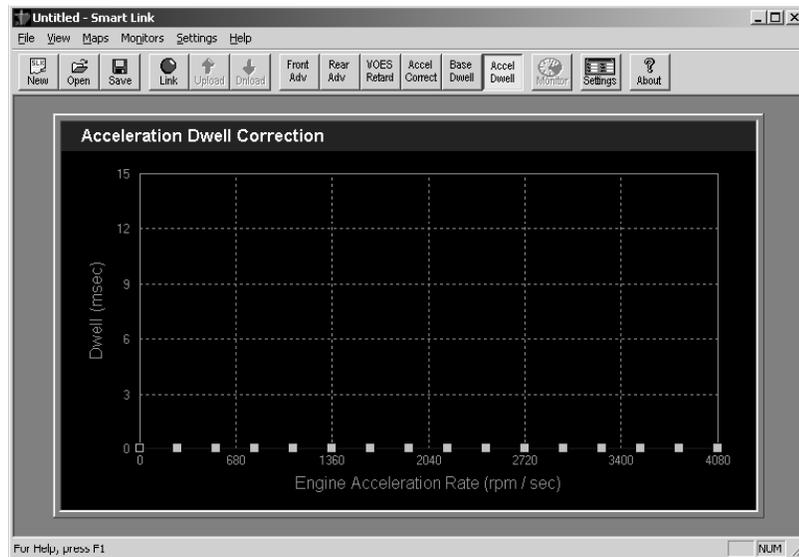


Figure 10—Acceleration Dwell Correction Map screen

Advance Maps Synchronized

From the MAPS menu click ADVANCE MAPS SYNCHRONIZED. For initial adjustments, both front and rear cylinder spark maps should be the same. This feature copies any changes made on one map to the other automatically. If separate advance maps are needed, disable this feature before making the changes.

2.4 Monitors

Select

From the MONITOR menu choose SELECT. This feature allows the user to monitor certain engine and module parameters in real-time when the ignition module is powered up and connected to the computer. These selected parameters are displayed to the left of the map window.

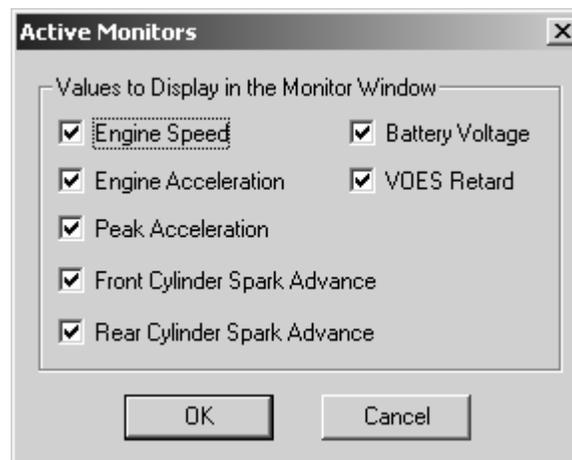


Figure 11—Active Monitors checkbox window

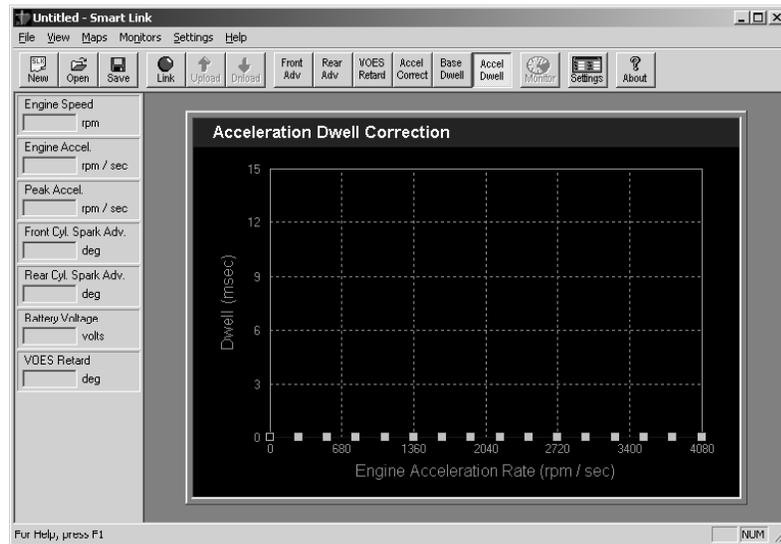


Figure 12—Monitor Window displayed

Engine Speed

From the MONITOR menu choose SELECT MONITOR VARIABLE; then click ENGINE SPEED. This displays the current engine speed in rpm.

Engine Acceleration

From the MONITOR menu choose SELECT MONITOR VARIABLE; then click ENGINE ACCELERATION. This displays the current engine acceleration in rpm/second.

Peak Acceleration

From the MONITOR menu choose SELECT MONITOR VARIABLE; then click PEAK ACCELERATION. This displays the highest recorded engine acceleration rate since the last ignition module power up. This feature may be helpful when testing a new component or setup.

Front Cylinder Spark Advance

From the MONITOR menu choose SELECT MONITOR VARIABLE; then click FRONT CYLINDER SPARK ADVANCE. This displays the current spark advance in crankshaft degrees for the front cylinder in real-time.

Rear Cylinder Spark Advance

From the MONITOR menu choose SELECT MONITOR VARIABLE; then click REAR CYLINDER SPARK ADVANCE. This displays the current spark advance in crankshaft degrees for the rear cylinder in real-time.

Ignition Dwell Time

From the MONITOR menu choose SELECT MONITOR VARIABLE; then click IGNITION DWELL TIME. This displays the current coil saturation time in milliseconds.

Battery Voltage

From the MONITOR menu choose SELECT MONITOR VARIABLE; then click BATTERY VOLTAGE. This displays the current battery voltage in real-time.

VOES Enabled

From the MONITOR menu choose SELECT MONITOR VARIABLE; then click VOES ENABLED. This displays the current state of the VOES switch (enabled/disabled) in real-time.

VOES Retard

From the MONITOR menu choose SELECT MONITOR VARIABLE; then click VOES RETARD. Displays the current VOES retard in crankshaft degrees.

Cancel Monitor

From the MONITOR menu choose CANCEL ALL. This cancels all monitoring functions.

Monitor Window

From the MONITOR menu choose MONITOR WINDOW. This toggles the monitor display window on/off.

2.5 Settings

Basic Module Settings

From the SETTINGS menu choose BASIC MODULE SETTINGS. These settings affect the basic operation of the ignition module. If the ignition module is powered up and connected to the computer then changes made in this area will automatically update the ignition module.

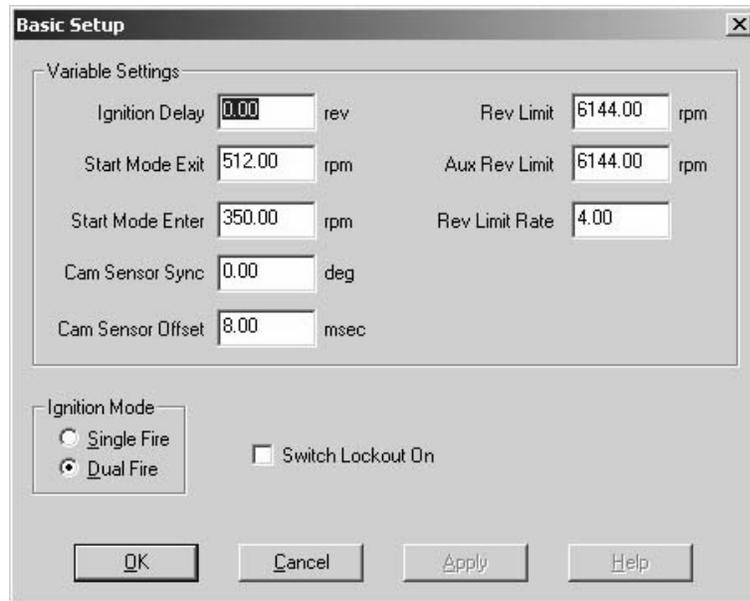


Figure 13—Basic Module Settings window

Ignition Delay

From the SETTINGS menu choose BASIC MODULE SETTINGS; then click the box next to IGNITION DELAY and enter desired value (0-5). To save the change click OK at the bottom of the window. Ignition delay is used to help prevent startup kickback by waiting the programmed number of revolutions before firing the ignition coil. This allows the engine to build momentum in the proper direction.

Note: Kick-start bikes must be set to zero. Most electric start engines work well with zero or 1.

If kickback is still a problem even with a delay, try rotating the sensor plate slightly counterclockwise and restore the correct timing with the cam sensor sync function (use a larger positive number). This will retard timing on startup but leave the ignition curve unchanged when running.

Start Mode Exit

From the SETTINGS menu choose BASIC MODULE SETTINGS then click the box next to START MODE EXIT and enter desired value (0-1000rpm). To save the change click OK at the bottom of the window.

Under start-up conditions the ignition simulates “points ignition” which produces a highly accurate but retarded spark timing. START MODE EXIT is the rpm at which the transition from “START” mode occurs. This should be set just above the lowest stable engine speed (just below normal idle speed).

In most cases the factory settings work fine and should not be adjusted. One situation where a change may be helpful is for engines that are tuned for lowest possible idle. In this case both START MODE EXIT and START MODE ENTER should be lowered to prevent unstable operation at the lower speed.

Start Mode Enter

From the SETTINGS menu choose BASIC MODULE SETTINGS then click the box next to START MODE ENTER and enter desired value (0-1000rpm). To save the change click OK at the bottom of the window.

Once the engine has entered "RUN" mode, if the engine speed drops below this rpm, it re-enters "START" mode to prevent stall from occurring. This value should normally be set 100-200 rpm below START MODE EXIT rpm.

Cam Sensor Sync

From the SETTINGS menu choose BASIC MODULE SETTINGS then click the box next to CAM SENSOR SYNC and enter desired value (0-15). To save the change click OK at the bottom of the window.

This function corrects for a misaligned sensor plate. When using a timing light, if you do not see the timing mark in the window at all, the engine should be static timed before proceeding. If you do see the timing mark but it is not centered in the window, you can use this function to correct the problem without moving the sensor plate. A negative value will correct for advanced timing, positive values correct for retarded timing.

Cam Sensor Offset

From the SETTINGS menu choose BASIC MODULE SETTINGS then click the box next to CAM SENSOR OFFSET and enter desired value (0-120). To save the change click OK at the bottom of the window.

All "Hall Effect" and Optical sensors have a delay time between the trigger action (rotor wheel notch) and the output signal. This delay is negligible at low speeds, but may be an issue at very high speeds (usually above 6000rpm). If the spark timing retards at high speed, even though programmed timing is constant, a larger value may correct this problem.

Rev Limit

From the SETTINGS menu choose BASIC MODULE SETTINGS then click the box next to REV LIMIT and enter desired value (2000-10000rpm). To save the change click OK at the bottom of the window.

Above this rpm, the module will begin to cut spark to one or both cylinders as required to bring engine speed back down below this rpm. Also see "Rev Limit Rate."

Rev Limit Rate

From the SETTINGS menu choose BASIC MODULE SETTINGS then click the box next to REV LIMIT RATE and enter desired value (0-8cycles). To save the change click OK at the bottom of the window.

This is the "softness" of the rev limit. Larger values will make a smoother rev limit. If the value is too high, the limiter may not stop engine acceleration and the rpm will overshoot the desired limit. Higher performance engines will require lower values.

Ignition Mode

From the SETTINGS menu choose BASIC MODULE SETTINGS then click the box next to SINGLE FIRE or DUAL FIRE to select the desired value. To save the change click OK at the bottom of the window. If single fire mode is chosen, each cylinder must have one coil installed.

Colors

From the SETTINGS menu choose COLORS. This function allows the user to select the color patters for the:

- Graph Background
- Grid Line Color
- Map Line Color
- Marker Color (In sync [on-line] with module)
- Marker Color (Not in sync [off line] with module)

2.6 Help

Click on HELP, and then click on HELP TOPICS for on-line help. You can also determine the software version and serial number by clicking ABOUT SMART LINK.

APPENDIX A DEFINITION OF TERMS

ADVANCE	the number of crankshaft degrees before TDC (Top Dead Center) that the ignition spark occurs
ADVANCE CURVE	the relationship of spark timing in degrees to (for example) engine RPM
CALIBRATION	the collection of adjustable settings that affect engine operation
COIL SATURATION	the amount of time that current flows through the ignition coil before a spark event
COMMUNICATIONS LINK	when the computer establishes a connection via an interface cable and talks to the ignition module
DOWNLOAD	the process of sending calibration information from the host computer to the ignition module
IGNITION DWELL	see COIL SATURATION
PEAK ACCELERATION	highest engine acceleration rate recorded since the last reset
RETARD	the number of crankshaft degrees that the spark advance is reduced when the VOES correction is applied
UPLOAD	the process of sending calibration information from the ignition module to the host computer
X AXIS	the horizontal scale of a graph
Y AXIS	the vertical scale of a graph