Owner's Manual

SMART LINK III IGNITION SOFTWARE

Standard Ignition
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CHAPTER 1   INTRODUCTION

1.1   General Information

Thunder Heart SMART LINK III 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.

Note: ***Not all software features presented in this manual will be available in all software and ignition products!***

1.2   System Requirements

The SMART LINK III software is designed to run on personal computers using Microsoft® Windows 98SE™ or later operating systems. Connection to an RS232 serial port via a Thunder Heart Performance EA2100C 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 III 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 III installation wizard will now guide you through the rest of the installation.

1.4   Software Authorization

Upon initializing the software for the first time, you may be prompted to enter an Authorization Code. Use the code printed on the CD.

1.5   Getting Started

SMART LINK III 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 color 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 AND WINDOWS

2.1   File Menu

Create a New File

From the FILE menu choose NEW, or type Ctrl+N. All calibration settings will revert back to the original default state.

Open an Existing File

From the FILE menu choose OPEN, or type Ctrl+O. A listing of files will appear. Any files with the ".slk" extension may be opened by selecting it with the mouse.

Close the Current File

From the FILE menu choose CLOSE, or click the "X" icon in the upper right-hand corner of the window.

Save the Current File

From the FILE menu choose SAVE, or type Ctrl+S. The calibration file currently displayed will be saved under the current filename. Always save files that you may want to use later.

Save the Current File Under a Different File Name

From the FILE menu choose SAVE AS. The calibration file currently displayed will can be saved under a different filename.

Upload Current Module Settings

From the FILE menu choose UPLOAD MODULE SETTINGS, or type Ctrl+U. 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 type Ctrl+D. 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.*
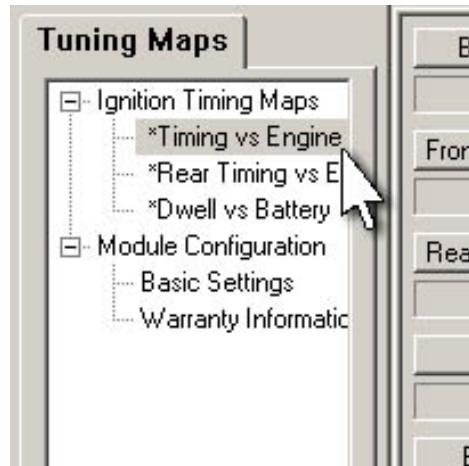
2.2 Selecting Tuning Maps and Settings

Figure 2—Tuning Maps Window

In the Tuning Maps window, clicking a map will display the map in the window to the right.

Note: *If a plus symbol* [+] *is next to a category, click it to expand your choices.*

The following maps can be selected:

2.3 Ignition Timing Maps

Timing vs Engine Speed

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.

Rear Timing vs Engine Speed

This is the map of spark advance (Y-axis) versus engine speed (X-axis) for the rear cylinder in relation (+/- 10 degrees) to the front cylinder. Since the rear cylinder on an air-cooled V-twin engine generally runs hotter than the front cylinder, the rear cylinder often needs a little less ignition advance than the front.

Dwell vs Battery

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.

2.4 Module Configuration

Basic Settings

Using the Basic Settings window, parameters such as number of cylinders, rev limit, etc. can be changed. These settings affect the basic operation of the ignition module.

Note: Some features are for reference only (do not affect the performance of the module), while others are not available with all products and software.
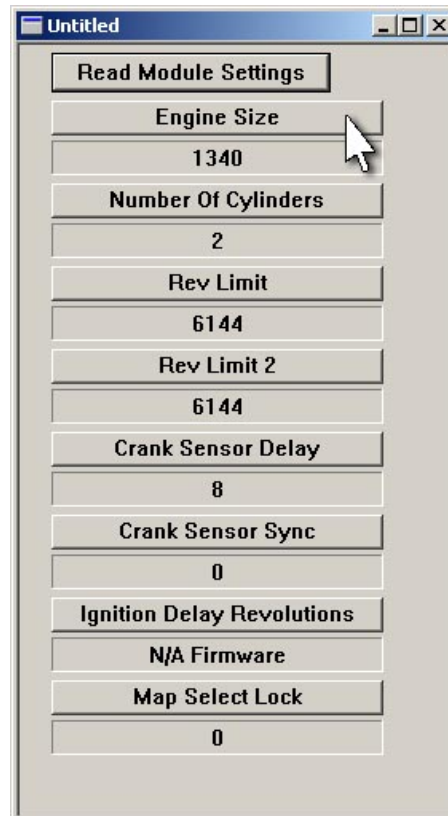

Figure 3—Basic Settings Window

Read Module Settings

After a module link has been established, click on the "Read Module Settings" button to retrieve the settings stored in the 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.

Engine Size

If desired, the engine size (in cubic centimeters) may be entered. This is purely for reference, and has no affect on ignition module performance.

Number of Cylinders

This value represents the number of cylinders the engine has. This is purely for reference, and has no affect on ignition module performance.

Rev Limit

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.

Tip: *Most engines are not designed to run much over 6,000 RPM. Use caution with this setting, as a limit that is too high may allow damage to the engine.*

Rev Limit 2

When the Rev Limit 2 wire is connected to ground (if equipped), the module will begin to cut spark to one or both cylinders as required to bring the engine below the set RPM.

Crank Sensor Delay

All "Hall Effect" and Optical sensors have a delay time between the trigger action (flywheel 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.

Crank Sensor Sync

This function corrects for a misaligned sensor or flywheel plate. A negative value will correct for advanced timing, positive values correct for retarded timing.

Speedo Cal

Your module is shipped with a speedometer calibration value for a Softail (except FXSTD). However, if you own a different motorcycle, use values from the chart below to calibrate your speedometer:

Model	Speedo Cal
Sportster 883	41453
Sportster 1200	40150
Dyna (except FXDP)	41251
Dyna (FXDP)	41569
Softail (except FXSTD)	40642
Softail (FXSTD)	40034
Touring (except police)	39831
Touring (police)	41569

Note: *If have made modifications to your motorcycle that affect the speedometer calibration (such as pulley ratios or replaced the tire with different diameter), you can fine-tune the speedometer calibration until the speedometer calibration matches your motorcycle. Larger values will cause the speedometer to read slower, while smaller values will cause the speedometer to read faster. Fine-tuning is best done on a chassis dynamometer.*

Shift RPM

Above this RPM, the module will supply ground to an output wire. This wire can be used to supply ground to a shift light, for example.

Ignition Delay Revolutions

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.

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

Note: If (after establishing a module link) "N/A Firmware" is displayed, this feature is not available with your ignition module.

Map Select Lock

If this value is set to "1" the user "locks out" any switches or buttons (if equipped) on the module itself. However, if this value is set to "0" moving any switches or pressing any buttons on the ignition module will override any settings you made using the SmartLink III software.

Tachometer Cal

With your ignition, some tachometers will read "double" or "half" of actual engine speed. Set this value to "1" or "0" to correct the reading of the tachometer.

Warranty Information

Click "Read Module" to retrieve the information from the module if it is not currently displayed. (This feature is not available with all products and software.)

This information is helpful in analyzing the history of how the motorcycle is operated. The VIN can be recorded for future reference, and service data files can be saved and loaded.

2.5   Monitors

To monitor engine current engine parameters, click the "Monitor" button located next to the "Link" button on the toolbar.

Figure 4—Monitor Button

Monitors are helpful for engine tuning and diagnosis. If a monitor is selected from the monitor selection window with the mouse, a stand-alone "gauge" can be configured to aid in monitoring that parameter.
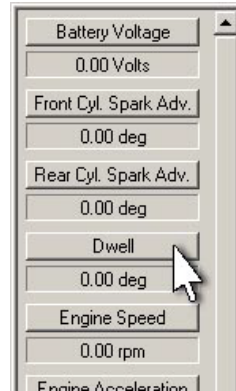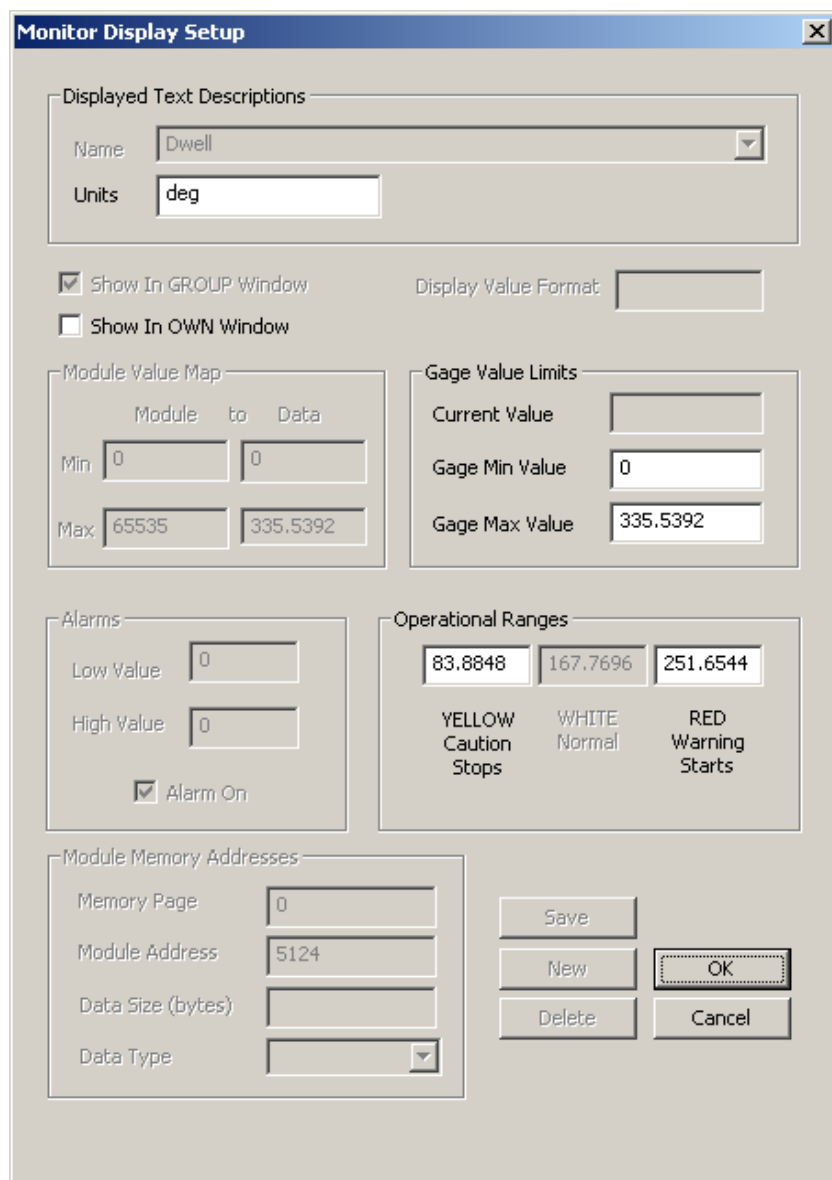
Figure 5—Monitors Selection Window

Figure 6—Monitor Display Setup Window

By checking the "Shown in OWN Window" box, a programmable "gauge" will appear. The limits for the gauge can be adjusted to suit your needs using the Monitor Display Setup window. Several gauges can be displayed simultaneously.

Battery Voltage

This displays the current battery voltage in real-time.

Front Cylinder Spark Advance

This displays the current spark advance in crankshaft degrees for the front cylinder in real-time (after all "modifiers" are applied, if applicable).

Rear Cylinder Spark Advance

This displays the current spark advance in crankshaft degrees for the rear cylinder in real-time (after all "modifiers" are applied, if applicable).

Dwell

This displays the current coil saturation time in milliseconds.

Engine Speed

This displays the current engine speed in rpm.

Engine Acceleration

This displays the current engine acceleration in rpm/second.

Peak Engine 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.

Peak Engine Speed

This displays the highest recorded engine speed in rpm since the last ignition module power-up.

Vehicle Speed

This displays the current vehicle speed in real-time (not available with some applications).

Base Ignition Timing

This displays the "base" ignition timing value (before all "modifiers" are applied, if applicable).

Run Time

This displays the time in seconds that the engine has been running from the last ignition module power-up.

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.

2.7 Configure

Select Com Port

If you have problems establishing a module link, try selecting a different com port.

Firmware Upgrade

Reserved for future use.

Authorize Product

Some features of SmartLink III software are only available with certain authorization codes. This is not needed for most ignition modules.

CHAPTER 3   TUNING OVERVIEW

By following these steps, the SmartLink III software will help you tune your bike in a minimal amount of time.

1. Establish a module link (see section 1.4, "Getting Started"). The motorcycle must be "ON" (or running, if you need to hear the motorcycle run while making adjustments).

2. Upload the calibration file stored in the module to the computer (see section 2.1, "Upload Current Module Settings")

3. Modify the calibration (see Chapter 4, "Modifying a Calibration).

4. Save the changes to the computer's hard drive for safe keeping (see section 2.1, "Save the Current File" or "Save the Current File Under a Different File Name").

5. To be sure the changes will take effect in the module, download the calibration file to the module (see section 2.1, "Download File to Module").

6. Turn the bike off and disconnect the communication cable from the ignition module.

7. Ride the bike. If any tuning is required, go back to step 1.

CHAPTER 4   MODIFYING A CALIBRATION

Higher values of spark advance generally can improve response, efficiency, and power until the point of detonation, which reduces power and can damage the engine.

WARNING!   BEWARE OF DETONATION! SEVERE PRE-IGNITION OR DETONATION CAN DAMAGE THE ENGINE BEYOND REPAIR. IF SPARK KNOCK IS HEARD OR YOU CAN READ DETONATION ON YOUR SPARK PLUGS IMMEDIATELY STOP TESTING AND RETARD THE IGNITION TIMING AT THAT RPM TO REMEDY THE SITUATION.

Tuning maps may be modified using the following procedure:

1. Make sure the window with the map to be modified is selected by clicking anywhere inside the map with the mouse.

2. Modify the map points by either:

   a. Using left or right arrow keys to select a point, and use the up and down arrow keys to adjust the value of the point

   b. Use the mouse to select and adjust the points

Tip: It is important to "smooth" the surrounding points to avoid abrupt changes in ignition timing. For example, if the engine needs less timing 1200 RPM, it is going to need less timing on the points surrounding it.

Tip: To quickly create a straight line between two points, use the "Point Point Fill" (PPF) feature:

   1. Select the first point and press the "P" key on the keyboard. The point will turn green.

   2. Select the last point and press the "P" key on the keyboard. The point will turn green.

   3. Press the "F" key on the keyboard. The points in-between the two green points will form a straight line.

Tip: When a point is selected, pressing the space bar will toggle the actual value of that point.

Figure 7—Space Bar Toggles Value

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
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	the amount of time that current flows through the ignition coil before a spark event. Also called "coil saturation."
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