

S&S® Cycle ProTune II

User Manual



ProTune II

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1 Installation

1.1 System Requirements

You must have the following minimum PC specification to install and run ProTune II:

- Microsoft® Windows® XP Service Pack 2 or later, Microsoft® Windows® Vista™, Microsoft® Windows® 7 or later operating system.
- 1.0 Ghz or faster processor. Intel® Core™ Duo or faster/equivalent recommended.
- 128Mb System RAM, 256Mb or more recommended.
- 200Mb of free hard drive space.
- A desktop resolution of at least 1024x768 pixels. Higher desktop resolution is recommended for optimum use.
- A modern graphics system with 3D acceleration and 64 MB or greater on-board RAM is required.

A 9-Pin serial COM port is required for communication with serial based modules (see below).

For USB modules, an available USB port (version 1 or later) is required.

For connection to serial modules:

Your computer's 9-Pin serial port will usually be located near the printer port and will look similar to the one in this picture:



If your PC does not have a serial port then a USB-Serial port adapter may be used instead. Before purchasing a USB-Serial adapter, be sure it is compatible with your PC's operating system.

For connection to USB modules:

Most PCs have multiple USB ports. Your computer's USB port will look similar to the two shown in this picture:

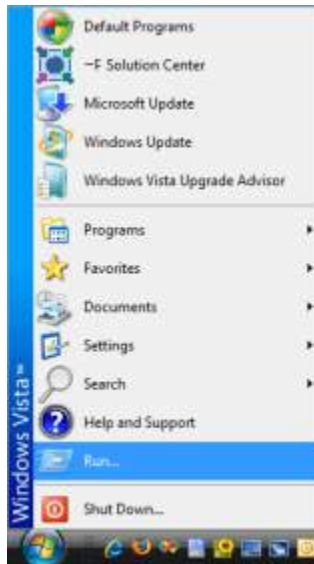


If your PC does not have a USB port then it may not be sufficiently up-to-date to run ProTune II. Please check the specification above. If your PC otherwise matches the minimum specification required for the software, USB add-on cards can be purchased from computer vendors for both notebooks and desktop PCs. Please note - ProTune II USB connection will not work with Windows 2000 or earlier operating systems.

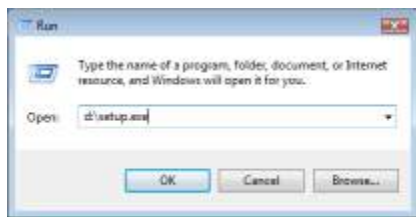
1.2 Installation

To install ProTune II for the first time or to upgrade ProTune II, perform the following:

1. Close all applications, especially any S&S® Cycle programs that are currently running.
2. Insert the ProTune II installation CD into your CD or DVD drive. After a few moments the setup program should appear on your screen and you can skip to step 5. If this doesn't happen automatically, proceed with steps 3 and 4.
3. From the **Start** menu, select **Run ...** or hold the **Windows** key and press **R**. The appearance of your Start menu will vary depending on the version of Windows® that you are using.



4. In the box marked **Open:** type **D:\setup.exe** and press **Enter** or click **OK**. Most PCs have the CD-ROM drive letter 'D:'. Replace this with the appropriate letter if your CD drive installation is different.



5. The Windows® Installer dialog box will appear and briefly examine your system.



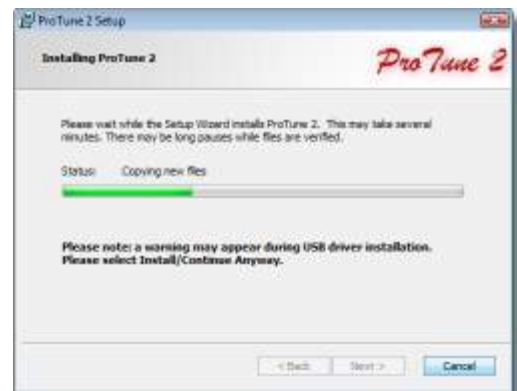
6. The Welcome screen will now appear. Click **Next**.



7. The Ready To Install screen will now appear. Click **Install**.



8. ProTune II will now install and copy files to your computer. If a warning message appears during USB driver installation, click **Install/Continue Anyway**.



9. Installation is now complete. Click **Finish**.



The user files such as calibration files and ECM code for this software are located in **'My Documents\ProTune 2'** directory.

When upgrading from a previous version of ProTune II, calibration files from the previous installation of the software will be copied to the new **'Calibrations\Archive'** folder, so they remain accessible in the new version.

After the installation, the ProTune II program icon will appear on your desktop. Double-click this icon to start ProTune II. You can also find ProTune II in your **Programs** menu under the program group **'S&S Cycle'**.



1.3 Manual USB Device Driver Installation

Installation of a device driver is required when you first connect a USB ECM to a PC. This USB driver is installed during the installation of ProTune 2. A USB device driver is an item of software which allows Windows® to communicate with the USB device. You do not need a device driver to communicate with a serial ECM.

The driver is located on your system when the software is installed. If you need to install the driver manually, follow the procedure outlined here.

In order to install the USB device driver, follow the steps below and then follow the steps appropriate to your version of Windows. **Please be sure to follow the instructions as closely as possible.**

1. Install the ECM using the separate installation instructions provided.
2. Close all Windows programs, including ProTune II.
3. Securely connect a standard USB-A to 5-pin mini-B cable to the mini-USB port on the case of the ECM.



4. Switch the motorcycle ignition key to the ignition ON position. Switch the engine kill switch to the RUN position. This will power the ECM.
5. Connect the USB cable to an available USB port on your PC.



Now follow the instructions specific to your version of Microsoft® Windows:

[Windows® XP](#) ¹⁰

[Windows® Vista™ & Windows® 7](#) ¹¹

1.3.1 Windows® XP

1. A few moments after connecting the powered ECM, Windows® will detect the presence of the new device. A small balloon window in the lower-right corner of the screen will indicate this. Wait for the **Found New Hardware Wizard** to appear.
2. When the **Found New Hardware Wizard** appears, select **No, not this time** to skip the Windows Update search and click **Next >**.



3. Select **Install the software**

automatically (Recommended) from the list of options and click **Next >**.



4. Windows will now locate the correct driver file and copy the required files. Wait for this to complete.



5. Depending on your security settings, a warning may appear indicating that the driver is 'unsigned'. Click **Continue Anyway**.
6. The device driver installation is now complete. Click **Finish**. You can now use ProTune II to communicate with the USB ECM.



1.3.2 Windows® Vista™ & Windows® 7

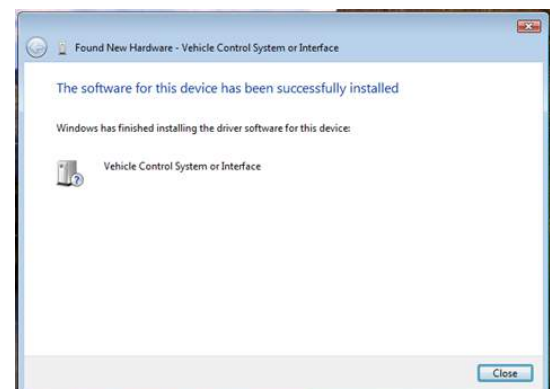
1. A few moments after connecting the powered ECM, Windows® will detect the presence of the new device. A small balloon window in the lower-right corner of the screen will indicate this. Windows® should automatically install the USB driver and you can skip to step 5. If this does not occur, proceed with step 2.
2. Wait for the **Found New Hardware** dialog box to appear.
3. When the **Found New Hardware** dialog box appears, double-click the **Locate and install driver software (recommended)** option.



4. Depending on your user account settings, a security warning message may appear asking you to confirm the device installation. Allow the installation to continue.
5. Depending on your security settings, the warning message shown below may appear. Double-click on the **Install this driver software anyway** option.



6. The device driver installation is now complete. Click **Close**. You can now use ProTune II to communicate with the USB ECM.



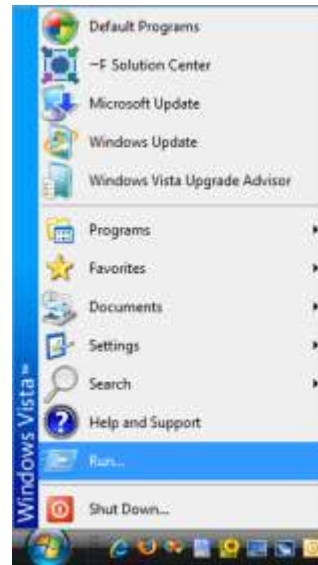
1.4 Removal

Important Note: When you remove ProTune II, any files that you have modified or added will be left unaltered on your hard-drive. If you reinstall ProTune II, new files that you have created will be left unaltered but files that you have modified will be overwritten with the original copies.

Hint: If you need to copy or backup any Pro Tune II data files in ProTune II version 2.2 or earlier, these can be found on your computer in the C:\Program Files\S&S Cycle\Pro Tune II\Tune-Files folder. If you need to copy or backup any data files in ProTune II version 2.3 or later, these can be found on your computer in the C:\My Documents\ProTune2\ folder. Pro Tune II Tune-Files have a .ECC file extension and Box files have a .BOX file extension.

To remove ProTune II from your system, use the following procedure:

1. Make sure that ProTune II is closed.
2. From the **Start** menu, access the Windows® **Control Panel** (this may be located in the Settings menu on some versions of Windows®).



3. For computers earlier than Windows Vista™, select **Add/Remove Programs** from the Control Panel. For Windows Vista™ and later, select **Uninstall a Program** located in the **Programs** section.
4. Highlight **ProTune II** in the list of programs displayed. Click **Uninstall**.
5. ProTune II will now uninstall from your system.

2 Introduction

2.1 Getting Started

ProTune II is a PC software application that allows you to setup and tune your S&S Cycle® Variable Fuel Injection (VFI) module for your performance requirements. Throughout this software and help document, the S&S Cycle® Variable Fuel Injection module is referred to as the ECM (Electronic Control Module).

The following terminology is also used throughout this software:

Calibration (File). This is a complete copy of all the configuration data inside an ECM, stored as a file on disk. There are two types of Calibration files, tune-files and BOX files.

BOX File. A type of calibration file that contains a complete record of the ECM configuration data (a tune-file) paired with an ECM software program file (a .h86 file). S&S Cycle® BOX files have a .box file extension.

Tune-File. A type of calibration file which only contains the ECM configuration data. Use of Tune-Files is for backward compatibility only. S&S Cycle® Tune-Files have a .ecc file extension.

Demo-Data. ProTune II is supplied with a demonstration calibration file which is loaded when the software starts. This demonstration data allows you to experiment with the software without altering important data. You cannot overwrite information in the Demo Data calibration.

Table. A grid of numbers inside the ECM used to control actuators such as the fuel injectors and ignition coil.

Tuning. The process of finding the best values to put in a table in order to get the optimum engine performance for a particular application.

ECM Settings. These are data items in the ECM used to set global properties of the ECM.

For a complete list of terms used in this software, click on the Glossary of Terms section of the Contents.

Below is a description of how to accomplish some basic tasks with ProTune II:

WARNING! For serial ECMs, use the supplied cable to connect the ECM to your PC. Use of any other cable may

result in damage to the PC.

NOTE: You may use a 9-Pin serial extension cable in conjunction with the supplied cable, but the supplied S&S® cable MUST be connected to the module.

To view the current trouble-code (fault) status of your ECM:

1. Make sure that your ECM is connected to your PC. See [Connecting the ECM](#)^[15] for details. **WARNING! For serial ECMs, use the supplied cable to connect the ECM to your PC. Use of any other cable may result in damage to the PC.**
2. Select the **DTCs** button or **Diagnostic Trouble Codes** from the **View** menu.
3. The dialog box will display the current and historic trouble-codes for your ECM. See [Diagnostic Trouble Codes](#)^[33] for more details.

To backup the data that is currently in your ECM, before making modifications to that data (recommended):

1. Connect your ECM to your PC. See [Connecting the ECM](#)^[15] for details. **WARNING! For serial ECMs, use the supplied cable to connect the ECM to your PC. Use of any other cable may result in damage to the PC.**
2. Go to the **File** menu and select **Load All Data to Computer...** Type a new filename in the File Name dialog box and click **Save**. The data will now load from the ECM and be stored as a new BOX File. See [Load All Data to Computer](#)^[24] for more details.

To tune a table from the ECM or a Calibration File:

For a full description on how to tune in Basic Mode, familiarize yourself with the [The Main Window in Basic Mode](#)^[17] and read the [Viewing and Tuning Tables](#)^[67] section.

For a full description on how to tune in Advanced mode, familiarize yourself with the [The Main Window in Advanced Mode](#)^[19] and read the [Using The Spreadsheet](#)^[71] section.

1. Connect your ECM to your PC if you want to tune an ECM table. See [Connecting the ECM](#)^[15] for details. **WARNING! For serial ECMs, use the supplied cable to connect the ECM to your PC. Use of any other cable may result in damage to the PC.**
2. Select a table by opening the **View** menu and selecting one of the tables.
3. Select where to load the table from by clicking on the down-arrow in the **Current Data Source** box on the top of the screen. If you just want to experiment, select the Demo Data.
4. Move the cursor around the spreadsheet by using the Up Arrow, Down Arrow, Left Arrow and Right Arrow keys. You can also click on an area of the spreadsheet to move to that location. Use the scroll bars to view more of the spreadsheet. Hold the Shift-key while using the cursor keys to select an area of the table.
5. In Advanced mode, enter a new value into the current cell or selected area by typing the value and pressing Enter. If the value is out of range it will be adjusted to the nearest allowed value. In basic mode, use the tuning and range dials to adjust the value of the selected area. You can also use the Page Up and Page Down keys to increment and decrement the values in the table.
6. Move to another area of the spreadsheet and continue tuning. When you have finished tuning, select the **Save** button or **Options** menu and select **Save Table To...** if you want to save your changes.

2.2 Using Help

This help window is split vertically into two panes. The right pane displays the current help topic. The left pane is selectable between the help document contents, index, search tool, or favorites. By clicking on the vertical bar separating the two panes and dragging it left or right, you can control the size of the windows.

In the left pane, select the **Contents** tab to view the sections of this help document. Double-clicking on the 'book' icons will list the topics in that chapter.

Clicking on the question mark icons in each chapter will display the corresponding help topic.

Click on the **Index** tab for an alphabetical list of the subjects in the help file. Double clicking on an item in the index will jump to the corresponding help topic.

Click on the **Search** tab and type in a word or phrase. Then click **List Topics** to find a relevant area of the help document.

Click on the navigation links at the top of the current help topic if you want to move to the **Next** or **Previous** pages. The back-button on the tool-bar of the help window can be used to jump back to the previously viewed help topic. The **Top** link takes you back to the first page of the help system.

Underlined words or phrases shown in blue are called links. Clicking on a link will jump to the corresponding section of the help document. Once used, a link will be shown in purple.

2.3 Basic and Advanced User Levels

ProTune II is a two level software application. When first installed, ProTune II will start in 'Basic' mode. In this mode you can make changes to the shapes of the basic ECM tables and change some of the essential properties of the ECM.

For some ECMs, warranty requirements will prevent you from editing certain data and performing functions that would void the warranty. When a protected ECM is connected, some of the menu items and functions of the software will be unavailable or hidden from view.

Advanced mode gives you total control over the basic ECM tables and also allows access to some of the more advanced tables and settings.

Advanced mode is recommended for experienced tuners only.

See [Select User Level...](#)⁵⁴ for switching between basic and advanced modes.

2.4 Connecting the ECM

S&S Cycle® ECMs connect using either a serial connection or a USB connection. Follow the instructions below applicable to your ECM.

[Connecting the PC to Serial ECMs](#)¹⁵



[Connecting the PC to USB ECMs](#)¹⁶



2.5 Connecting the PC to Serial ECMs

WARNING! For serial ECMs, use the supplied cable to connect the ECM to your PC. Use of any other cable may result in damage to the PC.

NOTE: You may use a 9-Pin serial extension cable in conjunction with the supplied cable, but the supplied S&S® cable MUST be connected to the module.

To connect your ECM to your PC:

1. Install the ECM using the separate installation instructions provided.
2. Connect the Communications Cable from the 9-Pin socket on the case of the ECM to the 9-Pin connector on your computer.



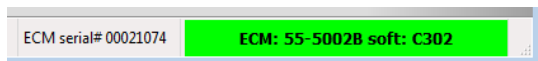
3. Launch ProTune II. When the ECM is not communicating with the PC, the communications status box at the bottom-right corner of the screen will flash between blue and black and alternate between the messages No ECM on COM1: and Checking COM1:



4. Switch the motorcycle ignition key to the ignition ON position. Switch the engine kill switch to the RUN position. This will power

the ECM.

5. The communications status box should illuminate green to show that an ECM is connected and communicating with the PC software.



The communications status box shows the ECM model number and hardware revision (55-5002, revision B in the example above) and the ECM software version (C302 in the example above). The box to the left also shows the serial number of the ECM (00021074 in the example above). This information may be required for customer support.

If you do not have a serial port on your computer, you may use a USB-Serial adapter instead. They are available from computer component vendors. Before purchasing a USB-Serial adapter, be sure it is compatible with your PC's operating system.

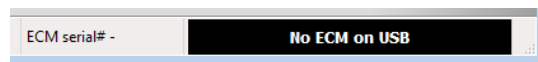
If you cannot establish a connection with your ECM:

1. Check that the ECM is powered. The ECM must be supplied with vehicle power in order to operate. Your motorcycle ignition key and kill switch should be set to the **ON** and **RUN** positions. Make sure that the battery level is normal. Try cycling the power to the ECM (switch ignition off for 15 seconds and then switch on).
2. Check that the cable is connected firmly to the ECM and the PC.
3. Some PCs may have more than one serial port. If this is the case, try connecting to the other port(s).
4. The external serial port on your PC might not be installed as COM1. This is the case on some notebook computers that use COM1 for other devices (modems, IR

ports, etc). If so, you will need to change the serial port that ProTune II checks for ECMs. See [Serial Port Settings...](#)^[55] for details on how to do this and for details on how to detect the port setup of your computer. For more detailed information on the port setup of your PC, go to the Windows® **Start** menu, find **Control Panel** (which may be in the **Settings** menu). Open the System control panel. Click on the **Hardware** tab. Click **Device Manager**. Under the group labeled Ports the available serial ports should be listed. The serial port names will start with the letters 'COM'. If you are using a USB to serial adapter, verify the USB to serial adapter is plugged in and note its COM number in Device Manager.

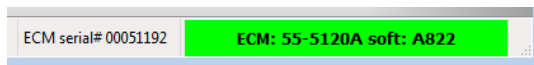
2.6 Connecting the PC to USB ECMs

1. In order to connect a USB ECM to ProTune II, you must first install the USB device driver. See the [USB Device Driver Installation](#)^[9] section for further information on this.
2. Once the USB device driver has been successfully installed, Launch ProTune II. When there is no ECM communicating with the PC, the communications status box at the bottom-right corner of the screen will flash between blue and black and alternate between the messages No ECM on USB and Checking USB.



3. Make sure the motorcycle ignition key to the ignition ON position. Switch the engine kill switch to the RUN position. This will power the ECM. Optionally, you may start and run the engine.
4. The communications status box should illuminate green to show that an ECM is connected and communicating with the PC

software.



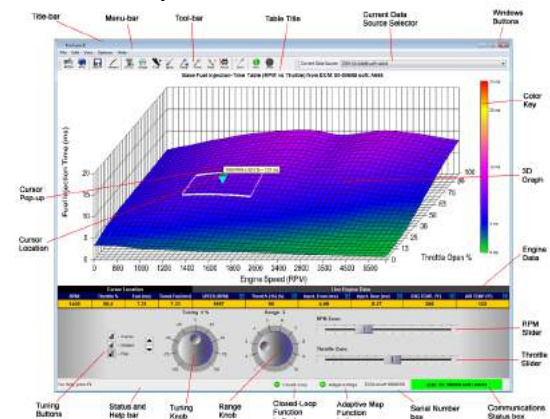
The communications status box shows the ECM model number and hardware revision (55-5120, revision A in the example above) and the ECM software version (A822 in the example above). The box to the left also shows the serial number of the ECM (00051192 in the example above). This information may be required for customer support.

If you cannot establish a connection with your ECM:

1. Check that the ECM is powered. The ECM must be supplied with vehicle power in order to operate. Your motorcycle ignition key and kill switch should be set to the ON and RUN positions. Make sure that the battery level is normal. Try cycling the power to the ECM (switch off ignition for 15 seconds and then switch on).
2. Check that the cable is connected firmly to the ECM and the PC.
3. Try disconnecting and reconnecting the USB connection to the ECM. This will reset the ECM connection and allow Windows® to relocate the device.
4. Have you installed the USB driver correctly? The first time you connect the ECM to a PC, you will need to install the supplied device driver. Please refer to the [USB Device Driver Installation](#)^[9] section for more details on this.
5. See [Troubleshooting USB Driver Problems](#)^[89] for more help.

2.7 The Main Window in Basic Mode

This is the layout of the main ProTune II window when the software is in 'Basic' mode (see [Basic and Advanced User Levels](#)^[15] for more details).



The **Title-bar** displays the name of the program. As with most Windows® programs, clicking on the title-bar and dragging it will move the window around the desktop. Clicking the program icon next to the title will open a menu that allows you to move, size and close the window.

The **Menu-bar** provides the main method of controlling the software. To access a menu, click on its title. See [Using Menus](#)^[21] for more details. The Menus section of this help document lists all the menu items of the software and their functions.

The **Tool-bar** provides a quick method of accessing commonly used menu items. To use the tool-bar, simply click one of the buttons. See [Tool Bar](#)^[21] for more details.

The **Table Title** shows the name of the table that is currently being tuned and where it was loaded from (the current data source).

The **Current Data Source Selector** allows you to load the current table from another data source (ECM or Calibration File). Click

on the down-arrow to view the available data-sources. From the list, you can choose between the ECM (if connected), the Demo Data, any Calibrations that you have accessed since the software started or select the 'Calibration not in this list' option to browse for another Calibration.

The **Windows Buttons** operate the same way as other Windows applications. You can minimize, maximize, restore and close the window using these buttons.

The **3D Graph** is an important element – it displays the current table data. **Engine speed** in Revolutions Per Minute (RPM) is shown along the width, or horizontal (x) axis of the graph. **Throttle position** is in percent of Open Throttle (0% is closed throttle, 100% is wide-open throttle) and is shown along the depth, or diagonal (z) axis of the graph (on the right side). The height, or upward (y) axis of the graph depends upon the current table. See [The Fuel Injection System](#)^[65] and [The Ignition Timing System](#)^[66] in the Viewing and Tuning Tables section of the help document for more information.

The **Color Key** shows the color values used to shade the 3D graph and how the colors correspond to the table values.

The **Current Selected Area** is shown as a white box drawn on the graph surface. The current selected area outlines the area of the graph that will be affected by adjusting the tuning. See [Viewing and Tuning Tables](#)^[67] for more information.

The **Cursor** shows you where you are currently positioned on the graph. The cursor is at the center of the current selected area and represents the current tuning position. See [Viewing and Tuning Tables](#)^[67] for more information.

The **Cursor Pop-up Window** is an optional window that displays the coordinates of the cursor and the current table value at the cursor position. See [Switch On/Off Map](#)

[Cursor Pop-up](#)^[28] for details on showing and hiding this window.

The **Cursor Location** area of the information bar, displays the coordinates of the cursor and the table values at the current cursor position.

The **Engine Data** area of the information bar is only shown when the ECM is connected. This is a user-configurable area which displays ECM variables that you select. Clicking on the bright-blue down arrow icons will allow you to change the selected value in that cell. See [The Engine Data Area](#)^[80] for more details.

The **Status and Help Bar** is located at the bottom of the window. This area will show hints on tool-bar items and key strokes as you use the software.

The **Tuning Knob** allows you to tune the currently selected area of the table at the current cursor position. Click on the knob and drag the mouse in a circular motion to adjust the knob and watch what happens to the graph. See [Viewing and Tuning Tables](#)^[67] for more information on how to tune. You can also use the **Tuning Buttons** and the keyboard to tune.

The **Tuning Buttons** provide an alternative to the using the tuning knob. Click on the up arrow to increase the value of the current selected area and click on the down arrow to decrease the value. Click on the buttons Fine, Medium and Coarse to determine the size of the value increase/decrease. You can also use the keyboard instead of the mouse. Press the Page Up key for a fine (small) increase. Press the Page Down key for a fine (small) decrease. Holding the Shift key while pressing Page Up or Page Down will result in a medium increase/decrease. Holding the Ctrl key while pressing Page Up or Page Down will result in a coarse (large) increase/decrease. See [Viewing and Tuning Tables](#)^[67] for more information on how to tune.

The **Range Knob** allows you to control the size of the selected area. The larger the range, the larger the selected area. The current selected area is always centered on the cursor position. See [Viewing and Tuning Tables](#) ^[67] for more information on tuning functions.

The **RPM Zone Cursor Position Slider** allows you to move the cursor along the horizontal (Engine Speed) axis of the table. Click on the slider and move it left or right to change the cursor position. You can also use the Left Arrow and Right Arrow keys to change the cursor position. See [Viewing and Tuning Tables](#) ^[67] for more information on tuning functions.

The **Throttle Zone Cursor Position Slider** allows you to move the cursor along the depth (Throttle) axis of the table. Click on the slider and move it left or right to change the cursor position. You can also use the Up Arrow and Down Arrow keys to change the cursor position. See [Viewing and Tuning Tables](#) ^[67] for more information on tuning functions.

The **Serial Number Box** will show the serial number of your ECM when it is connected.

The **Communications Status Box** shows the current status of the communications link with the ECM. When the ECM is not communicating, it will flash blue-black and display the names of the serial port(s) that ProTune II is searching for the ECM. When an ECM is connected, it illuminates green and displays the model number and software level of the connected ECM. If communication with an ECM is lost, it will illuminate red for a couple of seconds and then return to its search state. See [Connecting the ECM](#) ^[15] for more details.

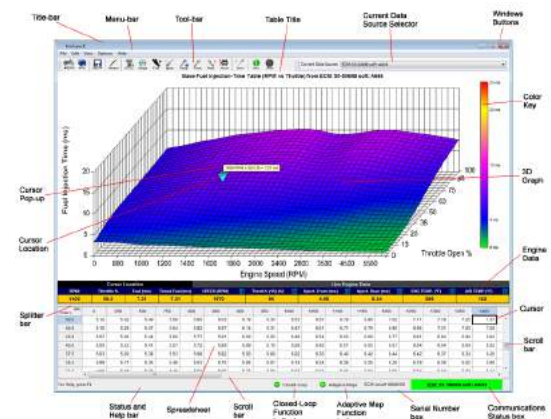
The **Closed-Loop Function Indicator** indicates the closed-loop settings for the current ECM or calibration file (the item shown in the **Current Data Source**

Selector). When the LED is lit, it indicates that the calibration / ECM is setup to allow closed-loop information to be written to the adaptive maps. See [The Closed-Loop Fuel Control System](#) ^[83] and [Closed-Loop Setup in Basic Mode](#) ^[84] for more details.

The **Adaptive Map Function Indicator** indicates the adaptive map settings for the current ECM or calibration file (the item shown in the **Current Data Source Selector**). When this LED is lit, it indicates that the calibration / ECM is setup to allow the values in the adaptive maps to adjust the current fuel output. See [The Closed-Loop Fuel Control System](#) ^[83] and [Closed-Loop Setup in Basic Mode](#) ^[84] for more details.

2.8 The Main Window in Advanced Mode

This is the layout of the main ProTune II window when the software is in 'Advanced' mode (see [Basic and Advanced User Levels](#) ^[15] for more details).



The **Title-bar** displays the name of the program. As with most Windows® programs, clicking on the title-bar and dragging it will move the window around the desktop. Clicking the program icon next to the title will open a menu that allows you to move, size

and close the window.

The **Menu-bar** provides the main method of controlling the software. To access a menu, click on its title. See [Using Menus](#)^[21] for more details. The Menus section of this help document lists all the menu items of the software and their functions.

The **Tool-bar** provides a quick method of accessing commonly used menu items. To use the tool-bar, simply click one of the buttons. See [Tool Bar](#)^[21] for more details.

The **Table Title** shows the name of the table that is currently being tuned and where it was loaded from (the current data source).

The **Current Data Source Selector** allows you to load the current table from another data source (ECM or Calibration File). Click on the down-arrow to view the current data-sources. From the list you can choose between the ECM (if connected), the Demo Data, any calibrations that you have accessed since the software started, or select the 'Calibration not in this list' option to browse for another calibration.

The **Windows Buttons** operate the same way as other Windows applications. You can minimize, maximize, restore and close the window using these buttons.

The **3D Graph** is an important element – it displays the current table data. **Engine speed** in Revolutions Per Minute (RPM) is shown along the width or horizontal (x) axis of the graph. **Throttle position** is in percent of open throttle (0% is closed throttle, 100% is wide-open throttle) and is shown along the depth, or diagonal (z) axis of the graph (on the right side). The height, or upward (y) axis of the graph depends upon the current table. See [Using the 3D Graph](#)^[74] for more information.

The **Color Key** shows the color values used to shade the 3D graph and how those colors correspond to the table values.

The current **Cursor** position is shown as an upside-down pyramid on the graph and a black rectangle on the spreadsheet. These indicators show you where you are currently positioned in the table. See [Using The Spreadsheet](#)^[71] for more information.

The **Cursor Pop-up Window** is an optional window that shows you the coordinates of the cursor and the current table value at the cursor position. See [Switch On/Off Map Cursor Pop-up](#)^[28] for details on showing and hiding this window.


The **Cursor Location** area of the information bar shows you the coordinates of the cursor and the table values at the current cursor position.

The **Engine Data** area of the information bar is only shown when the ECM is connected. This is a user-configurable area which displays ECM variables that you select. Clicking on the bright-blue down arrow icons will allow you to change the selected value in that cell. See [The Engine Data Area](#)^[80] for more details.


The **Status and Help Bar** is shown at the bottom of the window. This area will show hints on tool-bar items and key strokes as you use the software.



The **Spreadsheet** provides the most direct method of editing tables. It shows you the current table values and allows you to enter new values. As the table is often too big to fit in the spreadsheet area, the scroll-bars are provided to allow you to scroll the spreadsheet. Click and drag the light-gray scroll bar bubble areas to scroll. See [Using The Spreadsheet](#)^[71] for more information.



The **Splitter-bar** allows you to change the size of the 3D graph and spreadsheet relative to each other. Click on the Splitter-bar and drag it up and down to change the ratio between graph and spreadsheet. See [Changing the Spreadsheet and Graph Layout](#)

 for more help on this.

The **Serial Number Box** will show the serial number of your ECM when it is connected.

The **Communications Status Box** shows the current status of the communications link with the ECM. When the ECM is not communicating, it will flash blue-black and display the names of the serial port(s) that ProTune II is searching for the ECM. When an ECM is connected, it illuminates green and displays the model number and software level of the connected ECM. If communication with an ECM is lost, it will illuminate red for a couple of seconds and then return to its search state. See [Connecting the ECM](#)  for more details.

The **Closed-Loop Function Indicator** indicates the closed-loop settings for the current ECM or calibration (the item shown in the **Current Data Source Selector**). When the LED is lit, it indicates that the calibration / ECM is setup to allow closed-loop information to be written to the adaptive maps. See [The Closed-Loop Fuel Control System](#)  and [Closed-Loop Setup in Advanced Mode](#)  for more details.

The **Adaptive Map Function Indicator** indicates the adaptive map settings for the current ECM or calibration (the item shown in the **Current Data Source Selector**). When this LED is lit, it indicates that the calibration / ECM is setup to allow the values in the adaptive maps to adjust the current fuel output. See [The Closed-Loop Fuel Control System](#)  and [Closed-Loop Setup in Advanced Mode](#)  for more details.

3 Menu Functions

3.1 Using Menus

The menu bar is the main method of controlling the software. To use a menu, left-click with the mouse on the title of the menu. This will display the list of items in that menu. Select an item by left-clicking on it. You can also access menus using the keyboard. Holding the **Alt** key and pressing the first letter of a menu's title will open that menu (for example **Alt+F** will open the **File** menu). Use the up and down cursor keys to highlight items in the menu and press the **Enter** key to select the item.

Menu items may have underlined letters. When a menu is open, the menu item can be selected by pressing that letter key.

Menu items may have short-cut keys displayed on their right side. For example, the **Undo** item in the **Edit** menu has the short-cut key **Ctrl+Z**. This means that holding the control (**Ctrl**) key down and pressing **Z** will perform the **Undo** function directly without using the menus.

Some menu items may be unselectable or 'grayed-out'. This will happen if that menu item is not available in the current software state (for example, if the ECM is not connected).

3.2 Tool Bar

The tool bar provides a quick method of accessing commonly used menu items with the mouse. Clicking on a tool-bar button will access that function. Some tool-bar buttons may be unselectable or 'grayed-out'. This will happen if that tool-bar function is not

available in the current software state (for example, if the ECM is not connected).

All of the tool-bar buttons are listed below together with links to the menu item functions that they access.



[Send All Data to ECM](#) ²²



[Load All Data to Computer](#) ²⁴



[Save Table To...](#) ⁶⁰



[Diagnostic Trouble Codes](#) ³³



[ECM Gauges](#) ³⁴



[Fuel Injection Base Table](#) ³⁴



[Ignition Timing Base Table](#) ³⁵



[ECM Basic Setup](#) ³¹



[Front Cylinder Adjustment Table](#) ³⁵



[Rear Cylinder Adjustment Table](#) ³⁶



[Acceleration Fuel Settings](#) ³⁶



[Live-Tune Mode On/Off](#) ²⁹



[ECM Information](#) ⁴⁸



[Undo](#) ²⁵

3.3 File Menu

3.3.1 Send All Data to ECM

Selecting this function will update the data and software in your ECM from an ECM Upgrade file (BOX file). This BOX file will either be generated by using [Load All Data to Computer](#) ²⁴ or supplied by your ECM distributor.

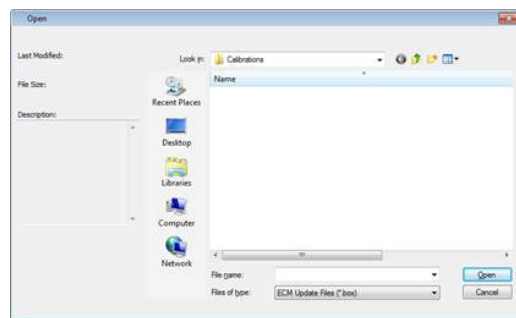
Important: Do not update the ECM while the engine is running. The ignition switch must be in the ON position and the kill switch set to RUN, but do not start the engine. Do not disconnect the communications cable or ECM power during the download.

1. First ensure the ECM is connected. See [Connecting the ECM](#) ¹⁵ for more information.



2. Select **Send All Data to ECM...**

3. The Open File dialog box will appear. Select a BOX file by clicking on its filename. A description of the BOX files contents appears on the left side when it is selected.

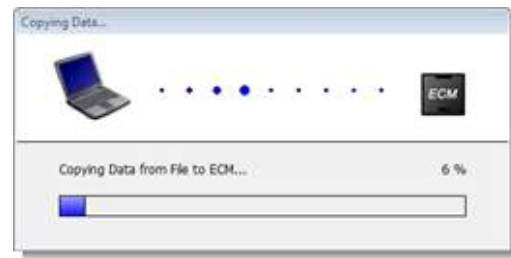


4. Click **Open**.

5. If the file you have selected is potentially

incompatible with your ECM, a message box will appear asking you to confirm your choice. If you are certain that you want to use the selected file, click **Yes** to continue. Otherwise, click **No** and go back to step 2 to select a compatible file. The file description in the Open File dialog box will provide the information for you to decide if you selected an appropriate calibration.

6. For certain software upgrades, you will be asked whether to update parameters in the ECM tune-file data for compatibility with the new ECM software. A message box will appear asking whether you want this update to proceed. Click **Yes** to continue or click **No** to cancel the download. You will then be asked whether you would like to save the current tune-file data in your ECM as a backup (recommended). If you click **Yes**, a Save dialog box will appear allowing you to choose a filename for the backup. Enter a filename and click **Save**. Additional data transfer progress bars will appear during the update. ProTune II is updating certain key parameters in your ECM in preparation for running the new software. Allow these transfers to complete. Do not disconnect or remove power from the ECM.
7. For updates, you will then be asked whether you would like to save the current tune-file data in your ECM as a backup (recommended). If you click **Yes**, a Save dialog box will appear allowing you to choose a filename for the backup. Enter a filename and click **Save**. Additional data transfer progress bars will appear during the update. Allow these transfers to complete. Do not disconnect or remove power from the ECM.
8. The calibration data and/or software will now download to the ECM. A progress bar indicates the amount of data left to send. Do not disconnect the communications cable or switch off power to the ECM during this stage.



If the data download fails to complete, verify that the ECM still has power (motorcycle ignition on), that the cables are firmly connected, and then retry the download. If the download continues to fail, try resetting the ECM by cycling the power (motorcycle ignition off for 15 seconds, then switch back on).

If the ECM software download fails to complete - incomplete download of ECM software will leave the ECM in boot-mode which is an inoperative state that will not run the engine. When you connect an ECM that is in boot mode, a warning will appear. This is a notification that you must retry the download in order to use the ECM. Click **OK** or press **Enter** and then return to step 3 in order to recover the ECM.

Important: When the download completes successfully, a message box will be shown advising you to cycle power to the ECM for at least 15 seconds before continuing. This allows the ECM to reset and power-up cleanly, as the BOX file download may have updated critical operating parameters. Click **OK** or press **Enter** to dismiss the message box.

SUMMARY: There are three ways to Send All Data to the ECM...

1) Using the tool bar: Click on the ->ECM button:



2) Using the menu bar: Select **Send All**

Data to ECM... from the **File** menu.

3) Using the keyboard: Hold **Ctrl** + press **D**.

3.3.2 Load All Data to Computer

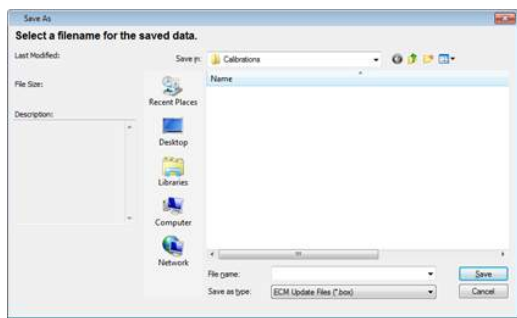
Selecting this function will copy the data and software inside the ECM and store it on your computer as a BOX File.

1. First ensure the ECM is connected. See [Connecting the ECM](#) ¹⁵ for more information.



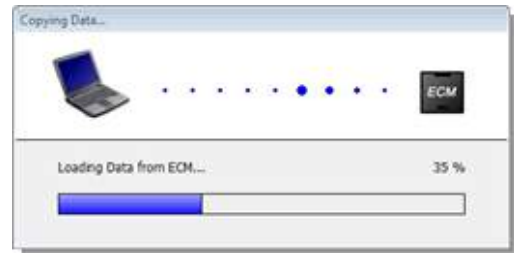
2. Select **Load All Data to Computer...**

3. The Save File dialog box will appear. You can either select an existing file to overwrite by clicking on its filename, or enter a new filename in the File Name box to create a new file. To select an existing file, click on its filename. To create a new file, enter a filename in the File Name box. A description of the file's contents appears on the left side when it is selected.



4. Click **Save**. The data will now be uploaded from the ECM. A progress bar indicates the amount of data left to load. Do not

disconnect the communications cable or switch off power to the ECM during this stage.



5. When the 'Transfer Complete' message appears, click **OK** or press **Enter**. If the upload fails to complete, verify the ECM still has power (motorcycle ignition on) and the cables are firmly connected. Retry the upload. If the upload continues to fail, try resetting the ECM by cycling the power (motorcycle ignition off for 15 seconds, then switch back on).

SUMMARY: There are three ways to load the data from the ECM...

1) Using the tool bar: Click on the ->PC button:



2) Using the menu-bar: Select **Load All Data to Computer...** from the **File** menu.

3) Using the keyboard: Hold **Ctrl** + press **U**.

3.3.3 Exit

This function closes the program. You will be prompted to save any data that may have been modified.

You cannot exit the program when Live-Tune

mode is active. Attempting to do so will display a warning message. See [Live-Tune Mode On/Off](#)^[29] for details on toggling Live-Tune mode.

SUMMARY: There are three ways to Exit or Close ProTune II...

- 1) Using the menu bar: Select **Exit** from the **File** menu.
- 2) Using the mouse: Click on the close box (X) at the top-right corner of the main screen.
- 3) Using the keyboard: Hold the **Alt** key + press **F4**.

3.4 Edit Menu

3.4.1 Undo

Selecting Undo will reverse the last change made to the current table. Selecting Undo repeatedly will undo each historic change made to the current table until it returns to its original state.

SUMMARY: There are three ways to use the Undo function...

- 1) Using the tool bar: Click the **Undo** button:



- 2) Using the menu bar: Select **Undo** from the **Edit** menu.
- 3) Using the keyboard: Hold **Ctrl** + press **Z**.

3.4.2 Copy

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

Selecting Copy will transfer the selected area of the spreadsheet to the Windows® clipboard, where it can be pasted into other areas of the ProTune II spreadsheet or into other applications. Select an area of the spreadsheet, use the Copy function, and then use the Paste function of ProTune II or another application to paste the information to a new location. Also see [Paste](#)^[25].

SUMMARY: There are two ways to use the Copy function...

- 1) Using the menu bar: Select **Copy** from the **Edit** menu.
- 2) Using the keyboard: Hold **Ctrl** + press **C**.

3.4.3 Paste

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

Selecting **Paste** will transfer values from the Windows® clipboard to the current cursor location on the spreadsheet. Select an area of the spreadsheet or select a table of values in another application, use that applications Copy function, and then use the Paste function of ProTune II to paste the information to a new location. Also see [Copy](#)^[25].

SUMMARY: There are two ways to use the

Paste function...

- 1) Using the menu bar: Select **Paste** from the **Edit** menu.
- 2) Using the keyboard: Hold **Ctrl** + press **V**.

3.4.4 Blend (Interpolate) Selected Area

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[74] for more information.

Selecting this function will blend (interpolate) the current selected area in the table. Interpolation effectively 'draws' straight value lines between the corners of the selected area, producing an area of constant gradient. This can be used to 'straighten-out' areas of the table.

1. Select an area of the table by using the spreadsheet or graph. See [Using The Spreadsheet](#) ^[74] and [Using the 3D Graph](#) ^[74] for more details.
2. Select **Blend (Interpolate) Selected Area**.

SUMMARY: There are three ways to blend (interpolate) the selected area...

- 1) Using the menu bar: Select **Blend (Interpolate) Selected Area** from the **Edit** menu.
- 2) Using the keyboard: Press **F8**.
- 3) Using the spreadsheet or graph: Right-click on the selected cells and select **Blend (Interpolate) Selected Area** from the menu.

3.4.5 Average Selected Area

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[15] for more information.

Selecting this function will perform a weighted average on the current selected area in the table. This averaging function will reduce the differences between neighboring sites in the selected area and can be used to 'smooth' areas of the table.

1. Select an area of the table by using the spreadsheet or graph. See [Using The Spreadsheet](#) ^[74] and [Using the 3D Graph](#) ^[74] for more details.

2. Select **Average Selected Area**.

SUMMARY: There are three ways to average the selected area...

- 1) Using the menu bar: Select **Average Selected Area** from the **Edit** menu.
- 2) Using the keyboard: Hold **Shift** + press **F8**.
- 3) Using the spreadsheet or graph: Right-click on the selected cells and select **Average Selected Area** from the menu.

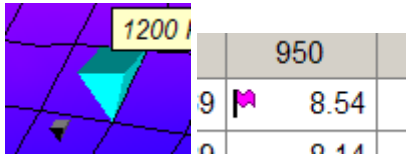
3.4.6 Tag / Untag Cells

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[15] for more information.

Cell tags are used to mark areas of the table for later reference. For example, if you detect a problem with an area of the table while the

engine is running, you can mark it for later attention by tagging the location on the table.

When a cell is tagged it appears with a downward black triangle on the graph and a purple flag on the spreadsheet:



To tag or untag a cell or group of cells:

1. Move the cursor to the cell that you want to tag or select an area of the table by using the spreadsheet or graph. See [Using The Spreadsheet](#)^[71] and [Using the 3D Graph](#)^[74] for more details.

2. Tag the cell(s) by selecting **Tag / Untag Cells**.

3. Untag the cell(s) by selecting **Tag / Untag Cells**.

SUMMARY: There are three ways to tag and untag cells...

- 1) Using the menu bar: Select **Tag/Untag Cells** from the **Edit** menu.
- 2) Using the keyboard: Press **F9**.
- 3) Using the spreadsheet or graph: Right-click on a selected cell or area and select **Tag/Untag Cells** from the menu.

3.4.7 Clear All Markers

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

Selecting the **Clear All Markers** function will clear all tags and markers currently present on the graph and spreadsheet, including 'Live-Tuned' markers and user tags. See [Tag/Untag Cells](#)^[73] for more details.

SUMMARY: There are three ways to clear all markers on the current table...

- 1) Using the menu bar: Select **Clear All Markers** from the **Edit** menu.
- 2) Using the keyboard: Press **F3**.
- 3) Using the spreadsheet or graph: Right-click on the spreadsheet or graph and select **Clear All Markers** from the menu.

3.4.8 Cycle Grid/Graph Position

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

You can select the display layout of the table using this function. The default display layout is with the 3D Graph at the top of the screen and the spreadsheet at the bottom of the screen. Select **Cycle Grid/Graph Position** repeatedly to cycle through the available display layout options.

1. Select **Cycle Grid/Graph Position**. This will place the spreadsheet at the top of the screen and the graph at the bottom.
2. Select **Cycle Grid/Graph Position** again. This will remove the graph and show the table as a spreadsheet only.
3. Select **Cycle Grid/Graph Position** again. This will remove the spreadsheet and show the table as a graph only.
4. Select **Cycle Grid/Graph Position** again.

This will return the display to its default mode with the graph at the top of the screen and the spreadsheet at the bottom.

For more information, see [Changing the Spreadsheet and Graph Layout](#)⁷⁵.

SUMMARY: There are two ways to cycle the position of the grid and graph...

- 1) Using the menu bar: Select **Cycle Grid/Graph Position** from the **Edit** menu.
- 2) Using the keyboard: Press **F6**.

3.4.9 Cycle Grid Size

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)¹⁵ for more information.

You can change the size of the cells in the spreadsheet by using this function. There are three modes, small, normal and large. Select **Cycle Grid Size** repeatedly to cycle through the available options.

1. Select **Cycle Grid Size**. This will set the cell size of the spreadsheet to large.
2. Select **Cycle Grid Size** again. This will set the cell size of the spreadsheet to small.
3. Select **Cycle Grid Size** again. This will set the cell size of the spreadsheet back to normal.

SUMMARY: There are two ways to cycle the grid size of the spreadsheet...

- 1) Using the menu bar: Select **Cycle Grid Size** from the **Edit** menu.
- 2) Using the keyboard: Hold **Shift** + press **F6**.

3.4.10 Cycle Graph-Line Resolution

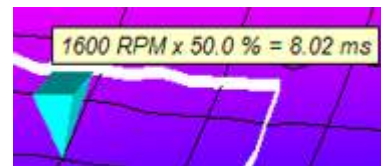
You can change the number of lines dividing the 3D graph by using this function. There are the following three modes: high resolution (closely spaced), medium resolution, and low resolution (widely spaced). Select **Cycle Graph-Line Resolution** repeatedly to cycle through the available options.

SUMMARY: There are two ways to cycle the graph-line resolution of the 3D graph...

- 1) Using the menu bar: Select **Cycle Graph-Line Resolution** from the **Edit** menu.
- 2) Using the keyboard: Press **F5**.

3.4.11 Switch On/Off Map Cursor Pop-up

By default, a small pop-up window is shown above the cursor in a 3D graph. It shows the table axis values at that location.



Use the **Switch On/Off Map Cursor Pop-up** function to show or hide the pop-up window.

SUMMARY: There are two ways to switch on/off the map cursor pop-up window...

- 1) Using the menu bar: Select **Switch On/Off Map Cursor Pop-up** from the **Edit** menu.
- 2) Using the keyboard: Hold the **Shift** + press **F7**.

3.4.12 Live-Tune Mode On/Off

Select this function to activate and deactivate Live-Tune mode. When Live-Tune mode is activated, tuning adjustments to the current table have an immediate effect on the table running inside the ECM.

For details on live-tuning in Basic Mode, see [Live-Tune in Basic Mode](#) ⁶⁹.

For details on live-tuning in Advanced Mode, see [Live-Tune in Advanced Mode](#) ⁷⁵.

To activate Live-Tune mode:

1. First ensure the ECM is connected. See [Connecting the ECM](#) ¹⁵ for more information.



2. Load the table that you want to Live-Tune. Select the table using the tool-bar or the **View** menu. Select the ECM as the current data source using the **Current Data Source** Selector at the top of the screen or from the **View** menu.
3. Select [Live-Tune Mode On/Off](#) ²⁹.
4. ProTune II will automatically send new control information to the ECM and Live-Tune mode will become active. Tuning the table will now directly effect the tuning in the ECM.

Note that during Live-Tune Mode, many of the program functions are disabled. You must deactivate Live-Tune Mode in order to return to normal mode.

To deactivate Live-Tune mode:

1. Select [Live-Tune Mode On/Off](#) ²⁹.
2. ProTune II will automatically send new control information to the ECM and Live-

Tune mode will deactivate.

3. The ECM is now running its original (pre-Live Tune) table. In order to utilize the changes that you made to the table during Live-Tune, you must send the modified Live-Tune table to the ECM. A message will appear when you deactivate Live-Tune mode asking whether you want to do this. Click **Yes** to send the tuned table to the ECM or click **No** cancel any changes made in Live-Tune.

SUMMARY: There are three ways to activate or deactivate Live-Tune mode...

- 1) Using the tool-bar: Click the Live-Tune button:



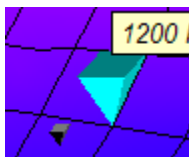
- 2) Using the menu bar: Select **Live-Tune Mode On/Off** from the **Edit** menu.

- 3) Using the keyboard: Hold **Ctrl** + press **L**.

3.4.13 Switch On/Off Auto-Tagging in LiveTune

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ¹⁵ for more information.

The Auto-Tagging feature will tag cells that the ECM has visited during live-tuning with black cell markers on the graph and purple markers on the spreadsheet. Auto-tagging allows you to see the speeds and throttle positions that the engine has been run at during a Live-Tune session. Selecting **Switch On/Off Auto-Tagging in LiveTune** will toggle this feature on or off (the default is on).



If you want to manually tag cells, see [Tag/Untag Cells](#) ^[73].

SUMMARY: There are two ways to switch auto-tagging in LiveTune on/off...

1) Using the menu bar: Select **Switch On/Off Auto-Tagging in LiveTune** from the **Edit** menu.

2) Using the keyboard: Press **F7**.

3.4.14 Track Live-Tune Cursor

The Track Live-Tune Cursor feature enables the table editing cursor (blue) to follow (track) the position of the current engine position cursor (black). This feature enables Live-Tune value editing to take place at the current engine speed and throttle position. When disabled, you can move the editing cursor freely with the cursor keys. Selecting **Track Live-Tune Cursor/Don't Track Live-Tune Cursor** will toggle this feature on or off (the default is on).

SUMMARY: There are two ways to toggle Live-Tune cursor tracking.

1) Using the menu bar: Select **Track Live-Tune Cursor** (to enable) or **Don't Track Live-Tune Cursor** (to disable) from the **Edit** menu.

2) Using the keyboard: Press the **Space** bar.

3.4.15 Snap To Live-Tune Cursor

During Live-Tune mode, you can use this function to move the current editing cursor to the current position of the ECM cursor. This allows you to make adjustments at the current engine speed and throttle position. This function will only function when Live-Tune cursor tracking is disabled (see [Track Live-Tune Cursor](#) ^[30]).

SUMMARY: There are two ways to snap to the Live-Tune cursor.

1) Using the menu bar: Select **Snap To Live-Tune Cursor** from the **Edit** menu.

2) Using the keyboard: Hold the **Ctrl** key + press . (period key).

3.4.16 3D Graph Settings

You can change the axis range limits of the 3D graph by selecting this function. This is useful if you want to 'zoom-in' on a particular section of the graph. When you choose new limits to display a table, they are used every time that table is loaded unless you set new limits or restore the default limits.

1. Select **3D Graph Settings**...

2. The 3D Graph Settings dialog box will appear. This box allows you to choose a maximum RPM limit for the horizontal or width (x) axis, a minimum and maximum limit for the vertical or height (y) axis and a maximum Throttle % for the diagonal or depth (z) axis.



3. Enter the required limits in the text boxes or click the **Reset To Default** button to restore the original limits.
4. Accept the new limits by clicking **OK** or by pressing **Enter**. The 3D graph will now be rescaled to the nearest limit you have specified. Click **Cancel** or press **Esc** if you don't want to change the limits.

SUMMARY: There are two ways to change the 3D graph settings...

- 1) Using the menu bar: Select **3D Graph Settings...** from the **Edit** menu.
- 2) Using the keyboard: Hold the **Shift** + press **F5**.

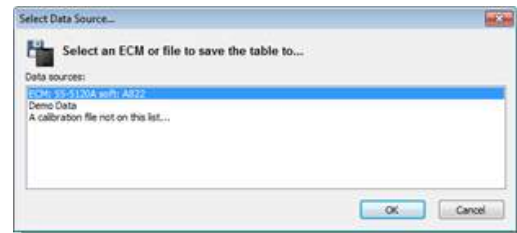
3.5 View Menu

3.5.1 ECM Basic Setup

The ECM Basic Setup allows you to change basic control properties of the ECM.

1. Select **ECM Basic Setup**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on

it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The ECM Basic Setup dialog box will appear. The top line of the dialog box shows the ECM or file that you are editing. Beneath it is an information box which will show you information about a function when it is selected.



4. The **Use Check Engine Light as a Shift Light** check box controls the shift light feature. When selected, the ECM is setup to use the Check Engine fault light on the motorcycle as a "high RPM" or "shift-up" indicator.
5. If the **Use Check Engine Light as a**

Shift Light property is selected, you may specify the engine speed at which the shift light illuminates, **Shift Light ON above Engine Speed**. You may also specify the engine speed at which the shift light will cancel, **Shift Light OFF below Engine Speed**.

6. The **Break-In Limiter System Enabled (for 55-5069 USB modules only)** checkbox controls the Break-In limiter function. **Note: The Break-In Rev Limit Status can only be viewed from an ECM.** The break-in limiter automatically sets the rev-limit for an initial period of running a new engine, allowing the new engine to be properly broken-in. Once the Break-In limiter function is enabled, it cannot be disabled until the break-in limiter time has elapsed. The length of this period, together with the current rev-limit, can be found in the [ECM Information](#) ⁴⁸ dialog page [Rev Limiting](#) ⁵³ tab. If the **Break-In Limiter System Enabled** checkbox is checked, this means the break-in limiter is currently active and will be deactivated once the break-in period is complete. If the box is unchecked, you can enable the break-in limiting period by checking the box and clicking **Save**.

7. The **Wheel Speed Gear Factor (for 55-5069 USB modules only)** is a value used by the ECM to scale the input from the wheel speed sensor to drive the speedometer and mileage counter. You can adjust this value by entering a percentage. 100% represents 50000 counts per kilometer (50000 pulses from the wheel speed sensor equals 1000 meters traveled). The calculated number of counts per kilometer is also shown. The valid range for the percentage value is 5% (2500 counts per kilometer) to 165% (82500 counts per kilometer).

When you have finished viewing or editing the properties, click **OK** or press **Enter** to save the changes to the current data source. Click **Cancel** or press **Esc** if you do not wish

to save the changes.

If this software is in Advanced Mode, the ECM Basic Setup dialog box will allow you to set the **Rev Limiter SOFT Cut**. When the engine is above the SOFT Cut threshold, the ECM will only fire every other spark to reduce power. When you set the soft-cut limit, the Rev Limiter HARD Cut is automatically set 250 RPM above the soft-cut threshold. When the engine is above the hard-cut limit, the ECM will not fire any sparks.



SUMMARY: There are three ways to access the ECM Basic Setup...

- 1) Using the tool bar: Click the **Setup** button



- 2) Using the menu bar: Select **ECM Basic Setup** from the **View** menu.

- 3) Using the keyboard: Hold **Ctrl** + press **1**.

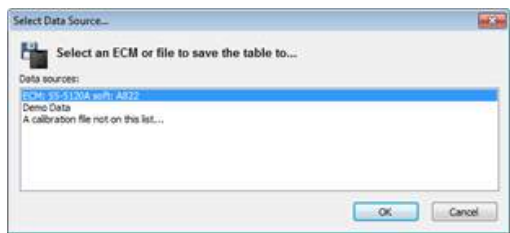
3.5.2 Diagnostic Trouble Codes

The Diagnostic Trouble Codes feature shows you the current trouble code status and historic trouble code status of the connected S&S® ECM.

1. To view current diagnostic info, ensure the ECM is connected. See [Connecting the ECM](#) for more information. 55-5069 ECMs with the appropriate calibration file can also retrieve freeze-frame diagnostic information.

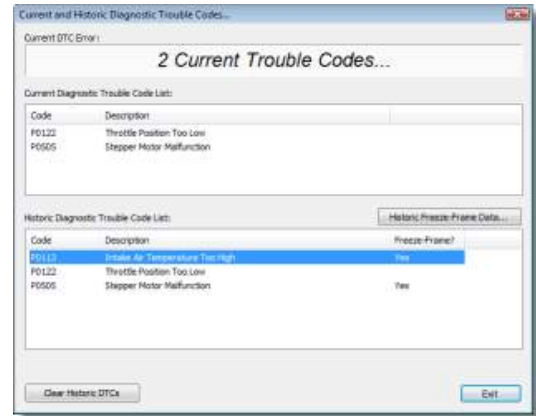


2. Select **Diagnostic Trouble Codes**.
3. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To view live and current diagnostic data, you must select the ECM as the data source. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



4. The Diagnostic Trouble Codes dialog box

will appear. When viewing diagnostic information from calibration files, the Current DTC Error message field and list are not applicable and will not be shown.



5. The top section is the **Current DTC Error** box. This displays a scrolling list of the current faults detected by the system. If there are no current faults the message 'No Current Trouble Codes' will be displayed on a green background. If there are current faults detected, the number of current faults will be displayed, followed by each fault displayed in turn on a red background.
6. The **Current Diagnostic Trouble Code List** displays the current faults as a list, together with their P-Codes (standard automotive codes for vehicle faults).
7. The **Historic Diagnostic Trouble Code List** displays all faults logged since the codes were last reset. For certain ECMs with the appropriate calibration file, freeze-frame data may be available for some of the items logged in the list. Freeze-frame data logs key engine parameters when the fault occurred. If a historic trouble-code has freeze-frame data, 'Yes' will be shown in the 'Freeze-Frame?' column. You can view the data by selecting the fault in the list and clicking **Historic Freeze-Frame Data...** The parameters logged are Engine Mileage, Trip Count, Engine Speed, Throttle Voltage and the Time spent With

Injection Base Table from the current data source. This table is used as the base table for calculating the current fuel injector pulse width. See [The Fuel Injection System](#)^[65] for more information on this table.

You can change the current data source by either selecting an option from the Current Data Source drop-down list at the top of the screen, or from the [Current Data Source menu](#)^[47] in the **View** menu. Alternatively, you can select [Open Table from...](#)^[59] from the **Options** menu.

SUMMARY: There are three ways to access the Fuel Injection Base Table...

- 1) Using the tool bar: Click the Fuel button:



- 2) Using the menu bar: Select **Fuel Injection Base Table** from the **View** menu.

- 3) Using the keyboard: Hold **Ctrl** + press **4**.

3.5.5 Ignition Timing Base Table

Selecting this option will load the Ignition Timing Base Table from the current data source. This table is used as the base table for calculating the current ignition advance in degrees before Top Dead Center. See [The Ignition Timing System](#)^[66] for more information on this table.

You can change the current data source by either selecting an option from the Current Data Source drop-down list at the top of the screen, or from the [Current Data Source menu](#)^[47] in the **View** menu. Alternatively, you can select [Open Table from...](#)^[59] from the **Options** menu.

SUMMARY: There are three ways to access

the Ignition Timing Base Table...

- 1) Using the tool bar: Click the Ignition button:



- 2) Using the menu bar: Select **Ignition Timing Base Table** from the **View** menu.

- 3) Using the keyboard: Hold **Ctrl** + press **5**.

3.5.6 Front Cylinder Adjustment Table

Selecting this option will load the Front Cylinder Adjustment Table from the current data source. This table is used to adjust the fuel delivery for each cylinder. See [The Fuel Injection System](#)^[65] for more information on this table.

You can change the current data source by either selecting an option from the Current Data Source drop-down list at the top of the screen, or from the [Current Data Source menu](#)^[47] in the **View** menu. Alternatively, you can select [Open Table from...](#)^[59] from the **Options** menu.

SUMMARY: There are three ways to access the Front Cylinder Adjustment Table...

- 1) Using the tool bar: Click the Front button:



- 2) Using the menu bar: Select **Front Cylinder Fuel Adjustment Table** from the **View** menu.

- 3) Using the keyboard: Hold **Ctrl** + press **6**.

3.5.7 Rear Cylinder Adjustment Table

Selecting this option will load the Rear Cylinder Adjustment Table from the current data source. This table is used to adjust the fuel delivery for each cylinder. See [The Fuel Injection System](#)^[65] for more information on this table.

You can change the current data source by either selecting an option from the Current Data Source drop-down list at the top of the screen, or from the [Current Data Source menu](#)^[47] in the **View** menu. Alternatively, you can select [Open Table from...](#)^[59] from the **Options** menu.

SUMMARY: There are three ways to access the Rear Cylinder Adjustment Table...

- 1) Using the tool bar: Click the Rear button:



- 2) Using the menu bar: Select **Rear Cylinder Fuel Adjustment Table** from the **View** menu.

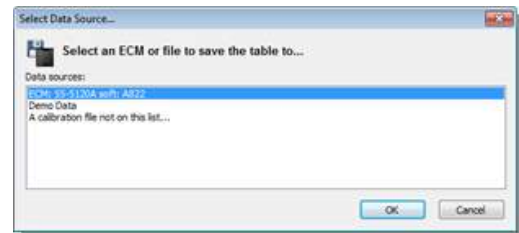
- 3) Using the keyboard: Hold **Ctrl** + press **7**.

3.5.8 Acceleration Fuel Settings

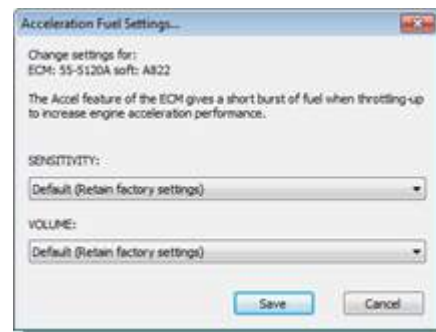
The Acceleration Fuel Settings function in the ECM improves acceleration by adjusting fuel delivery according to throttle movement. When the throttle is opened, additional fuel allows the engine to accelerate quickly.

1. Select **Acceleration Fuel Settings**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built

into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The Acceleration Fuel Settings dialog box will appear. You can select from three Sensitivity settings (Low, Medium and High) and three Volume settings (Minimum, Medium and Maximum).



4. The Sensitivity setting sets how responsive the accel fuel system is to throttle movement. A low sensitivity means that large throttle movements will be required to trigger changes in the fuel delivery. A high sensitivity means that small throttle movements will trigger changes in the fuel delivery. Select an option by clicking on the list's down arrow. If the option is set to Default (Retain factory settings) the

data in the data source that you are editing won't be altered from its current setting.

5. The Volume setting sets how large the boost in fuel delivery is when the accel is triggered. A minimum volume means the change in fuel delivery will be relatively small. A maximum volume means the change in fuel delivery will be relatively large. Select an option by clicking on the list's down arrow. If the option is set to Default (Retain factory settings) the data in the data source that you are editing won't be altered from its current setting.
6. Click **Cancel** or press **Esc** if you do not want to save the changes to the settings. Click **Save** or press **Enter** to store your new accel setup in the data source that you are editing (shown at the top of the dialog box).

SUMMARY: There are three ways to access the Acceleration Fuel Settings...

- 1) Using the tool bar: Click the Accel button:



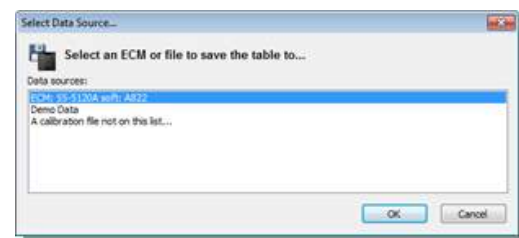
- 2) Using the menu bar: Select **Acceleration Fuel Settings** from the **View** menu.
- 3) Using the keyboard: Hold **Ctrl** + press **8**.

3.5.9 Closed-Loop Control Settings

This dialog box allows you to set the Closed-Loop fuel control mode in the S&S® ECM or calibration file. The Closed-Loop system is a feature that allows the ECM to learn fuel delivery based upon comparing the calibration fuel mixture against the actual fuel mixture measured by the oxygen sensors in the exhaust system. See the section on [The Closed-Loop Fuel Control System](#)^[83] for

more details.

1. Select **Closed-Loop Control Settings**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the **'A calibration file not on this list'** option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The Closed-Loop Control Settings dialog box will now appear. For details on how to use this dialog box in Basic Mode, see [Closed-Loop Setup in Basic Mode](#)^[84]. For details on how to use this dialog box in Advanced Mode, see [Closed-Loop Setup in Advanced Mode](#)^[85].
4. Click **Cancel** or press **Esc** if you do not want to save the changes that you have made to the settings. Click **Save** or press **Enter** to store your new Closed-Loop setup in the data source that you are editing (shown at the top of the dialog box).

SUMMARY: There are two ways to access the Closed-Loop Control Settings...

- 1) Using the menu bar: Select **Closed-Loop Control Settings** from the **View** menu.

- 2) Using the keyboard: Hold **Ctrl** + press **9**.

3.5.10 Knock Control Settings

For 55-5069 USB modules only. This dialog box allows you to set the Knock Control mode in the S&S® ECM or calibration file. The Knock Control system adjusts ignition timing to avoid engine knocking. See [The Knock \(Adaptive Ignition\) Control System](#)^[88] for more details.

1. Select **Knock Control Settings**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The Knock Control Settings dialog box will now appear.



4. Select a control mode from the drop-down list. Please see [The Knock \(Adaptive Ignition\) Control System](#)^[88] for more details.
5. To save the new setting, click **Save** or press **Enter**. To exit without saving any changes, click **Cancel** or press **Esc**.

SUMMARY: There are two ways to access the Knock Control Settings...

- 1) Using the menu bar: Select **Knock Control Settings** from the **View** menu.

- 2) Using the keyboard: Hold **Ctrl** + press **0**.

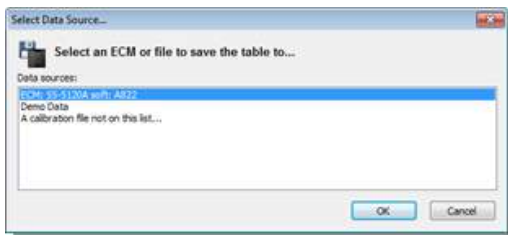
3.5.11 Engine Temperature Ignition Compensation

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

Selecting this option will allow you to view and edit the Engine Temperature Ignition Compensation table. This table specifies the adjustments made by the ECM to the ignition timing as a function of the temperature of the engine. See [Temperature Compensation Tables](#)^[82] for more details on this table.

1. Select **Engine Temperature Ignition Compensation**.

- The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



- The table will now load. See [Viewing and Editing Advanced Tables](#)^[80] for more details.

SUMMARY: There are two ways to access the Engine Temperature Ignition Compensation table...

1) Using the menu bar: Select **Engine Temperature Ignition Compensation** from the **View** menu.

2) Using the keyboard: Hold **Ctrl + Shift** + press **1**.

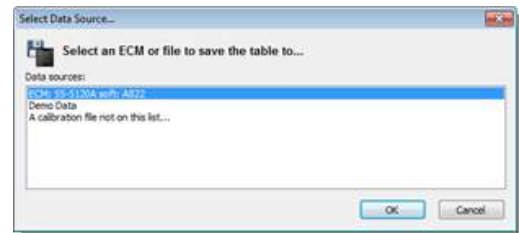
3.5.12 Air Temperature Ignition Compensation

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

Selecting this option will allow you to view and edit the Air Temperature Ignition Compensation table. This table specifies the adjustments made by the ECM to the ignition timing as a function of the ambient air temperature. See [Temperature Compensation Tables](#)^[82] for more details on this table.

1. Select **Air Temperature Ignition Compensation**.

- The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



- The table will now load. See [Viewing and Editing Advanced Tables](#)^[80] for more details.

SUMMARY: There are two ways to access the Air Temperature Ignition Compensation table...

1) Using the menu bar: Select **Air Temperature Ignition Compensation** from the **View** menu.

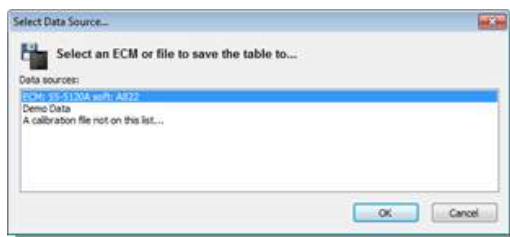
- 2) Using the keyboard: Hold **Ctrl** + **Shift** + press **2**.

3.5.13 Engine Temperature Fuel Compensation

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[15] for more information.

Selecting this option will allow you to view and edit the Engine Temperature Fuel Compensation table. This table specifies the adjustments made by the ECM to the fuel delivery as a function of the temperature of the engine. See [Temperature Compensation Tables](#) ^[82] for more details on this table.

1. Select **Engine Temperature Fuel Compensation**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The table will now load. See [Viewing and Editing Advanced Tables](#) ^[80] for more details.

SUMMARY: There are two ways to access the Engine Temperature Fuel Compensation table...

- 1) Using the menu bar: Select **Engine Temperature Fuel Compensation** from the **View** menu.
- 2) Using the keyboard: Hold **Ctrl** + **Shift** + press **3**.

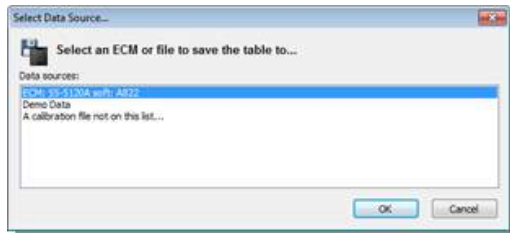
3.5.14 Air Temperature Fuel Compensation

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[15] for more information.

Selecting this option will allow you to view and edit the Air Temperature Fuel Compensation table. This table specifies the adjustments made by the ECM to the fuel delivery as a function of the ambient air temperature. See [Temperature Compensation Tables](#) ^[82] for more details on this table.

1. Select **Air Temperature Fuel Compensation**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option.

This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The table will now load. See [Viewing and Editing Advanced Tables](#)^[80] for more details.

SUMMARY: There are two ways to access the Air Temperature Fuel Compensation table...

- 1) Using the menu bar: Select **Air Temperature Fuel Compensation** from the **View** menu.
- 2) Using the keyboard: Hold **Ctrl + Shift** + press **4**.

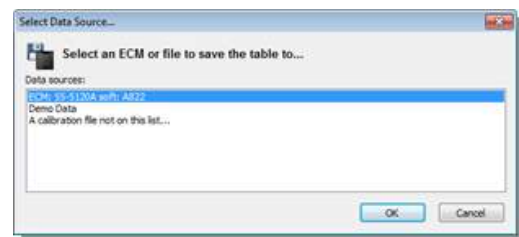
3.5.15 Engine Temperature Start Map

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

Selecting this option will allow you to view and edit the Engine Temperature Start Map table. This table specifies the adjustments made by the ECM to the fuel delivery during engine cranking as a function of the temperature of the engine. See [Engine Temperature Start Map](#)^[82] for more details on this table.

1. Select **Engine Temperature Start Map**.

2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The table will now load. [Viewing and Editing Advanced Tables](#)^[80] for more details.

SUMMARY: There are two ways to access the Engine Temperature Start Map...

- 1) Using the menu bar: Select **Engine Temperature Start Map** from the **View** menu.
- 2) Using the keyboard: Hold **Ctrl + Shift** + press **5**.

3.5.16 Stepper Motor Orientation Setting

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

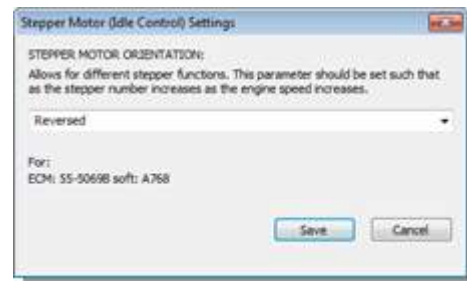
The stepper-motor on your motorcycle is used to control the idle speed of the engine by automatically making small adjustments to the throttle position.

The Stepper Motor Orientation Setting allows for different orientation of stepper motor wiring. The orientation should be left as default unless you have reason to alter it. The correct orientation is such that the stepper position increases as engine speed increases.

1. Select **Stepper Motor Orientation Setting**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The Stepper Motor Orientation Setting dialog box will appear. Select Normal or Reversed from the drop-down list by clicking on the down arrow.



4. Click **Save** or press **Enter** to set the new mode, click **Cancel** or press **Esc** to cancel any changes.
5. When you have altered the Stepper Motor Orientation Setting in an ECM, a message box will appear advising you to cycle power to the ECM (turn key off for at least 15 seconds) before continuing. This will allow the ECM to power-up using the new stepper motor orientation.

SUMMARY: There are two ways to access the Stepper Motor Orientation Setting...

- 1) Using the menu bar: Select **Stepper Motor Orientation Setting** from the **View** menu.
- 2) Using the keyboard: Hold **Ctrl + Shift +** press **6**.

3.5.17 Stepper Pre-Start Position Map

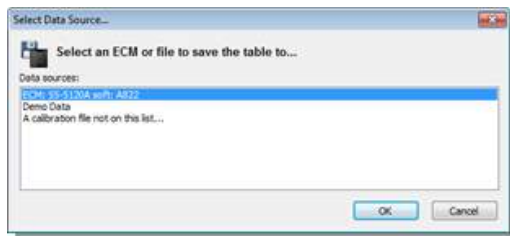
Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ¹⁵ for more information.

The stepper-motor on your motorcycle is used to control the idle speed of the engine by automatically making small adjustments to the throttle position.

The Stepper Pre-Start Position Map allows you to set the initial position of the stepper

motor during cranking as a function of engine temperature. See [Stepper Motor Tables \(Idle Speed Control\)](#)^[82] for more details on this map.

1. Select **Stepper Pre-Start Position Map**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The table will now load. See [Viewing and Editing Advanced Tables](#)^[80] for more details.

SUMMARY: There are two ways to access the Stepper Pre-Start Position Map...

- 1) Using the menu bar: Select **Stepper Pre-Start Position Map** from the **View** menu.
- 2) Using the keyboard: Hold **Ctrl + Shift +** press **7**.

3.5.18 Stepper Position with Temperature Map

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

The stepper-motor on your motorcycle is used to control the idle speed of the engine by automatically making small adjustments to the throttle position.

The Stepper Position with Temperature Map allows you to set the initial position of the stepper motor during engine running as a function of engine temperature. See [Stepper Motor Tables \(Idle Speed Control\)](#)^[82] for more details on this map.

1. Select **Stepper Position with Temperature Map**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The table will now load. See [Viewing and](#)

[Editing Advanced Tables](#) ⁸⁰ for more details.

SUMMARY: There are two ways to access the Stepper Position with Temperature table...

- 1) Using the menu bar: Select **Stepper Position with Temperature** from the **View** menu.
- 2) Using the keyboard: Hold **Ctrl** + **Shift** + press **8**.

3.5.19 Target Idle Speed Setting

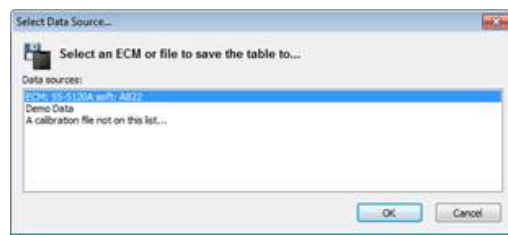
Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ¹⁵ for more information.

This function allows you to set the target idle speed setting of the ECM. This is the RPM value that the ECM will try to attain when idling.

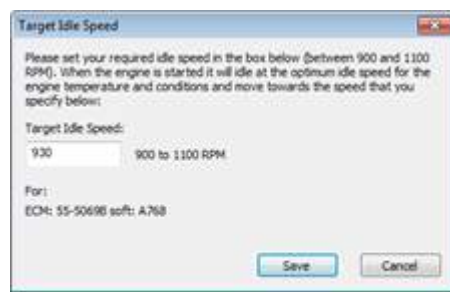
After the engine is started, the target idle speed is set to the optimum value for the engine temperature and conditions. As the motorcycle engine warms-up the ECM will move the idle speed towards the value that you specify. See [Stepper Motor Tables \(Idle Speed Control\)](#) ⁸² for more details.

1. Select **Target Idle Speed Setting**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A**

calibration file not on this list' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The target idle speed data will now be loaded from the ECM/Tune-File and the Target Idle Speed Setting dialog box will appear.



4. Enter a new target idle speed between 900 and 1100 RPM in the edit box.
5. Click **Save** or press **Enter** to set the new value. Click **Cancel** or press **Esc** to discard any changes.

SUMMARY: There are two ways to access the Target Idle Speed Setting...

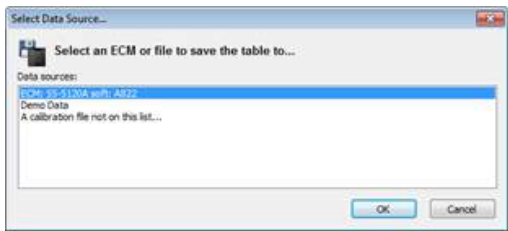
- 1) Using the menu bar: Select **Target Idle Speed Setting** from the **View** menu.
- 2) Using the keyboard: Hold **Ctrl** + **Shift** + press **9**.

3.5.20 Stepper Position Fuel Compensation

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[15] for more information.

The stepper position fuel compensation feature adjusts fuel delivery as a function of the stepper motor position. The stepper motor controls the throttle valve used for idle speed control. See [Stepper Motor Tables \(Idle Speed Control\)](#) ^[82] for more details. When this table is saved to an ECM, it will have no effect unless the checkbox located below the spreadsheet is checked.

1. Select **Stepper Position Fuel Compensation**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The table will now load. See [Viewing and Editing Advanced Tables](#) ^[80] for more details.

SUMMARY: There are two ways to access the Stepper Position Fuel Compensation table...

1) Using the menu bar: Select **Stepper Position Fuel Compensation** from the **View** menu.

2) Using the keyboard: Hold **Ctrl + Shift +** press **B**.

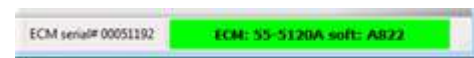
3.5.21 Front Cylinder Adaptive Map

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[15] for more information.

Selecting this function allows you to view the front cylinder adaptive fuel table from the ECM. This table is only accessible if an ECM supporting Closed-Loop Fuel Control is connected. The table can only be viewed, it cannot be modified as its values are generated internally by the ECM.

The adaptive maps are fuel trim maps that the ECM learns based upon the results of Closed-Loop Fuel Control. For more details on this subject see [The Closed-Loop Fuel Control System](#) ^[83].

1. Ensure the ECM is connected. See [Connecting the ECM](#) ^[15] for more information.



2. Select **Front Cylinder Adaptive Map**. The map will now be loaded and displayed.

SUMMARY: There are two ways to access the Front Cylinder Adaptive Map...

1) Using the menu bar: Select **Front Cylinder Adaptive Map** from the **View** menu. Note this menu item will only be shown when an ECM supporting Closed-Loop Fuel Control is connected.

2) Using the keyboard: Hold **Ctrl** + **Shift** + press **C**.

1) Using the menu bar: Select **Rear Cylinder Adaptive Map** from the **View** menu. Note this menu item will only be shown when an ECM supporting Closed-Loop Fuel Control is connected.

2) Using the keyboard: Hold **Ctrl** + **Shift** + press **D**.

3.5.22 Rear Cylinder Adaptive Map

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ¹⁵ for more information.

Selecting this function allows you to view the rear cylinder adaptive fuel table from the ECM. This table is only accessible if an ECM supporting Closed-Loop Fuel Control is connected. The table can only be viewed, it cannot be modified as its values are generated internally by the ECM.

The adaptive maps are fuel trim maps that the ECM learns based upon the results of Closed-Loop Fuel Control. For more details on this subject see [The Closed-Loop Fuel Control System](#) ⁸³.

1. Ensure the ECM is connected. See [Connecting the ECM](#) ¹⁵ for more information.



2. Select **Rear Cylinder Adaptive Map**. The map will now be loaded and displayed.

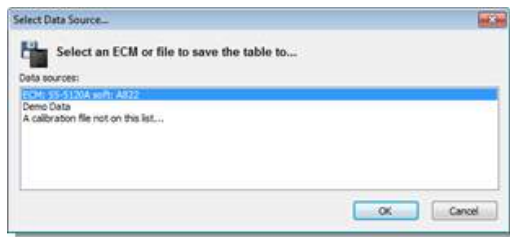
SUMMARY: There are two ways to access the Rear Cylinder Adaptive Map...

3.5.23 Target Closed-Loop Fuel Map

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ¹⁵ for more information.

This item allows you to view the Target Closed-Loop Fuel Map in an S&S® ECM or Calibration File. The Closed-Loop system is a feature that allows the ECM to learn fuel delivery based upon comparing the calibration fuel mixture against the actual fuel mixture measured by the oxygen sensors in the exhaust system. See the section on [The Closed-Loop Fuel Control System](#) ⁸³ for more details.

1. Select **Target Closed-Loop Fuel Map**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The Target Closed-Loop Fuel Map will now be loaded and displayed. Please see [Setting the Target Air-Fuel Mixture](#)^[85] for more details on editing this table.

SUMMARY: There are two ways to access the Target Closed-Loop Fuel Map...

- 1) Using the menu bar: Select **Target Closed-Loop Fuel Map** from the **View** menu.
- 2) Using the keyboard: Hold **Ctrl + Shift** + press **E**.

3.5.24 Adaptive Ignition Map

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

For 55-5069 USB modules only.

Selecting this function allows you to view the Adaptive Ignition Map. This map stores the current long-term ignition adjustments the ECM learns based upon the feedback of the knock sensor. The table can only be viewed, it cannot be modified as its values are generated internally by the ECM. See [The Knock \(Adaptive Ignition\) Control System](#)^[88] for more details.

1. Ensure the ECM is connected. See [Connecting the ECM](#)^[15] for more information.



2. Select **Adaptive Ignition Map**. The map will now be loaded and displayed.

SUMMARY: There are two ways to access the Adaptive Ignition Map...

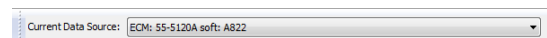
- 1) Using the menu bar: Select **Adaptive Ignition Map** from the **View** menu. Note this menu item will only be shown when an ECM supporting Knock Control is connected.
- 2) Using the keyboard: Hold **Ctrl + Shift** + press **F**.

3.5.25 Current Data Source menu

The **Current Data Source menu** allows you to load the current table from another data source. From the menu you can choose between the ECM (if connected), the Demo Data, any calibrations that you have accessed since the software started, or select the 'Calibration not in this list' option to browse for another calibrations. Selecting the 'Calibration not in this list' option will cause the Open File dialog box to appear. Select a file by clicking on its file name and click **Open**.

SUMMARY: There are two ways to change the current data source...

- 1) Using the tool bar: Select an item from the **Current Data Source** drop down list box on the tool-bar.



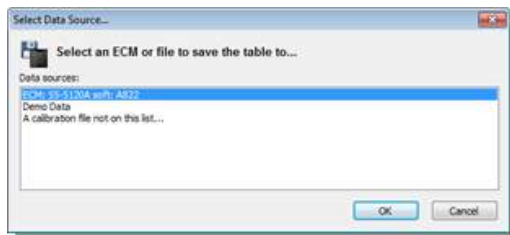
- 2) Using the menu bar: Access the **Current Data Source** menu in the **View** menu. Select one of the items in the menu.

3.5.26 Edit Comment Field

Every ECM and calibration file has a small area of memory reserved for a comment-field. The comment-field allows a tuner to describe the configuration and contents of the ECM/File. Each calibration file supplied by S&S Cycle® contains a comment field describing the particular configuration of that file. The comment-field is shown when you select a calibration file in the Open File or Save File dialog boxes. For some ECMs/files the comment field is read-only and cannot be changed.

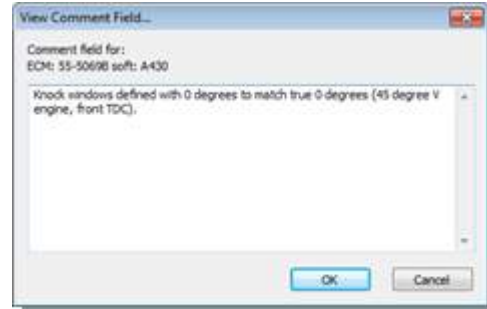
To view or edit the comment-field in your ECM or a calibration file, follow these steps:

1. Select **Edit Comment Field...**
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The Edit Comment Field dialog box will appear. The data source that you are editing is displayed at the top of the dialog

box. In the white text box you can edit comment text. The comment field text is limited to a maximum of 512 characters.



4. Click **Cancel** or press **Esc** if you do not wish to change the comment-field. Click **OK** or press **Enter** to store the new comment in the data source that you are editing (shown at the top of the dialog box). If the comment-field is read-only, you will not be able to change the text.

SUMMARY: There are two ways to edit the comment field in the ECM or a calibration file...

- 1) Using the menu bar: Select **Edit Comment Field** from the **View** menu.
- 2) Using the keyboard: Hold **Ctrl** + press **F**.

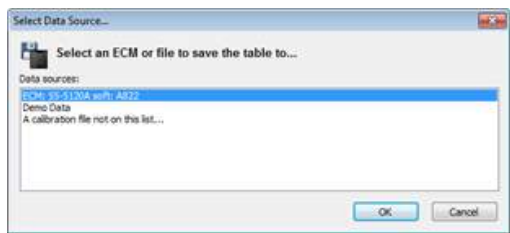
3.5.27 ECM Information

The ECM Information function allows you to view engine operation statistics in your ECM and calibration files. This includes historic data on ECM use and engine performance.

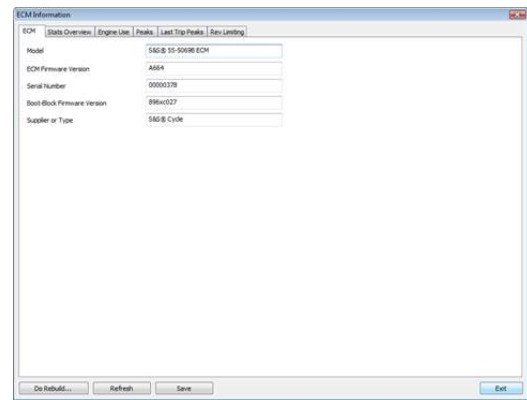
To access the ECM Information dialog box:

1. Select **ECM Information**.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built

into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The ECM Information dialog box will appear. The dialog box is arranged in pages. Select the tabs at the top of the dialog box to switch between the pages. The [ECM page](#)^[50] describes general properties and identifiers of the ECM and calibration files that support this information. The [Stats Overview page](#)^[50] details the overall statistics of the ECM and engine. The [Engine Use page](#)^[51] displays a chart of time the engine has spent in ranges of engine speed, throttle position and engine temperature. The [Peaks page](#)^[51] shows the highest values of key parameters and are logged over the life of the ECM. The [Last Trip Peaks](#)^[52] page shows the highest values of key parameters logged over the last four trips (a trip is running the motorcycle for five minutes or more). The [Rev Limiting page](#)^[53] shows how often the engine rev limiter has been hit and also describes the current break-in limiter status and schedule (see [ECM Basic Setup](#)^[31] for more details).



4. The ECM Information dialog shows a snapshot of the ECM state. To refresh this information at any time, click **Refresh**.
5. The contents of all pages of the ECM Information dialog may be saved to a text file and viewed in a text editor such as Notepad, Wordpad or Excel®. To do this, click **Save**. A Save As dialog box will appear. The default folder for ECM Information is My Documents\ProTune 2 \ECM Information Data. Enter a filename and click **Save**. The file produced is a .tsv (tab separated value file) which can be viewed in any text editor but is best viewed in a spreadsheet application like Excel®.
6. To close the ECM Information dialog box, click **Exit** or press **Esc**.

The ECM Information dialog box allows use of the **Engine Rebuild** function. The Engine Rebuild function resets the historic data for the ECM and is commonly used after installation or reconditioning of an engine. Some key data, such as engine mileage prior to the rebuild is retained but all recent use data is reset. To perform a rebuild click the **Do Rebuild...** button. Carefully read the warning messages that appear and click **Yes** for both if you have read and accepted the messages. **Warning: Performing an Engine Rebuild will void any remaining warranty.**

SUMMARY: There are three ways to view the ECM Information dialog box.

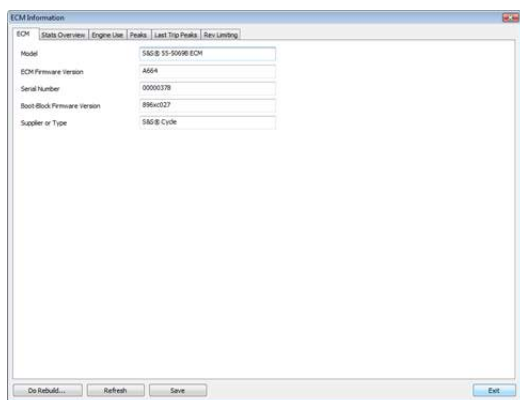
1) Using the tool bar: Click the Info button:



2) Using the menu bar: Select **ECM Information...** from the **View** menu.

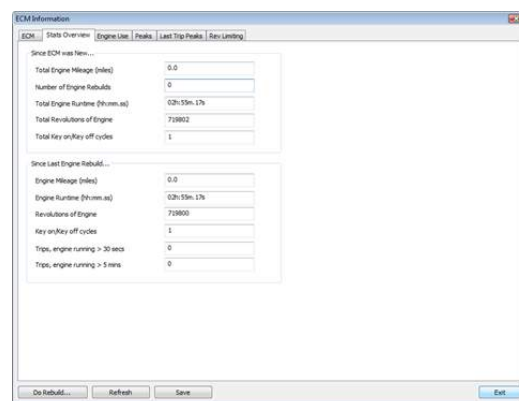
3) Using the keyboard: Hold **Ctrl + Shift** and press **T**.

The ECM page shows overall properties and identifiers of the ECM. Information is also shown for calibration files that support this data. The information on this page is mainly for technical support.



- **Model.** The model number for this ECM or file.
- **ECM Firmware Version.** The ECM software version for the ECM or file.
- **Serial Number.** The serial number for the ECM or file.
- **Boot-Block Firmware Version.** For technical support use only.
- **Supplier or Type.** Identifies the original supplier of this ECM/file or the warranty status of the ECM.
- **Vehicle Identification Number.** The VIN for this ECM or file (if any).

The Stats Overview page shows key overall statistics for the ECM and engine.



- **Since ECM was New...** Shows data logged since the ECM was new.

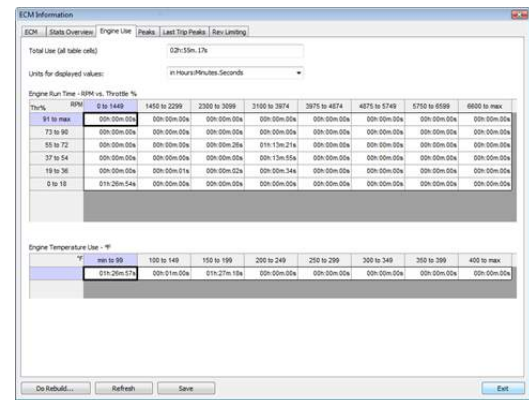
- **Total Engine Mileage.** Total miles logged on the engine.
- **Number of Engine Rebuilds.** The number of times the Engine Rebuild function has been used on this ECM. See [ECM Information](#) ⁴⁸ for more details. **Warning: Performing an Engine Rebuild will void any remaining warranty.**
- **Total Engine Runtime.** The time in hours:minutes.seconds that the ECM has run the engine since the ECM was new.
- **Total Revolutions of Engine.** The total number of engine revolutions since the ECM was new.
- **Total Key on/Key off cycles.** The total number of times the ignition key has been turned on, then off, since the ECM was new.

- **Since Last Engine Rebuild...** Shows data logged since the last time the Engine Rebuild function was used. See [ECM Information](#) ⁴⁸ for more details.

- **Engine Mileage.** The engine mileage since the last rebuild.
- **Engine Runtime.** The time in hours:minutes.seconds the engine has been run since the last rebuild.

- **Revolutions of Engine.** The number of engine revolutions since the last rebuild.
- **Key on/Key off cycles.** The number of times the ignition key has been turned on, then off, since the last rebuild.
- **Trips, engine running > 30 secs.** The number of times the motorcycle has run for 30 seconds or more since the last rebuild.
- **Trips, engine running > 5 mins.** The number of times the motorcycle has run for 5 minutes or more since the last rebuild.
- **Before Last Engine Rebuild...** Shows all data logged before the last time the Engine Rebuild function was performed. See [ECM Information](#) ⁴⁸ for more details.
 - **Engine Runtime.** The time in hours:minutes.seconds the engine had been run before the last rebuild.
 - **Revolutions of Engine.** The number of engine revolutions logged before the last rebuild.
 - **Key on/Key off cycles.** The number of times the ignition key had been turned on, then off, before the last rebuild.

The Engine Use page displays a chart of time the engine has spent in ranges of engine speed, throttle position and engine temperature.



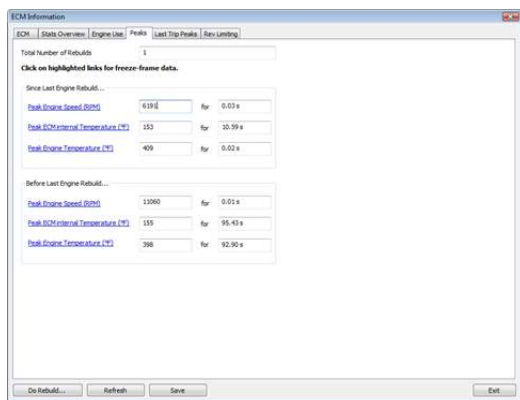
The **Total Use (all table cells)** value displays the total engine running time in hours:minutes.seconds.

The Engine Use tables can either be displayed in absolute time (hours:minutes.seconds) or as a percentage of the total engine use. Select this by selecting a format from the **Units for displayed values** drop-down list.

The **Engine Run Time - RPM vs. Throttle %** table shows the total amount of engine run time across the range of engine speed and throttle position. The sum for each RPM column is shown in the final row labeled 'Total'.

The **Engine Temperature Use - °F** table shows the total amount of engine run time across the range of engine temperature.

The Peaks page shows the highest values of key parameters logged during ECM operation.



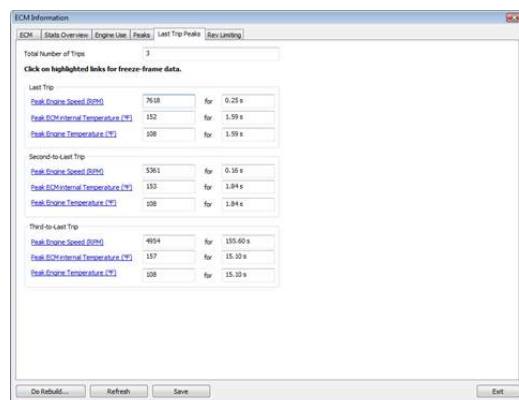
- **Since Last Engine Rebuild...** Shows data logged since the last Engine Rebuild function was performed. See [ECM Information](#) ⁴⁸ for more details.
 - **Peak Engine Speed (RPM).** The highest engine speed recorded since the last engine rebuild.
 - **Peak ECM internal Temperature (°F).** The highest ECM module temperature recorded since the last engine rebuild.
 - **Peak Engine Temperature (°F).** The highest engine temperature recorded since the last engine rebuild.
- **Before Last Engine Rebuild...** Shows data logged before the last Engine Rebuild function was performed. See [ECM Information](#) ⁴⁸ for more details.
 - **Peak Engine Speed (RPM).** The highest engine speed recorded before the last engine rebuild.
 - **Peak ECM internal Temperature (°F).** The highest ECM module temperature recorded before the last engine rebuild.
 - **Peak Engine Temperature (°F).** The highest engine temperature recorded before the last engine rebuild.

For each peak value, freeze-frame data is also logged. The freeze-frame data logs the value of other key parameters at the point where the peak occurred. To access the

freeze-frame data for a peak event, click on the blue, underlined link. The freeze-frame dialog will appear. The values logged are Rev Count, Engine Speed, Engine Temperature, ECM Temperature and Manifold Air Pressure. Click **OK** or press **Enter** to close the box.



The Last Trip Peaks page shows the highest values of key parameters logged during the last four motorcycle trips (engine operation lasting five or more minutes).



For up-to four of the last trips, the following information is logged:

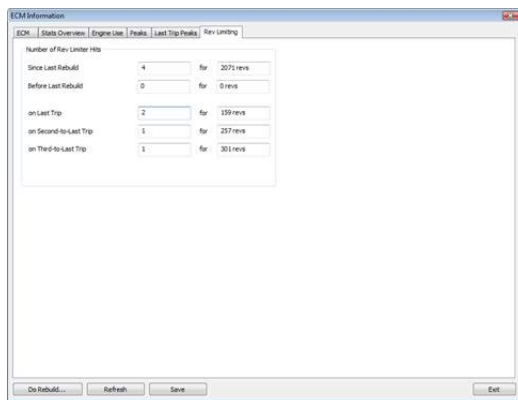
- **Peak Engine Speed (RPM).** The highest engine speed recorded on this trip.
- **Peak ECM internal Temperature (°F).** The highest temperature for the ECM module recorded on this trip.
- **Peak Engine Temperature (°F).** The highest engine temperature recorded on

this trip.

For each peak value, freeze-frame data is also logged. The freeze-frame data logs the value of other key parameters at the point where the peak occurred. To access the freeze-frame data for a peak event, click on the blue, underlined link. The freeze-frame dialog will appear. The values logged are Rev Count, Engine Speed, Engine Temperature, ECM Temperature and Manifold Air Pressure. Click **OK** or press **Enter** to close the box.



The Rev Limiting page shows the number of rev-limiter hits that have occurred during engine operation. The current status and schedule of the break-in limiter function are also shown.



- **Number of Rev Limiter Hits.** Shows the number of times the rev-limiter was hit and the total number of revs at the limiter for the given period. A 'Trip' is engine operation lasting five or more minutes.

- **Since Last Rebuild.** Rev limiter hits since the last engine rebuild was performed. See [ECM Information](#)^[48] for more details.
- **Before Last Rebuild.** Rev limiter hits before the last engine rebuild was performed. See [ECM Information](#)^[48] for more details.
- **on Last Trip.** Rev limiter hits during the last trip.
- **on Second-to-Last Trip.** Rev limiter hits during the second-to-last trip.
- **on Third-to-Last Trip.** Rev limiter hits during the third-to-last trip.
- **on Fourth-to-Last Trip.** Rev limiter hits during the fourth-to-last trip.

- **Break-In Rev Limiting Schedule.**

Displays the current status and schedule for the break-in limiter function. **Note:** **The Break-In Rev Limit Status can only be viewed from an ECM.** The break-in limiter automatically sets the rev-limit for an initial period of running a new engine, allowing the new engine to be properly broken-in. To enable the break-in limiter, see [ECM Basic Setup](#)^[31]. The break-in limiter operates in 3 stages, each stage allows a progressively higher rev limit until the rev limit is allowed to return to its full default value.

- **Current Rev Limit.** The current rev limit being used by the ECM.
- **Break-In Total Elapsed Time (snapshot).** The total engine run time since the break-in limiter was enabled. Upon reaching the time shown in the **End of Stage 3** cell, the break-in limiter will be disabled and the default rev limit will be used.
- **Stage 1 Rev Limit.** The rev limit used for Stage 1 of the break-in limiting.
- **End of Stage 1 (after total elapsed time).** The time at which Stage 1 ends and Stage 2 begins.
- **Stage 2 Rev Limit.** The rev limit used for Stage 2 of the break-in limiting.
- **End of Stage 2 (after total elapsed**

time). The time at which Stage 2 ends and Stage 3 begins.

- **Stage 3 Rev Limit.** The rev limit used for Stage 3 of the break-in limiting.
- **End of Stage 3 (after total elapsed time).** The time at which break-in limiting ends.

3.6 Options Menu

3.6.1 Preferences

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ¹⁵ for more information.

The preferences function allows you to select the preferred units for displaying throttle position, temperature values and pressure values.

1. Select **Preferences**.
2. Choose a preferred throttle unit from the drop down list by clicking on the down arrow icon. You can choose % of wide-open throttle (default), throttle pot voltage, or throttle site. The throttle site is the index that the ECM uses to reference tables that use throttle position as an input parameter.
3. Choose a preferred temperature unit from the drop down list by clicking on the down arrow icon. You can choose Fahrenheit (°F) or Celsius (°C).
4. Choose a preferred pressure unit from the drop down list by clicking on the down arrow icon. You can choose Bar (bar), Inches of Mercury (inHg), or Kilopascals

(kPa).

5. Click **OK** or press **Enter** to accept the new units or click **Cancel** (or press **Esc**) to cancel your choice.

SUMMARY: There are two ways to access the preferences dialog box...

1) Using the menu bar: Select **Preferences** from the **Options** menu.

2) Using the keyboard: Hold **Ctrl** + press **P**.

3.6.2 Select User Level

Select this function to change the user level of the software from Basic mode to Advanced mode and vice-versa.

Once you change into Advanced mode the main screen will change and more functions will be available in the menus. Accessing the help file in Basic or Advanced mode will provide information for tuning in the current mode.

1. Select **Select User Level...**

2. The Select User Level dialog box will appear. Choose 'Basic' mode or 'Advanced' mode from the drop-down list.
3. Click **OK** or press **Enter**. If you have selected 'Advanced', the following warning message will appear: 'WARNING! The Advanced level of ProTune II offers a high level of adjustability and is recommended for experienced tuners only. If you have read and understood this warning, click **Yes**. If you want to return to basic mode, click **No**.

SUMMARY: There are two ways to change the user level setting of the software...

1) Using the menu bar: Select **Select User**

Level... from the **Options** menu.

2) Using the keyboard: Hold **Ctrl** + press **G**.

3.6.3 Serial Port Settings

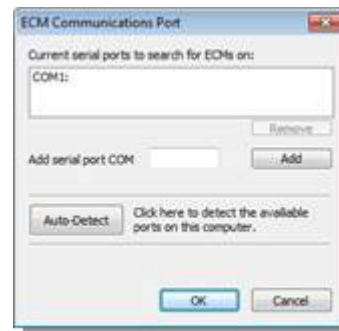
Most PCs have at least one 9-Pin serial port available for ECM connection, labeled in Windows® as COM1: (i.e. Communications Port 1). Some notebook computers and small form-factor desktops do not have a serial port. If this is the case with your PC, USB-Serial adapters are available from most computer component vendors. Before purchasing a USB-Serial adapter, be sure it is compatible with your PC's operating system.



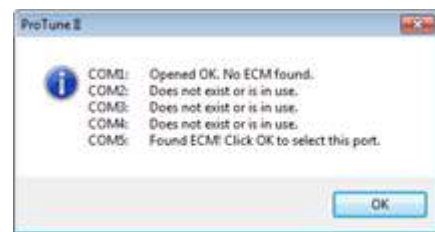
If your PC has more than one serial port, or doesn't use COM1 as the label for the available serial port, you will have to change the serial port that ProTune II searches for connected serial ECMs.

To do this:

1. Select **Serial Port Settings...**
2. The Serial Port Settings dialog box will appear. At the top of the dialog box is a list of serial ports that are currently being searched for an ECM.



3. If you would like to remove a serial port from the list, select it by clicking on it and then click **Remove**.
4. If you would like to add a serial port to the list, enter the serial port number (i.e. for COM2 enter 2) into the **Add serial port COM** text box and click **Add**. It will now appear in the list.
5. Click on the **Auto-Detect** button if you are unsure of your computer's port settings. The auto-detect feature will search all serial ports from COM1 to COM12 and inform you of which ports can be opened and which ports cannot. If an ECM is detected on one of the ports, the settings will be automatically changed to use that port.



6. To cancel the changes that you have made to the serial port settings, click **Cancel** or press **Esc**. If you want to accept the changes, click **OK** or press **Enter**.

ProTune II will search any specified serial ports for connected S&S Cycle® ECMs. Removing unnecessary ports from the list will improve the search performance.

If you need to check the available serial ports on your PC, you can use the Auto-detect feature described above. If this does not provide enough information, open the **Start** menu and launch **Control Panel** (which may be in the **Settings** menu). Open the **System** dialog box. Click on the **Hardware** tab. Click on **Device Manager**. Find the hardware group called **Ports**. Listed in this group will be the available ports on your PC. Serial ports begin with the letters 'COM'.

SUMMARY: There are two ways to access the Serial Port Settings window...

- 1) Using the menu bar: Select **Serial Port Settings...** from the **Options** menu.
- 2) Using the keyboard: Hold **Ctrl** + press **J**.

3.6.4 Download Code to ECM

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ¹⁵ for more information.

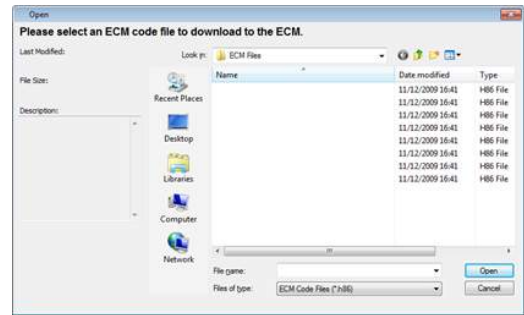
S&S Cycle® may provide a new ECM software program to be loaded into your ECM. This will be in the form of an H86 file (a file with a .H86 file extension).

Important: Do not perform a code download while the engine is running. The ignition switch must be in the ON position and that the kill switch set to RUN, but do not start the engine. Do not disconnect the communications cable or ECM power during the download. Do not download ECM code supplied from any source other than S&S Cycle®.

1. Ensure the ECM is connected. See [Connecting the ECM](#) ¹⁵ for more information.



2. Select **Download Code to ECM...**
3. Read the warning message that appears. Click **OK** (or press **Enter**) to continue or click **Cancel** (or press **Esc**) to cancel the download.
4. The Open File dialog box will appear. Select the ECM code file by clicking on its file name. When you select a file, information will appear about the model number and software version of the file. Once you have selected a file, click **Open** or press **Enter**.

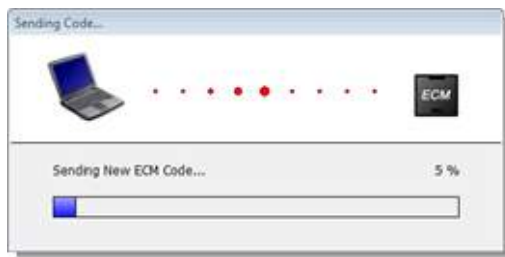


5. If the code file is incompatible with your ECM model, the message 'The file that you have selected is for a different model of ECM. Please select a file that matches your ECM model.' will appear. Click **OK**. Return to step 2 to select an appropriate file for your ECM model (shown in the Communications Status box at the bottom-right corner of the screen when the ECM is connected).
6. For certain software upgrades, you will be asked to update parameters in the ECM tune-file data for compatibility with the new ECM software. A message box will appear asking whether you want this update to proceed. Click **Yes** to continue or click **No** to cancel the download. You will be asked if you would like to save the current tune-file data in your ECM as a backup (recommended). If you click **Yes**,

a Save dialog box will appear allowing you to enter a filename and click **Save**.

Additional data transfer progress bars will appear during the update. ProTune II is updating certain key parameters in your ECM in preparation for running the new software. Allow these transfers to complete. Do not disconnect or remove power from the ECM.

7. A progress bar will appear which shows the ECM software download process. You must not disconnect or remove power from the ECM during the code download.



8. **Important.** When the download completes successfully, a message box will be shown advising you to cycle power to the ECM for at least 15 seconds before continuing. This allows the ECM to reset and power-up cleanly, as the ECM will now be running new software. Click **OK** or press **Enter** to dismiss the message box.

If the download fails: An incomplete download of ECM software will leave the ECM in boot-mode which is an inoperative state that will not run the engine. When you connect an ECM in boot-mode, a warning will appear. This is a notification that you must retry the download to restore the ECM to an operational state. Click **OK** or press **Enter** and return to step 3 to recover the ECM.

SUMMARY: There are two ways to download new code to the ECM...

- 1) Using the menu bar: Select **Download Code to ECM...** from the **Options** menu.

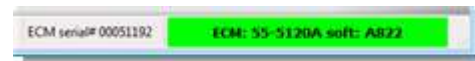
- 2) Using the keyboard: Hold **Ctrl** + press **H**.

3.6.5 Download Tune-File TO ECM

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[15] for more information.

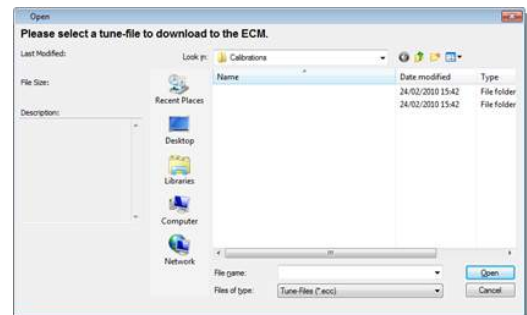
Selecting this function will copy the data inside a Tune-File and send it to the ECM.

1. First ensure the ECM is connected. See [Connecting the ECM](#) ^[15] for more information.



2. Select **Download Tune-File TO ECM...**

3. The Open File dialog box will appear. Select a Tune-File by clicking on its filename. A description of the Tune-File's contents appears on the left side when it is selected.

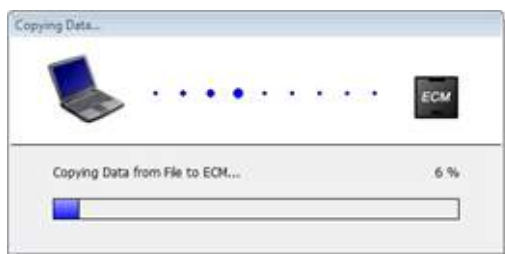


4. Click **Open**.

5. If the tune-file you have selected is potentially incompatible with your ECM, a message box will appear asking you to confirm your choice. If you are certain that you want to use the selected tune-file,

click **Yes** to continue. Otherwise, click **No** and return to step 2 to select a compatible tune-file (the tune-file description in the Open File dialog box will help you to do this).

6. For certain combinations of tune-file and ECM, ProTune II will resolve incompatibilities by adjusting the tune-file data before it is sent to the ECM. The tune-file update dialog box will appear. Select the model year of your motorcycle from the drop-down list options and click **OK** or press **Enter** to continue with the download. Click **Cancel** or press **Esc** to quit the tune-file download.
7. For tune-file updates, you will be asked if you would like to save the current tune-file data in your ECM as a backup (recommended). If you click **Yes**, a Save dialog box will appear allowing you to enter a filename and click **Save**. Additional data transfer progress bars will appear during the update. Allow these transfers to complete. Do not disconnect or remove power from the ECM.
8. The Tune-File will now download to the ECM. A progress bar indicates the amount of data left to send. Do not disconnect the communications cable or switch off power to the ECM during this stage.



9. If the download fails to complete, verify that the ECM still has power (motorcycle ignition on) and the cables are firmly connected. Retry the download. If the download continues to fail, try resetting the ECM by cycling the power (motorcycle ignition off for 15 seconds, then switch

back on).

10. **Important:** When the download completes successfully, a message box will be shown advising you to cycle power to the ECM for at least 15 seconds before continuing. This allows the ECM to reset and power-up cleanly, as the Tune-File download may have updated critical operating parameters. Click **OK** or press **Enter** to dismiss the message box.

SUMMARY: There are two ways to download a Tune-File to the ECM...

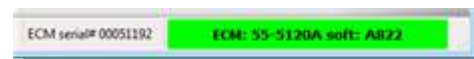
- 1) Using the menu bar: Select **Download Tune-File TO ECM...** from the **Options** menu.
- 2) Using the keyboard: Hold **Ctrl + Shift** and press R.

3.6.6 Upload Tune-File FROM ECM

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[15] for more information.

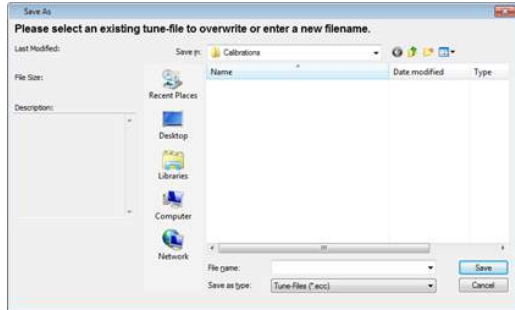
Selecting this function will copy the data inside the ECM and store it on your computer as a Tune-File.

1. First ensure the ECM is connected. See [Connecting the ECM](#) ^[15] for more information.

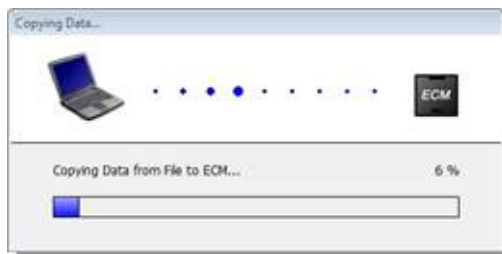


2. Select **Upload Tune-File FROM ECM...**
3. The Save File dialog box will appear. You can either select an existing Tune-File to overwrite by clicking on its filename or

enter a new filename in the File Name box to create a new Tune-File. A description of the Tune-File contents appears on the left side when it is selected.



4. Click **Save**. The Tune-File will now be uploaded from the ECM. A progress bar indicates the amount of data left to load. Do not disconnect the communications cable or switch off power to the ECM during this stage.



5. When the 'Transfer Complete' message appears, click **OK** or press **Enter**. If the upload fails to complete, verify the ECM still has power (motorcycle ignition on) and the cables are firmly connected. Retry the upload. If the upload continues to fail, try resetting the ECM by cycling the power (motorcycle ignition off for 15 seconds, then switch back on).

SUMMARY: There are two ways to upload a Tune-File from the ECM...

- 1) Using the menu-bar: Select **Upload Tune-File FROM ECM...** from the **Options** menu.

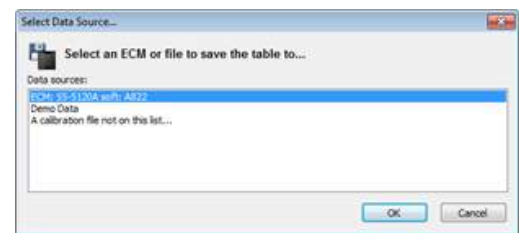
- 2) Using the keyboard: Hold **Ctrl + Shift** and press **S**.

3.6.7 Open Table from

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ^[15] for more information.

Select this function to load the current table from a different data source (ECM or file).

1. Select **Open Table from...**
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



The current table will now be redisplayed with the data from the selected data source. If the data source is the ECM, a progress bar will appear and the data may take a few seconds to load.

SUMMARY: There are two ways to open the current table from a different data source...

- 1) Using the menu bar: Select **Open Table from...** from the **Options** menu.
- 2) Using the keyboard: Hold **Ctrl** + press **O**.

3.6.8 Save Table

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#) ¹⁵ for more information.

Select this function to save the current table to the current data source. Doing this will overwrite the table stored in the current data source. If the current data source is the Demo Data file, a message will appear to inform you that the contents of this file cannot be modified. Click **OK** or press **Enter** to dismiss this message.

SUMMARY: There are two ways to save the current table to the current data source...

- 1) Using the menu bar: Select **Save Table** from the **Options** menu.
- 2) Using the keyboard: Hold **Ctrl** + press **S**.

3.6.9 Save Table To

Select this function to save the current table to a different data source. Doing this will overwrite the table stored in that data source.

1. Select **Save Table To...**

2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



3. The current table will now be saved to the selected data source.

SUMMARY: There are three ways to save the current table to a different data-source...

- 1) Using the tool bar: Click the Save-> button:



- 2) Using the menu bar: Select **Save Table To...** from the **Options** menu.
- 3) Using the keyboard: Hold **Ctrl** + press **T**.

3.6.10 Copy Data-File

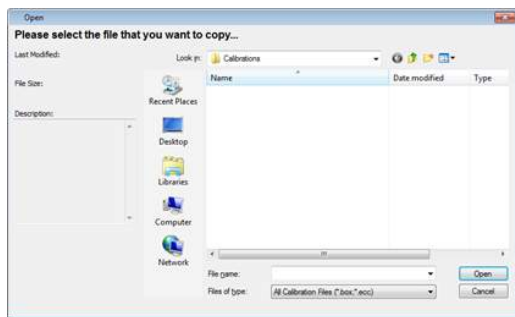
Note: This menu function is not available in Basic User Mode. See [Basic and Advanced](#)

[User Levels](#) ¹⁵ for more information.

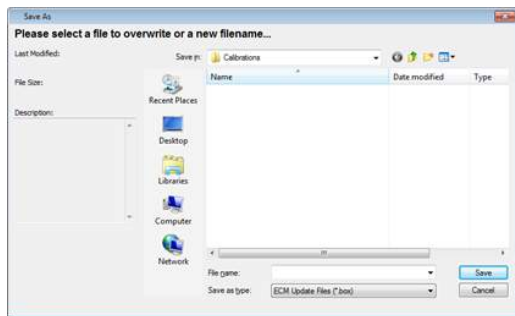
Use this function if you want to make modifications to a calibration file supplied with the software without altering the original.

1. Select **Copy Data-File...**

2. The Open File dialog box will appear. Select a file by clicking on its filename. A description of the files contents appears on the left side when it is selected.



3. The Save File dialog box will appear. You can either select an existing file to overwrite by clicking on its file name, or enter a new filename in the File Name box to create a new file. A description of the files contents appears on the left side when it is selected.



4. The 'File copied' message will appear. Click **OK** or press **Enter**.

SUMMARY: There are two ways to copy an

existing calibration file...

- 1) Using the menu-bar: Select **Copy Data-File...** from the **Options** menu.

- 2) Using the keyboard: Hold **Ctrl** + press **I**.

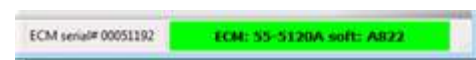
3.6.11 Test Outputs

The Test Outputs function allows you to drive critical ECM outputs directly in order to check the function of ECM electronics, motorcycle wiring, and actuators.

Important: The Test Outputs function assumes control over critical ECM outputs. The output tests will not function while the engine is running. Make sure motorcycle is secure and in neutral before performing any output tests.

Warning! Gasoline and its vapors are highly flammable! Testing an injector while power to the fuel pump is connected will cause injection of excess fuel. It is recommended to remove the fuel pump fuse if several consecutive injector tests are to be performed. Testing an ignition output at any time, especially after an injector test cycle can cause unburned fuel to ignite. Testing the function of the Fuel Pump will result in pressurizing of the fuel system. Be sure that the fuel line connection, fuel rail/injector installation, and all other appropriate connections are complete and secure before proceeding.

1. Ensure the ECM is connected. See [Connecting the ECM](#) ¹⁵ for more information.



2. Select **Test Outputs...**
3. Read the warning message that appears. Click **OK** (or press **Enter**) to continue to the test options or click **Cancel** (or press **Esc**) to return to the software.
4. ProTune II will now send information to the ECM to enable the output test functions.
5. The Test Outputs dialog box will appear. There is a selectable button for each of the eight possible tests; i.e. front and rear ignition, front and rear fuel injectors, fuel pump, tachometer, idle control valve (stepper motor), and Check Engine lamp. Select a test by clicking on one of the corresponding option buttons. A brief description of the selected test will appear and the **TEST** button will be enabled.



6. Click on the **TEST** button to run the selected test. For tests that may cause a hazard (i.e. those involving fuel injection, fuel ignition, and fuel pressurization) a second warning message box will appear. Read the warning message. To cancel the test, click **Cancel** or press **Esc**. To continue with the test, click **TEST** or press **Enter**.
7. On completion of a test, you may repeat the same test or run a different test as many times as required. Simply choose the test by clicking the corresponding option button and click the **TEST** button.

8. When you have finished testing outputs, click **Exit** or press **Esc**. ProTune II will now send information to the ECM to disable the output test functions.

SUMMARY: There are two ways to access the Test Outputs function...

- 1) Using the menu bar: Select **Test Outputs...** from the **Options** menu.
- 2) Using the keyboard: Hold **Ctrl** + press **K**.

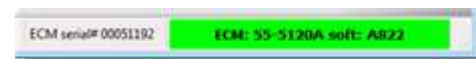
3.6.12 Cylinder Trim Adaptive Map Merge

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

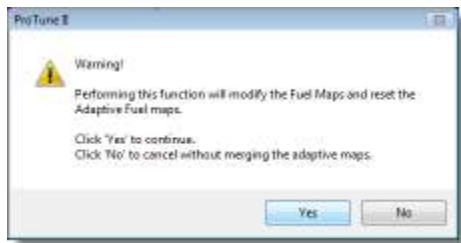
This function allows you to update the Cylinder Adjustment Tables in the ECM with the results of Closed-Loop Fuel adaptation and reset the adaptive maps. For more details on the use of this function see [Using the Adaptive Maps](#)^[86].

This function is only accessible if an ECM that supports Closed-Loop Fuel Control is connected.

1. Ensure the ECM is connected. See [Connecting the ECM](#)^[15] for more information.



2. Select **Cylinder Trim Adaptive Map Merge**. A warning will appear. Read the warning and accept it by clicking **Yes** or cancel by clicking **No**.



3. The current adaptive tables and cylinder adjustment tables will be loaded from the ECM, merged and then sent back to the ECM. The adaptive maps will then be reset to 0%.

SUMMARY: There are two ways to perform the Cylinder Trim Adaptive Map Merge.

- 1) Using the menu bar: Select **Cylinder Trim Adaptive Map Merge** from the **Options** menu. Note this menu item will only be shown when an ECM supporting Closed-Loop Fuel Control is connected.
- 2) Using the keyboard: Hold **Ctrl** + press **N**.

3.6.13 Main Fuel Adaptive Map Merge

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

This function allows you to update the Cylinder Adjustment Tables and the Fuel Injection Base Table in the ECM with the results of Closed-Loop Fuel adaptation and reset the adaptive maps. For more details on the use of this function see [Using the Adaptive Maps](#)^[86].

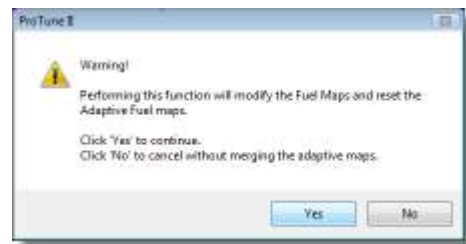
This function is only accessible if an ECM that supports Closed-Loop Fuel Control is connected.

1. Ensure the ECM is connected. See

[Connecting the ECM](#)^[15] for more information.



2. Select **Main Fuel Adaptive Map Merge**. A warning will appear. Read the warning and accept it by clicking **Yes** or cancel by clicking **No**.



3. The current adaptive tables, cylinder adjustment tables and main fuel table will be loaded from the ECM, merged and then sent back to the ECM. The adaptive maps will then be reset to 0%.

SUMMARY: There are two ways to perform the Main Fuel Adaptive Map Merge.

- 1) Using the menu bar: Select **Main Fuel Adaptive Map Merge** from the **Options** menu. Note this menu item will only be shown when an ECM supporting Closed-Loop Fuel Control is connected.
- 2) Using the keyboard: Hold **Ctrl** + press **M**.

3.6.14 Reset Adaptive Maps

Note: This menu function is not available in Basic User Mode. See [Basic and Advanced User Levels](#)^[15] for more information.

This function commands the ECM to reset (to

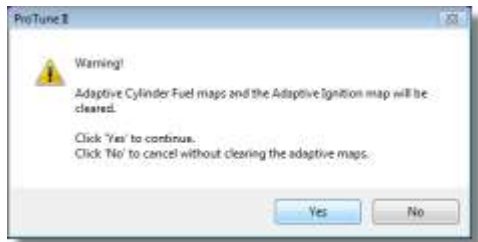
0%) its adaptive fuel maps and the adaptive ignition map. The adaptive fuel trim maps contain values that the ECM learns based upon the results of Closed-Loop Fuel Control. The adaptive ignition map contains long term ignition timing adjustments due to engine knock control. For more details on these subjects see [The Closed-Loop Fuel Control System](#)^[83] and [The Knock \(Adaptive Ignition\) Control System](#)^[88].

This function is only accessible if an ECM that supports Closed-Loop Fuel Control or Knock Control is connected.

1. Ensure the ECM is connected. See [Connecting the ECM](#)^[15] for more information.



2. Select **Reset Adaptive Maps**. A warning will appear. Read the warning and accept it by clicking **Yes** or cancel by clicking **No**.



3. The adaptive maps will now be reset. Click **OK** (or press **Enter**) to continue.

SUMMARY: There are two ways to Reset the Adaptive Maps...

- 1) Using the menu bar: Select **Reset Adaptive Maps** from the **Options** menu. Note this menu item will only be shown when an ECM supporting Closed-Loop Fuel Control or Knock Control is connected.
- 2) Using the keyboard: Hold **Ctrl** + press **R**.

3.6.15 Clear Historic Diagnostic Trouble Codes

Select this function in order to clear the list of historic diagnostic trouble-codes in your ECM. To view the current and historic ECM diagnostic trouble codes, use the [Diagnostic Trouble Codes](#)^[33] function.

1. Ensure the ECM is connected. See [Connecting the ECM](#)^[15] for more information.



2. Select **Clear Historic Diagnostic Trouble Codes**.

3. A message will appear telling you that the trouble-codes have been reset. Click **OK** or press **Enter**.

SUMMARY: There are three ways to clear the historic diagnostic trouble-codes in the ECM...

- 1) Using the menu bar: Select **Clear Historic Diagnostic Trouble Codes** from the **Options** menu.
- 2) Using the keyboard: Hold **Ctrl** + press **E**.
- 3) Using the DTCs dialog box. See [Diagnostic Trouble Codes](#)^[33] for details.

3.7 Help Menu

3.7.1 Help Topics

Select this function to display this help document.

SUMMARY: There are two ways to access this help system...

1) Using the menu bar: Select **Help Topics...** from the **Help** menu.

2) Using the keyboard: Press **F1**.

3.7.2 About ProTune II

Select this function to show the software version and installation details of your copy of ProTune II. This information may be required for customer support. Click **OK** or press **Enter** to dismiss the "About ProTune II" dialog box when finished.



SUMMARY: There are two ways to show the 'About ProTune II' dialog box...

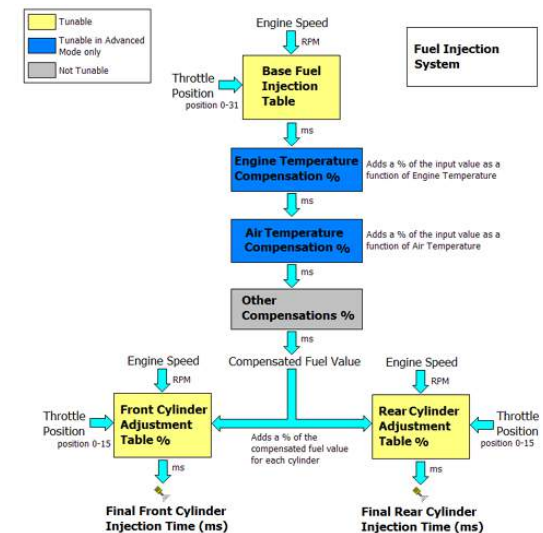
1) Using the menu bar: Select **About ProTune II...** from the **Help** menu.

2) Using the keyboard: Hold the **Ctrl +** press **B**.

4 The Fuel and Ignition Systems

4.1 The Fuel Injection System

The diagram below describes the fuel system of the S&S Cycle® ECM:



The Base Fuel Injection Table provides the initial fuel injector pulse width value in milliseconds (ms) as a function of engine speed and throttle position (with a resolution of 32 throttle sites). The fuel injector pulse width specifies how long the fuel injector is open per fuel injection event. The longer the pulse width, the more fuel that is injected.

The Engine Temperature Fuel Compensation and Air Temperature Fuel Compensation adjust the fuel delivery as a function of temperature. They are only accessible in Advanced Mode (see [Basic and Advanced User Levels](#) ¹⁵ for details of switching modes). Each table adds a percentage of the input fuel injector pulse width as a function of temperature.

Once other non-adjustable compensations are included in the calculation, a compensation value is added for each cylinder. These compensation tables are the

Front Cylinder Fuel Adjustment Table and the Rear Cylinder Fuel Adjustment Table. These compensation tables allow the fuel delivery to be adjusted for each cylinder as a function of engine speed and throttle position (with a resolution of 16 throttle sites). The result of each cylinder compensation produces the final injection pulse width for each cylinder.

Examples of compensation factors:

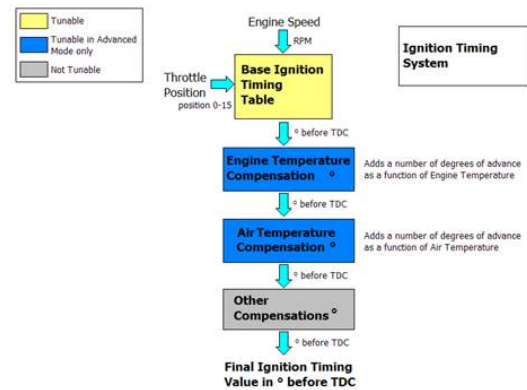
If a compensation value at a particular temperature is 0% and the input value is 4ms, the output of the compensation table would be $4\text{ms} + (0\% \text{ of } 4\text{ms}) = 4\text{ms}$ (no change).

If the compensation value is +100% and the input value is 4ms, the output of the compensation table would be $4\text{ms} + (100\% \text{ of } 4\text{ms}) = 8\text{ms}$ (double the fuel).

If the compensation value is -100% and the input value is 4ms, the output of the compensation table would be $4\text{ms} - (100\% \text{ of } 4\text{ms}) = 0\text{ms}$ (zero fuel).

4.2 The Ignition Timing System

The diagram below describes the ignition timing system of the S&S Cycle® ECM:



The Base Ignition Timing Table provides the initial ignition timing as a function of engine speed and throttle position (with a 16 throttle site resolution). This timing value is the Ignition Advance measured in degrees before TDC (Top Dead Center position). A positive number for the ignition advance will mean that the spark is fired before the piston reaches Top Dead Center during the compression stroke. A zero ignition advance means that the spark will be fired at the Top Dead Center position. A negative number for the ignition advance means that the spark will fire after the piston has reached Top Dead Center.

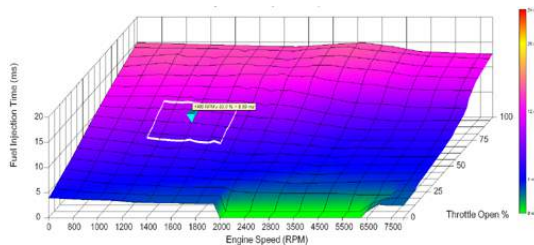
The Engine Temperature Ignition Compensation and Air Temperature Ignition Compensation tables adjust the ignition advance as a function of temperature. They are only accessible in Advanced Mode (see [Basic and Advanced User Levels](#)¹⁵⁾ for details of switching modes). Each table adds an amount of ignition advance which varies with temperature.

After other (non-adjustable) compensations have been added, the result is the Final Ignition Advance value which is used to fire the spark.

5 Tuning in Basic Mode

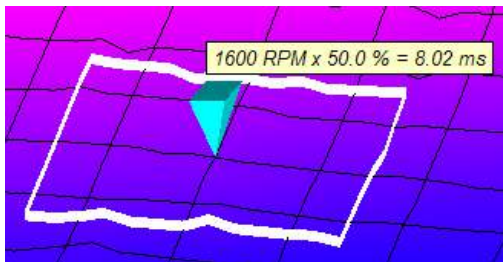
5.1 Viewing and Tuning Tables

The current table is displayed as a three-dimensional graph with Engine Speed in RPM along the horizontal (x) axis, Throttle Position in percent of wide open throttle along the depth (z) axis and table value along the upward (y) axis. For an explanation of what each table contains and does, see [The Fuel Injection System](#)^[65] and [The Ignition Timing System](#)^[66].



The graph is shaded according to the value at each point in the table. The meaning of the shading is illustrated in the color key strip on the right of the graph.

Also shown on the graph are the **Cursor** (bright blue upside-down pyramid) and the **Current Selected Area** (white rectangular boundary).

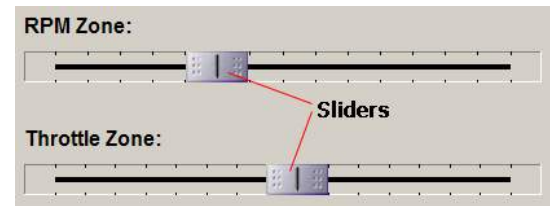


The **Cursor** shows the center of the zone of the table that you are currently editing. Above the **Cursor** is the **Cursor Pop-up Window** (this may be switched off, see [Switch On/Off Map Cursor Pop-up](#)^[28] for details). The **Cursor Pop-up Window** shows the RPM, throttle percentage and

tuned table value at the point of the **Cursor**.

You can move the cursor around the table to the next intersection of the graph lines (zone) by doing one of the following:

- Clicking and dragging the **RPM** or **Throttle Sliders** at the bottom of the screen. Dragging the **RPM Slider** left will move to a lower Engine Speed position (moves cursor left). Dragging it right will move to a higher Engine Speed position (moves cursor right). Dragging the **Throttle Slider** left will move to a lower (closing) throttle position (moves cursor down). Dragging it right will move to a higher (opening) throttle position (moves cursor up).



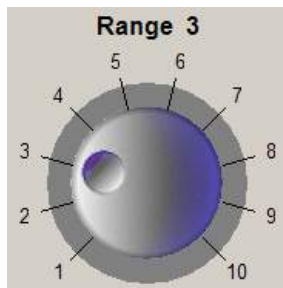
- When pressing the **Arrow keys**, the **Left Arrow** key will move to a lower Engine Speed position (moves the cursor left) and the **Right Arrow** key will move to a higher engine speed position (moves the cursor right). The **Up Arrow** key will move to a higher (opening) throttle position (moves the cursor up) and the **Down Arrow** key will move to a lower (closing) throttle position (moves the cursor down).
- By clicking on an area of the graph. This will move the cursor to the nearest engine speed and throttle zone (intersection of the graph lines).

As you move the **Cursor** the **Current Selected Area** moves with it. The **Current Selected Area** determines how much of the table is affected when you apply tuning to that zone of the table.

You can increase and decrease the size of the **Current Selected Area** by doing one of

the following:

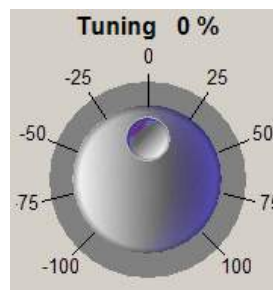
- Moving the **Range Knob** located in the lower center of the screen. Click on the circular knob indent and drag the mouse clockwise or counter-clockwise to adjust its position. The Range is a number from 1 (very small **Current Selected Area**) to 10 (very large **Current Selected Area**).



- By using the **Arrow keys** and **Shift** key. Holding **Shift** and pressing **Left Arrow** or **Down Arrow** will increase the range by 1. Holding **Shift** and pressing **Right Arrow** or **Up Arrow** will decrease the range by 1.

Once you have set the **Current Selected Area** to the portion of the table that you want to tune, you can then adjust its values. You can apply tuning to the **Current Selected Area** by doing one of the following:

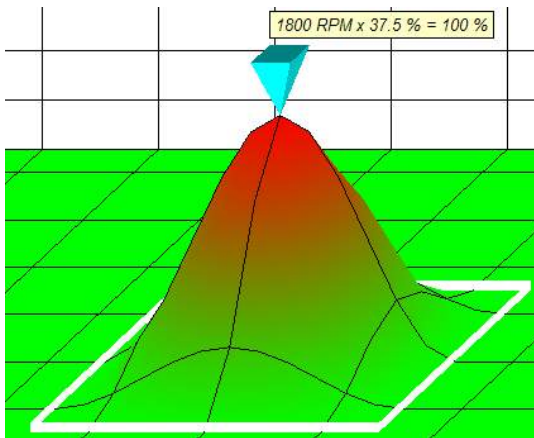
- Move the **Tuning Knob** (left of the **Range Knob**) at the bottom of the screen. Click on the circular knob indent and drag the mouse clockwise or counter-clockwise to adjust its position.



- Use the **Page Up** and **Page Down** keys. Pressing **Page Up** will increase the tuning by 1% and **Page Down** will decrease the tuning by 1%. Holding the **Shift** key and pressing **Page Up** will increase the tuning by 5% and **Shift+Page Down** will decrease tuning by 5%. Holding the **Ctrl** key and pressing **Page Up** will increase the tuning by 25% and pressing **Ctrl+Page Down** will decrease the tuning by 25%.
- Use the **Tuning Buttons** (left of the **Tuning Knob**) to select the size of the tuning increment by clicking either the **Coarse (25%)**, **Medium (5%)**, or **Fine (1%)** buttons. Click on the up-arrow to increase the tuning. Click on the down-arrow to decrease the tuning. Clicking and holding on one of the arrows will continuously increase or decrease.

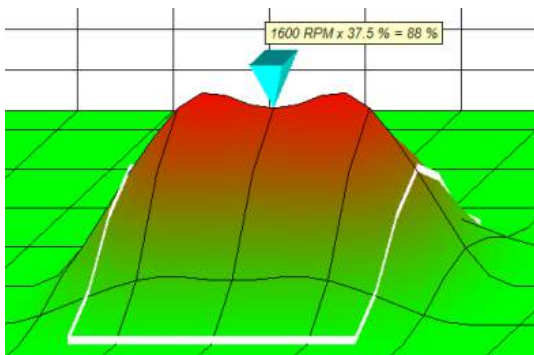


The effect of tuning the **Current Selected Area** will be applied fully at the cursor position and less towards the boundary of the selected area. See the following example of applying 100% to a flat section of a table:



The 100% tuning is applied fully at the cursor position and curves away towards the boundary of the selected area. This enables you to make smooth changes to a table without introducing sudden step changes that may cause poor engine response.

When tuning is applied to two zones of a table that are next to each other and the selected areas overlap, the tuning effect is blended (additively) between the two zones. See the example below:



In this example, three RPM zones next to each other are tuned and overlap.

The tuning range is applied differently depending on the table you are tuning:

- The **Base Fuel Injection Table**. A value is added corresponding to the tuning percentage of original value. For example, if the cursor is at 8 ms, applying a tuning of 100% will double the fuel at the cursor

position to 16 ms. If the tuning was set to -50% this would halve the fuel at the cursor position to 4 ms.

- The **Base Ignition Timing Table**. A tuning of +30° corresponds to adding 30 degrees of ignition advance (moving the ignition point 30 degrees more before Top Dead Center). A tuning of -30° corresponds to subtracting 30 degrees of ignition advance (moving the ignition point 30 degrees towards or after Top Dead Center).
- The **Front Cylinder Adjustment Table** and **Rear Cylinder Adjustment Table**. The tuning percentage value is added to the table's percentage value. For example, if the cursor is at 10% and the tuning knob is set to +10%, the tuned value will be 20%. If the cursor is at 10% and the tuning knob is set to -10%, the tuned value will be 0%.

This tuning system ensures that you can make safe and smooth changes to the original table values. To make changes that are more detailed to the tables, you must switch to Advanced Mode (see [Select User Level...](#)^[54] for more details).

To undo a change that you have made to the table, select [Undo](#)^[25] from the **Edit** menu.

Once you have made the changes you require to a table, you can save it by selecting [Save Table To...](#)^[60] from the **Options** menu. Once saved, the tuning applied to a table is reset so that the tuned values now become the original table values and can be tuned further.

5.2 Live-Tune in Basic Mode

Live-Tune mode allows you to make a direct connection with the ECM so that any tuning you apply to the current ECM table takes

immediate effect in the ECM. Live-Tuning can be very useful as you can run the engine in different throttle and RPM zones and see instantly how your tuning effects the engine performance.

Tuning in Live-Tune mode is performed the same way as tuning in normal mode. See the [Viewing and Tuning Tables](#) ^[67] page of this section for more information on how to tune.

To tune in Live-Tune mode you must edit a table that is loaded from the ECM. To do this:

1. First ensure the ECM is connected. See [Connecting the ECM](#) ^[15] for more information.



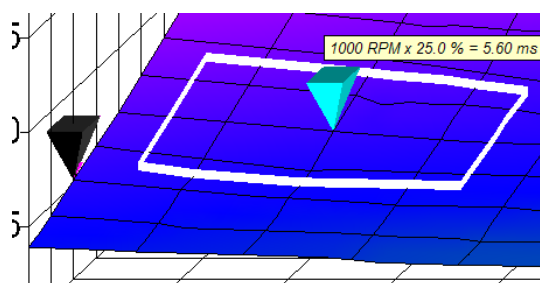
2. Load the table that you want to Live-Tune from the ECM. Select the table using the tool-bar or the **View** menu. Select the ECM as the current data source using the **Current Data Source Selector** at the top of the screen or from the **View** menu.
3. You now need to activate Live-Tune mode by selecting [Live-Tune Mode On/Off](#) ^[29] from the **Edit** menu or click the Live! button on the toolbar.



4. ProTune II will automatically send new control information to the ECM and Live-Tune mode will become active. Tuning the table will now directly effect the tuning in the ECM.

Note that during Live-Tune, many of the program's functions are disabled. You must deactivate Live-Tune mode in order to return to normal mode.

When Live-Tune mode is active, a second (black) cursor will appear on the 3D-graph:



This is the **Live Cursor** and shows you the position in the table that the engine is currently running. As you increase throttle position and/or engine speed, the **Live Cursor** will move across the table. You are free to move the blue **Cursor** around the table so that you can tune any part of the table. If you tune a part of the table which contains the **Live Cursor**, you will be able to detect this change in your engine's running behavior.

In Live-Tune mode, the **Cursor Location** section of the information bar now reflects the **Live Cursor** position and tuning at that position.

Cursor Location			
RPM:	Throttle %	Fuel (ms)	Tuned Fuel (ms)
0	14.1	9.70	9.70

The **Cursor Pop-up Window** above the blue **Cursor** will reflect the table values at that location.

Once you have finished Live-Tuning you need to deactivate Live-Tune mode:

1. Select [Live-Tune Mode On/Off](#) ^[29] from the **Edit** menu or click the Live! button.
2. ProTune II will automatically send new control information to the ECM and Live-Tune mode will deactivate.

The ECM is now running its original (pre-Live

Tune) table. In order to implement the changes that you have made to the table active, you must send the Live-Tuned table to the ECM. A message will appear when you deactivate Live-Tune mode asking if you want to do this. Click **Yes** to send the tuned table to the ECM. Important: If you click **No**, the Live-Tune changes will be lost and the original table values will be reloaded.

More:

[Setting and Moving the Cursor Position](#) ^[71]

[Selecting an Area of the Table](#) ^[71]

[Editing Table Values](#) ^[72]

[Using Math Functions to Adjust Table Values](#)

^[73]

[Tag/Untag Cells](#) ^[73]

[Changing the Grid Size of the Spreadsheet](#)

^[74]

6 Tuning in Advanced Mode

6.1 Using The Spreadsheet

The spreadsheet provides the most direct way of editing the values in a table.

For the main tables (Base Fuel Injection Time, Base Ignition Timing, Front and Rear Cylinder Fuel Adjustment tables), the spreadsheet shows engine speed in RPM along the columns of the table and throttle position along the rows of the table. The first row of the table represents full (wide-open) throttle and the last row represents closed throttle. To change the unit used for the throttle position, see [Preferences](#) ^[54]. Columns and rows shown in blue indicate that the current selected row/column.

As the table is often too big to fit on the screen, scroll-bars are provided. Click and drag the dark gray bubble-areas of the scroll-bars to scroll the table.

Moving the cursor and selecting areas will also scroll the table (see below).

Browse one of the sections below for details on using the spreadsheet interface.

6.1.1 Moving the Cursor Position

The cell surrounded by the black-rectangle shows the current **Cursor** position. This is the current cell on the spreadsheet that is being edited. You can move the cursor around the table by doing one of the following:

- Use the Cursor keys, pressing the **Left**, **Up**, **Down** and **Right** arrow keys to move the cursor in that direction. If the cursor moves out of the visible area of the table, the table will scroll automatically to keep it visible.
- Click on a cell in the spreadsheet, this will move the cursor to that cell.
- Click on a location in the 3D-graph, the cursor on the spreadsheet will move to the same location.

6.1.2 Selecting an Area of the Table

You can use the spreadsheet to select an area of cells in the table. The black border shows the extent of the selected area. Selected cells, columns, and rows are shown in blue with the cursor position shown in white.

	850	900	950	1000	1050	1100
58	8.43	8.29	8.14	7.99	7.80	7.86
17	8.02	7.88	7.74	7.60	7.74	7.36
75	7.61	7.47	7.34	7.20	7.03	6.85
34	7.20	7.07	6.93	6.80	6.64	6.52
93	6.79	6.66	6.53	6.40	5.88	6.03
51	6.38	6.26	6.13	6.00	5.62	5.83

You can select an area of the table using one of the following methods:

- Hold the **Shift** key and press the Cursor keys **Left**, **Right**, **Down**, or **Up** to expand or shrink the selected area in that direction. If the cursor moves outside of the visible area of the table, the table will scroll to keep it visible.
- Click on a cell and drag the mouse to select a region. The cell that you click on will form one corner of the selected area with the opposite corner being determined by the mouse position.
- Clicking on a column or row header to select that column/row. Clicking and dragging across the column or row headers will select multiple rows/columns.
- Hold the **Ctrl** key and press **A** to select the entire table. You can also access this function by right-clicking on a cell in the spreadsheet and selecting **Select All** from the menu.
- You can click and drag the mouse on the 3D-graph to select an area of the graph, this will also select the matching area on the spreadsheet.

To cancel the current selected area, press the **Esc** key, or move the cursor outside of the selected area. You can also right-click on the selected area of the spreadsheet and pick **Deselect** from the menu.

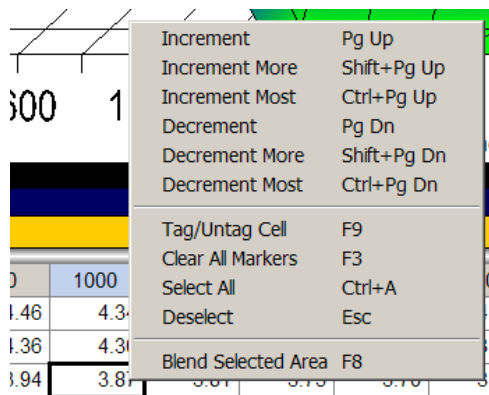
6.1.3 Editing Table Values

Once you have selected a cell or an area of cells to edit, you can then adjust the values of those cells. To enter a new value for the current cell or current selected area, type in the new value and press **Enter**. Pressing a number key will automatically start editing the cursor cell, use the **number keys** and **back-space** key to edit the value. Press **Esc** to cancel the editing without adjusting the value or press **Enter** to accept the new value. You can also edit a cell by double clicking on it and end editing by pressing one of the cursor keys to move to the next cell.

When you enter a new value, that value will be set in the cursor cell and any selected area. If the number is outside of the range of the table, it will be set to the nearest value allowed.

You can also adjust the value in the cursor cell or current selected area by using the **Page Up** and **Page Down** keys. **Page Up** will add a x1 increment to the selected area (0.01ms for the Fuel table, 0.1 degree of advance for the Ignition table, 1 % for cylinder adjustment tables). **Page Down** will subtract a x1 decrement from the selected cells. Holding the **Shift** key while pressing **Page Up** or **Page Down** will increment/decrement the selected cells by a x10 amount (0.1 ms for the Fuel table, 1 degree of advance for the Ignition table). The increment/decrement while holding the **Shift** key for the cylinder adjustment tables is +/- 5 %. Holding the **Ctrl** key while pressing **Page Up** or **Page Down** will increment/decrement the selected cells by a x100 unit amount (1 ms for the Fuel table, 10 degrees of advance for the Ignition table). The increment/decrement while holding the **Ctrl** key for the cylinder adjustment tables is +/- 25 %. These functions can also be accessed via the mouse by right clicking on the cursor cell or selected area and selecting one of the **Increment** or **Decrement** items from the

menu. You can also right-click any part of the 3D graph to access this menu.



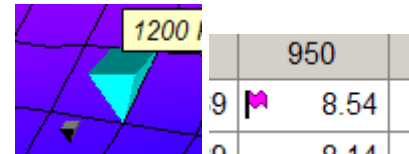
6.1.4 Using Math Functions to Edit Table Values

ProTune II supports the use of basic math functions (add, subtract, multiply and divide) to edit cell values. To apply a math function to the cursor cell or selected area:

- To add a value to the selected cells, type **+** followed by the value to add and press **Enter**. For example **+2 <Enter>**.
- To subtract a value from the selected cell, type **-** followed by the value to subtract and press **Enter**. For example **-2 <Enter>** will subtract 2 from the value. To set the value as a negative number rather than performing a subtraction, type **=** followed by the negative number. For example **=-2 <Enter>** will set the value as -2.
- To multiply the selected cells by a value, type ***** followed by the value to multiply and press **Enter**. For example ***2 <enter>**.
- To divide the selected cells by a value, type **/** followed by the value to divide by and press **Enter**. For example **/2 <enter>**.

6.1.5 Tag/Untag Cells

Cells on the table can be tagged (marked) for later reference. When a cell is tagged, it appears with a flag symbol next to it on the spreadsheet and an upside down triangle marker on the graph.



Cells can be tagged in three ways:

- Manually tagged at user discretion, these tags will appear in purple.
- Automatically tagged by ProTune II during Live-Tune to show the cells that the engine has visited the cell during running. These tags will appear in purple.
- Automatically tagged by ProTune II during Live-Tune to show that a cell value has been adjusted. These tags will appear in green.

Cells and areas of cells can be manually tagged or untagged by moving the cursor to the required cell (or selecting an area of cells) and doing one of the following:

- Pressing **F9**.
- Right-clicking on the selected cells and picking **Tag/Untag Cells** from the menu.
- Selecting **Tag/Untag Cells** from the **Edit** menu.

The feature that automatically tags cells during Live-Tune can be toggled on/off by selecting **Switch On/Off Auto-Tagging in LiveTune** from the **Edit** menu or by pressing **Shift+F7**.

All tags present in the current table can be cleared by selecting **Clear All Markers** from the **Edit** menu or by pressing **F3**.

6.1.6 Grid Size of the Spreadsheet

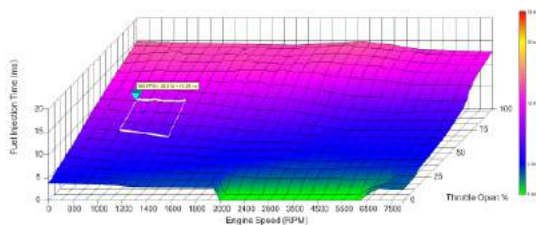
You can change the size of the cells and the values inside the cells by changing the grid size of the spreadsheet. There are three modes: small, normal and large. The default mode is 'normal'.

To change the size, select **Cycle Grid Size** from the **Edit** menu or hold the **Shift** key and press **F6**. This will move from 'normal' mode to 'large' mode.

Select again to move from 'large' mode to 'small' mode. Select once more to move from 'small' mode back to 'normal' mode.

6.2 Using the 3D Graph

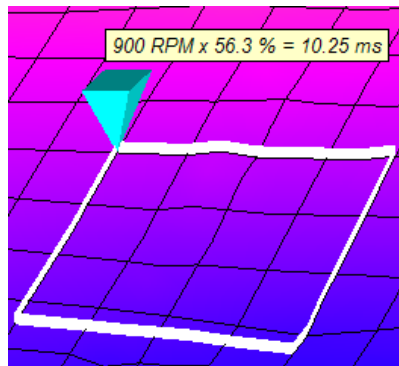
The 3D graph displays the current table as a three-dimensional surface plot with Engine Speed in RPM along the horizontal (x) axis, Throttle Position along the depth (z) axis and table value along the upward (y) axis. To change the unit used for the throttle position, see [Preferences](#) ^[54].



The graph is shaded according to the value at each point in the table. The meaning of the shading is illustrated in the color key strip

(right of the graph) by showing how the colors map onto the table values.

Also shown on the graph is the cursor (bright blue upside-down pyramid). A selected area of cells is shown on the graph by a white rectangular boundary.



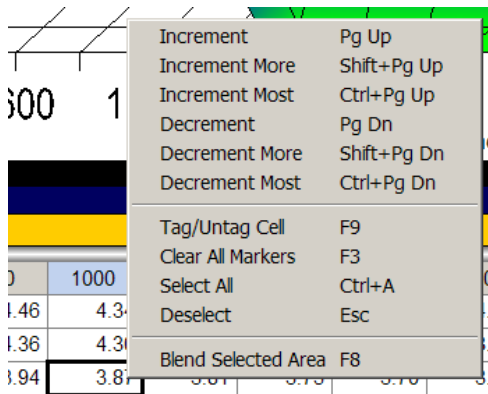
Above the cursor is the cursor pop-up window (this may be switched off, see [Switch On/Off Map Cursor Pop-up](#) ^[28] for details). The cursor pop-up window shows the RPM, throttle position and tuned table value at the point of the cursor.

When you edit the table using the spreadsheet, the changes made will be reflected on the graph (see [Using The Spreadsheet](#) ^[71] for more details).

You can set a new cursor position by clicking on the graph. The cursor will move to the nearest cell.

To select an area using the graph, click and drag the mouse over the area of the graph that you want to select.

The edit-menu accessed by right-clicking on the spreadsheet can also be accessed by right-clicking any part of the 3D graph.



6.3 Spreadsheet and Graph Layout

You can change the relative size of the spreadsheet and graph by using the Splitter-bar located midway between them.



Click on the splitter bar and drag it up or down to change the size of the graph and spreadsheet.

You can also switch the position of the graph and the spreadsheet, switch to spreadsheet-only, or graph-only mode. To do this, select **Cycle Grid/Graph Position** from the **Edit** menu (or press **F6**). Select this function once to switch to 'spreadsheet top, graph bottom' mode. Select again to move to 'spreadsheet-only' mode. Select again to switch to 'graph-only' mode. Select the function again to switch back to the default 'graph top, spreadsheet bottom' mode.

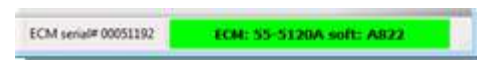
To change the spacing of the dividing lines on the 3D graph, select **Cycle Graph-Line Resolution** from the **Edit** menu or press **F5**.

6.4 Live-Tune in Advanced Mode

Live-Tune mode allows you to make a direct connection with the ECM so that any tuning you apply to the current ECM table takes immediate effect in the ECM. Live-Tune can be very useful as you can run the engine at different throttle and speeds and see instantly how your tuning effects the engine performance.

To tune in Live-Tune mode you must edit a table that is loaded from the ECM. To load a table from the ECM:

1. Ensure the ECM is connected. See [Connecting the ECM](#) ¹⁵ for more information.



2. Load the table that you want to Live-Tune from the ECM. Select the table using the tool-bar or the **View** menu. Select the ECM as the current data source using the Current Data Source Selector at the top of the screen or from the **View** menu.

Browse the following sections for information on how to Live-Tune.

More:

[Activating Live-Tune Mode](#) ⁷⁶

[Tuning in Live-Tune Mode](#) ⁷⁶

[Deactivating Live-Tune Mode](#) ⁷⁷

6.4.1 Activating Live-Tune Mode

To activate Live-Tune mode:

1. Select **Live-Tune Mode On/Off** from the **Edit** menu or click the Live! button on the toolbar.

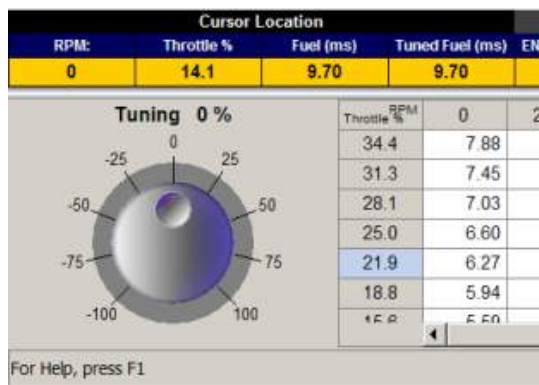


2. ProTune II will automatically send new control information to the ECM and Live-Tune mode will become active. Tuning the table will now directly effect the tuning in the ECM.

Note that during Live-Tune, many of the program's functions are disabled. You must deactivate Live-Tune mode to return to normal mode.

6.4.2 Tuning in Live-Tune Mode

When Live-Tune mode is active the Tuning Knob will appear to the left of the spreadsheet.



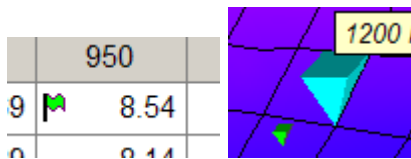
Move the editing cursor around the table using the **Cursor keys** or by clicking on areas of the graph (see [Using The](#)

[Spreadsheet](#)^[71] and [Using the 3D Graph](#)^[74] for more details). To tune the cell at the cursor position, click on the indent of the Tuning Knob and drag the mouse clockwise or counter-clockwise to adjust its position. You can also use the **Page Up** and **Page Down** keys to increment (page up) and decrement (page down) the cell value. Holding the **Shift** key while pressing **Page Up** and **Page Down** results in a larger adjustment. Holding the **Ctrl** key while pressing **Page Up** and **Page Down** results in the largest adjustment.

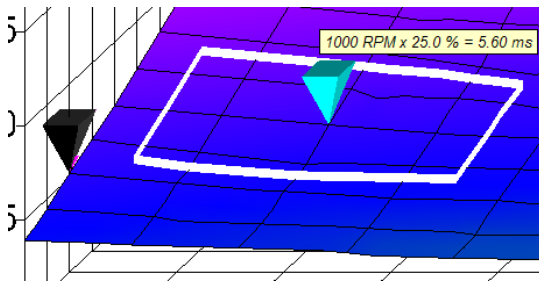
The tuning adjustment is applied differently depending on the table that you are tuning:

- The Base Fuel Injection Table. A value is added corresponding to the tuning percentage of original value. For example, if the cursor is at 8 ms, applying a tuning of 100% will double the fuel at the cursor position to 16 ms. If the tuning was set to -50% this would halve the fuel at the cursor position to 4 ms.
- The Base Ignition Timing Table. A tuning of +30° corresponds to adding 30 degrees of ignition advance (moving the ignition point 30 degrees more before Top Dead Center). A tuning of -30° corresponds to subtracting 30 degrees of ignition advance (moving the ignition point 30 degrees towards or past Top Dead Center).
- The Front Cylinder Adjustment Table and Rear Cylinder Adjustment Table. The tuning percentage value is added to the tables percentage value. For example, if the cursor is at 10% and the tuning knob is set to +10%, the tuned value will be 20%. If the cursor is at 10% and the tuning knob is set to -10%, the tuned value will be 0%.

Tuning a cell will result in a green tag marker being placed at that cell. This marker shows the cells that you have adjusted during Live-Tuning.



While Live-Tune mode is active, a second (black) cursor is shown on the 3D-graph:



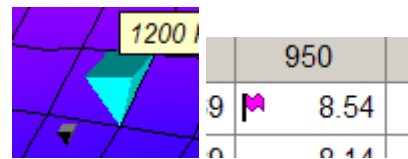
This is the Live Cursor that shows you the position in the table that the engine is currently running at. As you increase throttle position and/or engine speed, the Live Cursor will move across the table. You are free to move the blue Cursor around the table so that you can tune any part of the table. If you tune a part of the table which contains the Live Cursor, you will be able to detect this change in your engine's running behavior.

In Live-Tune mode, the Cursor Location section of the information bar now reflects the Live Cursor position and tuning at that position.

Cursor Location				
RPM:	Throttle %	Fuel (ms)	Tuned Fuel (ms)	
0	14.1	9.70	9.70	

The Cursor Pop-up Window above the blue Cursor will reflect the table values at that location.

As you Live-Tune, purple tags will be left at the cells that the engine has visited during Live-Tuning. To switch off this feature, see [Switch On/Off Auto-Tagging in LiveTune](#)^[29].



6.4.3 Deactivating Live-Tune Mode

Once you have finished Live-Tuning you need to manually deactivate Live-Tune mode:

1. Select **Live-Tune Mode On/Off** from the **Edit** menu or click the Live! button.



2. ProTune II will automatically send new control information to the ECM and Live-Tune mode will deactivate.

The ECM is now running its original (pre-Live Tune) table. In order to implement the changes that you have made to the table, you must send the Live-Tuned table to the ECM. A message will appear when you deactivate Live-Tune mode asking whether you want to do this. Click **Yes** to send the tuned table to the ECM.

Important: If you click **No**, the Live-Tune changes will be lost and the original table values will be reloaded.

7 Gauges and Realtime Data

7.1 Using the Gauges Window

The Gauges Window allows you to view various ECM parameters in real-time and arrange them on-screen. To view the Gauges

Window:

1. First ensure the ECM is connected. See [Connecting the ECM](#) for more information.



2. Click the **Gauges** button, or select **ECM Gauges** from the **View** menu, or hold **Ctrl** and press **3**.

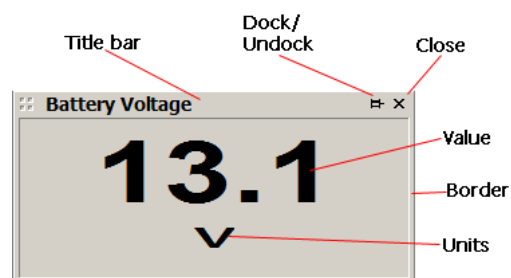


The Gauges window will appear on screen. This window can be moved, resized, minimized and maximized independently from the main window using its title bar and the Windows® buttons in the top-right corner. To close the window, click the close button (X) in the top-right corner.



The gauges layout may be opened and saved as a file. The default location for these files is My Documents\ProTune 2\Gauge Views. See [Opening and Saving the Gauges Window Layout](#) for more information.

Each gauge is displayed in its own window. A gauge can be presented as a text display for text and numeric channels or a dial for numeric channels.



The gauge can be moved around the display by clicking and dragging its title bar. Clicking the title bar of a gauge window selects it and makes it the current gauge.

The border of the gauge can be used to resize it. Click and drag one of the edges or corners of the gauge to resize it in that direction.

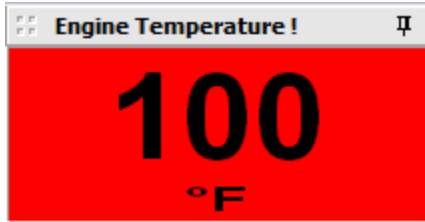
Click the close button (X) of a gauge window to remove it from the display.

The dock/undock button can be used to lock the gauge into a particular position. When undocked (the dock button appears as a horizontal 'thumb tack' icon) the gauge can be moved, resized and closed. When docked (the dock button appears as a vertical 'thumb tack' icon), the gauge is fixed into position and the close button and resizing border disappear. Docked gauges can make for neater displays as well as preventing accidental moving, resizing, and closing of gauges. Click on the button to toggle between its docked and undocked state.

Some gauges will have shaded background colors according to their state. The 'Target Closed-Loop', 'Front Cylinder Closed-Loop' and 'Rear Cylinder Closed-Loop' gauges are shaded to match the options on the 'Target Closed-Loop Fuel Map'.

Input gauges will flash red when the ECM detects that the input value is outside of the valid range. The title of the gauge will appear with an exclamation mark (!). When in this state, the gauge may show the default value that the ECM will use for this input (in

the example shown below, the engine temperature from the sensor is outside of valid range and the ECM is using 100 °F as a default value for this input).



More:

[To Add a Dial or Text Gauge...](#)

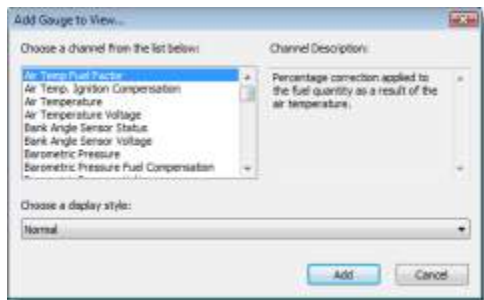
[To Remove a Gauge...](#)

[Always On Top setting](#)

[Saving the Gauges Window Layout](#)

7.1.1 To Add a Dial or Text Gauge

Go to the **View** menu of the Gauges Window and select **Add...** The Add Gauge dialog box will be displayed.



Choose a channel from the list by clicking on it. When you select a channel, a description appears in the description box on the right side. If the channel is numeric (number based) the display style drop-down list will allow you to choose between a "Normal" display and a "Dial" display. Text-based channels can only be displayed with "Normal" displays.

To add the selected channel, click **OK** or press **Enter**. If you do not wish to add the channel, click **Cancel** or press **Esc**.

If a channel is selected, the new gauge window will now appear on screen and can be repositioned and resized as required.

7.1.2 To Remove a Gauge

To remove an undocked (floating) gauge window from the display, either click on its close (X) button or select it by clicking on its title bar and select **Remove** from the **View** menu of the Gauges Window.

7.1.3 Always On Top setting

By default, the gauges window is set so that it will always appear on top of other windows. To change this so that the Gauges Window can be moved to the background, click on the **Always on Top** menu item in the **View** menu of the Gauges Window. This will remove the check mark from this menu item and you can now move the Gauges Window to the background. Click on the menu item again to reset the **Always on Top** property.

7.1.4 Opening and Saving the Gauges Window Layout

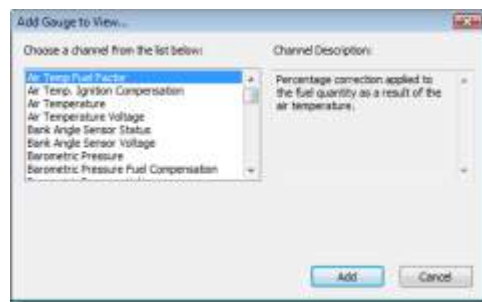
To open a layout from file, select **Open**

Layout from the **View** menu of the Gauges Window.

When you have modified the Gauges Display and attempt to close it, ProTune II will ask you whether you want to save your changes. Click **Cancel** to return to the Gauges Displays. Click **Yes** to save the current display state or click **No** if you do not want to save your changes.

To save the display layout manually, select **Save Layout** from the **View** menu of the Gauges Window.

To save the display layout to a specific filename, select **Save Layout As** from the **View** menu of the Gauges Window.



Choose a parameter channel from the list (by clicking on it) or select **–none–** if you don't want to display a channel in that cell. When you select a channel, a description of that channel appears in the description box on the right side.

To set the selected channel, click **OK** or press **Enter**. If you do not wish to change the channel, click **Cancel** or press **Esc**.

If you need a larger or more complex display of ECM parameters, use the Gauges Window. See [Using the Gauges Window](#) for more information.

7.2 The Engine Data Area

When the ECM is connected, the Engine Data section of the information bar will be displayed in the middle row of the screen. The Engine Data area allows you to select up to 6 ECM parameters to view in real-time while tuning a table.

Engine Data					
ENG TEMP. (°F)	AIR TEMP (°F)	BATT V (V)	Target Idle (RPM)	Stepper Position (steps)	Shift Light (L)
-39	-22	13.1	1300	255	Off

You can choose parameters by clicking on the bright blue down arrow symbol on the right side of each parameter title. This will display the Add Gauge dialog box.

8 Advanced Calibration Tables

8.1 Viewing and Editing Advanced Tables

The advanced tables can be accessed from the **View** menu by selecting one of the following items:

- Engine Temperature Ignition Compensation
- Air Temperature Ignition Compensation
- Engine Temperature Fuel Compensation
- Air Temperature Fuel Compensation
- Engine Temperature Start Map
- Stepper Pre-Start Position Map
- Stepper Position with Temperature Map
- Stepper Position Fuel Compensation Map
- Target Closed-Loop Fuel Map

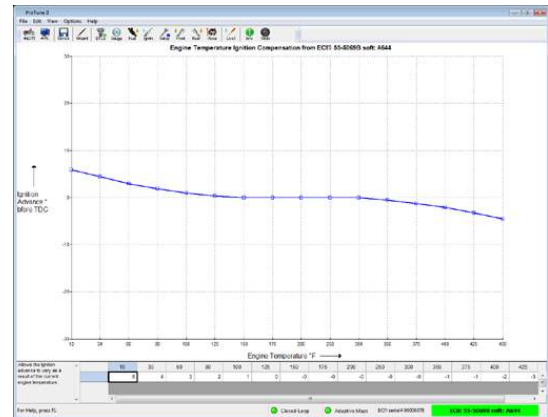
For details of what these tables do, browse the following sections ([Temperature Compensation Tables](#)^[82], [Engine Temperature Start Map](#)^[82], and [Stepper Motor Tables \(Idle Speed Control\)](#)^[82]).

To view or edit an advanced table:

1. Select one of the advanced tables listed above from the **View** menu.
2. The Select Data Source dialog box will appear. The dialog box will list the current active data sources; i.e. the ECM if it is connected, the demonstration data built into the software, and any calibration files that you accessed since starting the software. To select a data source, click on it to highlight it and then click **OK** or press **Enter**. You can also double-click on an item to select it. If you want to browse for another calibration, select the '**A calibration file not on this list**' option. This will cause an Open File dialog box to appear. Select a calibration file from this dialog box and click **Open**.



The table will be loaded and will appear as a 2D line graph, with a single row spreadsheet below it.



The vertical y-axis (height) shows the range of values for the table and the horizontal x-axis (width) corresponds to the columns of the table. A small text box displays a short description of the table (left of the spreadsheet).

Table values can be edited via the spreadsheet in the same way as the main fuel and ignition tables. Move the cursor around the spreadsheet using the **Left** and **Right** arrow keys. Type in a value and press **Enter** to change one of the cell values. See [Using The Spreadsheet](#)^[71] for more details.

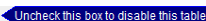
Certain functions are disabled with the advanced tables as they are not applicable. Namely:

- You cannot Live-Tune the advanced tables.
- You cannot tag cells in the advanced tables.
- You cannot change the display layout when viewing advanced tables.

When you have finished editing an advanced table you can select [Save Table...](#)^[60] from the Options menu to save it to its original data source or [Save Table To...](#)^[60] to save it to a different data-source.

Certain advanced maps will have an enable/disable checkbox located under the spreadsheet. Checking this box will enable the map in the ECM/Calibration file. Unchecking the box will ensure that the map

is not used in the ECM/Calibration file. The arrow box located to the right of the check-box contains further information on the check-box setting.

☒ Enable Stepper Position Fuel Compensation  Uncheck this box to disable this table

When the check-box is unchecked, the map values are 'grayed-out' and cannot be edited. The checkbox setting will be saved when the map is saved.

8.2 Temperature Compensation Tables

The temperature compensation maps adjust fuel and ignition as a function of the current engine and air temperatures. For a full description of how these compensation tables work, see [The Fuel Injection System](#) ^[65] and [The Ignition Timing System](#) ^[66].

8.3 Engine Temperature Start Map

The Engine Temperature Start Map adjusts the fuel delivery during cranking as a function of engine temperature. The table adds a percentage of the input fuel injector pulse width as a function of the engine temperature.

For example if the compensation factor from the Engine Temperature Start Map is +85% and the input fuel injector pulse width is 4ms, the output of the table will be 4 + (85% of 4) = 7.4ms.

See [The Fuel Injection System](#) ^[65] for more details on how the fuel system works and how fuel compensation works.

8.4 Stepper Motor Tables (Idle Speed Control)

The stepper-motor on your motorcycle is used to control the idle speed of the engine by automatically adjusting the throttle valve position by small amounts.

The stepper motor can drive the throttle valve open by a small amount to allow more air to pass and therefore increase engine speed. It can also close the throttle by a small amount to decrease engine speed. TheS&S Cycle® ECM has a closed-loop control feature that allows automatic throttle opening and closing to maintain an appropriate and constant idle speed (the speed of the engine when the throttle is closed and the motorcycle is not moving). It does this by trying to achieve the target idle speed taken from the target idle speed table in the ECM.

You can edit the target idle speed of the ECM by changing the [Target Idle Speed Setting](#) ^[44]. This is the speed that the ECM will try to attain when idling. When the engine is started, the target idle speed will be set at the optimum value for the engine temperature and conditions. As the engine warms up and runs, the target idle speed will move towards the value that you specify.

The initial stepper position when the engine starts affects both the starting characteristics of the engine and how quickly the required idle speed can be attained after engine start. The stepper-motor position during cranking can be tuned by adjusting the [Stepper Pre-Start Position Map](#) ^[42]. This map can be enabled or disabled by using the checkbox positioned below the map spreadsheet. When this checkbox is checked, the Stepper Pre-Start Position Map is enabled in the ECM/Calibration file and the values in this map will be used to determine the stepper-motor pre-start position.

When the checkbox is unchecked, the

Stepper Pre-Start Position Map is disabled in the ECM/Calibration file and the stepper pre-start position will be set as a function of the learned idle control value in the ECM.

The initial stepper position after engine start can be adjusted as a function of initial engine temperature by tuning the [Stepper Position with Temperature Map](#) ^[43]. Both of these tables have outputs ranging from 0 steps (no additional throttle) to 205 steps (maximum additional throttle).

The stepper motor should be wired so that an increase in stepper number (0-205) corresponds to an increase in throttle. If you have an application where the stepper-motor requires different wiring, you can select the orientation mode of the stepper motor in the ECM by editing the [Stepper Motor Orientation Setting](#) ^[41]. This setting should be left as default unless you have specific reason to change it.

As the stepper motor opens the throttle, you may want to compensate for the extra engine speed by adjusting the fuel delivery. This can be done using the [Stepper Position Fuel Compensation](#) ^[45] table. This table adds a percentage fuel compensation depending on the degree of stepper motor travel. The map can be enabled or disabled by using the checkbox positioned below the map spreadsheet. When this checkbox is checked, the Stepper Position Fuel Compensation table is enabled in the ECM/Calibration file and the values in this map will be used to adjust the fuel.

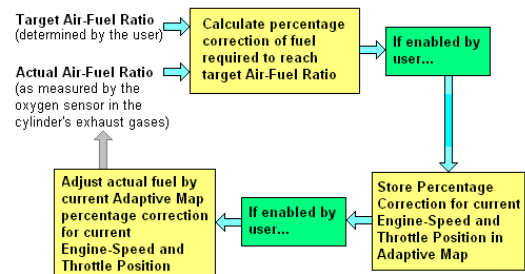
When the checkbox is unchecked, the Stepper Position Fuel Compensation table is disabled in the ECM/Calibration file and the fuel will not be adjusted by this table.

9 Closed-Loop Fuel Control

9.1 The Closed-Loop Fuel Control System

The S&S® ECM supports the Closed-Loop Fuel Control system. When fitted to a motorcycle with oxygen sensors in the exhaust system, this feature allows the ECM to learn (as the engine runs) the optimal fuel delivery required to maintain a specific fuel mixture or Air-Fuel Ratio (AFR). The ECM can then use that information to automatically adjust the fuelling towards that optimal value and continue refining the value to reach the desired Air-Fuel Ratio.

Below is a diagram that summarizes how this system works. Each cylinder (front and rear) has its own separate Closed-Loop Fuel Control system so the ECM can learn the optimal fuel values for each cylinder independently of the other.



The diagram shows that the ECM continually calculates how much fuel correction is needed to adjust the current Air-Fuel Ratio to the value required by the user. Optionally, that percentage correction may be stored in the cylinder's Adaptive Map so that a pattern of required fuel correction can be built up over different engine speeds and throttle positions. The [Closed-Loop Control Settings](#) ^[37] allows the user to specify that the current percentage correction is applied to the current fuel output. In other words, the adjusted fuel output will affect the actual measured Air-Fuel Ratio, thus completing the

loop.

ProTune II allows you to specify a general target mixture for different engine speeds and throttle positions by editing the Target Closed-Loop Fuel Map, see [Setting the Target Air-Fuel Mixture](#)^[85] for details. It also allows you to decide whether the Adaptive Map is to be changed and/or whether the current Adaptive Map value is to be used to adjust the current fuel output. This enables the option of running the engine over time to build an Adaptive Map and then using it later to correct the fuel. In addition, you can control when and how the Adaptive Maps are reset.

For details of these settings in Basic Mode, see [Closed-Loop Setup in Basic Mode](#)^[84]. For details of these settings in Advanced Mode, see [Closed-Loop Setup in Advanced Mode](#)^[85].

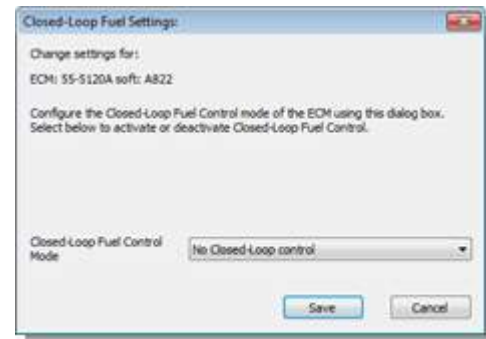
Once a successful Adaptive Map has been built up over time, you can use one of the ProTune II merge functions to translate the percentage corrections in the Adaptive Maps to the cylinder fuel adjustment tables and/or the main fuel table. See the section [Using the Adaptive Maps](#)^[86] for more details.

You can view the current state of the front and rear cylinder Adaptive Maps, by selecting [Front Cylinder Adaptive Map](#)^[45] and [Rear Cylinder Adaptive Map](#)^[46] from the View menu when a S&S® ECM is connected. The Adaptive Maps can be manually reset to zero percent correction at anytime by accessing the [Reset Adaptive Maps](#)^[63] function from the Options menu.

9.2 Closed-Loop Setup in Basic Mode

Select the [Closed-Loop Control Settings](#)^[37] item from the **View** menu in Basic Mode to specify the Closed-Loop mode of operation in

an ECM or Calibration file.



The Closed-Loop Control Settings dialog box in Basic Mode has one settings drop-down list:

Closed-Loop Fuel Control Mode. This sets the mode of operation for the Closed-Loop Control System. The options are:

- **No Closed-Loop or Adaptive.** The ECM will not place new values in the Adaptive Maps or use the Adaptive Maps to adjust the current fuel output. When editing the current ECM or calibration file, the status indicators on the main window will both be off.



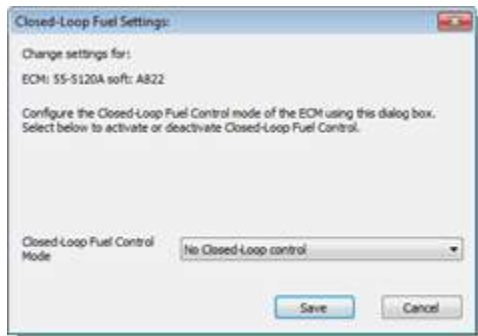
- **Full Closed-Loop control.** The ECM will update the Adaptive Maps with new percentage correction values and use the values in the Adaptive Map to adjust the fuel output. When editing the current ECM or calibration file, the status indicators on the main window will both be on.



- **Default (Retain factory settings).** Shown when an ECM or calibration file has a custom setting. Use this option to verify that the current mode is not changed.

9.3 Closed-Loop Setup in Advanced Mode

Select the [Closed-Loop Control Settings](#) ³⁷ item from the **View** menu in Advanced Mode to specify the Closed-Loop mode of operation in an ECM or Tune-File.



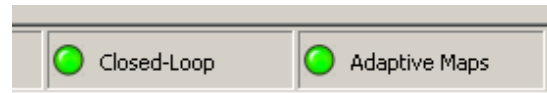
When in Advanced Mode, The Closed-Loop Control Settings dialog box has one settings drop-down list:

Closed-Loop Fuel Control Mode. This sets the mode of operation for the Closed-Loop Control System. The options are:

- **No Closed-Loop or Adaptive.** The ECM will not place new values in the Adaptive Maps or use the Adaptive Maps to adjust the current fuel output. When editing the current ECM or calibration file, the status indicators on the main window will both be off.



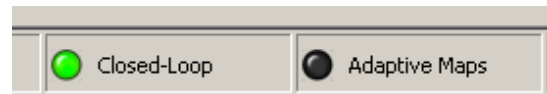
- **Full Closed-Loop control.** The ECM will update the Adaptive Maps with new percentage correction values and use the values in the Adaptive Map to adjust the fuel output. When editing the current ECM or calibration file, the status indicators on the main window will both be on.



- **Read Adaptive – No Closed-Loop.** The ECM will use the current values in the Adaptive Maps to adjust the fuel output but will not modify the Adaptive Maps. When editing the current ECM or calibration file, the adaptive map indicator will be lit.



- **Closed Loop Only – No Adaptive.** The ECM will update the Adaptive Maps with new percentage correction values but will not use the Adaptive Maps to adjust the fuel output. When editing the current ECM or calibration file, the closed-loop indicator will be lit.



- **Default (Retain factory settings).** Shown when an ECM or calibration file has a custom setting. Use this option to verify that the current mode is not changed.

9.4 Setting the Target Air-Fuel Mixture

You can specify the general target Air-Fuel Ratio for different engine speeds and throttle positions by modifying the Target Closed-Loop Map. Select this map from the **View** menu.

The map appears as a spreadsheet with sixteen Engine Speed columns and sixteen Throttle Position rows. Each cell of the spreadsheet specifies the required Air-Fuel mixture at that Engine Speed and Throttle Position. The spreadsheet is used in a similar way to other tables. Use the scroll bars at the bottom and right corner of the spreadsheet to see all of the data. The cursor, indicated by the black rectangle, may be moved around the spreadsheet with the Left, Right, Up and Down arrow keys. Holding Shift while pressing the arrow keys will enable you to select a rectangular area of cells. The cursor position can also be changed by clicking the mouse on the required cell. Clicking and dragging across a range of cells will select an area of the spreadsheet. Clicking on column or row headers will select an entire column or row. Clicking and dragging across column or row headers will select multiple columns or rows.

A line indicates a division on the table between Throttle Positions of 75% or more open and less than 75% open. You cannot select the two leanest mixture options at 75% throttle or above as a fuel rich mixture is advised in this area. You cannot select the richest mixture option at less than 75% open.

To edit a cell value, or a selected area of cell values, click on the grey down-arrow box which appears in the current cursor cell or press the **Enter** key. This will display a drop-

down list of options. An option can be selected using the cursor keys and pressing Enter or by clicking on the option with the mouse. Press the **Esc** key if you want to cancel editing the current cell.

Each cell may be set to one of the following modes:

- RICHEST. Available only for throttle positions equal to or greater than 75% open. Specifies a very highly fuel rich mixture for this cell.
- RICHER. Specifies a highly fuel rich mixture for this cell.
- RICH. Specifies a fuel rich mixture for this cell.
- STOICH – Available only for throttle positions less than 75% open. Specifies that the mixture should be stoichiometric, i.e. a balanced mixture of fuel and air for complete combustion.
- LEAN – Available only for throttle positions less than 75% open. Specifies that the mixture should be oxygen rich, i.e. less fuel than required for complete combustion.
- NO CL – Specifies that no closed-loop control should be performed at this Engine Speed and Throttle Position. The Adaptive Maps will not be updated at this location.
- DEFAULT – Used to indicate that the setup of this cell is custom and not one of the presets. Leave as default if you want to leave the setup unchanged.

9.5 Using the Adaptive Maps

Once Adaptive Maps are generated that produce the desired engine performance, the percentage fuel correction stored in the Adaptive Maps can be applied to the cylinder fuel adjustment tables and/or main fuel map in the ECM. The reason for doing this is to reduce the amount of adaptation required for further closed-loop running. The Adaptive

Maps are volatile. They may be modified by the ECM with further closed-loop running and will be lost if the permanent battery connection to the ECM is interrupted. For details of these settings in Basic Mode, see [Closed-Loop Setup in Basic Mode](#)^[84]. For details of these settings in Advanced Mode, see [Closed-Loop Setup in Advanced Mode](#)^[85].

The values in the Adaptive Maps may be applied to the ECM fuel tables by selecting either [Cylinder Trim Adaptive Map Merge](#)^[62] or [Main Fuel Adaptive Map Merge](#)^[63] from the Options menu. The Cylinder Trim Adaptive Map Merge function will modify the Cylinder Fuel Adjustment tables ([Front Cylinder Adjustment Table](#)^[35], [Rear Cylinder Adjustment Table](#)^[36]) with the Adaptive Map values. The Main Fuel Adaptive Map Merge will distribute the Adaptive Map correction between the cylinder fuel adjustment tables and the [Fuel Injection Base Table](#)^[34]. Which option you select depends upon whether you want the base fuel table to be modified by the process or left in its current state. Using the Main Fuel Adaptive Map Merge will reduce the magnitude of the change to the cylinder adjustment tables. Using this function also averages the change across the two cylinders, which may be desirable for balanced engine running. The Cylinder Trim Adaptive Map Merge function calculates each cylinder separately.

The **Cylinder Trim Adaptive Map Merge** function operates as follows:

1. ProTune II loads the Front Cylinder Adaptive Map, Rear Cylinder Adaptive Map, Front Cylinder Fuel Adjustment Table, Rear Cylinder Fuel Adjustment Table from the ECM.
2. It adjusts the current value in the Cylinder Adjustment Table by an amount proportional to the Adaptive Map percentage correction, for each cylinder.
3. ProTune II then sends the modified the Cylinder Adjustment Tables back to the ECM.

4. The Adaptive Maps are reset to zero.

The **Main Fuel Adaptive Map Merge** function operates as follows:

1. ProTune II loads the Front Cylinder Adaptive Map, Rear Cylinder Adaptive Map, Front Cylinder Fuel Adjustment Table, Rear Cylinder Fuel Adjustment Table and the Fuel Injection Base Table from the ECM.
2. Works out the total adjustment for each cylinder by adding the current value in the Fuel Adjustment Table to the percentage correction in the Adaptive Map.
3. Averages the two total adjustment values for the two cylinders.
4. Compensates the values in the Fuel Injection Base Table by this average adjustment (for example, if the average total adjustment is +100%, this will result in a doubling of fuel at that location in the fuel table).
5. Calculates the difference between the average total adjustment and the total adjustment for each cylinder. Stores this difference in the Cylinder Fuel Adjustment tables.
6. ProTune II then sends all modified tables back to the ECM.
7. The Adaptive Maps are reset to zero.

You can view the current state of the front and rear cylinder Adaptive Maps, by selecting [Front Cylinder Adaptive Map](#)^[45] and [Rear Cylinder Adaptive Map](#)^[46] from the View menu when a S&S® ECM is connected. The Adaptive Maps can be manually reset to zero percent correction at anytime by accessing the [Reset Adaptive Maps](#)^[63] function from the Options menu.

10 Knock (Adaptive Ignition) Control

menu. The Adaptive Ignition Map can be reset by selecting [Reset Adaptive Maps](#)⁶³ from the **Options** menu.

10.1 The Knock (Adaptive Ignition) Control System

The 55-5069 USB ECM supports a Knock Control system. When fitted to a motorcycle with a knock sensor, this feature allows the ECM to adjust the ignition timing to avoid engine knocking (also called pinging or detonation).

The Knock control system can operate in one of three modes. You can select the mode for your ECM by selecting [Knock Control Settings](#)³⁸ from the **View** menu.



- **Learned and instantaneous adjustment.** The ECM will adjust ignition timing to avoid engine knocking. Adjustments are made as knocking occurs and long-term adjustments are stored.
- **Instantaneous adjustment only (non-learned).** The ECM will adjust ignition timing to avoid engine knocking as it occurs. Long term adjustments are not stored.
- **Disabled.** Knock Control is not enabled and no adjustments to ignition timing are made due to engine knocking.

You can view the long term adjustments made due to engine knocking by selecting the [Adaptive Ignition Map](#)⁴⁷ from the **View**

11 Diagnostics

11.1 Frequently Asked Questions

The 3D graph does not appear or appears as an empty rectangle on my PC.

This may be caused by the color resolution of your PC being set too low for ProTune II (for example, if Windows® is set to 256 or 16 color mode). ProTune II requires a color resolution of 16-bit color (thousands of colors) or greater. To change your color resolution, go to the **Start** menu and launch **Control Panel** (this may be in the **Settings** menu). Double-click on the **Display** icon. Click on the **Settings** tab. The color settings can be adjusted by selecting an item from the Color Quality drop-down list. Select either the 16-bit, 24-bit or 32-bit color options. Some Windows versions may require that you restart your computer for the new color settings to take effect. If you do not have 16-bit, 24-bit or 32-bit color options it is likely that you will need to update your graphics system to run ProTune II successfully.

The 3D graph is drawn very slowly or does not update correctly on my PC.

You may need to update the graphics driver on your PC. A graphics driver is an item of software that allows Windows to send instructions to your video display system. Go to the website of your video system manufacturer and search for the latest driver for your version of Windows. The

manufacturer and model of your video display system can be found by accessing the **Start** menu and launching **Control Panel** (this may be in the **Settings** menu). Double-click on the **Display** icon. Click on the **Settings** tab. Click on the **Advanced** button. Click on the **Adapter** tab. The properties of your video display system will be shown in the dialog box.

ProTune II does not communicate with my serial ECM.

1. Check that the ECM is powered. The ECM must be supplied with vehicle power in order to operate. Your motorcycle ignition key and kill switch should be set to the ON and RUN positions. Make sure that the battery level is normal. Try cycling the power to the ECM (switch off ignition for 15 seconds and then switch on).
2. Check that the cable is connected firmly to the ECM and the PC.
3. Some PCs may have more than one serial port. If this is the case, try connecting to the other port(s).
4. The external serial port on your PC might not be installed as COM1. This is the case on some models of notebook computers that use COM1 for other devices (modems, IR ports, etc). You will need to change the serial port that ProTune II checks for ECMs on. Try searching on COM2 instead of COM1. See [Serial Port Settings...](#)^[55] for details on how to detect the port setup of your computer. For detailed information on the port setup of your PC, go to the Windows **Start** menu, open the **Control Panel** (this may be in the **Settings** menu). Open the **System** control panel. Click on the **Hardware** tab. Click **Device Manager**. Under the group labeled Ports the available serial ports should be listed. The serial port names will start with the letters 'COM'.

ProTune II does not communicate with my USB ECM.


1. Check that the ECM is powered. The ECM must be supplied with vehicle power in order to operate. Your motorcycle ignition key and kill switch should be set to the ON and RUN positions. Make sure that the battery level is normal. Try cycling the power to the ECM (switch off ignition for 15 seconds and then switch on).
2. Check that the cable is connected firmly to the ECM and the PC.
3. Try disconnecting and reconnecting the USB connection to the ECM. This will reset the ECM connection and allow Windows to relocate the device.
4. Have you installed the USB driver correctly? The first time you connect the ECM to a PC, you will need to install the supplied device driver. Please refer to the [USB Device Driver Installation](#)^[9] section for more details on this.
5. See [Troubleshooting USB Driver Problems](#)^[89] for more help.

Windows reports 'locked files' when I am upgrading or removing ProTune II.

Make sure all applications (especially ProTune II itself) are closed before you attempt to upgrade or remove ProTune II from your PC. To be sure that all applications are closed, you may wish to restart your computer and retry the upgrade/removal process.

11.2 Troubleshooting USB Driver Problems

If an error occurs during the installation of the USB device driver, or the device does not communicate with ProTune II, it may be necessary to manually check the connection

to the ECM in Windows® and reinstall the USB driver. To install the USB driver for the first time see [USB Device Driver Installation](#) .

To check the device connection and reinstall the driver, follow these steps:

1. Close all programs, including ProTune II.
2. Check that the ECM is powered. The ECM must be supplied with vehicle power in order to operate. Your motorcycle ignition key and kill switch should be set to the ON and RUN positions. Make sure that the battery level is normal.
3. Check that the cable is connected firmly to the ECM and the PC.

Now follow the instructions below appropriate to your version of Windows.



[Windows® XP](#) 

[Windows® Vista™ & Windows® 7](#) 

11.2.1 Windows® XP

1. Go to the **Start** menu button.
2. Select **Control Panel** from the menu.
3. Double-click the **System** icon.
4. Select the **Hardware** tab.
5. Click the **Device Manager** button to launch the Device Manager window.
6. There should be a group of devices named **Automotive Controllers and Interfaces**. This group should contain one **Vehicle Control System or Interface Unit** item. If not, the device has not been installed correctly. Search

under the **Other devices** and **Universal Serial Bus controllers** groups for any ECM devices that have a yellow exclamation mark symbol next to them. If you cannot find any related items then the USB ECM has not been detected by the PC. Check that the ECM is installed correctly, powered and the cable is securely connected and not damaged. Contact customer support if this does not solve the problem.

7. If you find the device listed with a yellow exclamation mark symbol next to it, right click the item and select **Uninstall**. The device icon should disappear. Now unplug the USB cable from the PC and reattach it. If the **Found New Hardware** dialog box appears, follow the steps described in the [USB Device Driver Installation](#)  section.
8. If the device continues to be listed with a yellow exclamation mark, right click the item and select **Properties**. Make a note of the **Device status** message. Click the **Driver** tab. Click **Update Driver...** and follow the steps described in the [USB Device Driver Installation](#)  section, or manually select the driver in the ProTune II directory (C:\Program Files\S&S Cycle\ProTune 2). Contact customer support if this does not solve the problem.

11.2.2 Windows® Vista™ & Windows® 7

1. Go to the Windows® icon button on the task-bar.
2. Select **Control Panel** from the menu.
3. Click the **System and Maintenance** link.
4. Click the **System** link.
5. Click the **Device Manager** link in the **Tasks** pane.
6. Depending on your security settings, a

message may appear asking for permission to continue. Click **Continue**.

7. There should be a group of devices named **Automotive Controllers and Interfaces**. This group should contain one **Vehicle Control System or Interface** item. If not, the device has not been installed correctly. Search under the **Other devices** and **Universal Serial Bus controllers** groups for any ECM devices that have a yellow exclamation mark symbol next to them. If you cannot find any related items then the USB ECM has not been detected by the PC. Check that the ECM is installed correctly, powered and the cable is securely connected and not damaged.
8. If you find the device listed with a yellow exclamation mark symbol next to it, right click the item and select **Uninstall**. The device icon should disappear. Now unplug the USB cable from the PC and reattach it. If the **Found New Hardware** dialog box appears, follow the steps described in the [USB Device Driver Installation](#) ⁹¹ section.
9. If the device continues to be listed with a yellow exclamation mark, right click the item and select **Properties**. Make a note of the **Device status** message. Click the **Driver** tab. Click **Update Driver...** and follow the steps described in the [USB Device Driver Installation](#) ⁹¹ section, or manually select the driver in the ProTune II directory (C:\Program Files\S&S Cycle\ProTune 2\drivers). Contact customer support if this does not solve the problem.

11.3 Check Engine Lamp Diagnostics

The S&S Cycle® ECM has a feature which can report engine faults by flashing a code via the Check Engine lamp on the

motorcycle.

Note: if you have set your motorcycle to use the check engine lamp as a shift-light, this function will be disabled.

The procedures to activate and read the check engine lamp are as follows:

1. Turn the ignition switch to the on position for three seconds (one second pause after the fuel pump stops), and then switch back to the off position for three seconds. Repeat this procedure one more time and then turn the ignition to the on position and wait for eight seconds for the check engine lamp to start flashing.
2. The transmission of a code is always preceded by a series of rapid flashes (about 3 per second). This "intermission" is followed by a 2 second pause in which the lamp is off. The lamp will then flash one or more times to indicate the first digit of the trouble code. The length of time the lamp is illuminated and the length of time in which it is off are each about 1 second in duration. The number of times the lamp flashes indicates the first digit of the trouble code.
3. Following the transmission of the first digit, there is another 2-second pause in which the lamp is off. The lamp will then flash one or more times to indicate the second digit of the trouble code. The number of times the lamp flashes indicates the second digit of the trouble code.
4. Following the transmission of the second digit, there is a third 2-second pause in which the lamp is off. After the pause comes an "intermission", followed by transmission of the next recorded trouble code. All subsequent codes are sent in the same manner, each separated from the next by an "intermission". Once the trouble codes have been sent the data string is repeated. See the [Check Engine Lamp - Fault Flashing Codes](#) ⁹² for a list

of the trouble codes supported.

5. Turn the Ignition Key switch to off. Wait 10 seconds for the ECM relay to click. Vehicle can now be started normally.

11.4 Speedometer Diagnostics

The S&S Cycle® 55-5069 USB ECM has a feature which can report engine faults through the vehicle odometer of the stock speedometer on a 2004 or newer motorcycle. A computer cable is not required for these diagnostics.

The procedures to activate and read the speedometer diagnostic trouble codes are as follows:

1. With the Ignition switch **Off** and the Run/Stop switch set to **Run**, press and hold the odometer reset button. The odometer will light up and display the total mileage.
2. While pressing the odometer reset button, turn the Ignition switch to the **Ign** position. Then release the odometer reset button. The speedometer and tachometer, if equipped, will do full range sweeps and light all the indicator lights. The odometer will display "diAG".
3. Press and release the odometer reset button again. The odometer will display "PSSPt", with the first P blinking. The blinking letter indicates which module is selected to send diagnostic information. The first "P" is the Electronic Control Module (ECM). The first "S" is the Turn Signal Module (TSM). The "SP" is the Speedometer. The "t" is the Tachometer.
4. Press and release the odometer reset button to select the desired module from the list above. As you cycle through the P,

S, SP, and t, the selected digits will blink.

5. To view the diagnostic fault codes in the selected module, press and hold the odometer reset button for about 4 seconds. The odometer will display a 5 digit code for any fault codes that are present. Record the fault codes. If there are not any trouble codes set on the selected module, the odometer will display "nonE".
6. Press and release the odometer reset button to toggle through the remaining fault codes, if any are present. The odometer will display "End" when all the fault codes present have been displayed. See the [Check Engine Lamp - Fault Flashing Codes](#)⁹² for a list of the trouble codes supported.
7. To clear the diagnostic fault codes on the selected module, press and hold the reset button for about 4 seconds. The odometer will display "CLEAr" after clearing the trouble codes.
8. If you do not want to clear the trouble codes, press and release the reset button. The part number of the selected module will scroll across the odometer.
9. Press and release the reset button again. The odometer will now be back to step 3. You may now retrieve diagnostic trouble codes from a different module. Turning the Ignition switch to **Off** at any point will exit the speedometer diagnostics procedure.

11.5 Check Engine Lamp - Fault Flashing Codes

The fault-flashing codes correspond to the following fault conditions:

Check Engine Lamp Flash Code	Speedometer Diagnostic Code	Fault Condition
11	P0122	Throttle Position Sensor Low/Short Circuit
11	P0123	Throttle Position Sensor High/Open Circuit
12	P0105	Barometric Pressure Sensor Malfunction
12	P0108	MAP/Baro Sensor Low/Open Circuit
14	P0117	Engine Temperature Sensor Low/Short Circuit
14	P0118	Engine Temperature Sensor High/Open Circuit
15	P0113	Intake Air Temperature High/Open Circuit
15	P0112	Intake Air Temperature Low/Short Circuit
16	P0562	System Voltage (Battery) Low
16	P0563	System Voltage

		(Battery) High
23	P0261	Front Injector Open Circuit
23	P0262	Front Injector Short Circuit
32	P0264	Rear Injector Open/Low
32	P0265	Rear Injector Short/High
34	P0505	Stepper Motor Malfunction
52	P0604	ECM RAM Error
53	P0605	ECM Flash Error
54	P0603	ECM EEPROM Error
55	P0606	Microprocessor Malfunction (ECM Processor)
	P0217	Overheat Protection Stage 1
	P0217	Overheat Protection Stage 2
	P0217	Overheat Protection Stage 3
71	P0327	Knock Sensor 1 Circuit Low Input
72	P0328	Knock Sensor 2 Circuit High Input
	P0132	Front O2 Sensor High Voltage
	P0134	Front O2 Sensor

		Open/Not Responding
	P0170	Front Adaptive Maxed Out
	P0152	Rear O2 Sensor High Voltage
	P0154	Rear O2 Sensor Open/Not Responding
	P0173	Rear Adaptive Maxed Out

12 Glossary

BOX (file)

A complete copy of the state of an ECM, including ECM software and all data. This is a file containing new ECM software and/or data which can be used to update and backup the state of ECMs. A BOX file is a type of calibration file, the other being a Tune-File.

Calibration (File)

A file that stores a copy of ECM data and/or software. Specifically, a calibration file is either a BOX file type or a Tune-File type.

Cell

A single site or value in a table.

Channel

A real-time measurement from the ECM. Either an input value, output value, or ECM calculation.

Closed-Loop (Fuel Control)

A method of continuously adapting the engine fuel delivery to obtain an ideal mixture (ratio of fuel to air) for specific engine performance.

Data Source

A source of calibration data, either an ECM, BOX file, or a Tune-File.

DTC

Diagnostic Trouble Code. A record of a fault or error condition stored in the ECM memory.

ECC (file)

See Tune-File below.

ECM

Electronic Control Module. An electronic device which controls a vehicles engine and other systems. Also known as a VFI (Variable Fuel Injection) module.

ECM Upgrade File

See BOX file above.

Gauge

A display of real-time information from the ECM.

H86 (file)

An ECM software program file. If an update of the ECM program is required, S&S Cycle® can supply a new program in the form of an H86 file.

Idle-Control

A method of continuously adjusting the air flow into the engine in order to obtain a smooth engine idle condition.

Live-Tune (Live-Tuning)

A method of tuning where changes made by the user immediately effect the performance of the ECM.

Map

See **Table** below.

Setting (ECM)

A value in the configuration data of the ECM which globally controls an ECM feature (example - engine rev limiter value).

Site

See **Cell** above. Also used as a unit to denote a value with a fixed interval, often used as an index into a table. For example, throttle position site is used as an index into tables that reference throttle position.

Table

A grid of numbers inside the ECM used to control engine actuators such as fuel injectors and ignition coils. The output of a table will typically vary as a function of current engine speed and current throttle position.

Tune-File

A Tune-File is a copy of the configuration data, tables, and settings in an ECM which is stored as a file on disk. Tune-Files are used to backup, restore and exchange ECM configurations. A Tune-File is a type of calibration file, the other being a BOX file.

Tuning

The process of determining table values to produce the best performance for a particular application.

13 Footnote

All brand names, trademarks or registered trademarks mentioned in this document are the property of their respective holders and are used in a reference capacity only.

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