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Installation Instructions for S&S® USB-C Delphi® Style VFI (Variable Fuel Injection) ECM (Engine Control Module) and Pro Tune II Software

DISCLAIMER:

S&S parts are designed for high performance, off road, racing applications and are intended for the very experienced rider only. The installation of S&S parts may void or adversely affect your factory warranty. In addition such installation and use may violate certain federal, state, and local laws, rules and ordinances as well as other laws when used on motor vehicles used on public highways, especially in states where pollution laws may apply. Always check federal, state, and local laws before modifying your motorcycle. It is the sole and exclusive responsibility of the user to determine the suitability of the product for his or her use, and the user shall assume all legal, personal injury risk and liability and all other obligations, duties, and risks associated therewith.

The words Harley®, Harley-Davidson®, H-D®, Sportster®, Evolution®, and all H-D part numbers and model designations are used in reference only. S&S Cycle is not associated with Harley-Davidson, Inc.

DISCLAIMER: FOR CLOSED COURSE COMPETITION USE ONLY. NOT INTENDED FOR STREET USE.

LEGAL IN CALIFORNIA ONLY FOR RACING VEHICLES WHICH MAY NEVER BE USED, OR REGISTERED OR LICENSED FOR USE, UPON A HIGHWAY.

SAFE INSTALLATION AND OPERATION RULES:

Before installing your new S&S part it is your responsibility to read and follow the installation and maintenance procedures in these instructions and follow the basic rules below for your personal safety.

- Gasoline is extremely flammable and explosive under certain conditions and toxic when breathed. Do not smoke. Perform installation in a well ventilated area away from open flames or sparks.
- If motorcycle has been running, wait until engine and exhaust pipes have cooled down to avoid getting burned before performing any installation steps.
- Before performing any installation steps disconnect battery to eliminate potential sparks and inadvertent engagement of starter while working on electrical components.
- Read instructions thoroughly and carefully so all procedures are completely understood before performing any installation steps. Contact S&S with any questions you may have if any steps are unclear or any abnormalities occur during installation or operation of motorcycle with an S&S part on it.
- Consult an appropriate service manual for your motorcycle for correct disassembly and reassembly procedures for any parts that need to be removed to facilitate installation.
- Use good judgment when performing installation and operating motorcycle. Good judgment begins with a clear head. Don't let alcohol, drugs or fatigue impair your judgment. Start installation when you are fresh.
- Be sure all federal, state and local laws are obeyed with the installation.
- For optimum performance and safety and to minimize potential damage to carb or other components, use all mounting hardware that is provided and follow all installation instructions.
- Motorcycle exhaust fumes are toxic and poisonous and must not be breathed. Run motorcycle in a well ventilated area where fumes can dissipate.

IMPORTANT NOTICE:

Statements in this instruction sheet preceded by the following words are of special significance.



WARNING

Means there is the possibility of injury to yourself or others.



CAUTION

Means there is the possibility of damage to the part or motorcycle.

NOTE

Other information of particular importance has been placed in italic type.

S&S recommends you take special notice of these items.

WARRANTY:

All S&S parts are guaranteed to the original purchaser to be free of manufacturing defects in materials and workmanship for a period of twelve (12) months from the date of purchase. Merchandise that fails to conform to these conditions will be repaired or replaced at S&S's option if the parts are returned to us by the purchaser within the 12 month warranty period or within 10 days thereafter.

In the event warranty service is required, the original purchaser must call or write S&S immediately with the problem. Some problems can be rectified by a telephone call and need no further course of action.

A part that is suspect of being defective must not be replaced by a Dealer without prior authorization from S&S. If it is deemed necessary for S&S to make an evaluation to determine whether the part was defective, a return authorization number must be obtained from S&S. The parts must be packaged properly so as to not cause further damage and be returned prepaid to S&S with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem, how the part was used and the circumstances at the time of failure. If after an evaluation has been made by S&S and the part was found to be defective, repair, replacement or refund will be granted.

ADDITIONAL WARRANTY PROVISIONS:

- (1) S&S shall have no obligation in the event an S&S part is modified by any other person or organization.
- (2) S&S shall have no obligation if an S&S part becomes defective in whole or in part as a result of improper installation, improper maintenance, improper use, abnormal operation, or any other misuse or mistreatment of the S&S part.
- (3) S&S shall not be liable for any consequential or incidental damages resulting from the failure of an S&S part, the breach of any warranties, the failure to deliver, delay in delivery, delivery in non-conforming condition, or for any other breach of contract or duty between S&S and a customer.
- (4) S&S parts are designed exclusively for use in Harley-Davidson® and other American v-twin motorcycles. S&S shall have no warranty or liability obligation if an S&S part is used in any other application.

NOTE: All brand names, trademarks or registered trademarks mentioned in these instructions are the property of their respective holders and are used in a reference only capacity.

CAUTION

S&S FUEL INJECTION IS NOT COMPATIBLE WITH E85 FUEL. USE OF E85 FUEL MAY CAUSE YOUR ENGINE TO RUN POORLY AND/OR DAMAGE TO SYSTEM COMPONENTS.

WARNING

UNRESTRICTED S&S VFI ECMs AND PROTUNE II SOFTWARE MUST NOT BE INSTALLED OR USED FOR TUNING OF POLLUTION CONTROLLED VEHICLES.

THESE VEHICLES HAVE SPECIFIC CALIBRATIONS TO MEET EMISSION REGULATIONS. MODIFYING OR INSTALLING AN UNAPPROVED CALIBRATION OR ECM IS CONSIDERED TAMPERING AND IS PUNISHABLE BY LAW.

INTRODUCTION

The S&S VFI (Variable Fuel Injection) ECM (Engine Control Module) works in place of the stock fuel injection ECM and is compatible with the stock sensors and injectors. This Delphi® Style ECM works with all 2001-'10 Harley-Davidson® EFI Softail®, 2002-'07 EFI touring, and 2004-'11 EFI Dyna® motorcycles.

This instruction sheet describes the installation of the S&S Delphi® Style ECM with a USB-C computer interface.

KIT CONTENTS

- VFI ECM
- USB Port Cover and Hardware Packet



Kit Contents

ADDITIONAL PARTS REQUIRED

In most instances, the VFI ECM will be pre-programmed. If the VFI ECM included in this kit has not been programmed, this will be indicated by a label on the VFI ECM.

If programming is required, the following items are needed:

- A PC capable of running the ProTune II software (see minimum requirements in Installation section).
- A standard USB-A to USB-C cable.

NOTE: You must run ProTune II version 3.10 or later for compatibility with S&S USB-C VFI ECM. USB cable must be compatible with USB 2.0 or later. The ECM will not work with cables designed for charging only.

OPTIONAL ACCESSORIES

All S&S VFI ECM are capable of closed-loop fuel control. Optional Closed Loop Oxygen Sensor kits are available.

The S&S part number for the Closed Loop Oxygen Sensor kit to be used with the VFI ECM described in this instruction sheet is listed below:

- 106-2066 – S&S Delphi® Style VFI Closed Loop Sensor Kit

INSTALLATION

VFI ECM Installation

NOTE: Included in this kit are components used to cover the USB port of the VFI ECM (o-ring, cover, and 2 screws). After the ECM is installed and any required work with the ProTune II software is complete, install these components before it is put into service. This is required to protect the ECM from the elements.

- 1- Disconnect the negative battery cable.
- 2- Refer to the appropriate H-D® service manual to locate and remove the stock ECM. Save the mounting and installation hardware for reuse.
- 3- Push the 36-position connector straight into the end of the VFI ECM. Be sure that the connector seal is properly inserted and the connector lock clicks into place.



Picture 1

- 4- Install the VFI ECM in the same location as the OEM ECM using the original mounting hardware.
- 5- Connect the negative battery cable.
- 6- Before starting the motorcycle, power must be cycled to allow the Idle Air Control (stepper) motor to recalibrate. To cycle the power, turn the ignition switch on with the run/stop switch in the "run" position then turn the ignition switch off and allow at least 15 seconds for the ECM to completely power down.
- 7- In most instances, the VFI ECM will be pre-programmed. If the VFI ECM included in this kit has not been programmed, this will be indicated by a label on the VFI ECM. If the VFI ECM has not been programmed, proceed with ProTune II Software Installation followed by Installing USB Drivers and Loading a Calibration sections of this instruction sheet. If the VFI ECM has been programmed, proceed with the next step.
- 8- Install the o-ring and port cover on the ECM using the 2 screws provided (tighten to 2-4 in-lbs). This is required to protect the VFI ECM from the elements.

CAUTION

Failure to install the provided USB port cover before use could result in damage to the VFI ECM not covered by warranty. Do not overtighten the retaining screws or you can damage the ECM. Torque retaining screws to 2-4 in-lbs.

CAUTION

S&S® recommends that you position the main connector of the VFI ECM in its stock location for maximum protection against the elements.

ProTune II Software Installation

NOTE: You must run ProTune II version 3.10 or later for compatibility with S&S USB-C VFI ECM

The ProTune II Software allows the average performance enthusiast to install existing maps and modify them to optimize the performance of a particular engine. Maps for some of the most common engine and exhaust combinations are included with the installation of ProTune II. In addition, ProTune II is a great tool for diagnosing/troubleshooting issues if they arise.

The ProTune II software can be found in the Tech Info section of the S&S Website (www.sscycle.com) or by going to the following address: <http://www.sscycle.com/tech-info/software/>

If you are unable to access the internet and need a copy of ProTune II mailed to you, please contact S&S Technical Services at 608-627-TECH (8324).

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

- Microsoft® Windows® 7 or later operating system.
- 1.0 GHz or faster processor. Intel® Core™ Duo or faster/equivalent recommended.
- 1GB System RAM for 32-bit systems. 2GB System RAM for 64-bit systems.
- 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.

If you are new to the ProTune II program, you should load it on a computer and familiarize yourself with the screen and the controls before connecting to the VFI ECM. All required information for the installation is explained below. For additional information on ProTune II, see the User Manual installed with the software.

1- Please use the following steps to locate and install the ProTune II software.

NOTE: An instructional video covering the installation and initial connection of the ProTune II software with your ECM can also be found by clicking on the Instructional Videos section under **TECH INFO** on our website:

<http://www.sscycle.com/media/instructional-videos/>

a- Close all applications other than your internet browser.

b- Go to **Tech Info** section of the S&S Website (www.sscycle.com) and click on **ProTune II VFI Software**:

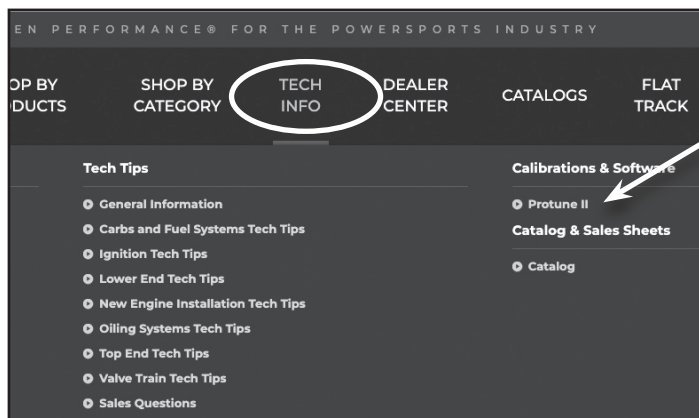


Figure 1 Tech Info Menu

c- When you arrive at the ProTune II Download page, click on the “Download” button by the current version of ProTune II:

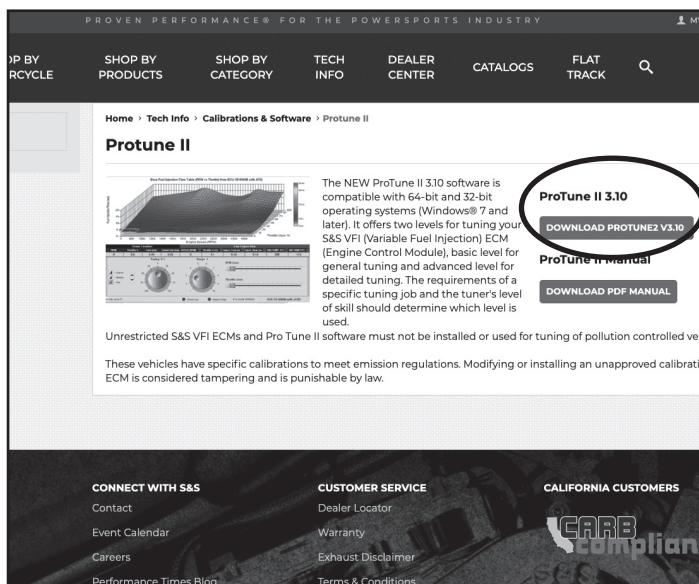


Figure 2 ProTune II Download Screen

d- If you are using Internet Explorer, please proceed to **Step f**. In Google Chrome, a small box will appear in the lower left of the screen that shows the progress of the download. After it is completed, click on the arrow to the right of that box, then click on “Open.”

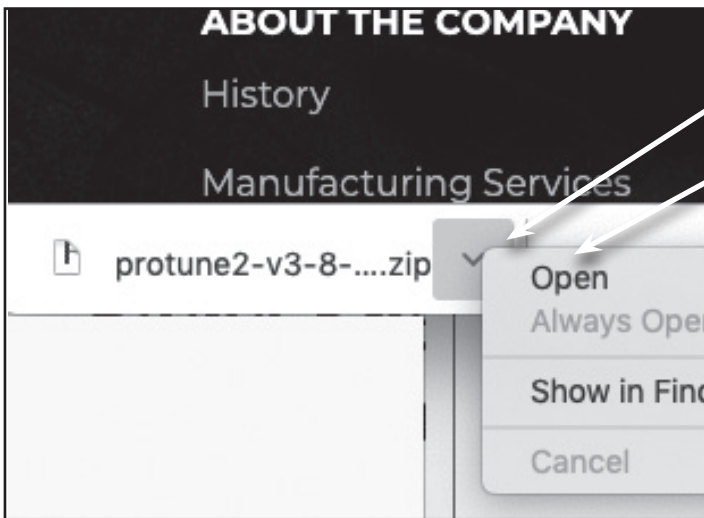


Figure 3 File Download and Open in Google Chrome

- e- From there, Windows Explorer will open showing the contents of the downloaded file. Double-click on the “**setup**” file to proceed with the installation of ProTune II as described later.

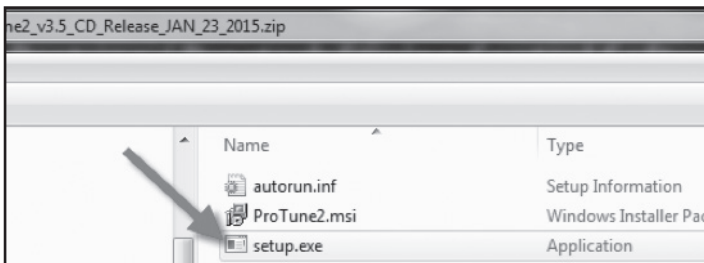


Figure 4 Double click on the setup file to start in installation process

- f- In Internet Explorer, when you click on the “**Download**” button the following screen will appear. Click on the “**Save as**” button to proceed.

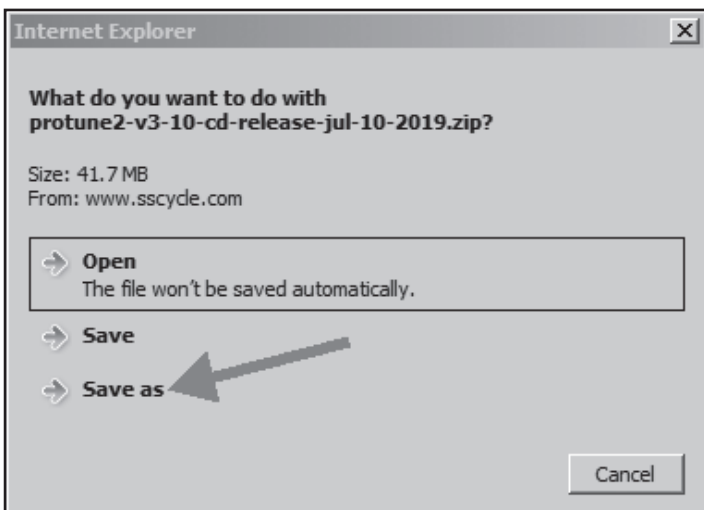


Figure 5 Internet Explorer Download Screen

- g- Save the downloaded file to your Desktop by clicking to highlight “**Desktop**” in the left part of the screen and clicking the “**Save**” button in the lower right.

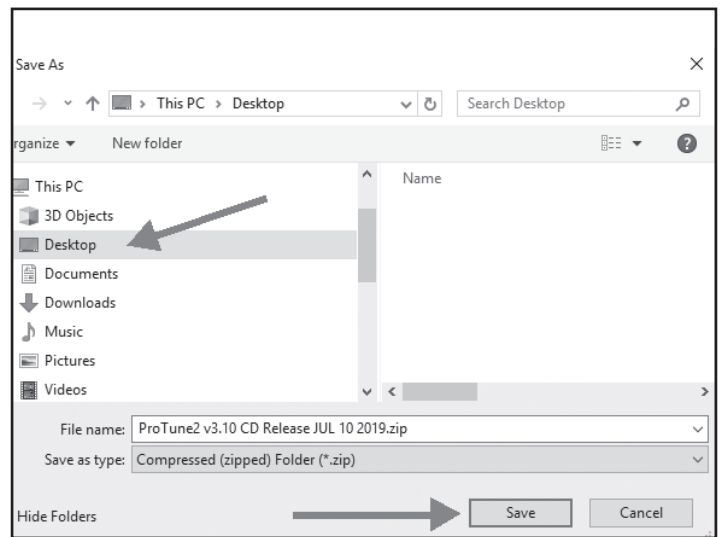


Figure 6 Saving file to Desktop

- h- On your Desktop, locate and double click on the downloaded file as shown below, then proceed with double clicking on the “**setup**” file contained within as shown in **step e**.

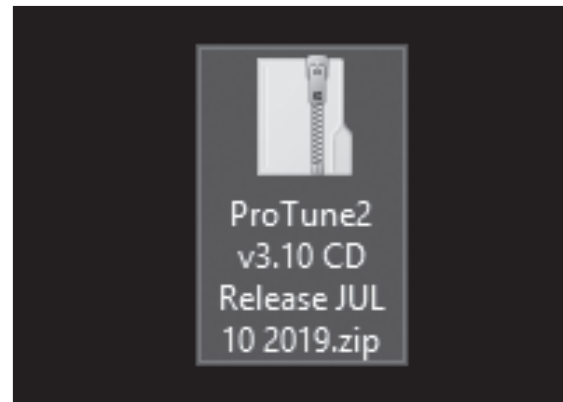


Figure 7 Resulting file downloaded from S&S website

- i- On some systems, the "Windows Defender SmartScreen" may appear. If it does, click on "More info" then "Run Anyway." Also, depending on your system and system settings, a screen may appear asking if you want the program to make changes to your computer. Click on "Yes" Then, the Pro Tune II Setup Wizard will appear on your screen. From the ProTune II Setup Wizard click **Next**.



Figure 8 ProTune II Setup Wizard Screen



Figure 9 Windows Defender Screens

j- The Ready to Install Screen will now appear. Click **Install**.

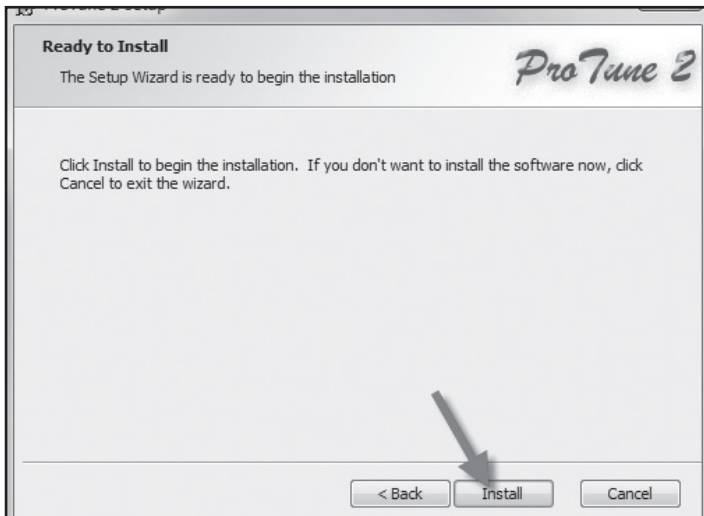


Figure 10 ProTune II Ready to Install Screen

- k- ProTune II will now install and copy files to your computer. If a Windows Security message appears during device driver installation click **Install**.
- l- When the ProTune II installation is completed select **Finish** to exit the Setup Wizard.

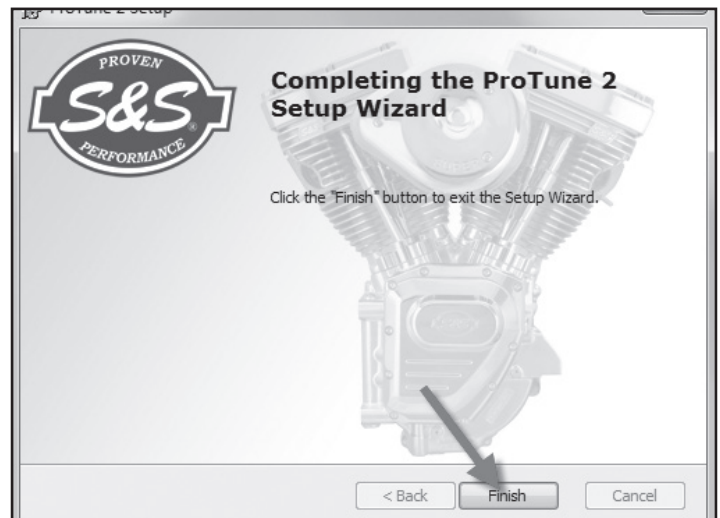


Figure 11 Completing ProTune II Setup

- 2- See Figure 12. After the installation, the ProTune II program and user manual icons will appear on your desktop. ProTune II can be opened by double-clicking on the program icon.



Figure 12 ProTune II Program and Manual Icons

Installing USB Drivers

The USB drivers will be installed during the installation of the ProTune II software. If you encounter issues with communication and/or USB Driver installation, please refer to the ProTune II Manual installed with the software on your PC.

Loading a Calibration

In most instances, the VFI ECM will be pre-programmed. If the ECM included in this kit has not been programmed, this will be indicated by a label on the VFI ECM. If there is a need to program the VFI ECM, proceed with the following steps:

- 1- Connect to the VFI ECM.
 - a- Using a standard USB-A to USB-C cable, connect the USB port on the case of the VFI ECM to the USB port on the PC.
 - b- Open ProTune II by double-clicking the ProTune II icon on the desktop. The lower-right corner of the ProTune II window contains a communication status box. When there is no ECM communication this box will flash between blue and black and alternate between messages. No ECM on USB and Checking USB.

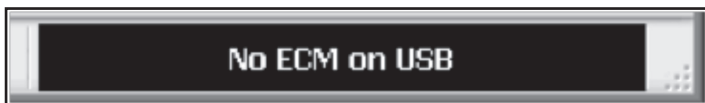


Figure 13

- c- Turn the ignition switch of the motorcycle to on and set the run/stop switch to "run". Do not start the motorcycle at this time.
- d- The communication status box in the lower-right corner of ProTune II will illuminate green to show that ProTune II is communicating with the VFI ECM. If it does not illuminate green see the **Basic Troubleshooting** section below.

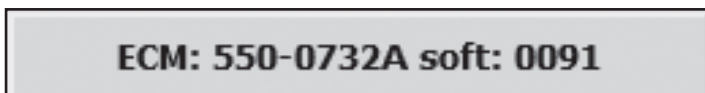


Figure 14

- 2- Sending a Calibration file to the VFI ECM.
 - a- From the File menu of ProTune II, select Send all data to ECM... or click on the motorcycle icon in the upper-left corner of the screen.



Figure 15

- b- A window will open showing the list of calibration folders for each type of ECM. Open the folder "USB-C Port Delphi® Style ECM" to view the available files for this ECM. Select the calibration from the list that most closely matches the vehicle setup and click **Open** to start the calibration download process. Do not switch off power to the ECM at this time.
 - c- After the calibration has loaded a message will appear advising you to cycle power on the ECM for at least 15 seconds. Select OK on the message and turn the key off on the motorcycle for at least 15 seconds.
- 3- The VFI ECM calibration is now complete. Install the o-ring and port cover on the VFI ECM using the 2 screws provided. This is required to protect the VFI ECM from the elements.

BASIC TROUBLESHOOTING

- 1- Problem: ProTune II is not communicating with the VFI ECM.
 - a- Check that the VFI ECM is powered. The VFI ECM must be supplied with vehicle power in order to operate. Your motorcycle ignition and run/stop switch should be set to the ON and RUN positions. Make sure that the battery voltage is normal. Try cycling power to the VFI ECM (switch off the ignition for 15 seconds and then switch on).
 - b- Check that the cable is connected firmly to the VFI ECM and the PC.
 - c- Try disconnecting and reconnecting the USB connection to the VFI ECM. This will reset the ECM connection and allow Windows to relocate the device.
 - d- Additional troubleshooting information can be found in the ProTune II Manual installed with the software on your PC.

- 2- Problem: I have the correct calibration loaded into the VFI ECM for my motorcycle, but it won't start or idle properly.
 - a- If the motorcycle has an S&S or other aftermarket throttle body, please review setup instructions for those components. Typical S&S throttle body closed throttle voltage setting is 0.50 V. Variation of +/- 0.02 V is typical.
 - b- Perform **Test Outputs** function using the ProTune II software (see ProTune II manual or help files installed with the software for additional information). Specifically, check to ensure that both injectors and ignition coils are working correctly and installed on the correct cylinder. Also verify that the stepper motor (Idle Air Control) is functioning properly.
 - c- Verify that the VFI ECM is powering down properly. When the VFI ECM is powering down (ignition on then off) the stepper motor will move through a recalibration process and the VFI ECM will remain in communication with the ProTune II software for approximately 10–15 seconds after the ignition switch is turned off. If this does not happen, verify components and wiring for the constant or ECM power system of the motorcycle.
 - d- If performing the above tasks does not correct the problem, please contact S&S Tech Services. Be prepared to list details about your motorcycle and engine configuration. Model year, displacement, compression ratio, camshaft, intake, and exhaust are typical items needed to determine if the calibration is correct. Also, be prepared to provide the part number or details about the calibration you are using. This information can be found in the Comment Field portion of the calibration. This is accessed through the View menu of ProTune II. You may also be asked to send your current calibration to S&S via e-mail.

ProTune II Diagnostics

The recommended method for checking the VFI ECM for Diagnostic Trouble Codes (DTCs) is by using the ProTune II software. DTCs can be read and cleared by clicking on the DTCs button found on the upper left of the ProTune II screen when connected to a powered ECM. Please, refer to the ProTune II manual or help files for more information on DTCs.