

ZEUS™

User Manual



ZEEMSGB342A Rev. C

Start 

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Safety Information

READ ALL INSTRUCTIONS

For your own safety, the safety of others, and to prevent damage to the product and vehicles upon which it is used, it is important that all instructions and safety messages in this manual and the accompanying *Important Safety Instructions* manual be read and understood by all persons operating, or coming into contact with the product, before operating. We suggest you store a copy of each manual near the product in sight of the operator.

For your safety, read all instructions. Use your diagnostic tools only as described in the tool user's manual. Use only manufacturer recommended parts and accessories with your diagnostic tools.

This product is intended for use by properly trained and skilled professional automotive technicians. The safety messages presented throughout this manual and the accompanying *Important Safety Instructions* manual are reminders to the operator to exercise extreme care when using this product.

There are many variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. Because of the vast number of test applications and variations in the products that can be tested with this instrument, we cannot possibly anticipate or provide advice or safety messages to cover every situation. It is the responsibility of the automotive technician to be knowledgeable of the system being tested. It is essential to use proper service methods and test procedures. It is important to perform tests in an appropriate and acceptable manner that does not endanger your safety, the safety of others in the work area, the equipment being used, or the vehicle being tested.

It is assumed that the operator has a thorough understanding of vehicle systems before using this product. Understanding of these system principles and operating theories is necessary for competent, safe and accurate use of this instrument.

Before using the equipment, always refer to and follow the safety messages and applicable test procedures provided by the manufacturer of the vehicle or equipment being tested. Use the product only as described in its user manual. Use only manufacturer recommended parts and accessories with your product.

Read, understand and follow all safety messages and instructions in this manual, the accompanying *Important Safety Instructions* manual, and on the test equipment.

Environmental Conditions:

- This product is intended for indoor use only
- This product is rated for Pollution Degree 2 (normal conditions)

Safety Signal Words

All safety messages contain a safety signal word that indicates the level of the hazard. An icon, when present, gives a graphical description of the hazard. Safety Signal words are:

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury to the operator or to bystanders.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to the operator or to bystanders.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury to the operator or to bystanders.



Safety Message Conventions

Safety messages are provided to help prevent personal injury and equipment damage. Safety messages communicate the hazard, hazard avoidance and possible consequences using three different type styles:

- Normal type states the hazard.
- **Bold type states how to avoid the hazard.**
- *Italic type states the possible consequences of not avoiding the hazard.*

An icon, when present, gives a graphical description of the potential hazard.

Safety Message Example



 **WARNING**

Risk of electric shock.

- **Prior to recycling the battery pack, protect exposed terminals with heavy insulating tape to prevent shorting.**
- **Disconnect all test leads and turn diagnostic tools off before removing the battery pack.**
- **Do not attempt to disassemble the battery or remove any component projecting from or protecting the battery terminals.**
- **Do not expose the diagnostic tool or battery pack to rain, snow, or wet conditions.**
- **Do not short circuit the battery terminals.**

Electric shock can cause injury.

Important Safety Instructions

For a complete list of safety messages, refer to the accompanying *Important Safety Instructions manual*.

SAVE THESE INSTRUCTIONS

Using This Manual



This manual contains basic operating instructions and is structured in a manner to help you become familiar with your diagnostic tool features and perform basic operations.

The illustrations in this manual are intended as reference only and may not depict actual screen results, information, functions or standard equipment. Contact your sales representative for availability of other functions and optional equipment.

For information on navigating through this manual on the diagnostic tool, see [Help on page 169](#).

Page Navigation Controls

The following navigation controls are provided on the top of each page of the user manual. They can be used in addition to the viewer controls in the toolbar.

Icon	Description
Quick Links Menu	Opens the Quick Links menu within the Table of Contents (TOC) section. From Quick Links you can link to most topics in this manual.
Jump Back	Click to move back one page.
Jump Forward	Click to move forward one page.

Return to previous page (on PC): hold ALT and press back arrow.

Conventions

Hyperlinks

Hyperlinks (links) are identified by blue colored text, and take you to other related content or websites (must be connected to the Internet to link to websites).

Example:

Before using the diagnostic tool, make sure the battery is fully charged, or is connected to the AC power adapter. See [Battery Pack Charging on page 9](#).

Procedures

An arrow icon indicates a procedure.

Example:



To change screen views:

1. Select **View**.
The dropdown menu displays.
2. Select an option from the menu.
The screen layout changes to the format you selected.

Bold Text

Bold emphasis is used in procedures to highlight selectable items such as buttons and menu options.

Example:

- Select **Functions**.



Symbols

The “greater than” arrow (>) indicates an abbreviated set of selection instructions.

Example:

- Select **Utilities > Tool Setup > Date**.

The above statement abbreviates the following procedure:

1. Select the **Utilities** icon.
2. Select the **Tool Setup** submenu.
3. Highlight the **Date** option from the submenu.

Terminology

The term “select” describes tapping/touching an icon on the touch screen, or highlighting an icon or menu choice and then selecting the confirmation menu choice such as **Continue, Accept, OK, Yes**, or other similar choice.

Example:

- Select **Reset**.

The above statement abbreviates the following procedure:

1. Navigate to the **Reset** icon.
2. Select the **Reset** icon with your stylus.

Notes and Important Messages

The following messages are used.

Note

A note provides helpful information such as additional explanations, tips, and comments.

Example:

NOTE

For additional information refer to...

Important

Important indicates a situation which, if not avoided, may result in damage to the test equipment or vehicle.

Example:

IMPORTANT

Disconnecting the USB cable during vehicle communication can cause damage to the ECM.

Quick Reference

Introduction

For your convenience this section provides product support information, quick reference links to each section, and general reference information.

Main Topic Links

- [Support Contact Information](#) page 5
- [Product Training Videos](#) page 6

Quick Links

Click on an icon below to go to that section.



Scanner



OBD Direct



Guided
Component
Tests



Scope
Multimeter



Information



Vehicle
History



Data
Manager



Help



System
Settings



Exit

Support Contact Information

Phone / E-mail - Technical Assistance

(United Kingdom) +44 (0) 845 601 4736 /
diagnosticsUKproductsupport@snapon.com

Website:

Snap-on Diagnostics and Information

- <http://diagnostics.snapon.co.uk>

Manuals / Technical Documentation - The information in this manual is periodically revised to ensure the latest information is included. Download the latest version of this manual and other related technical documentation from our website.

Accessories - Find diagnostic tool accessories on our website. Contact your sales representative to purchase product accessories.

Information Service

The following integrated services provide up-to-date service/repair information directly to your diagnostic tool, via wireless network connection to our Snap-on Web Services Network:

- Intelligent Diagnostics (within Scanner)
- Information (Home screen function)

If your access to these services has expired, or you have received messages about upcoming software upgrades or pending expiration, contact your sales representative to purchase the current software upgrade.

i NOTE

Performance varies depending on your wireless network equipment and ISP.

The Snap-on® Cloud

Using the Snap-on Cloud allows you to upload, store and share code scan reports, screenshots and pictures taken with your diagnostic tool. For more on the Snap-on Cloud, see [The Snap-on® Cloud](#) on page 180.



Product Training Videos

Product specific training videos and support is available on our website. Learn the basics of diagnostic tool operation with our free training videos, and watch our Quick Tips videos to see how to use your diagnostic tool to solve common vehicle problems.

Common Abbreviations Used

CSM - Compact Scan Module

CTM - Component Test Meter (Guided Component Tests)

DLC - Data Link Connector (vehicle)

DMM - Digital Multimeter

ECM - Electronic Control Module

GCT - Guided Component Tests

GMM - Graphing Multimeter

SSC - ShopStream Connect™

SST - ShopStream® Update Tool

VIN - Vehicle Identification Number



Introduction

This diagnostic tool is a specialized personal automotive diagnostic solution that combines information with test instrumentation to help you diagnose symptoms, codes, and complaints quickly and efficiently. There are three main components to the system:

- [Diagnostic Tool](#)—central processor and display for the system
- [Scope Module](#)—oscilloscope/meter module used to measure circuits and signals
- [Compact Scan Module](#)—wireless module used to access vehicle data

The Scope Module and Compact Scan Module are described in their applicable sections within this manual.

Main Topic Links

- [Diagnostic Tool Feature Locations](#) page 8
- [Power \(Battery Pack/Charging\)](#) page 9
- [Turning On/Off, and Emergency Shutdown](#) page 9
- [Shortcut \(S\) Button \(Setup\)](#) page 10
- [Camera \(Taking Pictures\)](#) page 11
- [Windows \(Applicable Features / Operations\)](#) page 12
 - [Wi-Fi Setup](#) page 12
 - [Touch Screen and Stylus](#) page 14
 - [Sleep Mode \(Auto Off Display\)](#) page 15
 - [E-Mail Client Setup](#) page 16
 - [Calibrating the Touch Screen](#) page 18
 - [Printing / Printer Setup](#) page 19
- [Operating System Restore](#) page 22
- [Accessories \(Optional Equipment\)](#) page 23
- [Diagnostic Tool Technical Specifications](#) page 23

1.1 Diagnostic Tool Feature Locations



Figure 1-1 Features

1. Capacitive Touch Screen
2. Shortcut (S) Button (special functions)
3. Power Button (with backlit LED functions)
4. Audio Speaker
5. Stylus Storage
6. Scope Module M4 (removable)
7. Camera Lens
8. Communication and Power Jacks Cover
9. Head Phone Jack
10. Micro SD Card Slot
11. USB (universal serial bus) Jacks (2)
12. DC Power Supply Input Jack
13. Collapsible Stand
14. Battery Pack
15. Docking Station Connector



1.2 Power (Battery Pack/Charging)

1.2.1 Internal Battery Pack

The diagnostic tool (display unit) comes equipped with a rechargeable internal battery pack that can be charged using the supplied AC power adapter. A fully charged battery pack provides sufficient power for up to 5 hours of continuous operation.

Battery Pack Charging

Use the supplied AC power adapter to charge the battery pack.

Insert the end of the AC power adapter cable into the DC power supply input jack on the diagnostic tool, then connect the AC power adapter to an approved AC power source.

IMPORTANT

Only use the supplied AC power adapter. Never connect the power adapter to the diagnostic tool when the tool is communicating with a vehicle.

Battery Status Indicator

An illuminated indicator is located in the power button, to indicate battery status and charge level.

Battery Status Indicator (modes)



Three colors are used to show battery level and power status:

- **Green** (continuous on) - indicates either the battery is fully charged, or the diagnostic tool is being powered by the AC power adapter.
- **Orange** (continuous on) - indicates the battery is charging.
- **Red** (continuous on) - indicates the battery is low (15% of capacity or less).

1.3 Turning On/Off, and Emergency Shutdown

The following sections describe how to turn the diagnostic tool on and off, and perform an emergency shutdown.

Before using the diagnostic tool, make sure the battery is fully charged, or is connected to the AC power adapter. See [Power \(Battery Pack/Charging\)](#).

1.3.1 Turning On

Press and release the **Power** button ([Figure 1-1](#)) to switch the diagnostic tool on. The system boots up, then opens the ShopStream Diagnostic Suite Home screen.

Power Button	Description
	Turns the diagnostic tool on. See Battery Status Indicator for battery status indicator information.

1.3.2 Turning Off

IMPORTANT

All vehicle communication must be terminated BEFORE turning off the diagnostic tool. A warning message displays if you attempt to turn the diagnostic tool off while communicating with the vehicle. Forcing a shut down while communicating may lead to ECM problems on some vehicles. Never disconnect the Compact Scan Module when the diagnostic tool is communicating with the vehicle ECM.

Before turning the diagnostic tool off, it is highly recommended to back up personal and saved data to a USB mass storage device on a regular basis to prevent loss in the event of system corruption or hard disk drive failure, see [Data Backup](#) on page 172.

To turn off the diagnostic tool:

1. Navigate to the Home screen.
2. Select the **Exit** icon.
3. From the Windows desktop, open the Windows **Start** menu.
4. Select **Shutdown**.



1.3.3 Emergency Shutdown

IMPORTANT

Using the emergency shutdown procedure while communicating with the vehicle ECM may lead to ECM problems on some vehicles.

During normal operation, turn the diagnostic tool off using the *Turning Off* procedure above. The emergency shutdown procedure should only be used as the last option, if the diagnostic tool does not respond to navigation or control buttons or exhibits erratic operation.

To perform an emergency shutdown:

1. Press and release the **Power** button.

The display screen will turn off and the LED backlit power button will turn red and begin blinking.

2. Press and hold the **Power** button again, until the LED in the power button stops blinking.

1.4 Shortcut (S) Button (Setup)

The **Shortcut (S)** button ([Figure 1-2](#)) is located on the front of the diagnostic tool, and is a customizable button that can be set to perform various routine functions.








Figure 1-2

NOTE

You can open the Shortcut menu at anytime by pressing and holding the Shortcut (S) button for three seconds.

Pressing the shortcut button ([Figure 1-2](#)) (when set to open the shortcut menu), opens a slide-out menu which provides the following selectable icon options:

Icon	Description
Screen Capture 	Saves a bitmap image (screenshot) of the visible screen. For file retrieval and management information, see Viewing Saved Files on page 159 .
Camera 	Opens the camera application. See Camera (Taking Pictures) on page 11 for additional information.
Keyboard 	Opens the virtual keyboard. See Virtual Keyboard (Entering Text) on page 15 for additional information.
Brightness 	Opens the display brightness setting. Use multiple taps to toggle through the brightness level settings.
Settings 	Opens the Shortcut (S) button configuration menu.



1.4.1 Configure Shortcut (S) Button

This feature allows you to change the function of the **Shortcut (S)** button.

- To configure the Shortcut (S) button:**
1. Press and release the **Shortcut (S)** button.
 2. Select the **Settings** icon from the slide-out menu.
 3. Choose the function you would like the **Shortcut (S)** button to perform when pressed (*Figure 1-3*).

The current/active setting is indicated by a yellow highlight box.

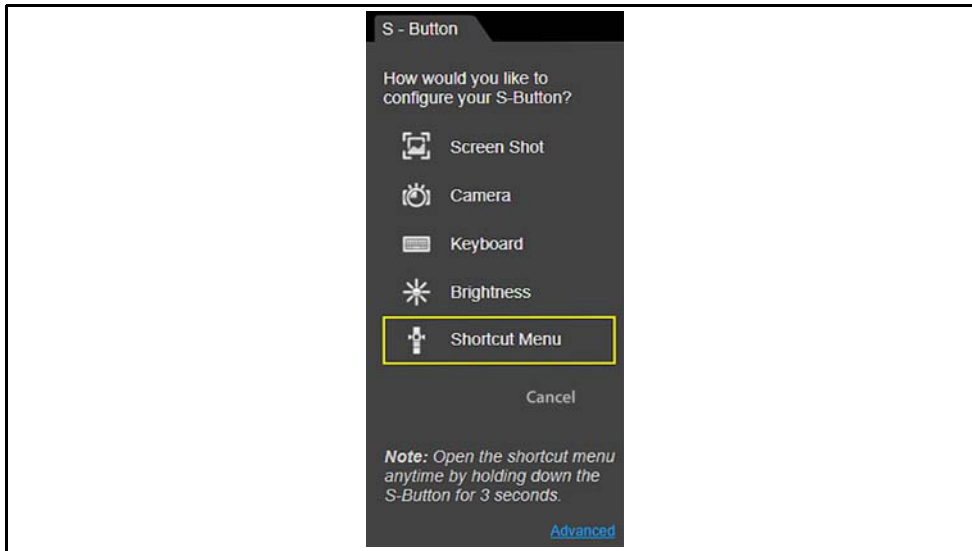


Figure 1-3 Shortcut (S) button configuration menu

4. Select **Cancel**.

1.4.2 Advanced (menu selection)

The **Advanced** selection has no functionality under normal operating conditions, and should **ONLY** be selected when directed to do so, by Snap-on customer service.

Selecting **Advanced** displays the advanced diagnostic system information screen. The system information and functions are **ONLY** used during system troubleshooting, when requested by Snap-on customer service.

1.5 Camera (Taking Pictures)

1.5.1 Using the Camera

Selecting **Camera** from the **Shortcut (S)** button menu opens the camera application. The touch screen becomes the view finder and is also used for reviewing photographs that are taken. Icons on the touch screen are used to operate the camera. The icons change depending on which camera function is active:

Icon	Description
Photo 	Acts as a shutter to take a photograph of what is visible in the view finder, which is the left-hand portion of the screen.
Gallery 	Opens a thumbnail gallery of recently taken pictures.
Exit 	Closes the camera application and returns to the previous screen.
Save 	Displays after a picture is taken. Selecting saves the photograph and returns to the view finder.
Delete 	Displays after a picture is taken and in Gallery mode. Selecting discards the photograph and returns to the previous screen.
Back 	Displays in Gallery mode. Selecting returns to the previously viewed screen.
Previous 	Displays in Gallery mode. Selecting opens the picture prior to the current image in the gallery.
Next 	Displays in Gallery mode. Selecting opens the picture after the current image in the gallery.

**Taking pictures:**

1. Press the **Shortcut (S) Button** and choose **Camera** from the menu.
2. Focus the image to be captured in the view finder.
3. Press the **Photo** icon.
The view finder now shows the captured picture.
4. Select **Save** to save the image, or **Delete** to delete it.
5. Select **Exit** from the live view to close the camera application.

1.5.2 Viewing Pictures

Photographs are stored on the hard drive and can be retrieved two ways:

From the Diagnostic Suite; select **Data Manager** from the Home screen, then open the **Camera Folder**.

From the desktop; select **ShopStream User > My Documents > ShopStream > Camera Folder**.

1.6 Windows (Applicable Features / Operations)

The ShopStream Diagnostic Suite program runs on the Microsoft Windows 7 operating system. This section includes introductory information on some of the Windows features and programs that are applicable with the operation of the ShopStream Diagnostic Suite program.

Specific Windows features and instructions are beyond the scope of this manual, please refer to Microsoft Windows 10 user documentation for additional information.

1.6.1 Wi-Fi Setup

The diagnostic tool uses Windows® 10 embedded system software. Wi-Fi connection is controlled through the Windows operating system.

The Wi-Fi connection instructions shown here are intended for quick reference only. For Wi-Fi related instructions / troubleshooting that are outside the scope of these instructions, visit Windows online support.

Wi-Fi connection allows you to:

- Access the Internet using the Windows web browser.
- Use built-in ShopStream Diagnostic Suite Repair Information applications (e.g. Intelligent Diagnostics). **Note:** *Repair Information applications are not available on all models, are optional and vary by model.*
- Receive diagnostic software updates
- Receive important product messages.

Connecting to Wi-Fi

i NOTE

Whenever the diagnostic tool is turned on, Wi-Fi will automatically try to connect to a network.

1. Turn on the diagnostic tool and allow Windows to bootup, then allow the ShopStream Diagnostic Suite software to open.

After bootup if Wi-Fi is not automatically connected the Wi-Fi icon in the System Tray (lower right side) ([Figure 1-4](#)), or on the Diagnostic Suite lower toolbar ([Figure 1-5](#)) indicates Wi-Fi is not connected.

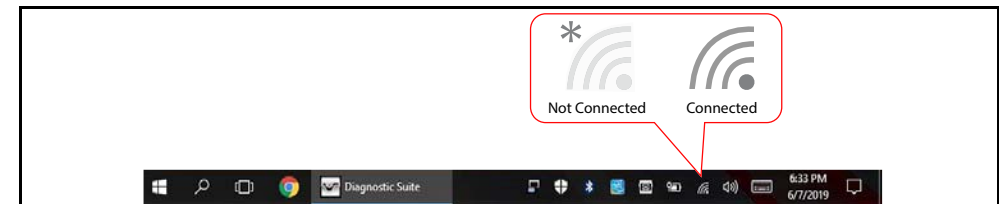


Figure 1-4

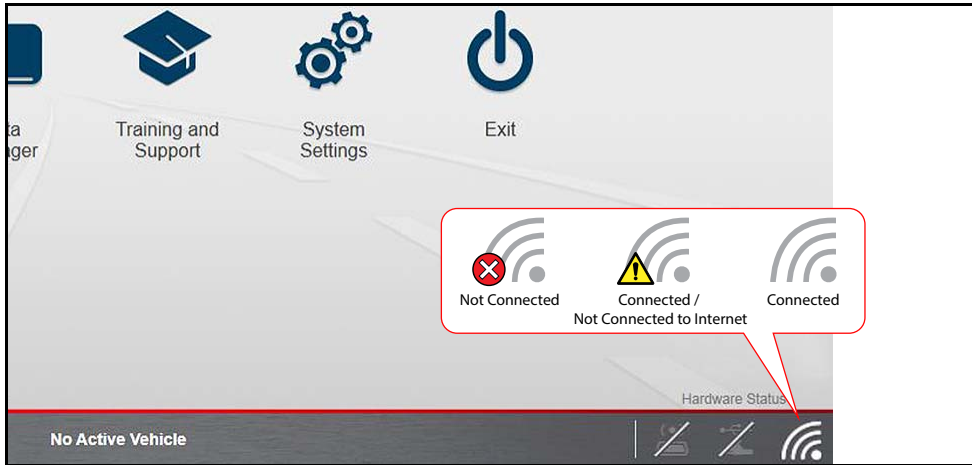


Figure 1-5

- To connect to a network, click the Wi-Fi icon in the System Tray or on the Diagnostic Suite lower toolbar.

The wireless network connection window opens (shown below).

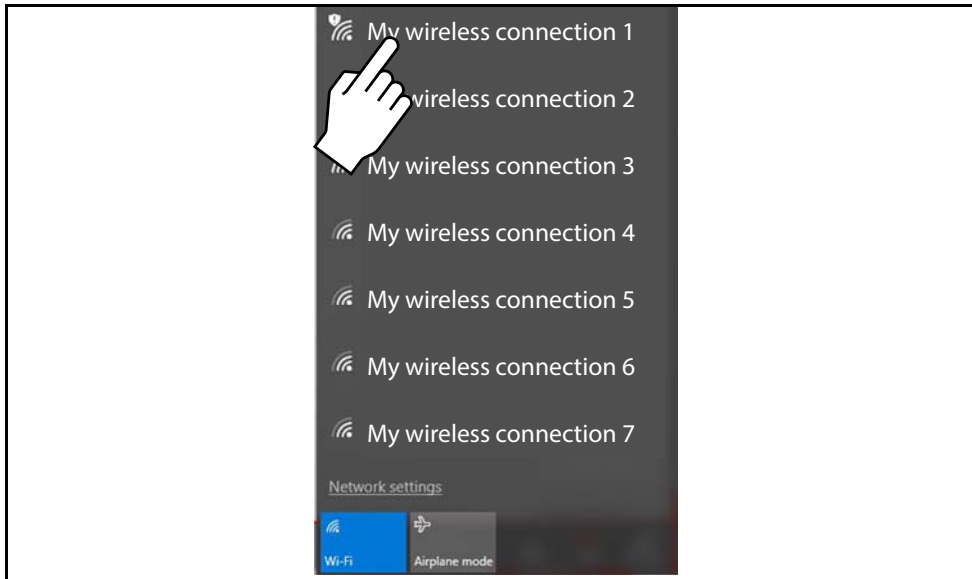


Figure 1-6

- Choose your **Wireless Network** from the list of available networks, then select **Connect**.

NOTE

A password is required when choosing a protected network.

A wireless network connection progress window displays as the connection is being made.

- After the connection is successfully made, the Wi-Fi icon will display as Connected (shown below).



The diagnostic tool is now connected to the Wi-Fi network.

NOTE

Wi-Fi performance varies depending on your wireless network equipment and ISP.

1.6.2 Windows Taskbar

The standard Windows taskbar displays program icons that are currently running or that you have pinned to the taskbar for quick access.

1.6.3 Windows Taskbar Notification Area

The notification area contains icons that provide active status and notifications of selected programs. The notification area may contain standard Windows application icons (e.g. Wireless Network Connection Status, Audio volume, etc.) and specialized application icons designed for use only on this diagnostic tool (e.g. ShopStream Update Tool and Virtual Keyboard).

For additional information on the ShopStream Update Tool and Virtual Keyboard, see:

ShopStream Update Tool - [ShopStream Update Tool \(SST\)](#) on page 174

Virtual Keyboard - [Virtual Keyboard \(Entering Text\)](#) on page 15



1.6.4 Touch Screen and Stylus

The capacitive touch screen is used to control almost all the operations of the diagnostic tool. Simply touch the screen with your finger, or use the capacitive stylus to make a selection. The capacitive touch screen also provides you with multi-touch gesture capabilities found on common surface touch devices. Most operations are menu driven, which allows you to quickly locate the test, procedure, or data that you need through a series of choices and questions. Detailed descriptions of the menu structures are found in the sections for the various functions.

For information on touch screen calibration, maintenance and stylus tip replacement:

Touch screen calibration - see [Calibrating the Touch Screen](#) on page 18

Touch screen maintenance - see [Cleaning](#) on page 198

Stylus tip replacement - see [Stylus Tip Replacement \(Touch Screen\)](#) on page 202

Touch Screen Gestures

This device uses common touch screen gesture motions (e.g. pinch-to-zoom, press and tap, pan and swipe). The terms used to describe the various gestures may vary (industry wide), however the general procedures and usage are similar for specific operations.

Common Gesture Names	General Procedure	Common Usage
Tap Touch Select	Quickly tap a point (once), then release. Quickly tap a point (twice).	Make a selection (e.g. open application). Insert a cursor in a text string. Open alternate menus.
Pinch open/close Pinch-to-zoom Zoom	Touch two points, then move your fingers toward or away from each other.	Zoom the display in or out, to make a selection (e.g. image or picture) larger or smaller.
Touch and hold Select and hold Tap and hold	Touch a point and maintain light pressure.	Make a selection. Insert a cursor in a text string. Open alternate menus.
Touch and drag Select and drag Tap and drag Pan	Touch a point, then while maintaining light pressure, drag in the desired direction.	Move onscreen controls (e.g. scrollbars and slidebars). Move windows. Select text.
Swipe Flick	In a quick and continuous motion, select a point and quickly swipe in the desired direction while lifting off the screen.	Quickly scroll or move through content. Open alternate menus.
Press and tap Select and tap	Touch a point, then while maintaining light pressure, tap (in the same general area) with another finger.	Open alternate menus (similar to right click).

The information provided in the above table is not inclusive, may vary and is intended as a general guide only. For additional information on Windows touch screen operations, see Windows 7 and Windows "Touch Gesture" user documentation. Also refer to *Pen and Touch* settings in the Windows Control Panel for additional information and settings.

1.6.5 Virtual Keyboard (Entering Text)

The Windows Touch Keyboard (Virtual Keyboard) allows you to type characters and key in information to complete form and data entry fields, similar to a physical keyboard.

The virtual keyboard is normally running in the Windows background and can be opened in the following ways:

- **Shortcut (S) button** - choose the **Virtual Keyboard** icon from the Shortcut (S) button menu
- **Windows notification area** - choose the **Virtual Keyboard** icon in the Windows notification area
- **Docking area** - By default the virtual keyboard is docked (auto-hide) to the left side of the screen. To access the virtual keyboard, swipe from the left edge of the screen to right (centered top to bottom). A tab will appear on the edge of the screen. Swipe the tab again left to right and the virtual keyboard will display.

NOTE

As an alternative, you can connect a USB keyboard to the diagnostic tool and use it to key in information.

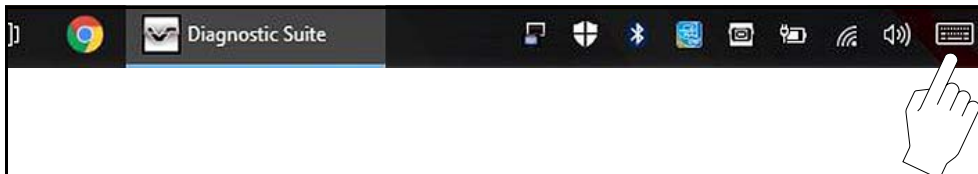


Figure 1-7 Virtual Keyboard icon in notification area

To customize settings and find additional operational information, select **Tools** (Figure 1-8) to open a dropdown menu to access optional settings and Help links.

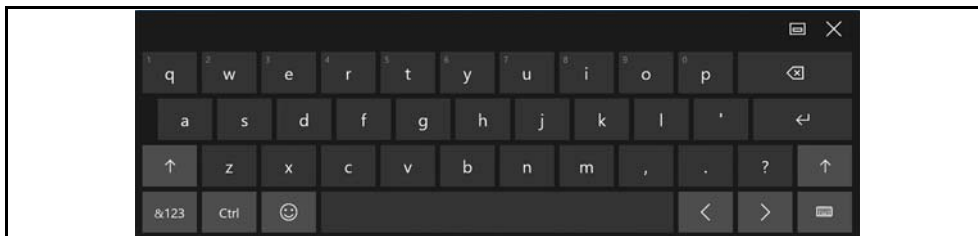


Figure 1-8 Tools menu

To learn more about the virtual keyboard, select **Help Topics** from the Tools menu to open the Windows Touch Keyboard help and support (Figure 1-9).

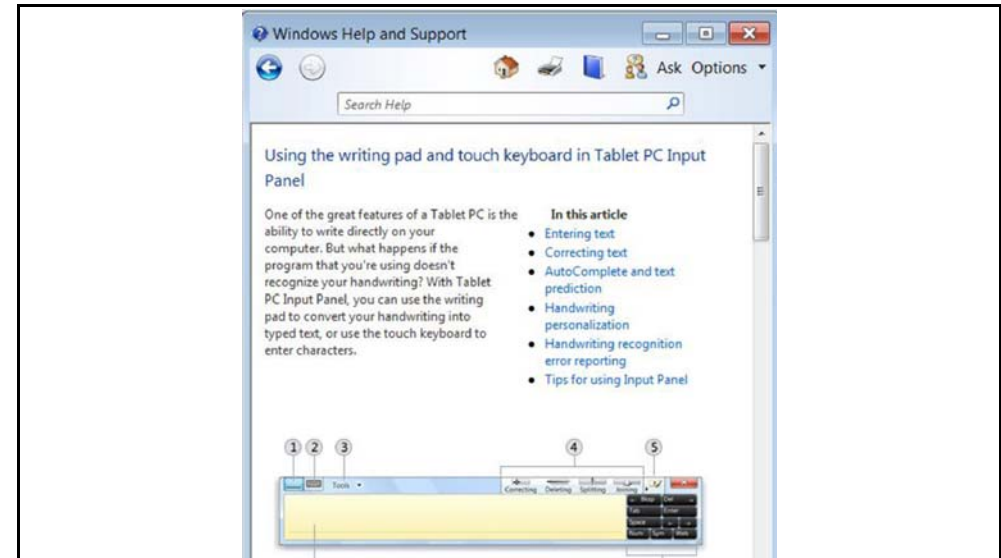


Figure 1-9 Help window

1.6.6 Sleep Mode (Auto Off Display)

The Windows operating system uses Sleep Mode to conserve power by stopping all processes and turning off the display screen, while keeping the diagnostic tool on and your open applications active. When you are ready to resume work, the diagnostic tool can be started up again quickly, just by pressing the **Power** button.

Sleep Mode settings can be found in Windows **Control Panel > Power Options**. For additional information, refer to Windows 7 user documentation.


IMPORTANT

It is recommended that you terminate current vehicle communication and save any open working files or data before entering Sleep Mode, to avoid ECM problems (on some vehicles) or data loss from unforeseen circumstances (e.g. power loss).




IMPORTANT

If Sleep Mode is accidentally activated during active vehicle communication, vehicle communication will stop, vehicle selection will be reset to “no active vehicle” and the Home screen is displayed.

-  **To enter Sleep Mode:**
1. Press and release the **Power** button.
The display screen will turn off, and the Battery Status Indicator located in the power button will light up red, blinking on and off at two second intervals.
A blinking **Red** indicator (on and off at two second intervals) indicates the diagnostic tool is in Sleep Mode.

Sleep Mode - Blinking Red Indicator




-  **To exit Sleep Mode (wake up):**
1. Press and release the **Power** button.
The display screen will turn on and resume the last open application.
Depending on settings, you may need to select your user ID icon to open the last application.

1.6.7 E-Mail Client Setup

The Data Manager function features an e-mail option that allows you to send a saved data or image files as an e-mail attachment. To use this feature, you must install an e-mail client, and then link your existing e-mail address to the client.

The following instructions are intended as a guide only, as e-mail client setup procedures vary. See [Email](#) on page 161 for information on sending e-mails from Data Manager.

-  **E-mail client installation and setup (Example):**
1. Download an email client (e.g. eM Client) ([Figure 1-10](#)).

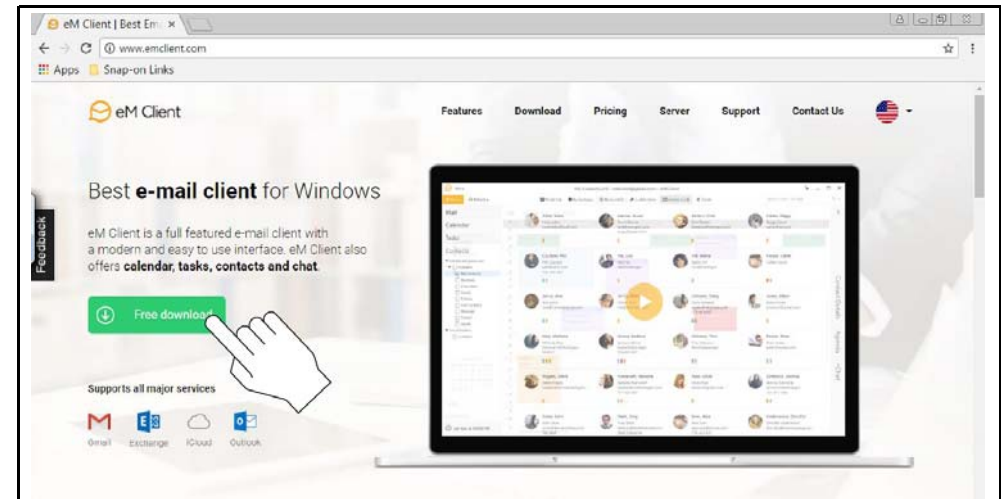


Figure 1-10

2. Install the software following the screen prompts ([Figure 1-11](#)).

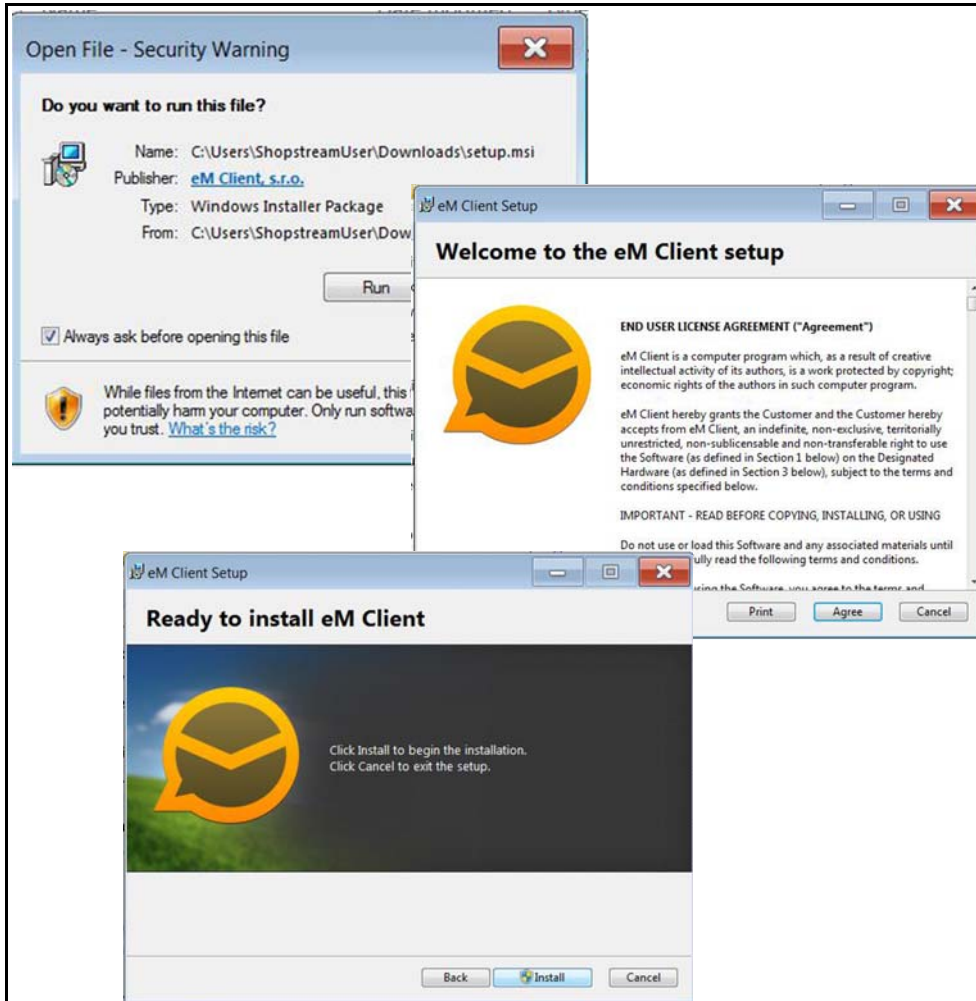


Figure 1-11

NOTE

The Data Manager e-mail feature uses the Windows system e-mail client.

3. Select "Use this client as default application" option when prompted. This sets the client as the Windows system e-mail client.
4. Enter your e-mail information as required (Figure 1-12).

NOTE

E-mail client configuration settings should automatically be set during installation. If problems arise with the setup and manual configuration is needed, refer to the e-mail client help information and the Windows help information.

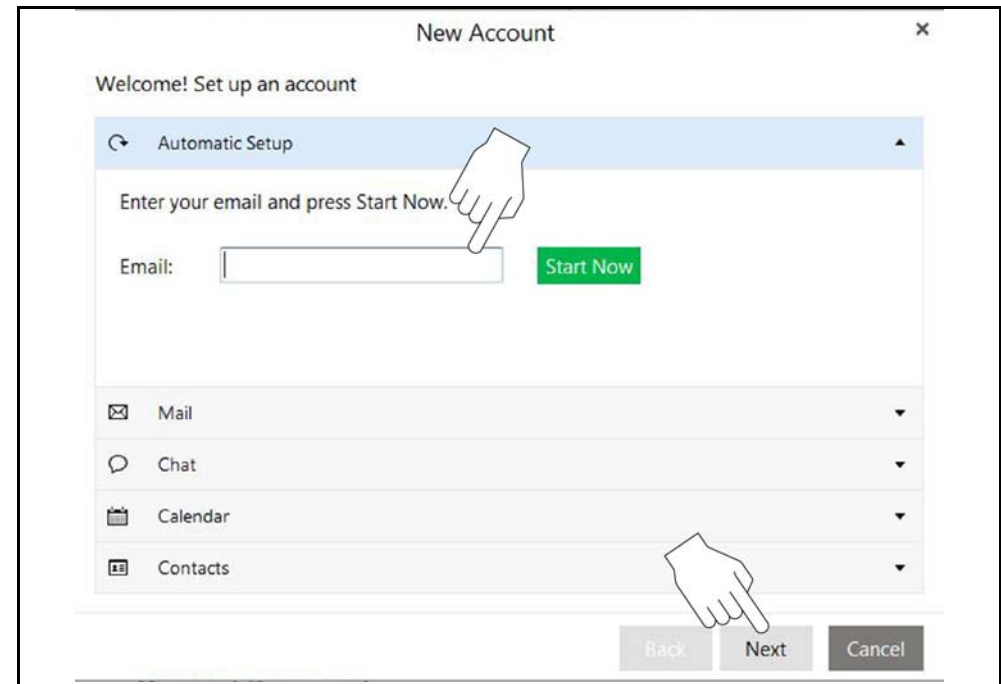


Figure 1-12

5. If your existing email provider login screen displays, enter your email address and password to allow the client to continue the setup with your provider (Figure 1-13).

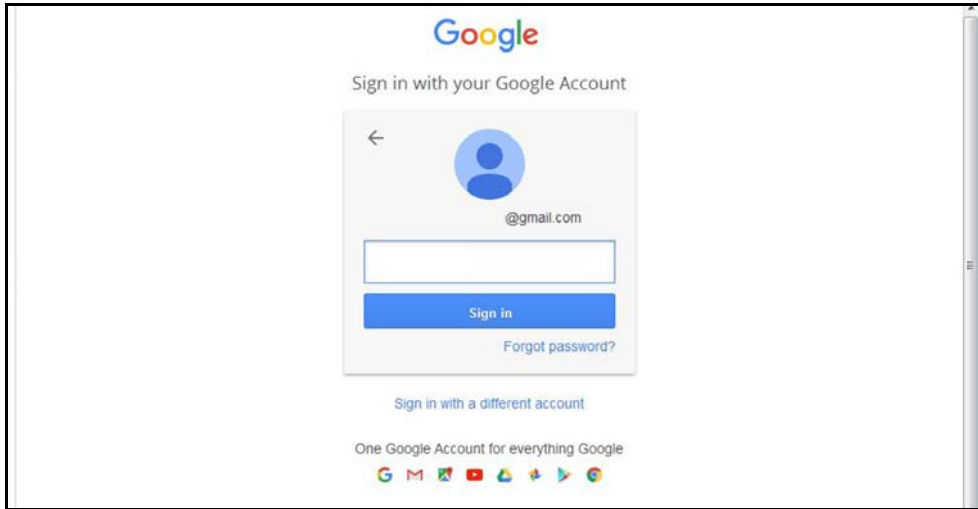


Figure 1-13

6. Follow the screen prompts to allow the client to link to your email address.
7. Once the client has successfully linked to your address, you can begin using the new e-mail client software on the diagnostic tool (Figure 1-14).

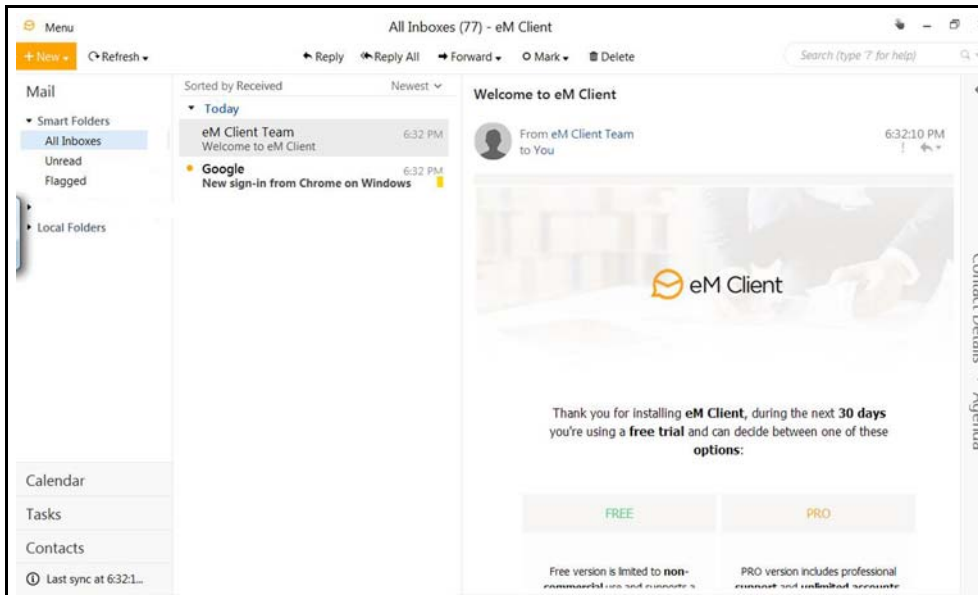


Figure 1-14

1.6.8 Calibrating the Touch Screen

The touch screen can be calibrated for accuracy using the Windows Tablet PC Settings.

To calibrate the touch screen:

1. From the Windows menu select **Start > Control Panel > Hardware and Sound > Tablet PC Settings**.

The Tablet PC Setting window is displayed (Figure 1-15).

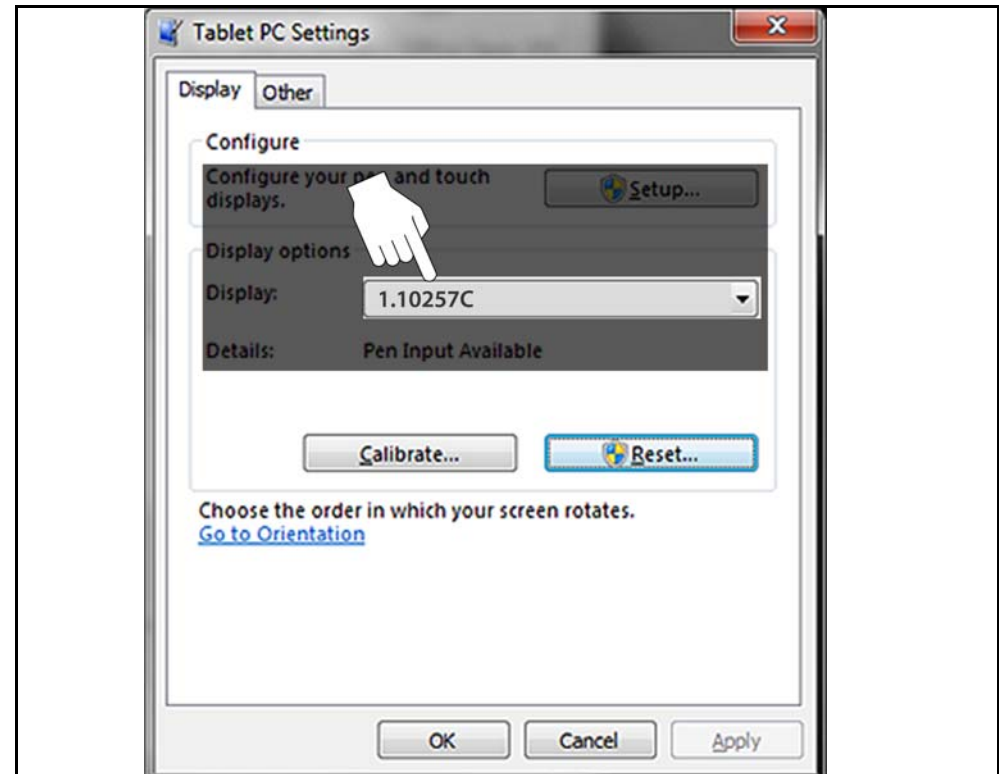


Figure 1-15 Typical - Tablet PC Settings window

2. Select the diagnostic tool display from the dropdown list. The current default diagnostic tool display number "1.10257C" is shown in Figure 1-15 as an example.

**NOTE**

If you are using an optional touch screen (e.g. using an external touch screen with a Tech Cart and docking station), there will be an additional touch screen choice displayed.

3. Select Calibrate.

The Calibration screen is displayed (*Figure 1-16*).

4. Using the stylus, follow the screen prompts and tap on the center of the cross-hairs as they appear at each corner on the screen (*Figure 1-16*).**NOTE**

To achieve the best results, it is recommended to use the capacitive stylus when performing the touch screen calibration.

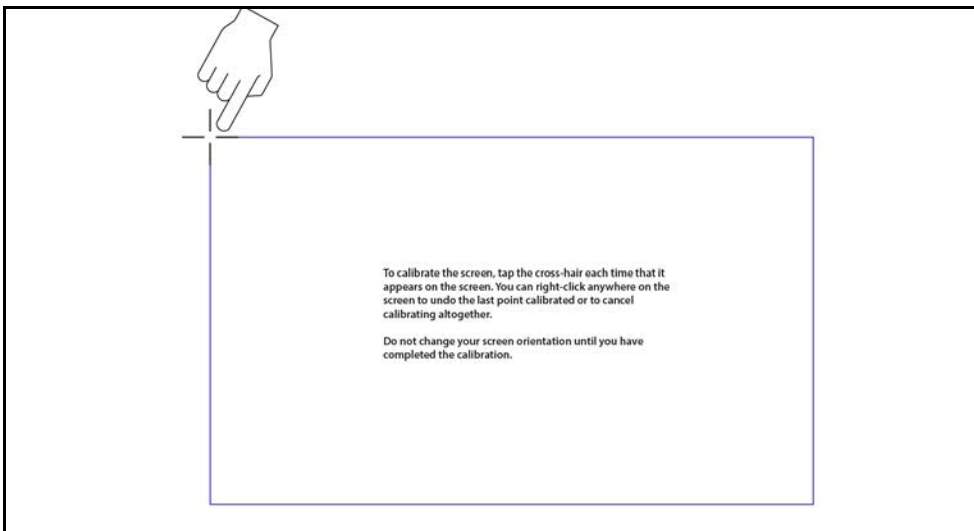


Figure 1-16 *Calibrating the Touch Screen*

5. Select OK to close the dialog boxes once the calibration is complete.**1.6.9 Printing / Printer Setup**

Selecting **Print** opens a standard Windows Print dialog box.

To print, a printer must be installed and set as the system default printer. The following sections provide basic instructions for local printer setup.

NOTE

The factory default printer setting is (.XPS file format). From the standard Windows print dialog box, you can name the file and specify the location that it is saved to. The file can then be viewed onscreen using the Windows XPS Viewer.

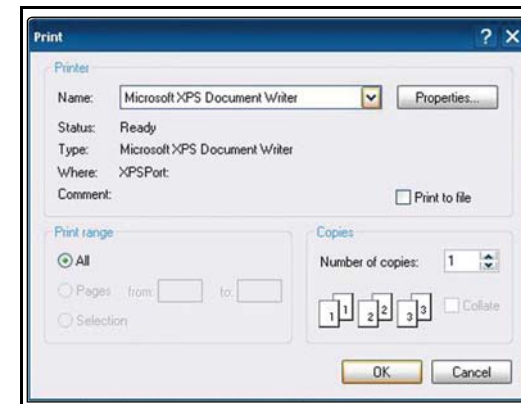


Figure 1-17 *Typical Print dialog box*

NOTE

To print a code scan Vehicle System Report, Adobe Reader must first be installed. See [Checking/Installing Adobe® Reader](#) on page 22.

The following is intended as a basic printer setup instruction only. Printer setup will vary. For specific instructions and details, refer to your printer setup information and the online Windows printer setup help information.

There are three basic methods to connect a printer to the diagnostic tool, using a USB cable, connecting over a Wireless Network and Direct Wireless connection. Basic connection instruction are provided in the following sections.



USB Printer Setup

1. Turn the printer on.
2. Connect the USB cable from the printer to the diagnostic tool.
3. Windows should automatically detect and install the printer.
4. Follow the onscreen instructions to install the printer and then set the printer as the default printer. See [Default Printer Setting on page 22](#).

If the printer driver files are not automatically installed, you will have to manually install the printer driver files. Printer driver files may be supplied with the printer (e.g. CD or memory stick), or check the printer manufacturer's website to download the files. Follow the manufacturer's instructions for driver installation.

1.6.10 Wireless Printer Setup

If your printer is Wi-Fi enabled, you may have options to connect the diagnostic tool to the printer using an existing Wi-Fi network (through a router), or connect directly to the printer wirelessly.

Connecting to an existing Wi-Fi network is the most common method, as this allows you to connect to the printer and stay connected to the Internet (if applicable).

i NOTE

You may only connect to one network, therefore when connecting directly to your wireless printer, any other active wireless connection will be disconnected.

Wi-Fi Network Connection

Use the following instructions (as a guide) if you choose to connect the diagnostic tool to the printer through your existing network.

1. Turn your printer on and make sure it is setup per the manufacturers instructions.
2. Connect the printer to your wireless network. A password may be required when connecting to a protected network. Note the printer connection IP address when it connects to the network.
3. From the diagnostic tool, select the **Windows** icon on the desktop (lower left).
4. Select **Devices and Printers** (right-side menu).
5. Select **Add a Printer** from the toolbar.
6. Select **Add Network, Wireless or Bluetooth Printer**.

7. Follow the onscreen instructions to search, locate and install your printer. Windows automatically searches for available printers on the network ([Figure 1-18](#)).

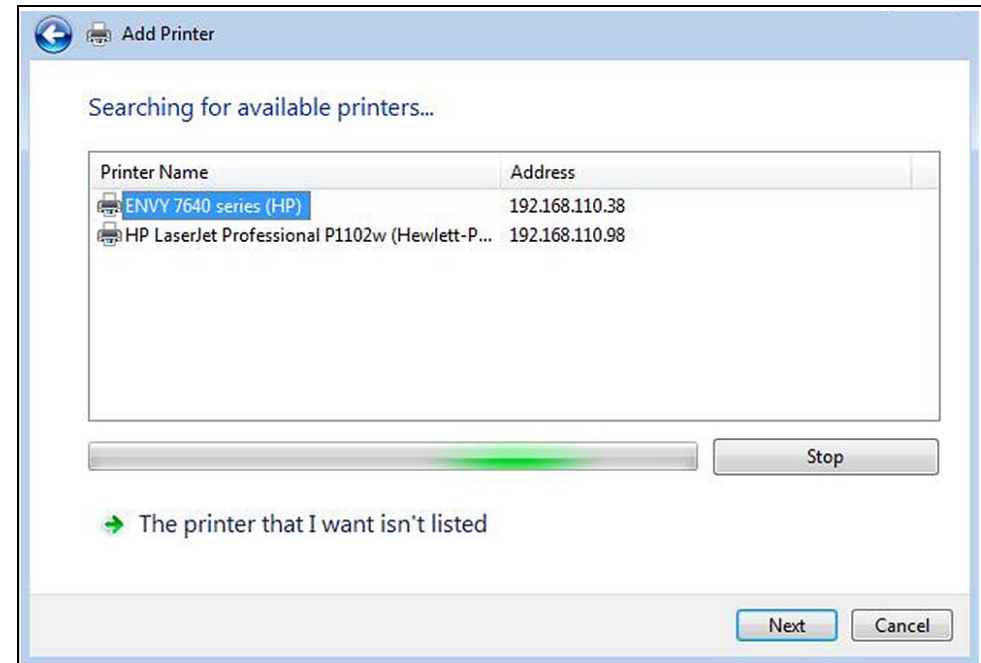


Figure 1-18

i NOTE

If other devices are discovered on the network, connect to the printer with the matching IP address from step 2.

It is important that you install the printer driver files when prompted, during setup. Printer driver files may be supplied with the printer (e.g. CD or memory stick), or check the printer manufacturer's website to download the files.

8. Set the printer as the default printer. See [Default Printer Setting on page 22](#).

Direct Wi-Fi Connection

Use the following instructions (as a guide) if your printer supports direct connection, and you choose to connect the diagnostic tool directly to the printer.

1. Turn your printer on and make sure it is setup per the manufacturers instructions for direct connection. The printer must be able to be wirelessly detected by the diagnostic tool.

NOTE

You can only connect to one network, therefore when connecting to your wireless printer, any other active wireless connection will be disconnected.

2. From the diagnostic tool, click the Wi-Fi icon in the System Tray (Figure 1-19), or from the Diagnostic Suite lower toolbar (Figure 1-20).

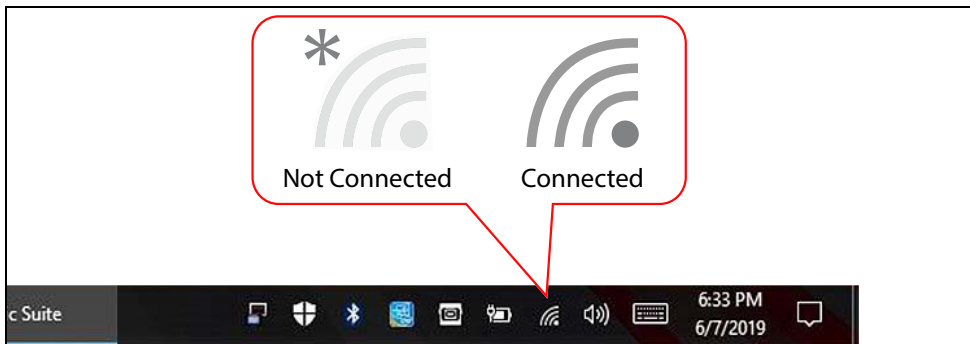


Figure 1-19

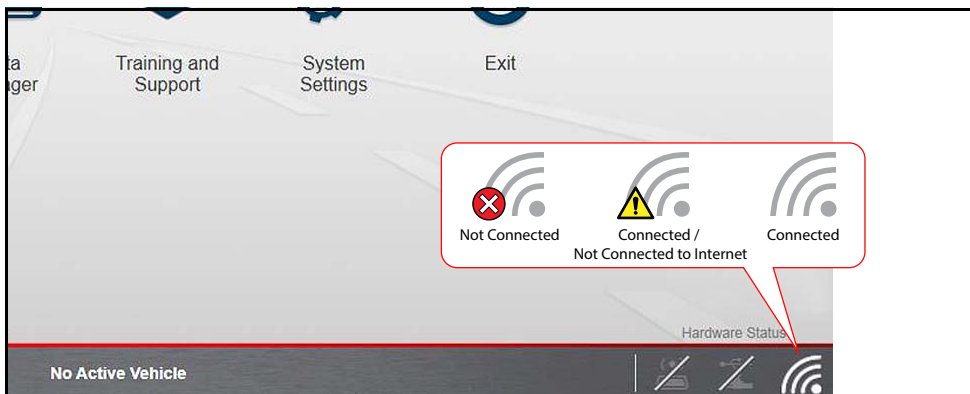


Figure 1-20

3. Choose your **Wireless Printer** from the list of available networks, then select **Connect** (Figure 1-21).

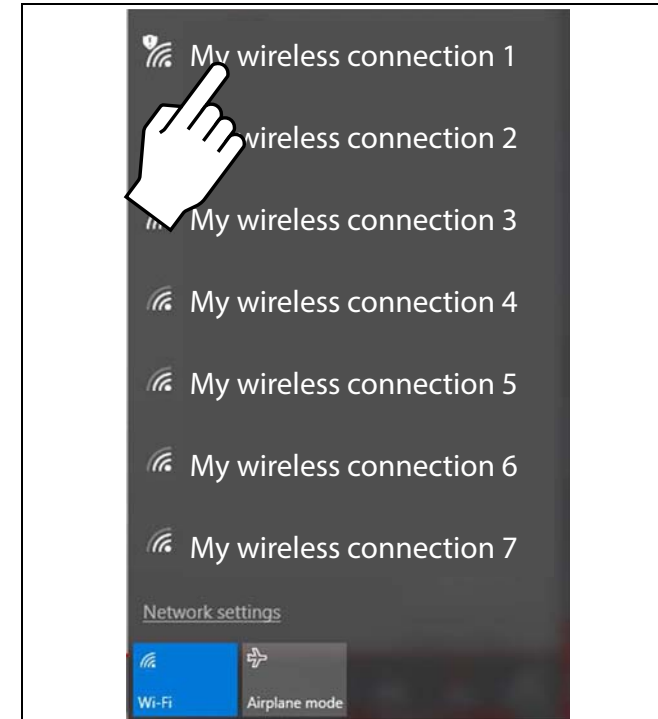


Figure 1-21

4. Enter the security password for your wireless printer. See your printer documentation for details.

A wireless network connection progress window displays as the connection is being made.

Once the diagnostic tool is connected to the Wi-Fi printer, follow these steps to install the printer:

5. Select the **Windows** icon on the desktop (lower left).
6. Select **Devices and Printers** (right-side menu).
7. Select **Add a Printer** from the toolbar.
8. Select **Add Network, Wireless or Bluetooth Printer**.
9. Follow the onscreen instructions to search, locate and install your printer. Windows automatically searches for available printers on the network (Figure 1-18).

It is important that you install the printer driver files when prompted, during setup. Printer driver files may be supplied with the printer (e.g. CD or memory stick), or check the printer manufacturer's website to download the files.

10. Set the printer as the default printer. See [Default Printer Setting](#) on page 22.

1.6.11 Default Printer Setting

To set a default system printer:

1. Select the **Windows** icon on the desktop (lower left).
2. Select **Devices and Printers** (right-side menu).
3. Touch and hold the icon of the printer you want to set as the default, until the optional menu indicator (circle outline) appears ([Figure 1-22](#)) and then release (this is also known as right-click menu). From the menu, select “**Set as default printer**”. When set, a check mark is displayed next to the option ([Figure 1-22](#)).

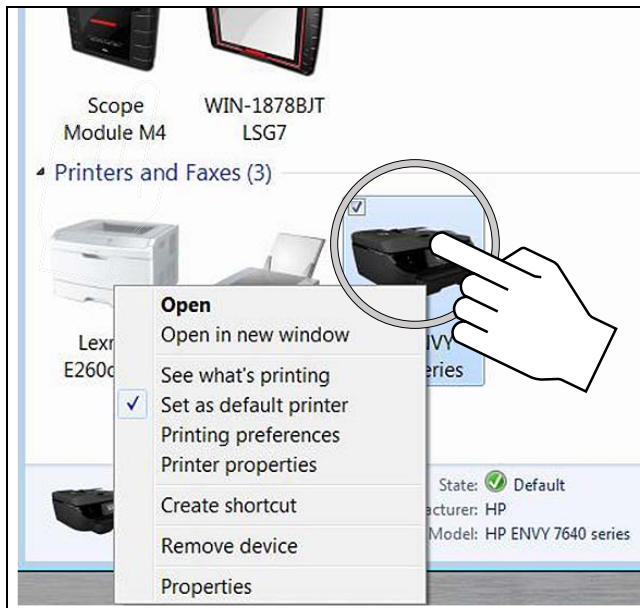


Figure 1-22

i NOTE

The printer right-click menu, also provides access to other printer settings such as properties and preferences.

1.6.12 Checking/Installing Adobe® Reader

To print the Vehicle System Report, Adobe Reader must be installed.

To check if you have Adobe Reader installed:

1. Check if the Adobe Reader shortcut icon is on the desktop, or
2. Select the Windows icon on the desktop (lower left).
3. Select **All Programs** from the menu.

Adobe Reader should appear near the top of the list (depending on what other software you have installed).

To install Adobe Reader:

1. Visit: adobe.com, or get.adobe.com/reader/
2. Follow the instructions to download and install the free version of Adobe Reader for Windows.

i NOTE

Deselect any options such as “Install Acrobat Reader Chrome Extension”, or install optional security, etc. Only Adobe Reader is needed.

1.7 Operating System Restore

Snap-on System Restore is a program that allows you restore the diagnostic tool operating system software to the original factory setup, in the event of a failure. Running the program replaces all “C” drive files with the original factory files and settings.

It is important to understand that ALL files on the “C” drive will be deleted when performing a restore. Performing a restore will restore the Windows operating system to the original factory setup, however the ShopStream Diagnostic Suite will be restored to the same version that was installed at the time the restore was performed.

IMPORTANT

Transfer all files (e.g. personal files) off of the “C” drive that you wish to retain BEFORE performing the system restore, as all files on the “C” drive will be deleted. To backup saved files created in the ShopStream Diagnostic Suite (e.g. engine data, scope recordings, or image files) see [Data Backup](#) on page 172.

**To restore the operating system**

1. Turn on the diagnostic tool.
2. During boot-up wait for the “Press the “S” button to run Snap-on System Restore.” message to display, then Press the **Shortcut (S)** button.
A progress indicator displays while the program loads.
3. Select **OK** from the confirmation message.
A progress indicator displays while the files are being restored.
4. Select **OK** from the confirmation message.
The diagnostic tool shuts down, then reboots and the system recovery portion of the operation begins. Follow any on-screen prompts.
The diagnostic tool shuts down and reboots a second time. When the Home screen displays, the procedure is complete and the diagnostic tool is ready for use.

1.8 Accessories (Optional Equipment)

Visit our website, or contact your local sales representative to learn more about diagnostic tool accessories. The following are just a few of the optional accessories that will allow you to take full advantage of your diagnostic scanner. Not all accessories listed here may be available in all markets.

- **Screen Protectors** - Custom-fit screen protectors can keep your diagnostic tool display screen clean and protect against scratches, solvents and dirt.
- **Docking Station** - Provides a convenient way to keep your diagnostic tool powered up all day, and extra connections for up to four USB devices and an HDMI video out connector to display the screen on an external monitor.
- **12VDC Power Cable** - The diagnostic tool can also be powered using an optional 12VDC vehicle power cable adapter. The power cable adapter uses vehicle power (from a standard vehicle power port) to power the diagnostic tool. Contact your sales representative to order this accessory.

1.9 Diagnostic Tool Technical Specifications

Item	Description / Specification
Touch Screen	Capacitive Touch Panel
Display	10.1 inch diagonal, TFT Color LCD
	1280 x 800 resolution (WXGA)
Processor	Intel Quad Core N2930, 1.8GHz
Camera	5MP (2592x1944), JPG format
Operating System	Microsoft® Windows® Embedded 10
Communications	Wi-Fi standard (802.11 b/g/n)
	Bluetooth® 2.1 Technology
Battery	Rechargeable Lithium Ion Smart Battery Pack, 11.1VDC
	Approximate 5 hour run time
	Approximate 3.5 hour charge time
Power Supply	Supply Rating; 19 VDC, 3.4A
DC Operating Voltage	10 to 32 VDC
Width	12.4 in. (316 mm)
Height	8.23 in. (209 mm)
Depth	2.0 in. (51 mm)
Weight (including battery pack without Scope Multimeter Module)	3.80 lb (1.73 kg)
Weight (including battery pack and Scope Multimeter Module)	4.40 lb (2.00 kg)
Operating Temperature Range (ambient)	At 0 to 90% relative humidity (non-condensing) 32 to 113°F (0 to 45°C)
Storage Temperature (ambient)	At 0 to 70% relative humidity (non-condensing) -4 to 140°F (-20 to 60°C)
Operating Altitude	Maximum 2000 m
Environmental Conditions	This product is intended for indoor use only.
	This product is rated for Pollution Degree 2 (normal conditions).

Introduction

This section describes the basic operation, and navigation of the ShopStream Diagnostic Suite program Home screen and icons.

Main Topic Links

- [The ShopStream Diagnostic Suite Program](#) page 24
- [Home Screen Layout](#) page 24
- [Function Icons](#) page 25
- [Toolbar Icons](#) page 26
- [Menu Icon](#) page 26

2.10 The ShopStream Diagnostic Suite Program

The ShopStream Diagnostic Suite program is used for all diagnostic functions. The ShopStream Diagnostic Suite icon is located on the Windows desktop.



Figure 2-1 ShopStream Diagnostic Suite desktop icon

The program is automatically started when the diagnostic tool is turned on through the Windows “start up” folder function. Once started the Home Screen displays, see [Home Screen Layout](#). The program runs in a normal window and can be minimized, resized, and closed like any other Windows program.

To access the Windows desktop, minimize the program window, or use the Desktop icon, see [Toolbar Icons](#) on page 26

NOTE

The ShopStream Diagnostic Suite can also be started from the Windows Start menu.

2.11 Home Screen Layout

The Home screen includes Function Icons, the Main Toolbar and Windows Taskbar.









1. Function Icons, see [Function Icons](#) on page 25
2. Main Toolbar, see [Toolbar Icons](#) on page 26
3. Windows Taskbar, see [Windows Taskbar](#) on page 13
4. Windows Taskbar Notification Area, see [Windows Taskbar Notification Area](#) on page 13





Figure 2-2 Home screen



2.12 Function Icons

The Function Icons configure the diagnostic tool for the type of test to be performed. The following table gives brief descriptions of the available icons, which operations are available depends upon the individual configuration of your system. Use the stylus or your finger tip to select from the icons.








Icon	Description
Scanner	
	Configures the diagnostic tool to operate as a scan tool. See Scanner on page 37 .
OBD Direct	
	Allows you to perform generic OBD-II or EOBD system tests without identifying the specific vehicle. See OBD Direct on page 75 .
Guided Component Test	
	Opens a diagnostic database of specific tests for the identified vehicle. See Guided Component Tests on page 80 .
Scope Multimeter	
	Configures the diagnostic tool to operate as a lab scope, graphing multimeter, or digital multimeter. See Scope and Multimeter Operations on page 87 .
Information	
	Provides the information needed to make repairs once you have made your diagnosis. The linked program varies by region. See Information on page 134 .
Vehicle History	
	Identifies the test vehicle and organizes and manages work in progress and service records. See Vehicle History on page 154 .

Icon	Description
Data Manager	
	Opens the organization system for saved data files. See Data Manager on page 158 .
Help	
	Opens the on-line help for the system. See Help on page 169 .
System Settings	
	Establishes and manages connections to peripheral devices, such as the Scan Module. See System Settings on page 170 .
Exit	
	Closes the diagnostic tool software and returns the display to the Windows desktop.



2.13 Toolbar Icons

Operation of the icons located on the toolbar are described in the table below:

Icon	Description
Home	
	Selecting this icon returns you to the Home screen from any test. See Home Screen Layout on page 24.
Desktop	
	Selecting this icon toggles the Windows taskbar on/off at the bottom of the screen, and allows you access to the Windows desktop.
Menu	
	Selecting this icon opens a menu that provides information and basic operations and features for the current screen. See Menu Icon on page 26.
Change Vehicle	
	The currently identified vehicle is shown to the right of the icons, selecting allows you to change the identified test vehicle.
View Record	
	Selecting the icon opens an editable worksheet of vehicle records.
Compact Scan Module Hardware Status	
	Indicates the connectivity status of the Compact Scan Module. Icon changes depending on status. See Checking Paired Status on page 32 for icon descriptions.
Scope Module Hardware Status	
	Indicates the connectivity status of the Scope Multimeter Module. Icon changes depending on status. See Checking Paired Status on page 32 for icon descriptions.

2.14 Menu Icon



The Menu icon on the Toolbar at the base of the display screen opens a list of basic operations and features. The list of options varies depending upon which module, or tool function, is active. Selecting a menu item opens a submenu of choices, and some submenus also open an additional menu. A right arrowhead (▶) indicates additional choices are available. Touch an item to select it. The following Menu options are available from the Home Screen:

- [Safety Information](#)—opens the *Important Safety Instructions* document.
- [Help](#)—allows you to view diagnostic software information.

2.14.1 Safety Information

Selecting **Safety Information** opens a PDF copy of the *Important Safety Instructions* that are included in your diagnostic tool kit. The *Important Safety Instructions* document should be read and understood prior to using the diagnostic tool.

2.14.2 Help

A variety of utilities and additional resources are available through the Help menu. Basic menu options, which are available for all modules, include:

- **Version Info** - This option opens a window showing the version of the software and a copy of the Software License Agreement. Select OK to close the window.
- **Activation Status** - This option opens a dialog box with version and licensing details for the system, and activation status for the diagnostic tool and all other modules.



2.15 Changing the Units of Measurement

The Diagnostic Suite units of measurement can be changed for temperature, vehicle speed, air pressure and other pressure readings. Choose between US customary or metric units of measure.



To change the units of measurement:

1. Select **Scanner**..
2. Select the **Menu** icon from the lower toolbar.

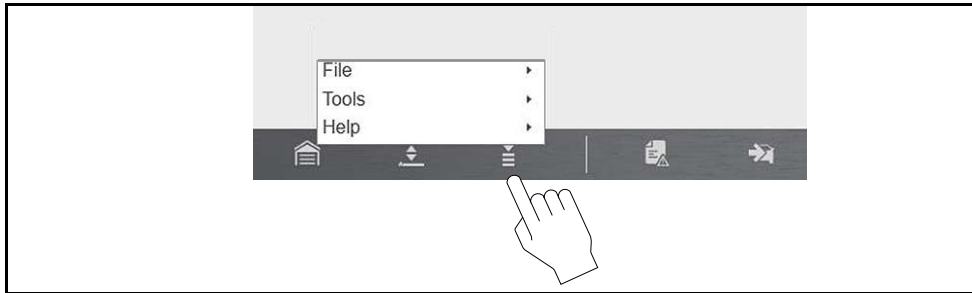


Figure 2-3 Menu icon

3. Select **Tools > Units Setup**..

The Units setup dialog box opens.

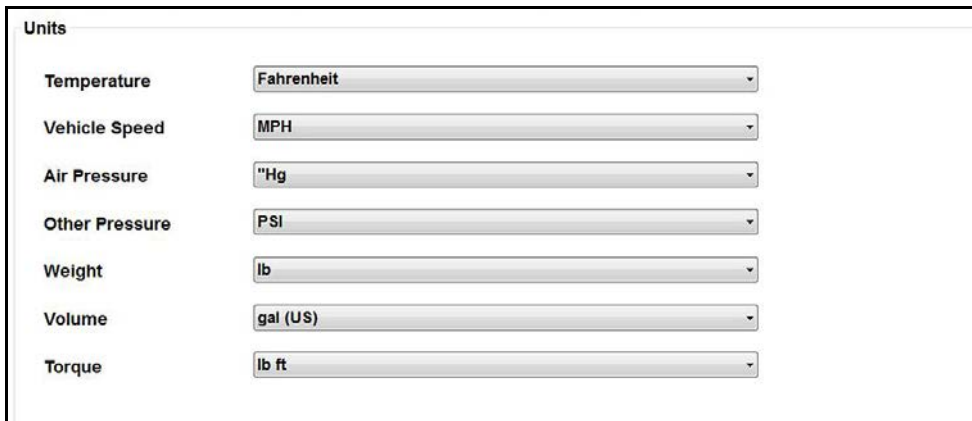


Figure 2-4 Units Setup screen

4. Use the dropdown menus to select the desired value for each item.
5. Select **Accept** to close the dialog box and apply the changes.



Introduction

This section describes the connection, and basic operation of the Compact Scan Module (CSM).

The CSM is a wireless device that is connected directly to the vehicle data link connector (DLC), and wirelessly transmits vehicle data to the diagnostic tool.

Main Topic Links

- [Feature Locations](#) page 28
- [Power Source](#) page 28
- [LED Indicators](#) page 29
- [Connecting the CSM](#) page 29
- [Pairing and Hardware Status Icons](#) page 31
- [Hardware Status Icons](#) page 32
- [Firmware Updates](#) page 33
- [Troubleshooting](#) page 34
- [Technical Specifications](#) page 36

3.16 Feature Locations



- | | |
|------------------------------------|--------------------------|
| 1. LED indicator | 4. Micro SD card slot |
| 2. Universal serial bus (USB) jack | 5. LED Flashlight |
| 3. Lanyard anchor | 6. LED Flashlight switch |

Figure 3-1 Compact Scan Module

3.17 Power Source

The CSM requires power from an external source to operate.

When testing OBD-II/EOBD vehicles, the CSM is powered by the vehicle when connected to the data link connector (DLC).

When testing OBD-I vehicles that do not have battery power (B+) at the DLC, the CSM is powered by connecting a power cable directly to the optional OBD-I manufacturer specific adapter, see [To connect the CSM to OBD-I vehicles: on page 30](#).

When performing a CSM firmware update, the CSM should be powered by USB connection directly to the diagnostic tool, see [Firmware Updates on page 33](#).



3.18 LED Indicators

Light emitting diodes (LEDs) on the CSM indicate communication status. The following LED descriptions apply only when the CSM is powered by the vehicle DLC.



- **GREEN** - Power / Communication indication
- **RED** - Error / Self-test indication
- **BLUE** - Connection / Communication indication

Figure 3-2 LEDs

LED indicator descriptions:

- **GREEN**
 - **Off** - CSM is not being powered
 - **On Continuous** - CSM has power, but is not communicating
 - **Flashing** - CSM has power, and is communicating
- **RED**
 - **Off** - normal state, no errors detected
 - **On Continuous** - communications error detected
 - **Flashing** - internal self-test in process, will go out once the test completes
- **BLUE**
 - **Off** - no connection
 - **On Continuous** - USB cable connected and communicating
 - **Flashing** - wirelessly connected and communicating

3.19 Audible Alerts

In addition to onscreen messages, the CSM uses audible tones to alert you of connection status. Alerts include:

- Initial power on - (single 100ms “beep”)
- Communication terminated, CSM still connected to vehicle DLC - (After losing communication, will continuously beep at two different frequency's every 10 seconds.)
- Communication terminated with diagnostic tool (out of range) - (After losing communication, will continuously beep at two different frequency's every 10 seconds.). Diagnostic tool will also display a message “trying to re-establish communication”, see [Out of Range Alarm](#) on page 35.

If other alerts occur (series of “beeps”) this may indicate a communication error. Follow the onscreen instructions, to identify and resolve the issue.

3.20 LED Flashlight (built-in)

A built-in LED flashlight is provided to assist in illuminating dark areas in the vehicle to find the DLC. To operate the light, press and hold the switch (see [Figure 3-1](#) for location).

The LED is powered by a built-in (non-replaceable) battery, and automatically charges when the CSM is supplied power.

3.21 Basic Operation

3.21.1 Connecting the CSM

To use the Compact Scan Module (CSM), it must be powered, paired to the diagnostic tool and connected to the vehicle DLC. To pair the CSM, see [Pairing The Scan Module](#) on page 59. For power source information see, [Power Source](#) on page 28.



To connect the CSM to OBD-II vehicles:

1. Connect the CSM directly to the vehicle DLC.
2. Proceed to [Basic Scanner Operation \(Quick Start\)](#) on page 38.

i NOTE

An optional CSM extension cable DA-4EX is available to allow an extended connection of the CSM to the vehicle DLC.

To connect the CSM to OBD-I vehicles:

The following applies to most OBD-I vehicles. Use the optional DA-6 adapter and the optional OBD-I manufacturer specific adapter. Connection example shown [Figure 3-3](#). Contact your sales representative to purchase adapters.

1. Connect the CSM to the DA-6 adapter.
2. Connect the DA-6 adapter to the OBD-I manufacturer specific adapter.
3. Connect the OBD-I manufacturer specific adapter to the vehicle DLC.

For vehicles that do not supply battery power at the DLC, connect the optional 12VDC power cable to the OBD-I manufacturer specific adapter.

IMPORTANT

Never disconnect the power cable from the optional OBD-I adapter or the power supply to the diagnostic tool if the tool is communicating with a vehicle.

4. Proceed to [Basic Scanner Operation \(Quick Start\)](#) on page 38.



Figure 3-3 OBD-I DA-6 Connection Example

3.21.2 Pairing and Hardware Status Icons

To use the CSM, it must be paired with the diagnostic tool.

Pairing is the wireless connection (identification) process used to connect the CSM to your diagnostic tool.

The CSM only needs to be paired once before its initial use. The connection configuration should remain in memory for all future uses, unless the connection configuration is removed or lost.

NOTE

Wireless devices shown in this section are used as reference. Not all devices shown may be applicable to your diagnostic tool.



To pair the CSM with the diagnostic tool:

1. Turn on the diagnostic tool.

IMPORTANT

The CSM and diagnostic tool must be on when pairing. Make sure the diagnostic tool has a fully charged battery, or is connected (recommended) to the AC power supply.

2. Connect the CSM to a vehicle data link connector (DLC), or use the supplied USB cable to connect the CSM to the diagnostic tool to supply power to the CSM.

NOTE

The green LED on the CSM is illuminated when power is being supplied to the CSM by a vehicle DLC. The blue LED is illuminated when power is being supplied by USB connection.

3. After the CSM is powered (green LED on), from the diagnostic tool select **System Settings > Paired Devices**.
4. Select **Add** from the toolbar, then **OK** when prompted.
The diagnostic tool searches for compatible wireless devices, then displays the results. (Figure 3-4).



Figure 3-4

NOTE

Search results include all compatible wireless devices detected, and may include multiple Scan Modules if you are in a shop environment where more than one unit is powered on. Available module listings include a partial serial number. Make sure the screen listing matches the last six digits of the serial number of your CSM before continuing.

5. Select your CSM from the results list.

A progress message displays during the pairing procedure (Figure 3-5), the Paired Devices screen (Figure 3-7) displays once the procedure completes.

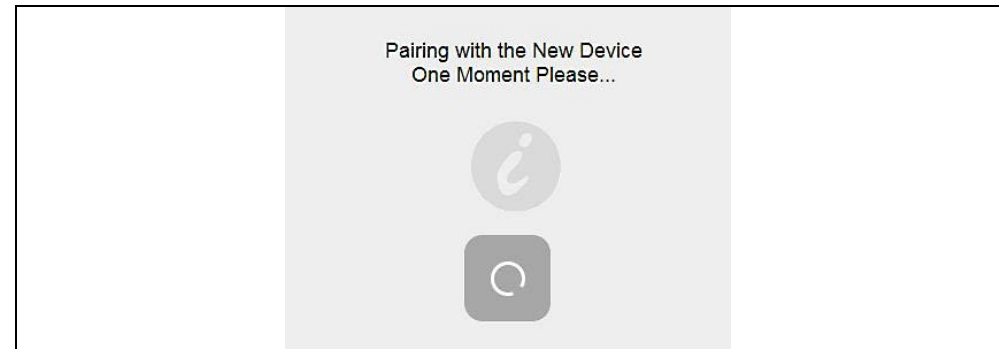


Figure 3-5

6. After the pairing process completes, select the **Home** icon on the toolbar to return to the Home screen. The CSM and diagnostic tool are now paired for wireless communication and should automatically connect when both are powered up.

NOTE

If a CSM firmware update is available, the CSM will automatically be updated, see [Firmware Updates](#) on page 33 for additional information.

When pairing is successful the CSM hardware status indicator displays on the Home screen (lower-right corner) ([Figure 3-6](#)), providing a quick reference to connection status.

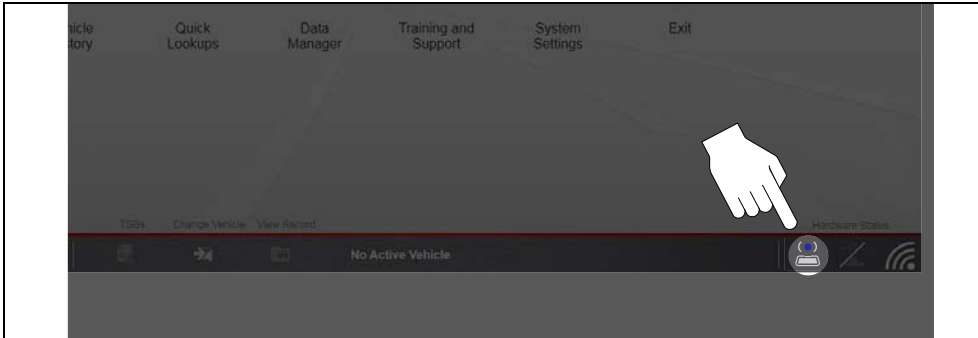


Figure 3-6

Checking Paired Status

To check if the CSM is paired to your diagnostic tool:

1. Select **System Settings > Paired Devices**.

The paired devices screen opens ([Figure 3-7](#)).

The Paired Devices screen lists all of the devices paired to the diagnostic tool, and also indicates whether or not there is active communication occurring.

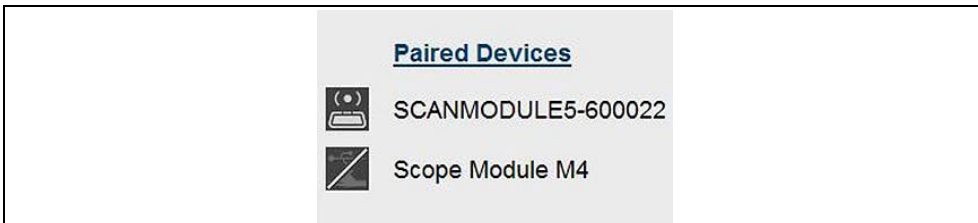


Figure 3-7 Typical Paired Devices screen results

2. Verify the CSM is in the list of paired devices.

3. For additional CSM connection status information, see [Hardware Status Icons](#) on page 32.

Hardware Status Icons

The hardware status indicators (Home screen lower-right corner) provide a quick reference to connection status ([Figure 3-8](#)).

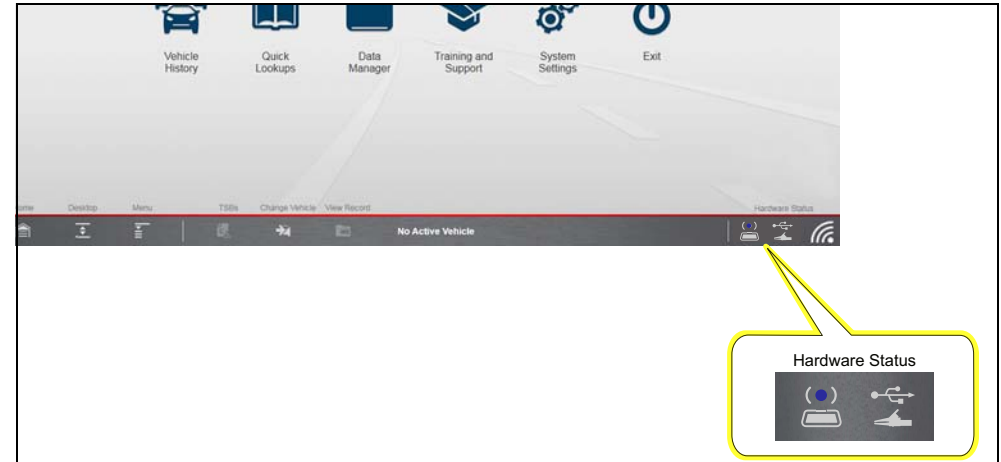




Figure 3-8 Home screen - Hardware status icons

Status/Icon	Action
Paired and Communicating 	Indicates the CSM is wirelessly connected and communicating.
Not Paired 	Indicates the CSM is not paired or connected to the diagnostic tool. Pair the CSM to the diagnostic tool. See Pairing and Hardware Status Icons on page 31 for instructions.
Paired but Not Communicating 	Indicates the CSM is wirelessly connected but not communicating. You may have moved out of range. Move the diagnostic tool closer to the CSM to reestablish communications. If connectivity is not restored, see Pairing and Hardware Status Icons on page 31 for instructions, or if required perform the Loss of Connection - Recovery Procedures on page 35.

Status/Icon	Action
Paired and Communicating	Indicates a USB cable is connected between the CSM and the diagnostic tool, and the CSM is communicating (through the USB cable) with the diagnostic tool.
	
Paired but Not Communicating	Indicates a USB cable is connected between the CSM and the diagnostic tool, but the CSM is not communicating with the diagnostic tool. If connectivity cannot be restored, see Pairing and Hardware Status Icons on page 31 for instructions, or if required perform the Loss of Connection - Recovery Procedures on page 35.
	

3.22 Firmware Updates

The internal programming (firmware) of the CSM may require periodic updates. Firmware updates increase the CSMs diagnostic capabilities; typically by adding support for new tests, vehicles, and enhanced applications to the vehicle databases.

CSM firmware updates (when available) are delivered with diagnostic software updates/upgrades. Upon starting the Scanner function, initially after a software update or upgrade has been installed, a message may be displayed to inform you an update is available ([Figure 3-9](#)).

NOTE

When performing a firmware update it is recommended to disconnect the CSM from the vehicle (if connected) and use the supplied USB cable to connect the CSM to the diagnostic tool.

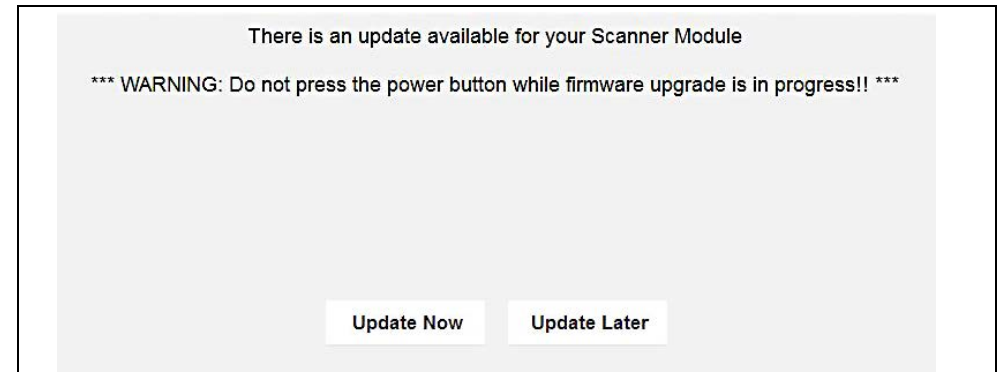


Figure 3-9 Firmware update message

The firmware update process, as explained in the following procedure, begins automatically after ten seconds (only when connected by USB) unless Update Now or Update Later is selected. Selecting **Update Now** begins the process immediately. **Update Later** defers the operation, closes the message, and starts the Scanner function. If you choose not to perform the update, it will not affect diagnostic tool operation, however you will not benefit from the additional features available in the update. Selecting **Details** in the upper-right corner opens a list of what is included in the update.

▶ Updating firmware:

IMPORTANT

The diagnostic tool must be connected and powered by the AC power supply during the CSM firmware update process. Damage can occur to the CSM if the diagnostic tool power is turned off, the power supply is disconnected, or the diagnostic tool loses communication (out of range) with the CSM during the firmware update process.

1. Connect the AC power supply to the diagnostic tool.
2. Turn on the diagnostic tool.
3. Connect the CSM to the diagnostic tool as follows:

**NOTE**

When performing a firmware update it is recommended to disconnect the CSM from the vehicle (if connected) and use the supplied USB cable to connect the CSM to the diagnostic tool. Using the USB cable provides power direct from the diagnostic tool to the CSM, and allows for faster updates. Leaving the CSM connected to the vehicle DLC during a firmware update will work, however may take longer than if connected by USB. Also, if vehicle power to the DLC is interrupted, or the diagnostic tool loses communication with the CSM, the CSM may not update correctly and/or be damaged.

- Plug the small end of the USB cable into the USB jack on the CSM.
- Plug the large end of the USB cable into one of the USB jacks on the side of the diagnostic tool.

NOTE

When connected, the CSM USB connection status icon will change to indicate the CSM is connected by USB.

- Select **Scanner** from the diagnostic tool Home screen.
- Select **Update Now** when the update available message displays (Figure 3-9).
The update begins and installation progress is tracked on the screen (Figure 3-10).

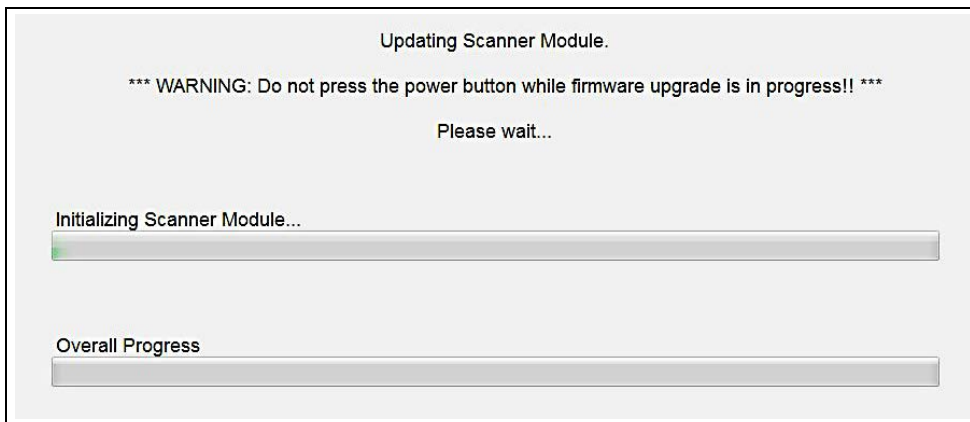


Figure 3-10 Sample update in progress screen

A “Successfully Updated” message displays once the installation process is complete (Figure 3-11).



Figure 3-11 Sample firmware update complete message

- Select **OK** to close the message and return to Scanner operations.
The CSM, now has the latest firmware update, and is ready to use.

3.23 Troubleshooting

When troubleshooting CSM connectivity issues, first review the CSM LED status and hardware status icons for possible causes. See [Hardware Status Icons](#) on page 32, and [LED Indicators](#) on page 29.

CSM operations can be impacted when signal interference, or some other condition, disrupts or impairs the wireless communication network. These interruptions are usually temporary and easily repaired.

Indicators of wireless communication interference include:

- Slow CSM response accompanied by “Error 101” message.
- Slow CSM response accompanied by “Error 404” message.
- “Error Occurred” Message when trying to use the CSM.
- “Error Occurred” Message after 20 or more minutes sitting idle, particularly if the devices have been stationary.



3.23.1 Error Messages

If the CSM is paired to the diagnostic tool and tries to communicate with the vehicle and the CSM is not connected to the vehicle, a “no communication” message displays.

The following conditions cause a “no communication” message to display:

- The Scanner is unable to establish a communication link with the vehicle.
- You selected a system for testing that the vehicle is not equipped with (such as ABS).
- There is a loose connection.
- There is a blown vehicle fuse.
- There is a wiring fault on the vehicle, or in the CSM, or adapter.
- There is a circuit fault in the CSM, Personality Key, or adapter.
- Incorrect vehicle identification was entered.

3.23.2 Out of Range Alarm

If the diagnostic tool is moved out of range of the CSM while communicating, the CSM will sound a short tone and the diagnostic tool will display a message “Trying to Re-establish Communication”. The message will display until communication is established.

Move within range (approximately 50 feet (15.24 m) to restore the connection.

3.23.3 Loss of Connection - Recovery Procedures

This is a quick and easy method that reestablishes connectivity between the diagnostic tool and the CSM in most instances. If connectivity remains unavailable following recovery, use one of the alternate procedures to restart the system.

i NOTE

This product is intended to be used by professional technicians in a garage environment. Electrostatic discharges may happen occasionally and cause a loss of communication. To restore communication disconnect and reconnect the CSM and follow screen prompts.



To recover wireless connectivity:

1. Disconnect the CSM from the vehicle.
2. Navigate to the Home Screen on the diagnostic tool.
3. Select **Exit** to close the ShopStream Diagnostic Suite.
4. Connect the CSM to the vehicle.
5. Select the **ShopStream Diagnostic Suite** icon on the desktop.



Figure 3-12 Sample ShopStream Diagnostic Suite desktop icon

i NOTE

The ShopStream Diagnostic Suite can also be started from the Windows Start menu.

Alternate Recovery Procedures

Use these methods as alternate options to the Recovery Procedure, or when recovery fails to restore the wireless connection.

USB Procedure

This method establishes a “hard-wired” USB cable connection between the CSM and diagnostic tool.




To connect by USB:

1. Plug the small end of the USB cable into the USB jack on the CSM.
2. Plug the large end of the USB cable into a USB jack on the diagnostic tool. Scanner functionality should be restored immediately once the USB connection is complete. If not, suspect a hardware failure. The diagnostic tool and CSM are both fully functional, so you can complete your testing with the USB connection intact.




Software Restart Procedure

This method, which closes and restarts the ShopStream Diagnostic Suite software, takes about two minutes to complete.

-  **To restart the ShopStream Diagnostic Suite:**
1. Navigate to the Home Screen on the diagnostic tool.
 2. Select **Exit** to close the ShopStream Diagnostic Suite.
 3. Wait for the CSM Communication LED to stop flashing.
 4. Select the **ShopStream Diagnostic Suite** icon on the desktop.
The ShopStream Diagnostic Suite should open with connectivity restored.

Windows Reboot Procedure

This method, which completely shuts down the diagnostic tool, takes several minutes to complete.

-  **To reboot the diagnostic tool:**
1. Disconnect the CSM from the vehicle.
 2. Navigate to the Home Screen on the diagnostic tool.
 3. Select **Exit** to close the ShopStream Diagnostic Suite.
 4. Select **Start** in the lower-left corner of the screen to open the menu.
 5. Select **Turn Off Computer** from the menu.
 6. Select **Turn Off** when the Confirmation window opens.
 7. Wait for the tool to completely turn off, then press the **Power** button to restart the diagnostic tool.
 8. Connect the CSM to the vehicle once the ShopStream Diagnostic Suite opens.

3.24 Technical Specifications

Item	Description / Specification
Communications	Wireless <i>Bluetooth</i> ® 2.1 Technology
Operating Range	Approx. 50 feet (15.24 m)
USB Power	5V @ 500mA
DC Operating Power	8V to 32V, Maximum 10 Watts
Width	1.85 in. (47 mm)
Height	0.92 in. (23.4 mm)
Depth	4 in. (101.6 mm)
Weight	0.22 lb (100 g)
Operating Temperature Range (ambient)	At 0 to 90% relative humidity (non-condensing) 32 to 113°F (0 to 45°C)
Storage Temperature (ambient)	At 0 to 70% relative humidity (non-condensing) -4 to 140°F (-20 to 60°C)
Operating Altitude	Maximum 2000 m
Environmental Conditions	This product is intended for indoor use only
	This product is rated for Pollution Degree 2 (normal conditions)



Introduction



The Scanner function allows your diagnostic tool to communicate with the electronic control modules (ECMs) of the vehicle being serviced. This allows you to perform tests, view diagnostic trouble codes (DTCs), and live data parameters from various vehicle systems such as the engine, transmission, antilock brake system (ABS) and more.

Main Topic Links

- [Demonstration Modes](#) page 62
- [Basic Operation](#) page 37
- [Codes Menu \(Viewing Codes\)](#) page 43
- [Intelligent Diagnostics](#) page 66
- [Code Scan \(with Vehicle System Report\)](#) page 44
- [Data \(Viewing PIDs\)](#) page 48
- [Functional Tests](#) page 60
- [Generic Functions](#) page 61
- [Troubleshooter](#) page 61

4.25 Basic Operation

This section includes a basic overview of the Scanner function and basic operation information.

4.25.1 Scanner Overview

Scanner is a menu driven application that communicates with vehicle control modules to access diagnostic trouble codes (DTCs), parameter data (PIDs), functional tests, and more. To navigate the application, use your fingertip or the stylus to make onscreen menu selections to access the desired data, test or function.

Screen messages appear when additional input is needed before proceeding. There are three types of on-screen messages; confirmations, warnings, and errors.

- **Confirmation Messages** - Confirmation messages inform you when you are about to perform an action that cannot be reversed or when an action has been initiated and your confirmation is needed to continue. When a user-response is not required to continue, the message displays briefly before automatically disappearing.
- **Warning Messages** - Warning messages inform you when completing the selected action may result in an irreversible change or loss of data.
- **Error Messages** - Error messages inform you when a system or procedural error has occurred. Examples of possible errors include a disconnected cable or a peripheral, such as a printer, is powered off.



4.25.2 Basic Scanner Operation (Quick Start)

This section lists the basic scanner operation steps, and is only intended as a quick-start reference. Refer to the supporting topics in this section for detailed operation information.



Getting Started (Basic Steps)

i NOTE

Menus, options and procedures may vary by vehicle. The following instructions apply to most OBD-II vehicles. Not all vehicles support the Auto ID feature.

1. Turn the diagnostic tool on.
2. Connect the CSM to the vehicle DLC. See [Connecting the CSM on page 29](#).

i NOTE

The CSM must be paired to the diagnostic tool to communicate. See [Pairing and Hardware Status Icons on page 31](#).

3. Turn the vehicle ignition switch on.
4. Select **Scanner** from the Home screen.

i NOTE

While using the Scanner and OBD-II/EOBD functions, on-screen connection instructions are provided. The instructions may include the location of the vehicle DLC.

5. Select the vehicle make.
6. Select the vehicle year.
7. Choose **Automatic ID** or **Manual ID** and enter the vehicle information at the screen prompts to continue. See [Identifying the Vehicle on page 38](#).
If Automatic ID is selected, the identification process automatically completes (if supported by the vehicle) after the vehicle make and year are manually entered.
8. Select a **Vehicle System** (e.g. Engine). See [Selecting a Vehicle System on page 40](#).

i NOTE

If the CSM is not connected, an onscreen message may appear providing connection instructions.

9. Select a **Vehicle System Test/Function** (e.g. Codes Menu) to perform. See [Selecting a Vehicle System Test/Function on page 41](#).

4.25.3 Identifying the Vehicle

Connection of the CSM to the diagnostic tool and vehicle DLC is required for Scanner testing.

Vehicle identification is the initial step in using the Scanner function. Once vehicle identification information is entered it is saved in Vehicle History and can be selected again to save time when re-testing the same vehicle in the future.

i NOTE

Menus options and procedures may vary by vehicle.

Manual ID

Using Manual ID, the vehicle identification must be manually entered. The vehicle identification sequence is menu driven. Follow the screen prompts to enter the vehicle information.

To complete the Manual ID process and continue, select **Continue** from the vehicle confirmation screen.



Identifying a vehicle:

1. Select **Scanner** from the Home screen.

A list of vehicle manufacturers (makes) will display ([Figure 4-1](#)).

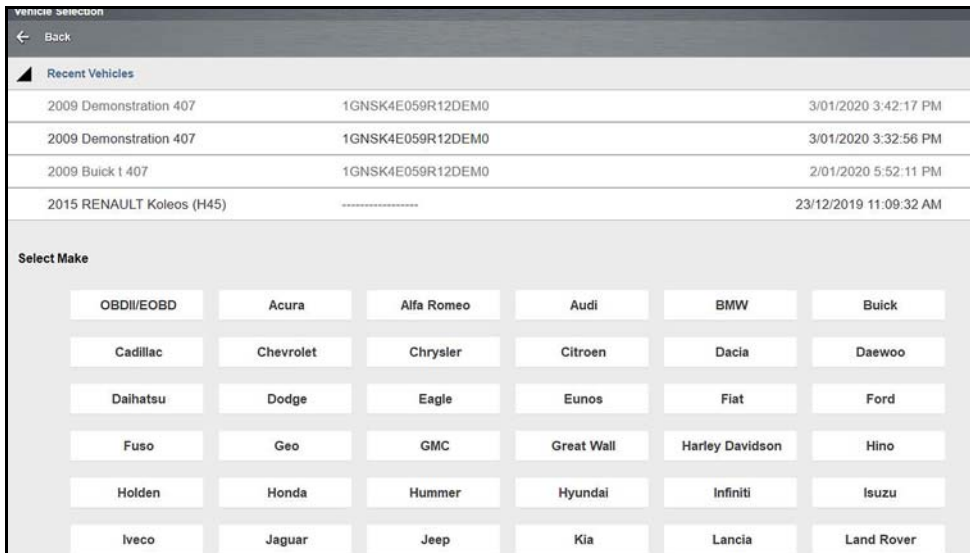


Figure 4-1 Typical - Manufacturer list

2. Select a manufacturer from the list.

A model year menu will display.

NOTE

You can limit the number of manufacturers that appear on the list by selecting **Configure Favorites** from the toolbar. See [Configuring the Favorites List](#) on page 81 for details.

3. Select the vehicle year.

A list of vehicle types or models will display. Several selections may be required to identify the vehicle type and model, follow the screen prompts and enter the required information.

A confirmation page showing the identified vehicle will display once all the required data has been entered. If needed, enter the vehicle VIN, odometer reading and license plate ([Figure 4-2](#)). Review the information to make sure it is correct.



Figure 4-2


4. Select **OK**.

Alternative Vehicle Identification

Occasionally, you may try to identify a test vehicle that the Scanner does not recognize, the database does not support, or has some unique characteristics that prevents it from communicating with the Scanner. In these instances, there is an alternate choice that allows you to establish communication with the vehicle:

- **OBDII/EOBD Function**—this function allows you to connect to the OBDII equipped vehicle and perform basic OBD-II or EOBD diagnostic functions, see [OBD Direct](#) on page 75 for additional information.

4.25.4 Selecting a Vehicle System

-  **Selecting a vehicle system:**
- After the vehicle has been identified, the Systems menu will display available vehicle systems ([Figure 4-3](#)).
 - The System menu can be displayed in two views, by individual system categories or by common vehicle system categories. To change the view, select/deselect the **Category View** checkbox in the upper toolbar. Typical views are shown in ([Figure 4-3](#) and [Figure 4-4](#)).
 - Select the desired vehicle system to continue.

NOTE

Not all vehicle systems may be supported by the vehicle, or available. Available systems will vary across vehicle manufacturers and models.

Typical vehicle system options may include:

- Engine
- Transmission
- Antilock Brakes
- Airbag
- Body Control Module
- Instrument card
- Tire Pressure Monitor

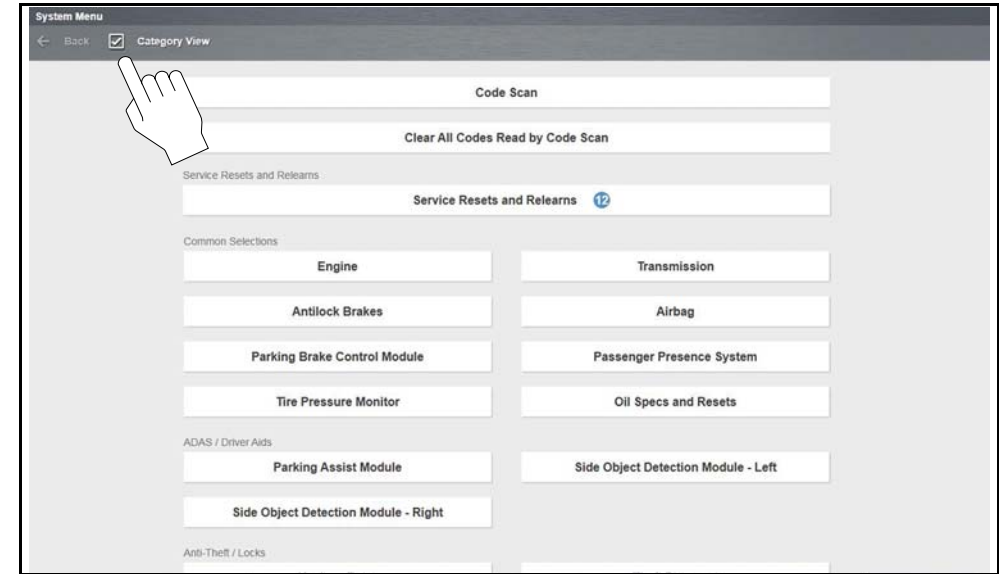


Figure 4-3 Typical - System Menu "Category View" Selected

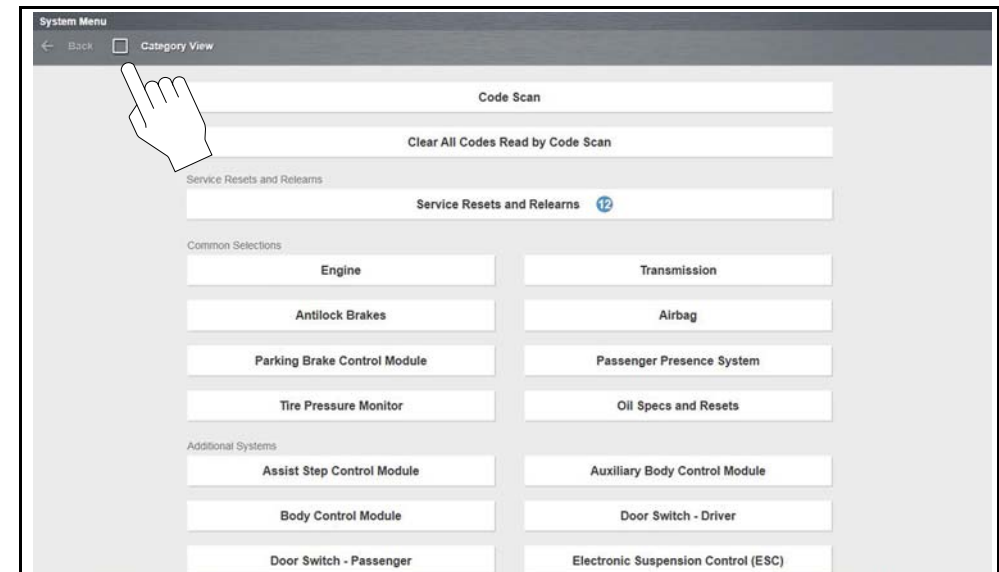


Figure 4-4 Typical - System Menu "Category View" Not Selected

Special vehicle system options may include:

- **Code Scan**, see [Code Scan \(with Vehicle System Report\)](#) on page 44

- **Clear All Codes Read by Code Scan**, see [Clear All Codes Read by Code Scan](#) on page 48.

4.25.5 Selecting a Vehicle System Test/Function

Selecting a vehicle system test/function:

After a vehicle system is selected the vehicle system main menu will display ([Figure 4-5](#)) available tests and/or functions. Select the desired option to continue.



Figure 4-5 Typical - Main menu (Engine shown)

NOTE

Not all vehicle system test/functions may be supported by the vehicle, or available. Available system test/functions will vary across vehicle manufacturers and models.

Typical vehicle test/function options may include:

- **Codes Menu**, see [page 43](#)
- **Clear Codes**, see [page 44](#)
- **Data Display**, see [page 48](#)
- **Generic Functions**, see [page 61](#)
- **Functional Tests**, see [page 60](#)
- **Troubleshooter**, see [page 61](#)
- **Actuator Tests**—similar to functional tests, checks the operation of certain actuators, such as solenoid valves and relays.
- **Memory Resets**—allows you to reprogram adaptive values for certain components after making repairs. Selecting opens a submenu. These options are found on the Functional Tests Menu for some models.
- **System Tests**—provides specific subsystem testing. Performing these tests is similar to functional tests.

NOTE

Actual onscreen test/function names may vary.

4.25.6 Exiting Scanner

To exit Scanner, you must first terminate communication with the vehicle. The Scanner function will remain open as long as there is an active communication link with the vehicle.

NOTE

A warning message displays if you attempt to exit before terminating communication with the vehicle. Damage to the vehicle's control modules may occur if communication is abnormally disrupted. Make sure the CSM is properly connected at all times when communicating with a vehicle. Always exit all tests properly, and return to the Home screen before disconnecting the CSM, and before turning off the diagnostic tool.

To exit Scanner:

Before disconnecting the diagnostic tool from the vehicle, Scanner communication must be terminated.

1. As applicable, end any test being performed, and then select the **Exit** or **Back** icon from the upper toolbar ([Figure 4-6](#)).

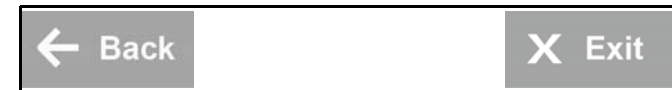


Figure 4-6

2. Continue to select the **Back** icon until the “stopping communication” message is displayed.
3. Select the **Change Vehicle** icon ([Figure 4-7](#)).



Figure 4-7 Change Vehicle icon

The vehicle description on the lower toolbar will change to display “No Active Vehicle”.

4. Select the **Home** icon on the lower toolbar, to return to the Home screen (Figure 4-8).



Figure 4-8 Home icon

5. Disconnect the CSM from the vehicle DLC.

4.26 Menu Options (lower toolbar icon)

The following Menu options are available:

- **Safety Information**—opens the *Important Safety Instructions* document.
- **File**—allows you to print or save the data being viewed.
- **Tools**—allows you to perform certain maintenance operations and adjust tool settings.
- **Help**—allows you to view supporting documentation.

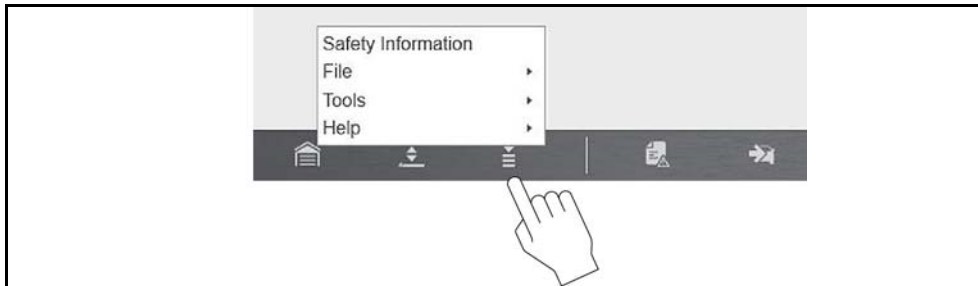


Figure 4-9 Menu icon (menu)

4.26.1 File

Use to print or save a copy of the data currently being viewed. Menu options include:

- **Save**—opens a submenu with these options:
 - **Screenshot**—saves a graphic image of the current screen.

- **Collected Data**—saves a recording of all the data currently in the buffer plus the number of frames designated after the trigger event (see [Properties on page 53](#)).
- **Print**—opens a submenu with these options:
 - **Screen**—sends the current screen image to a printer.
 - **Troubleshooter**—prints the full text of the troubleshooter topic shown in the main body.

Selecting an option opens a Windows Print dialog box for printing or saving the file, see [Printing / Printer Setup on page 19](#).

4.26.2 Tools

This option (only available from within Scanner) allows you to adjust tool settings to your personal preferences. Selecting **Tools** opens a menu with two options:

- [Units Setup](#)
- [Display BEN](#)

Units Setup

The units of measurement can be changed for temperature, vehicle speed, air pressure and other pressure readings. Choose between US customary or metric units of measure.



To change the units setup:

1. Select **Tools > Units Setup**.

The Measurement Units Setup dialog box will open.

Units	
Temperature	Fahrenheit
Vehicle Speed	MPH
Air Pressure	"Hg
Other Pressure	PSI
Weight	lb
Volume	gal (US)
Torque	lb ft

Figure 4-10 Units Setup screen

2. Use the dropdown menus to select the desired value for each item.
3. Select **Accept** to close the dialog box and apply the changes.

Display BEN

Selecting this option displays the Balco Engine Number (BEN) of the currently identified vehicle. In the event you contact customer service about a Scanner data issue, you may be asked to provide the BEN for reference to help in troubleshooting the issue.

4.26.3 Help

A variety of utilities and additional resources are available through the Help menu:

- [About Scanner Hardware Version](#)
- [About Scanner](#)

The Version Info and Activation Status options are the same as explained previously, see [Menu Icon on page 26](#) for details. Other options are explained below.

About Scanner Hardware Version

This option opens a dialog box showing the hardware version and other details about the Scanner function. A **Copy to Clipboard** icon allows you to paste the information to a document or e-mail.

About Scanner

This option opens a dialog box that shows the software version and other Scanner function details. A **Copy to Clipboard** icon allows you to paste the information to a document or e-mail.

4.27 Codes Menu (Viewing Codes)

NOTE

The “Codes Menu” descriptive name may vary (e.g. Codes, Codes Menu, Codes Only, Codes (No Data), or other similar).

Selecting **Codes Menu** from the Vehicle Systems Test/Function menu opens a submenu of options for viewing and clearing individual system codes (e.g. Engine codes, Transmission codes, ABS codes).

Typical options may include (descriptive name may vary):

- **Display Codes**, see page 43
- **Clear Codes**, see page 44
- **Freeze Frame/Failure Records**, see page 44

To scan all vehicle systems at once, see [Code Scan \(with Vehicle System Report\) on page 44](#).

4.27.1 Display Codes (Code List)

Selecting **Display Codes** (descriptive name may vary) may directly open a list of the diagnostic trouble codes (DTCs) found, or it may open a submenu of options (see below).

The code list ([Figure 4-11](#)) includes:

- Total codes found indicator (upper left)
- A list of all codes found.

Selecting a code from the list opens **Intelligent Diagnostics** providing you additional code specific information. See [Intelligent Diagnostics on page 66](#) for detailed information.

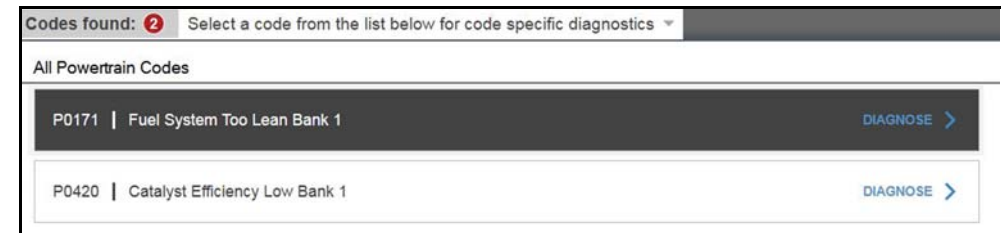


Figure 4-11 Typical - Code list



Typical submenu options may include (descriptive name may vary):

- **(Variable Name) Codes**—opens a list of diagnostic trouble codes in ECM memory.
Example of variable name - All Powertrain Codes, Current Codes, All Body Codes, etc.
- **History Codes**—opens a list of codes whose symptoms are not currently present. History codes indicate an intermittently occurring problem.
- **Failed This Ignition**—opens a list of codes that set during the current ignition cycle.
- **MIL SVS or Message Requested**—displays ECM requests to light the malfunction indicator lamp (MIL) or service vehicle soon (SVS) lamp, or display a driver information alert.
- **Last Test Failed**—displays a complete list of failed tests.
- **Test Failed Since Code Cleared**—displays a list of tests that failed since the last time codes were cleared from ECM memory.

4.27.2 Clear Codes

i NOTE

The Clear Codes function is dependent upon the vehicle. Not all vehicles may support this function. See [Selecting a Vehicle System](#) on page 40.

- To clear codes:
1. Select **Clear Codes** from the Codes Menu.
A confirmation message displays.
 2. Make sure any conditions shown on the confirmation message are met, then select **Yes**.
A “codes cleared” message will display once the operation is complete.
 3. Select **Continue** to return to the Codes Menu.

4.27.3 Freeze Frame/Failure Record Data

Selecting the **Freeze Frame Data** icon ([Figure 4-12](#)), displays a snapshot of the data captured at the time the code was set.

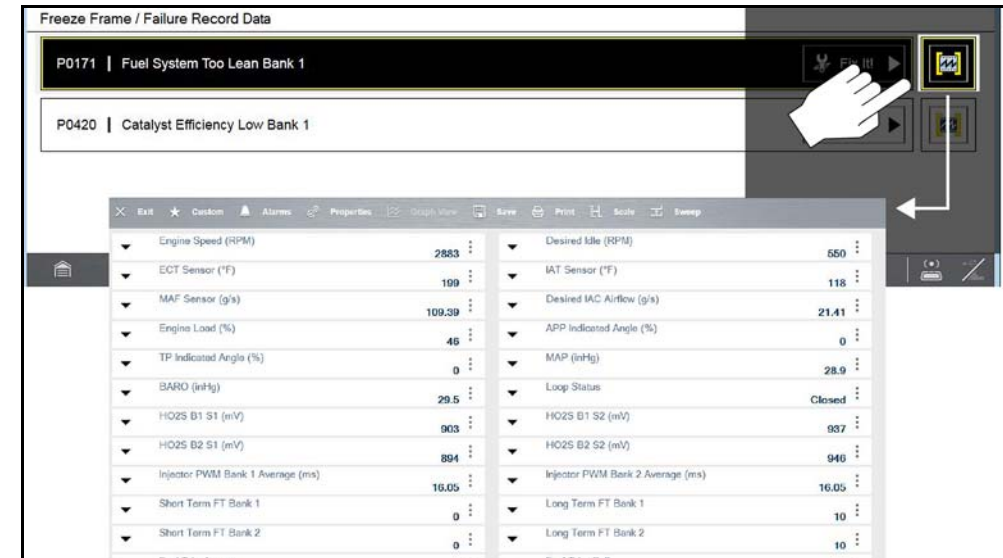


Figure 4-12

4.28 Code Scan (with Vehicle System Report)

i NOTE

The Code Scan function is dependent upon the vehicle. Not all vehicles may support this function. See [Selecting a Vehicle System](#) on page 40.

Selecting **Code Scan** from the Vehicle System menu starts an active scan of vehicle control modules, and opens the Code Scan results screen ([Figure 4-13](#)). When initially opened, a progress bar is shown at the top indicating the active scanning progress. Once completed, code results are displayed by system.

The following Code Scan toolbar options are used:

Toolbar Function
Save - Saves the Vehicle System Report as a PDF, see Saving the Vehicle System Report on page 46 . Save also attaches the report to the current vehicle record (viewable using the Attachments icon from the vehicle record toolbar).
Print - Allows you to print the Vehicle System Report, see Printing the Vehicle System Report on page 47 .
Refresh - Refreshes the code scan data (restarts the code scan)

The following results are displayed progressively as the modules are scanned:

- **The total number of systems (modules) detected** ([Figure 4-13](#)).

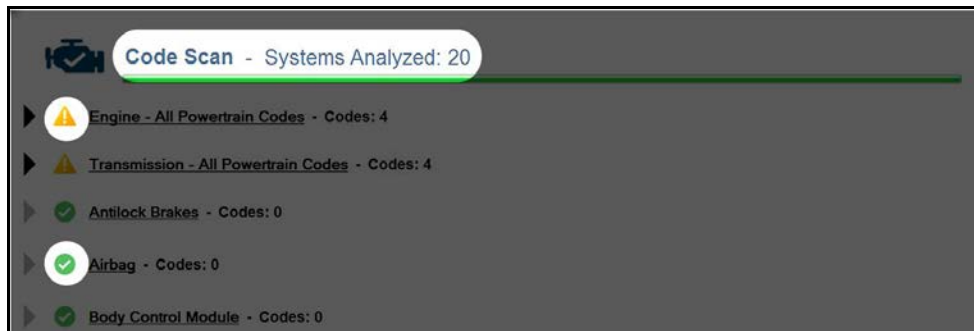


Figure 4-13 Code Scan (scanned system total and status icons)

Quick reference indicators are used to show system code status ([Figure 4-13](#)):

- **Green icon “✓” mark** - No Codes
- **Yellow Triangle icon “!” mark** - Codes are present
- **Systems Code list with totals** - A categorized system list with code totals is displayed in the order they are scanned. To view the main menu for a system in the list, select the system title ([Figure 4-14](#)).

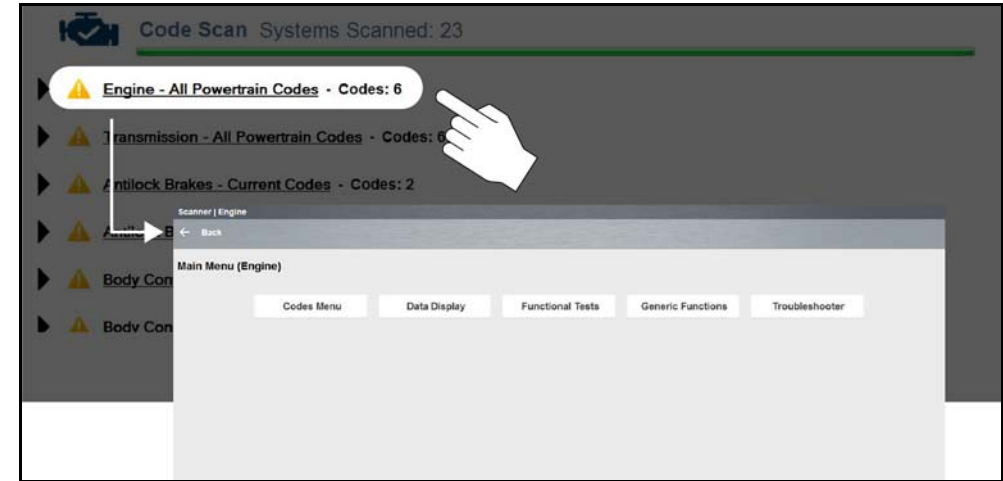


Figure 4-14 System title (opens System Main Menu)

Select the **expand/collapse** icon ([Figure 4-15](#)) on the left side of a system category title to expand or collapse a system list.

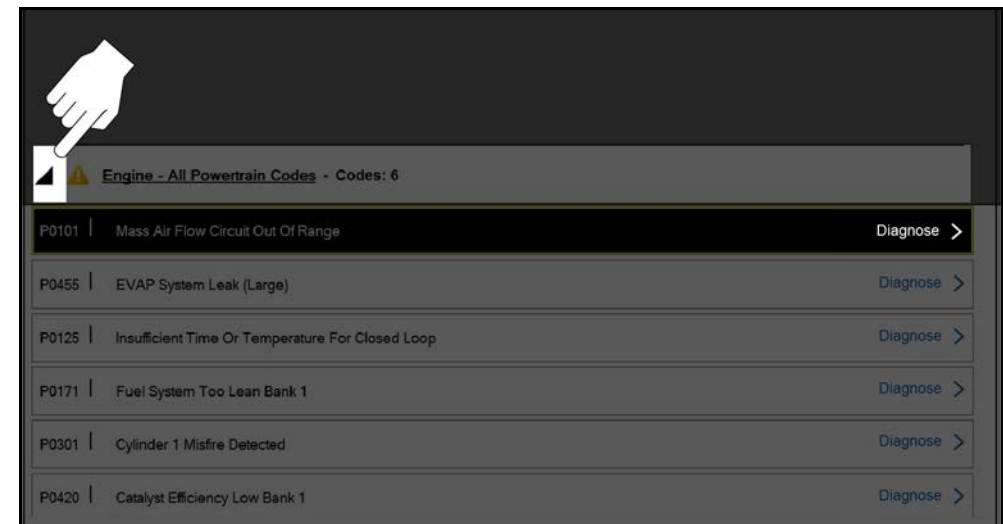


Figure 4-15 Expand/Collapse Icon (expanded view)

- **Diagnose Icon** - ([Figure 4-16](#)) Selecting **Diagnose** opens **Intelligent Diagnostics** providing you additional code specific information. See [Intelligent Diagnostics on page 66](#) for detailed information.

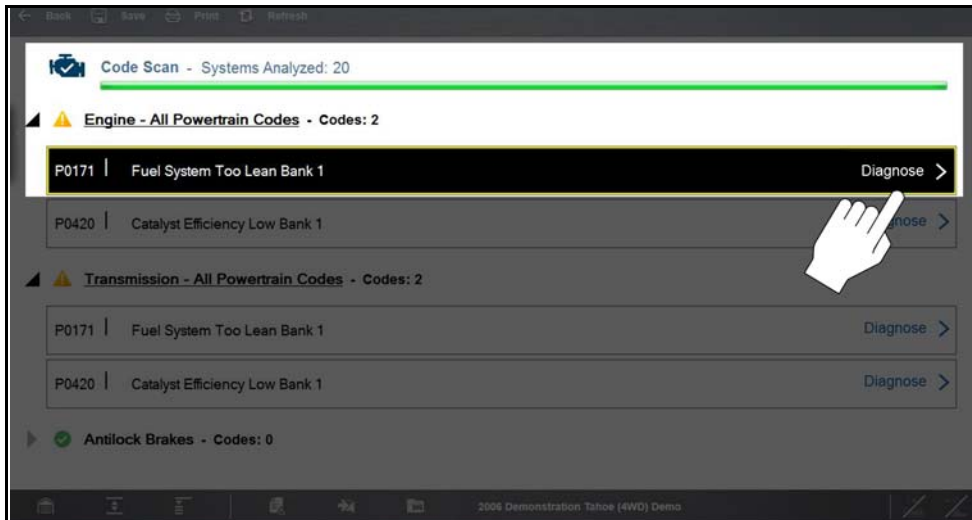


Figure 4-16 Diagnose icon

- **Global OBDII DTCs.** Towards the end of the Code Scan list Global OBD-II DTCs are displayed (if applicable) (Figure 4-17).

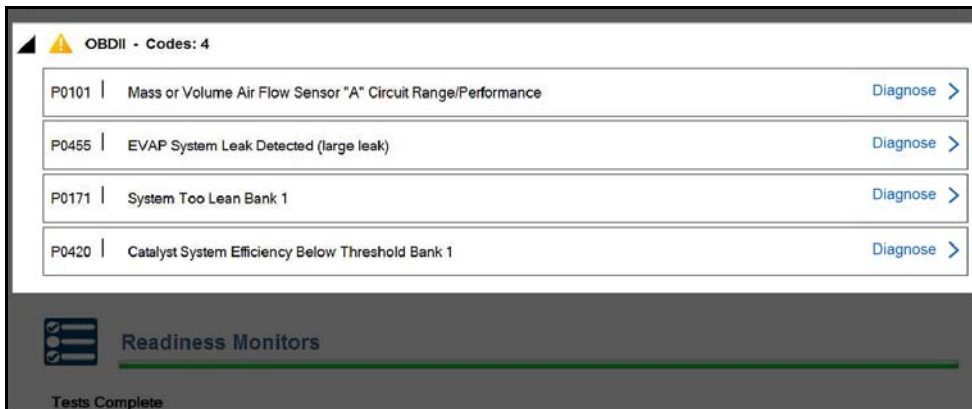


Figure 4-17 OBD-II code results

NOTE

Some 2005 to 2008 vehicles may not display global OBD-II information in the Code Scan list. A message will be displayed to inform you the OBD-II - codes and monitors for this vehicle may be accessed using the global OBD-II function.

- **Readiness Monitor Test Status.** At the end of the Code Scan Report, readiness monitor test results are displayed as “Tests Complete” or “Not Complete” (Figure 4-18).

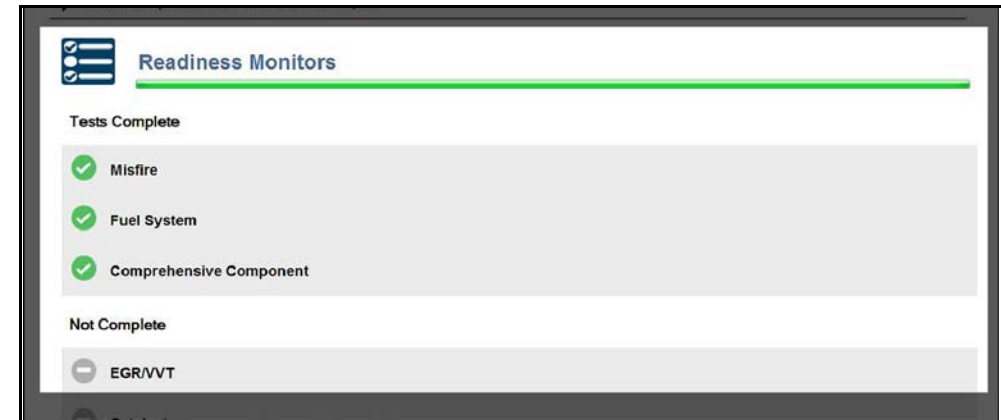


Figure 4-18 Readiness Monitor status

Quick reference indicators are used to show monitor status.

- **Green icon “✓” mark** - Monitor test is complete
- **Grey icon “—” mark** - Monitor test is not complete

NOTE

Monitors that are not supported by the vehicle are not displayed in Code Scan.

4.28.1 Saving the Vehicle System Report

The code scan can be saved as a Vehicle System Report in PDF file format.

The PDF file can be accessed from either of the following locations:

- Vehicle Record attachment field.
- Vehicle System Report Data Folder (in Data Manager).

To save the Vehicle System Report:

1. Perform a code scan.
2. After the code scan has completed, select **Save**.

A confirmation message is displayed indicating that the file was saved and its location.



Message Example: The file is attached to the vehicle record, and can be accessed from Vehicle History or Data Manager. It is located in the System Code Scan Data Folder. File name (example):

C:\Users\ShopstreamUser\Documents\ShopStream\Vehicle System Report Data Folder\Vehicle System Report (date).pdf.

3. To print or view the file, see [Printing the Vehicle System Report](#) on page 47.

4.28.2 Edit Vehicle System Report Shop Information

To edit the Shop Information displayed on the Vehicle System Report header, see [Shop Information](#) on page 171.

4.28.3 Hide / Show Vehicle System Report Timestamp

See [Code Scan \(Timestamp\)](#) on page 173.

4.28.4 Printing the Vehicle System Report

Before you can print you must install a printer and have a current version of Adobe Reader installed.

To install a printer, see [Printing / Printer Setup](#) on page 19.

To check and/or install Adobe Reader, see [Checking/Installing Adobe® Reader](#) on page 22.

- The Vehicle System Report may be directly printed by selecting the **Print** icon from the code scan toolbar.
- If the file was saved (toolbar Save icon) it may also be printed from either the Vehicle Record attachment, or from the Vehicle System Report Data Folder within Data Manager.

The following sections describe these methods.

Printing (From Code Scan Screen)

After a code scan has been performed, the Vehicle System Report can be directly printed by selecting the **Print** icon from the toolbar.

When print is selected, the file is sent directly to the default printer. The file may be displayed momentarily in the PDF viewer and then minimized (this is normal).

Note: The file is not saved using this method, To save the file, see [Saving the Vehicle System Report](#) on page 46.

Printing (From Data Manager)

When a code scan is saved, the file is saved as a PDF file in the Vehicle System Report Data Folder within Data Manager.

To print the file from Data Manager:

1. Select **Data Manager** from the Home Screen
2. Select and open the Vehicle System Report Data Folder ([Figure 4-19](#)).

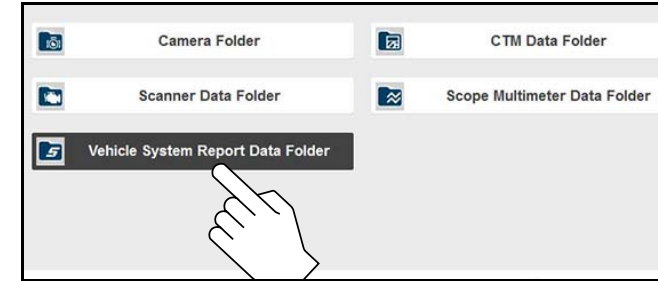


Figure 4-19

3. Select and open the Vehicle System Report PDF file from the list.
4. From the PDF viewer use the menu or toolbar print options to print the file ([Figure 4-20](#)).

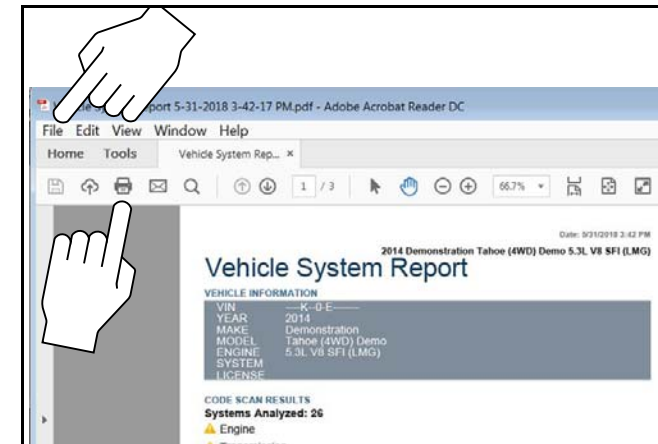


Figure 4-20

Printing (From Vehicle History Record)

When a code scan is saved, the file is saved as a PDF file in the attachments section of the current Vehicle Record.

To print the file from the Vehicle History Record:

1. Select **Vehicle History** from the Home Screen
2. Select and open the vehicle record from the list.
3. Select and open the Vehicle System Report PDF file from the attachments box (Figure 4-21).

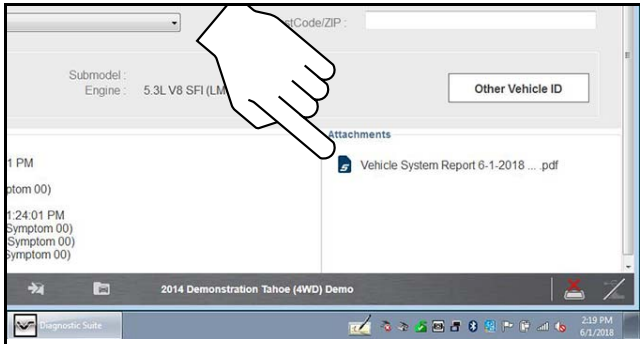


Figure 4-21

4. From the PDF viewer use the menu or toolbar print options to print the file (Figure 4-20).

4.28.5 Clear All Codes Read by Code Scan

Selecting **Clear All Codes Read by Code Scan** erases all codes from all vehicle system modules that were read by Code Scan.

NOTE

Availability of the **Clear All Codes Read by Code Scan** function is dependent upon the vehicle. Not all vehicles may support this function.

4.29 Data (Viewing PIDs)

Selecting **Data** displays the data (PID) list for the selected module. The Data display is typically opened from the Vehicle Systems Test/Function menu, see [Selecting a Vehicle System Test/Function on page 41](#). The descriptive name may vary (e.g. Data, Data Menu, Data Only, or other similar).

Selecting has one of the following results:

- A submenu of data viewing choices displays.
- Vehicle data displays.

NOTE

On some models, the engine must be started or cranked before data can be displayed. For these models, a "Waiting to Communicate" message displays if the engine was not cranked or started.

4.29.1 Data Screen Overview



1. Data Toolbar - see [Data Toolbar on page 51](#)
2. Main Body
3. Data Controls Toolbar - see [Data Controls Toolbar on page 55](#)

Figure 4-22 Typical data screen (List / text) layout shown

Select the **Expand/Collapse** icon ([Figure 4-23](#)) to toggle a PID between list ([Figure 4-23](#)) and graph display ([Figure 4-24](#)).

Selecting the **Expand/Collapse** icon (PID in list display), opens the PID in graph display, and moves that PID to the top of the list ([Figure 4-25](#)).




1. Expand/Collapse Icon
2. PID Name/Description - Descriptive name of the parameter ID
3. PID Current Value - The PID Current Value can display as a value or as a status. When displayed as a value, the value correlates with trace cursor line, which indicates the current vertical point of the signal. When displayed as a status, it correlates to an operational state (e.g. On/Off, Enabled/Disabled, etc)
4. Menu Icon -  Menu options for display and setup
5. Full Screen View - expands the graph to fill the entire screen
6. Setup - opens graph scale and trigger settings

Figure 4-23 Typical PID (list view)

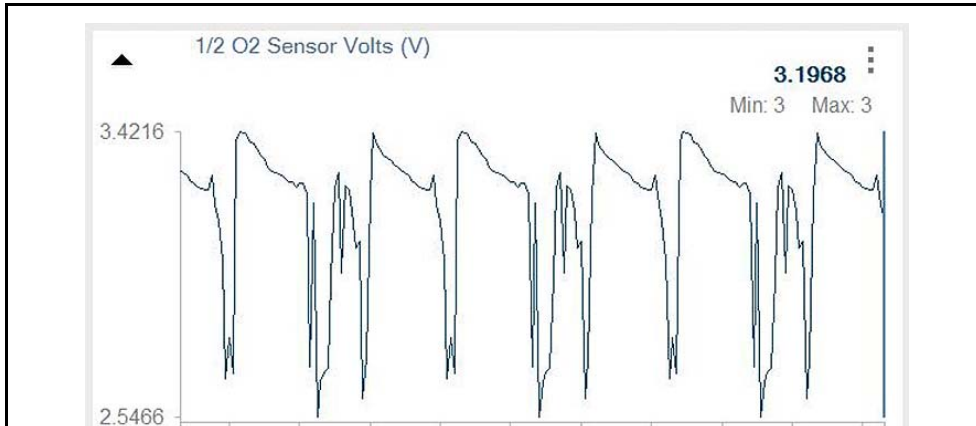


Figure 4-24 Typical PID (graph view)

Use gesture scrolling (up/down) to quickly move through each data list ([Figure 4-25](#)).

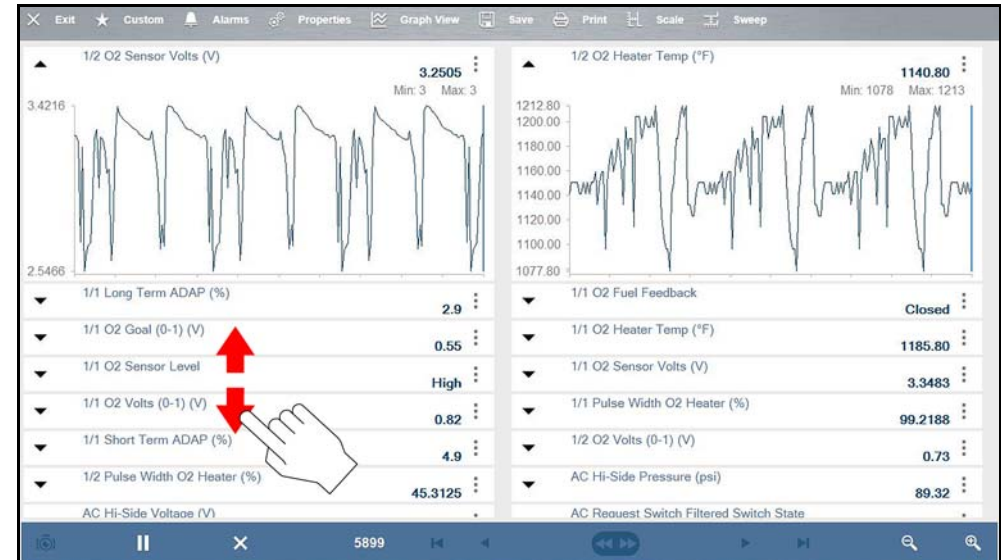


Figure 4-25

Data Display Options

PIDs can be displayed in different views ([Figure 4-26](#)).



Figure 4-26

1. List View
2. Split View
3. Full Screen Graph
4. Multi-Graph View

List View

List View is the default view mode and displays all PIDs in list (text) format (Figure 4-27).

Engine Speed (RPM)	2883	Desired Idle (RPM)	550
ECT Sensor (°F)	199	IAT Sensor (°F)	118
MAF Sensor (g/s)	109.39	Desired IAC Airflow (g/s)	21.41
Engine Load (%)	46	APP Indicated Angle (%)	0
TP Indicated Angle (%)	0	MAP (inHg)	28.9
BARO (inHg)	29.5	Loop Status	Closed
HO2S B1 S1 (mV)	903	HO2S B1 S2 (mV)	937
HO2S B2 S1 (mV)	894	HO2S B2 S2 (mV)	946
Injector PWM Bank 1 Average (ms)	16.05	Injector PWM Bank 2 Average (ms)	16.05
Short Term FT Bank 1	0	Long Term FT Bank 1	10
Short Term FT Bank 2	0	Long Term FT Bank 2	10
Fuel Trim Learn	Disabled	Fuel Trim Cell	15
Deceleration Fuel Cutoff		Power Enrichment	

Figure 4-27

Split View

To view one or more PIDs as a graph (Figure 4-28) from the list view, select the **Expand/Collapse** icon. To return the PID to list view, select the icon again.

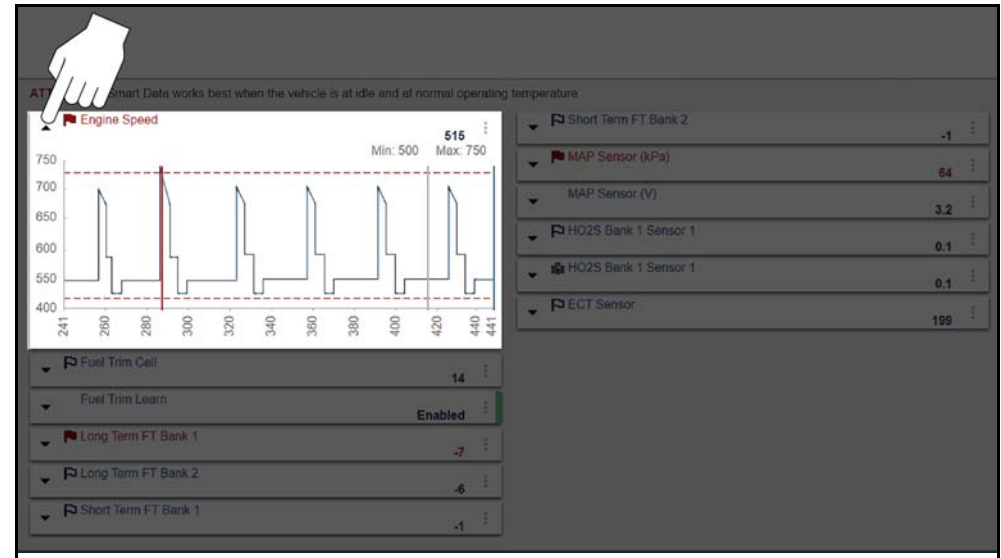


Figure 4-28

Multi-Graph View

To view more than one PID in a multi-graph display ([Figure 4-29](#)), select the PID **Expand/Collapse** icon to open each PID in graph display you want to include, then select **Graph View** from the toolbar. To return to list view, select **List View** from the toolbar.

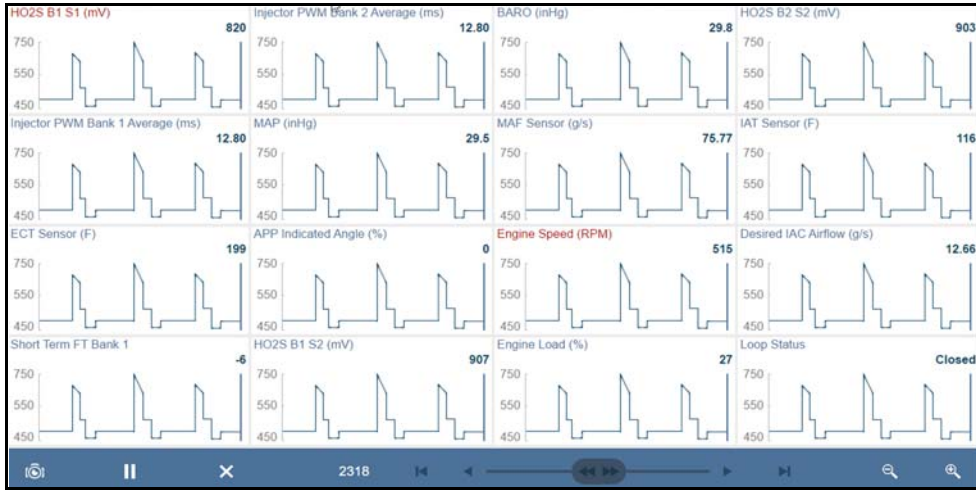



Figure 4-29

Full Screen Single Graph View

To view a single PID graph in full screen ([Figure 4-30](#)), select the PID **Expand/Collapse** icon to open the PID in graph display, then select **Graph View** from the toolbar, or select the **Menu** icon  and then select **Full Screen Graph**. To exit full screen, select **List View** from the toolbar, or select the **Menu** icon, and then select **Normal Graph**.

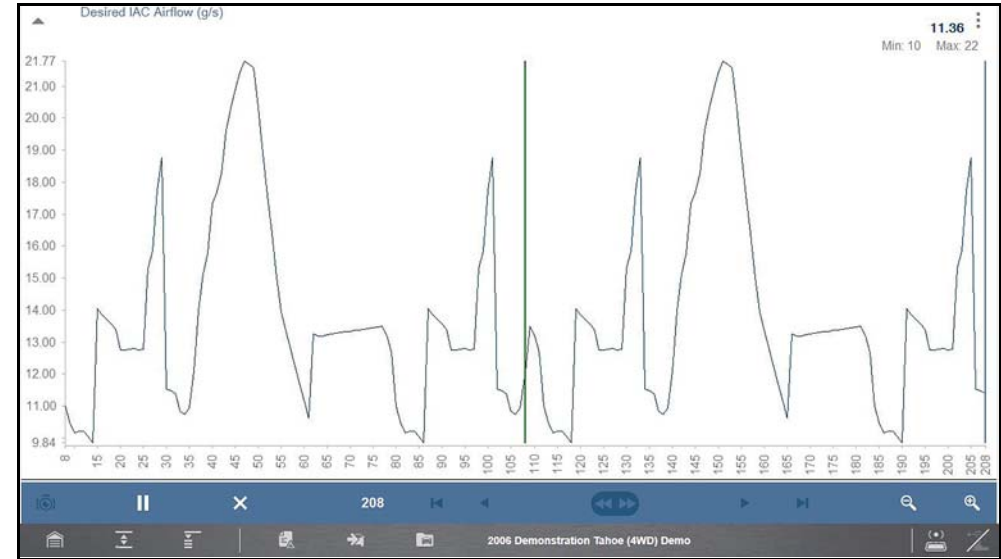












Figure 4-30


Data Toolbar

The Data toolbar contains a number of icons that allow you to configure the displayed data and to exit:

Icon	Description
 Exit	Closes the current test and returns to the menu.
 Back	Returns to the previously viewed screen.
 Custom	Configure which parameters are displayed on the screen. See Custom on page 52.
 Alarms	Set alarms for two-state PIDs. See Alarms on page 53.
 Properties	Allows you to adjust the display characteristics for all of the data screens. See Properties on page 53.

Icon	Description
 Graph View	Allows you to simultaneously view up to 16 data graphs. See Graph View on page 54 .
 Save	Saves a copy of the current frame of data that can be viewed using Data Manager. See Save on page 54 .
 Print	Opens a standard Windows Print dialog box for saving a print copy of the current frame of data. See Printing / Printer Setup on page 19 .
 Scale	Hide, or display, the scale values (left side of the graph). See Scale on page 54 .
 Sweep	Hide, or display, the sweep values (base of the graph). See Sweep on page 55 .

Custom

 **Custom** is used to set which PIDs are displayed. Minimizing the number of PIDs displayed allows you to focus on specific data and may increase the data transmission rate from the vehicle. You can add or remove most parameters from the list.

NOTE

Limiting the number of parameters that display allows for a faster refresh rate of the data.

To create a custom data list:

1. Select **Custom** on the Scanner Toolbar.
The parameter selection dialog box with all of the parameters selected opens ([Figure 4-31](#)).
2. Select the **Deselect All** icon to clear the highlights from the screen.
3. Create a custom data list by selecting the parameters to be included. Highlighting indicates a parameter that displays, parameters that are not highlighted do not display.

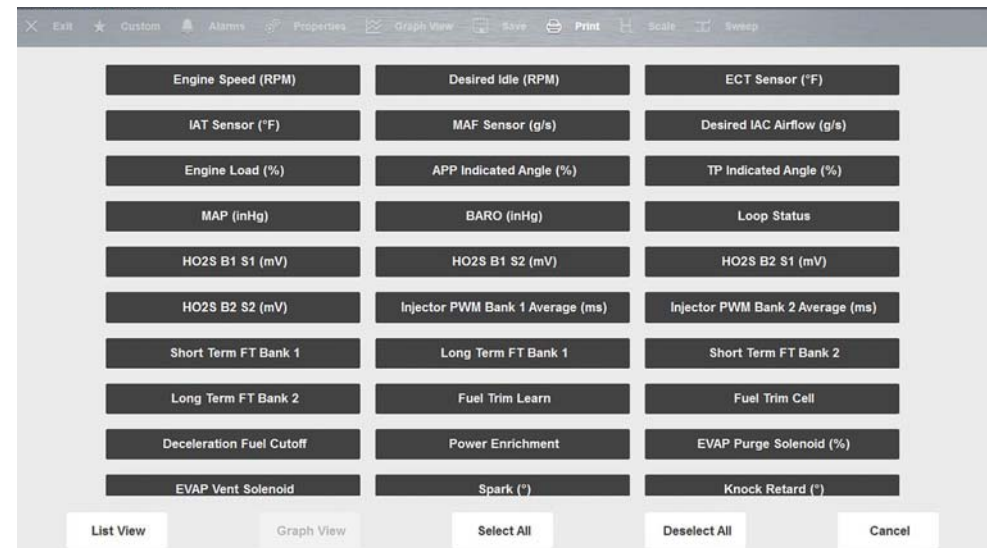


Figure 4-31 Custom configuration (Select All shown)

Keep the following in mind when configuring a custom data list:

- Gesture scroll if the list of parameters is longer than what is shown on the screen.
 - Use the **Select All** icon to display the complete list.
 - Use the **Deselect All** icon to remove all the currently selected parameters from the list.
 - Select individual parameters to highlight and include them in the list.
 - Select individual highlighted parameters to remove them from the list.
 - Use the **Cancel** icon to return to the data display.
4. Once all desired parameters have been selected, return to the data list:
 - Use the **List View** icon to return to a data screen in PID List format.
 - Use the **Graph View** icon to return to a data screen in Graph View format, see [Graph View on page 54](#) for details.

NOTE

Graph View is only available when 16 or fewer parameters (the number that can display on a single screen) were selected for the custom list. Make sure that no more than 16 parameters are highlighted if the screen displays a single graph when the Graph View icon is selected.

Alarms

Alarms are visual indicators alongside a parameter in the data display list that change color to show the signal status. A green alarm indicates on, a gray alarm indicates off. Only digital parameters, those with a range limited to two states (e.g. enabled/disabled, on/off, etc), can have alarms. Parameters with continuous ranges, such as variable voltage and pressure values, cannot have alarms. The alarm indicator assignments remain as selected until you exit the data list:

To configure alarm settings:

1. Select the **Alarms** icon on the Scanner Toolbar.
The Alarm List dialog box will open.
2. Check the parameters that you want to show alarms.
3. Select **Save**.

Alarm indicators now appear next to the selected parameters in the Data List ([Figure 4-32](#)).

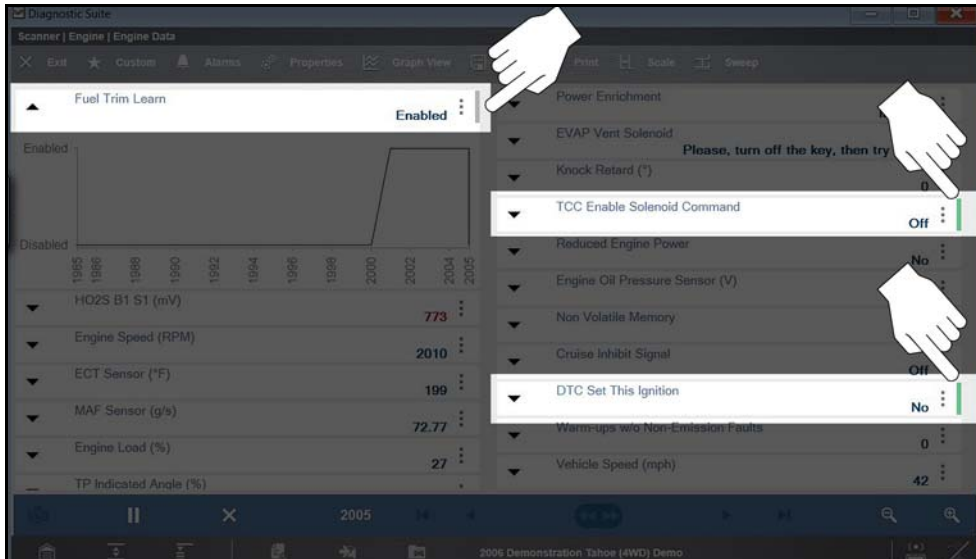


Figure 4-32 Typical - Alarm indicators

NOTE

Alarms can only be set for certain parameters. If the Alarm List dialog box is empty, no parameters are available and alarms cannot be set.

Properties

Properties is used to configure (all) graph color, settings, samples after trigger, and sweep ([Figure 4-33](#)).

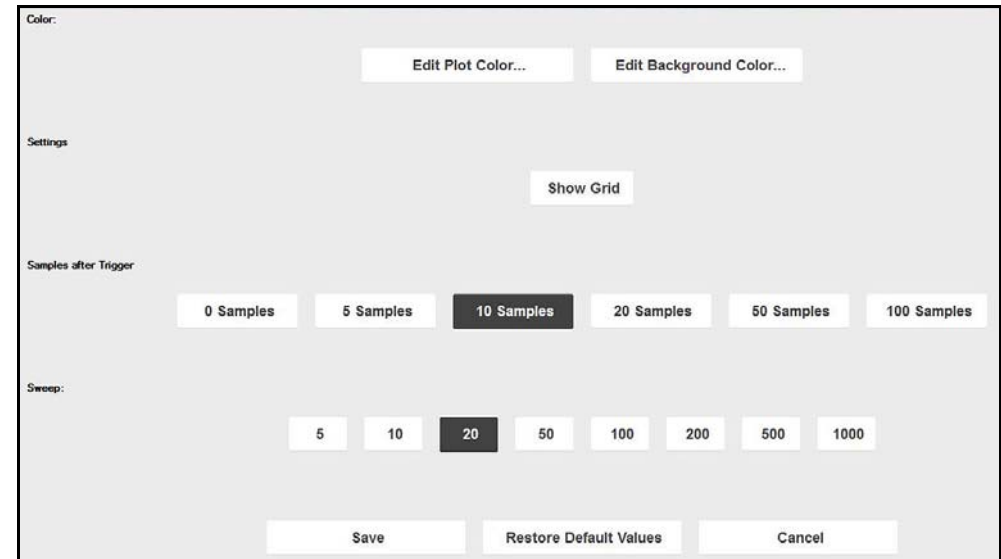


Figure 4-33 Properties screen

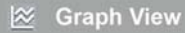
Edit Plot Color and **Edit Background Color** are used to set graph plot and background colors.

Show Grid is used to hide/display graph background grid pattern.

Samples After Trigger settings determine how many data samples (number of frames) are recorded following a trigger event.

Sweep is used to set the amount of data that displays across the graph. Values are in sample points (frames of data). A frame of data equals one complete transmission of the serial data by the electronic control module.

Graph View



Graph View allows you to display up to 16 graphs (Figure 4-34). To view more than one PID in a multi-graph display, select the PID **Expand/Collapse** icon to open each PID in graph display you want to include, then select **Graph View** from the toolbar. To return to list view, select **List View** from the toolbar. The display defaults to a single graph if more than 16 graphs are open when the toolbar icon is selected. Should this happen, return to the data list and close some of the graphs.

NOTE

The screen does not scroll in Graph View mode, it adjusts to show only the selected parameters.

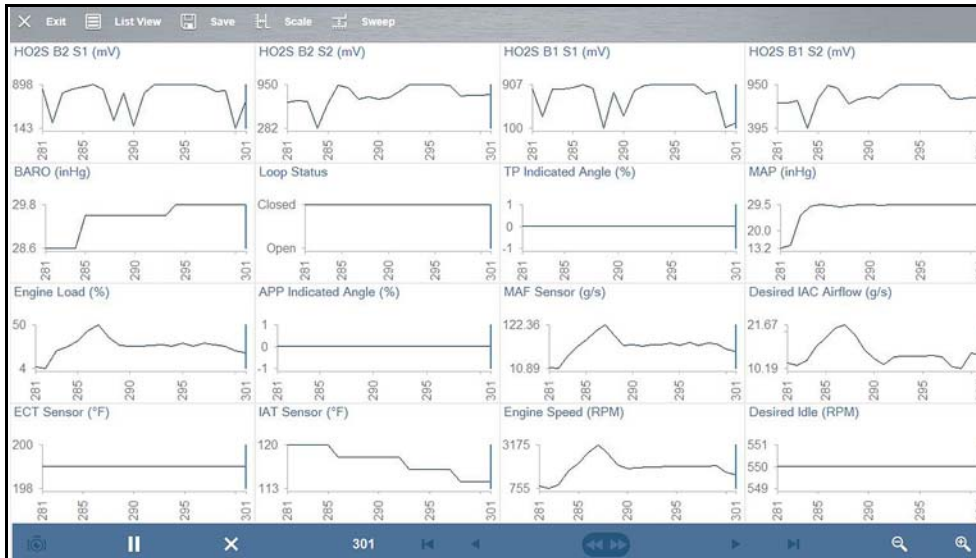


Figure 4-34 Graph View screen

Graph View mode can also be used from the custom data list configuration screen. Refer to [Custom](#) on page 52 for details.

Save



Save is used to record PID data. Saved files can be helpful when trying to isolate an intermittent problem or to verify a repair during a road test.



To save PID data:

- Select **Save**.

A save dialog box displays while data is being saved. The file is saved when the message box disappears.

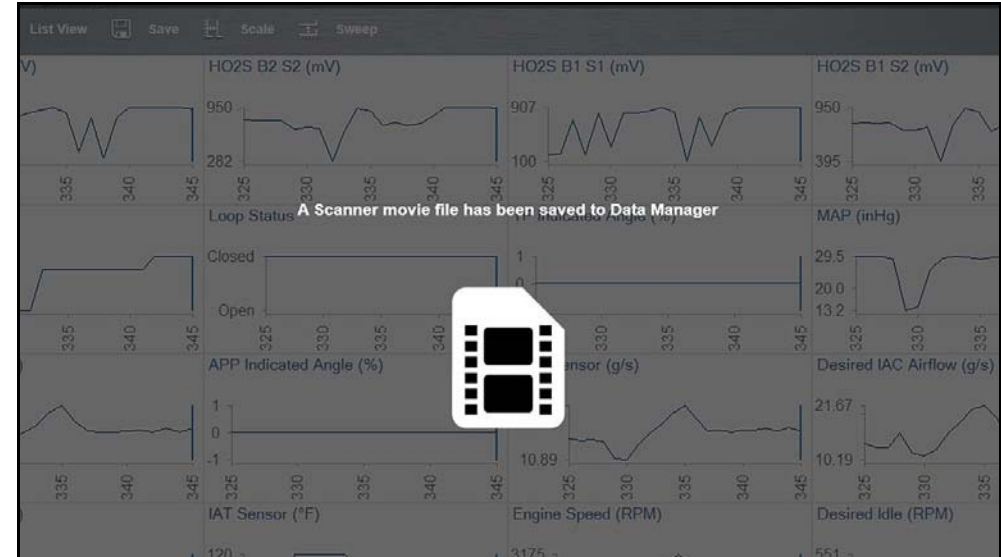


Figure 4-35 Save file screen

To open saved Scanner data files, from the Home screen select **Data Manager > Scanner Data Folder**, see [Scanner Data Viewer](#) on page 163.

Print



See [Printing / Printer Setup](#) on page 19.

Scale



Scale allows you to display/hide the graph scale values along the left side of the graphs (Figure 4-36).



Figure 4-36 Scale values (shown OFF)

Sweep



Sweep allows you to display/hide the graph sweep values, displayed below the graphs (Figure 4-37).

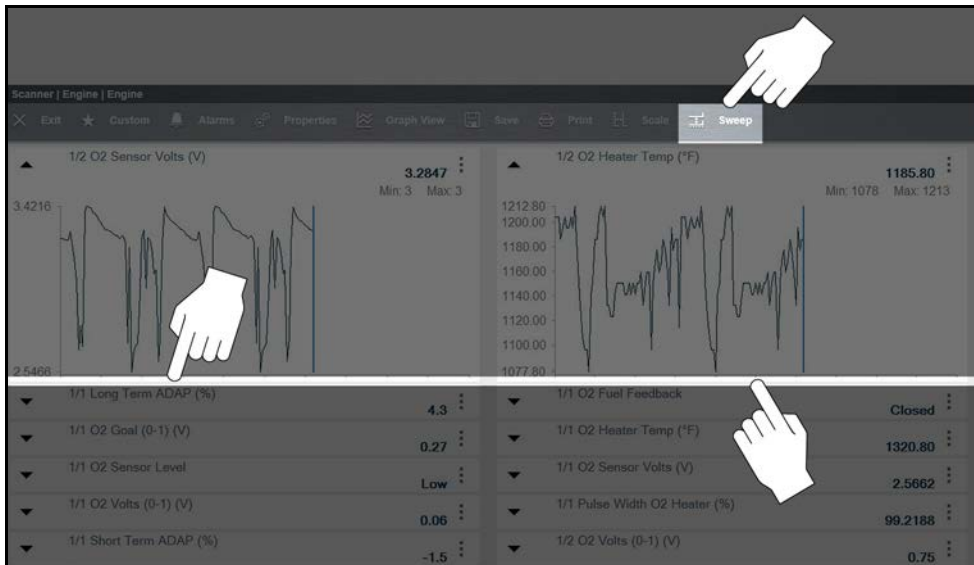


Figure 4-37 Sweep values (shown OFF)

Data Controls Toolbar

Whenever communication is established with a vehicle, the Scanner continuously collects data transmitted by the ECM in the data buffer. The Data Toolbar (Figure 4-38) contains the controls for navigating the buffered data and other options.

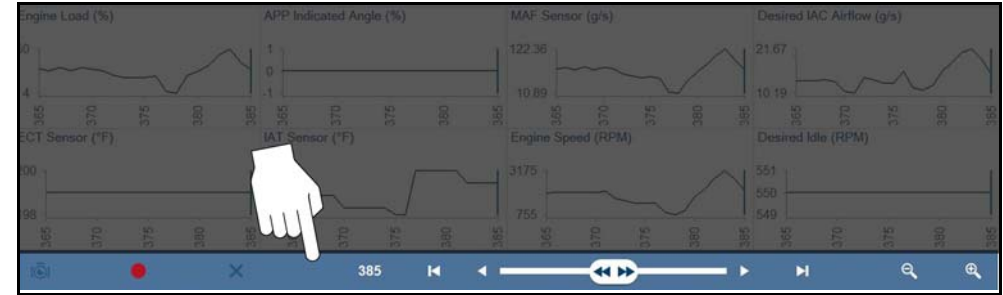








Figure 4-38

Icon	Description
<p>Not Armed (Trigger Arm Control)</p>	<p>(Flashing Icon) When this icon is flashing, the triggers are not armed and no data capture will occur. (Select this icon to arm)</p>
<p>Armed (Trigger Arm Control)</p>	
<p>Go To Start/End</p>	<p>Moves to the first/last frame in the data buffer.</p>

Icon	Description
Pause	
	Suspends data collection.
Record/Play	
	Starts or resumes data collection.
Clear	
	Erases the data buffer.
Step Back/Forward	
	Moves to the previous/next frame in the data buffer.
Frame Counter	
	Indicates the data buffer frame currently displayed.
Zoom In/Out	
	Increases/decreases the magnification by decreasing the sweep of the graph. The zoom options on the Data Buffer toolbar allow you to change the magnification level of the sweep when viewing data graphs. Use the Zoom In (+) icon to increase magnification, and the Zoom Out (-) icon to decrease magnification.

Use the self-centering slider button in the middle of the toolbar to quickly move through paused data.

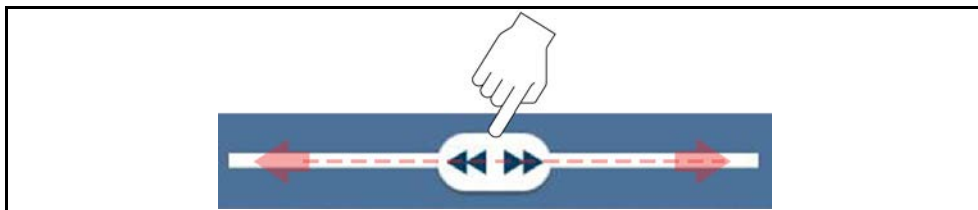


Figure 4-39 Data buffer slider

4.29.2 Using Triggers

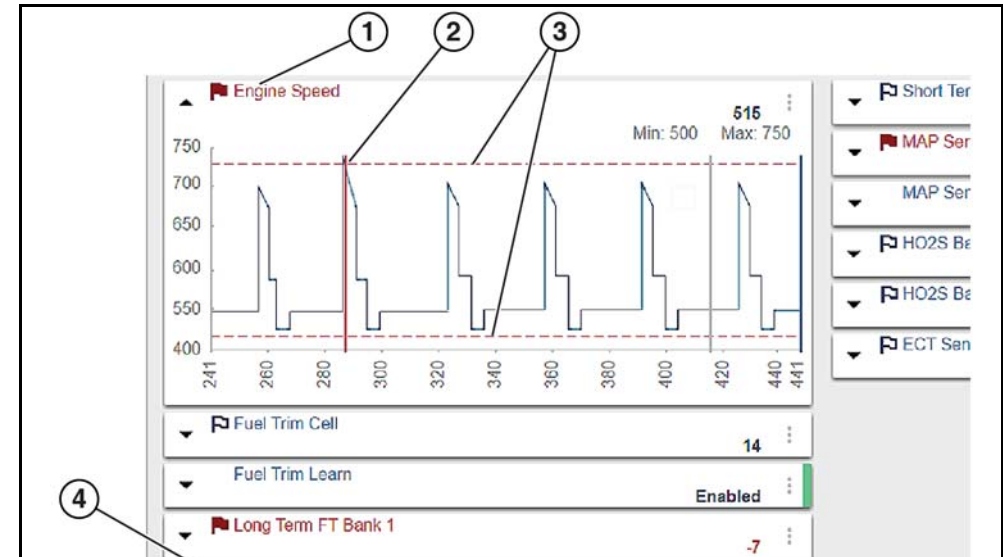
Trigger Description and Status Icons

Setting PID triggers allows you to configure the diagnostic tool to automatically save PID data to a file, when a PID value meets an upper/lower limit (trigger point).

When a PID value meets the trigger point it activates the trigger which captures a short recording of all available PID data and saves it as a data file.

You can replay the saved data file to closely evaluate not only the PID that triggered the event, but all the PIDs being monitored to collectively see what was happening at the time of the event.

Trigger indicators and the arming control are shown in (Figure 4-40).





1. Activated PID Trigger Indicator - A red flag and text indicate the PID trigger has activated.
2. Trigger Cursor - A red cursor line is displayed as a marker at the point the trigger was activated.
3. Upper and Lower Limit Lines - Limit lines indicate the upper and lower thresholds (trigger points).
4. Armed PID Trigger Indicator - A blue outlined flag indicates the PID trigger is armed.
5. Trigger Arm Control Icon - Select this icon to arm/disarm all PID triggers. See [Trigger Arming/Disarming](#) on page 59.

Figure 4-40

PID Trigger Status Icons

The icons (below) are used to help you quickly identify the status of individual PID triggers:

Icon	Description
Trigger Armed 	Trigger has been set (configured) and is armed.
Trigger Activated 	Trigger has been activated (upper or lower limit has been met).

Trigger Setup

To use triggers, they must be turned on, set (configured), and then armed. Use the following procedures to setup PID triggers. See [Trigger Arming/Disarming](#) on page 59 for trigger arming/disarming information.

▶ To adjust the amount of data collected after a trigger activates:


1. Select **Properties** from the toolbar.
2. Highlight one of the **Samples After Trigger** options (0, 5, 10, 20, 50, 100, 200, 500 or 100) ([Figure 4-41](#)).



Figure 4-41 Properties screen

3. Select **Save**.

▶ To turn a trigger on, and set upper/lower trigger limits:

1. Select the **Menu** icon  on the PID you want to set a trigger on.
2. Select **Setup**.
The properties dialog box opens ([Figure 4-42](#)).
3. To turn the trigger on select the **Trigger On** checkbox.
4. Enter the desired upper threshold trigger limit in the **Max** field.

5. Enter the desired lower threshold trigger limit in the **Min** field.
6. Select **Save**.
7. To arm the trigger, see [Trigger Arming/Disarming](#) on page 59.

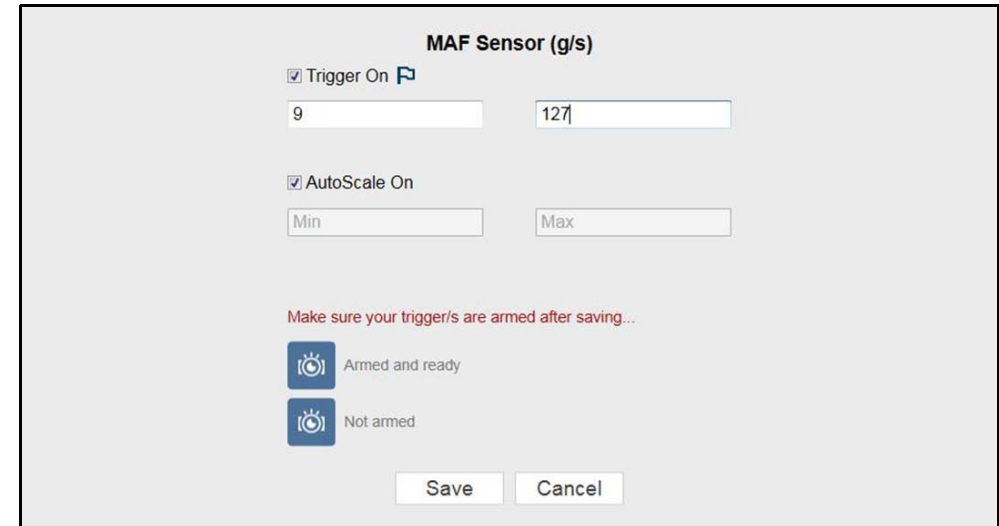


Figure 4-42 Typical - Trigger Max/Min settings

Upper and lower trigger limit lines (red) are displayed on the graph.

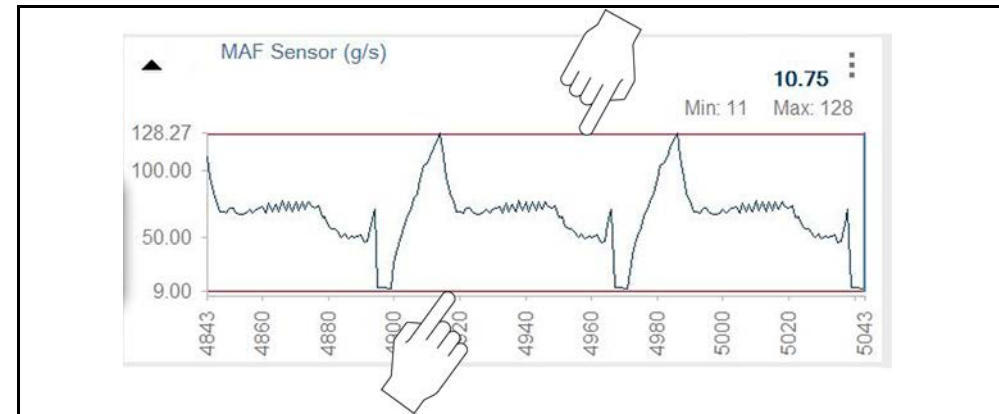



Figure 4-43 Typical - Trigger upper/lower limit lines


▶ To use Autoscale or set the scale manually:

Autoscale On - The graph scale (vertical axis range) is automatically adjusted based upon the minimum and maximum PID values. Autoscale On (checkbox selected) is the default setting, and can be used for most testing. To access this setting:

1. Select the **Menu** icon  on the PID you want to set.
2. Select **Setup**.
The properties dialog box opens ([Figure 4-42](#)).
3. Select Autoscale checkbox.

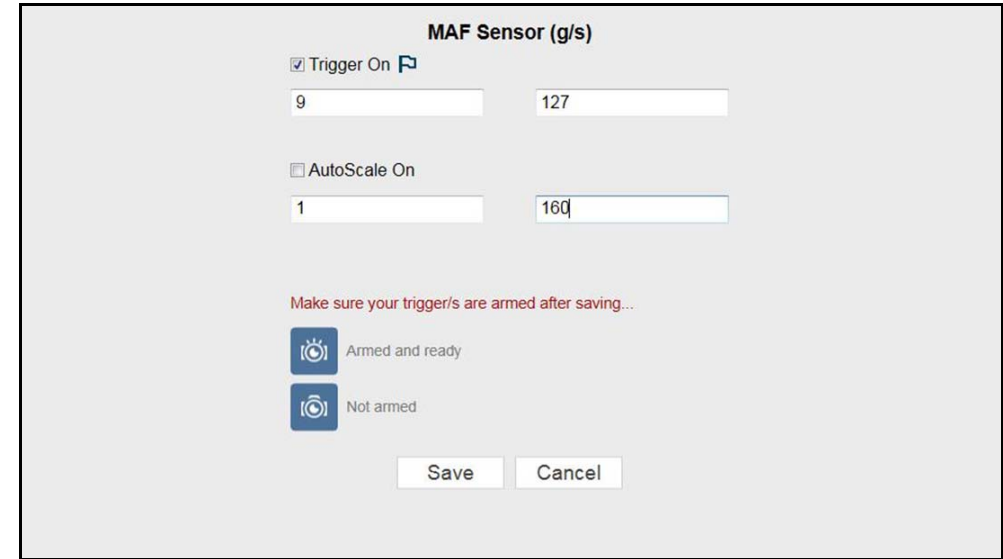
Autoscale Off (manual setup) - Allows you to set the Graph scale (vertical axis range).

To manually set the scale:


1. Select the **Menu** icon  on the PID you want to set.
2. Select **Setup**.
The properties dialog box opens ([Figure 4-44](#)).
3. Deselect the Autoscale checkbox.
The check mark is cleared from the box and the minimum and maximum fields activate.
4. Enter the desired upper limit in the **Max** field.
5. Enter the desired lower limit in the **Min** field.
6. Select **Save**.
7. To arm the trigger, see [Trigger Arming/Disarming](#) on page 59.

NOTE

Minimum scale setting must be less than the maximum scale setting:



MAF Sensor (g/s)


Trigger On 


9 127

AutoScale On

1 160

Make sure your trigger/s are armed after saving...

 Armed and ready

 Not armed

Save Cancel

Figure 4-44 Manual scale setup (w/trigger set)

The vertical scale is now at the set values.

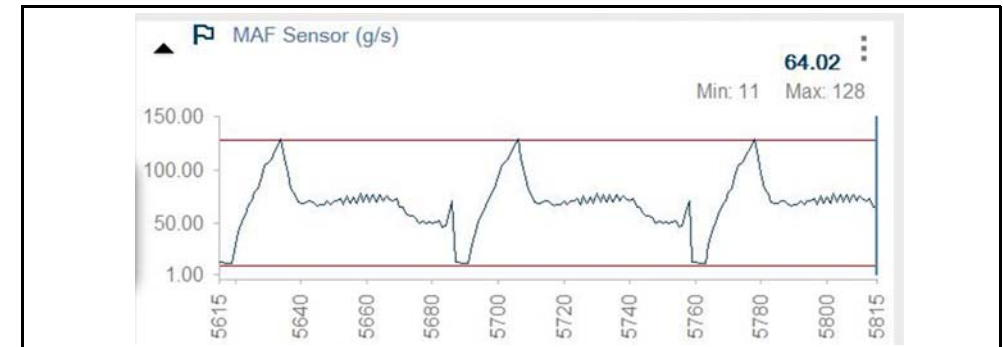


Figure 4-45 Manually set scale (w/trigger set)

About Activated Triggers

A trigger is activated (displays red flag)  when a PID value meets an upper/lower limit (trigger point).

When a trigger is activated:

- Data collection is briefly paused as the Scanner captures a short recording of all available PID data from just before the trigger point to just after, and saves it as a data file.
- A message displays indicating a data file was saved ([Figure 4-46](#)).
- Data collection restarts. **Note** - Triggers for other PIDs (not activated) will continue to be armed.
- The activated PID trigger is disarmed. **Note** - if a different PID trigger is activated subsequently, the previously recorded data file will be over written.
- A red cursor line is displayed on the graph of the PID with the activated trigger to indicate where the trigger occurred. A black cursor line is displayed on all the other PID graphs to indicate their relationship to where the trigger occurred.
- The PID name, flag icon, and current value all change color to red on the PID with the activated trigger.
 - **Note** - When data collection restarts the current value may switch from red to blue as the data runs over the limit and returns within limits.

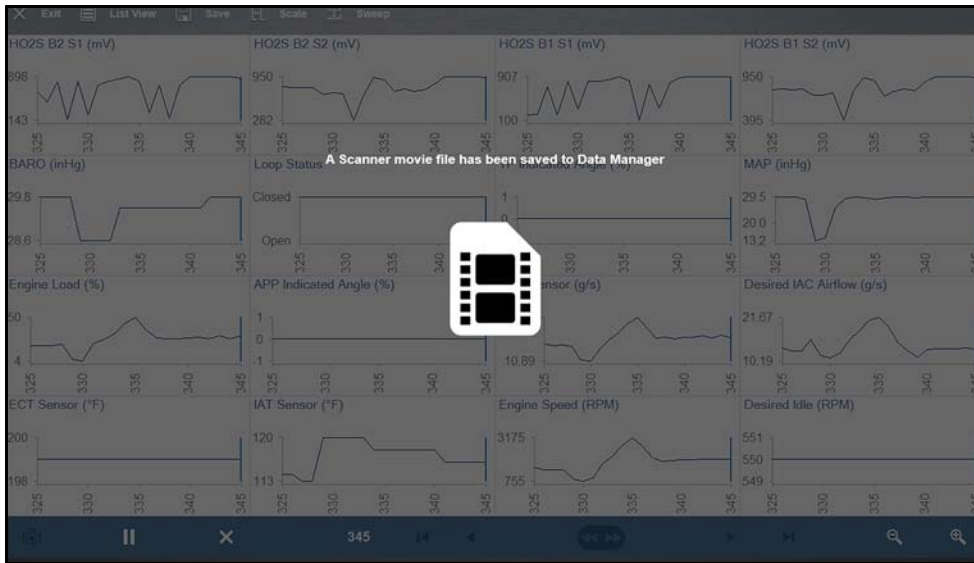





Figure 4-46 Typical - Activated trigger saved data file screen

Trigger Arming/Disarming

Arming - arms all triggers to record data if a trigger is activated.

Disarming - prevents all triggers from activating.

Select the trigger arm control icon (in the data control toolbar) to arm or disarm all triggers.



Trigger Arm Control Icons	Description
 	(Flashing Icon) When this icon is flashing, the triggers are not armed and no data capture will occur. (Select this icon to arm)
	When this icon is continuously displayed, triggers are armed, and ready to capture data. (Select this icon to disarm)

If trigger settings are modified, or are added for other PIDs, they are armed as soon as you exit the setting screen.

Rearming Activated Triggers

Once a PID trigger has activated, you cannot use the Trigger Arm Control Icon to rearm that trigger.

To rearm an activated trigger use one of the following methods:

- Rearm Individual Trigger
 - a. Select the **Menu** icon  on the PID you want to rearm the trigger on.
 - b. Select **Setup**.
 - c. From the properties dialog box, select **Save**. This rearms the trigger using the original trigger points. If different trigger points are needed, change the Max/Min values and then select **Save**.
- Rearm All Triggers and Clear Data
 - a. Select the **Clear** icon .
 - b. From the confirmation screen select **Yes**.



4.30 Functional Tests

The **Functional Tests** selection is used to access vehicle-specific subsystem and guided component tests. Available tests vary by manufacturer, year, model, and only the available tests display in the menu.

IMPORTANT

Follow all instructions while performing tests or resets.

IMPORTANT

Do not enter any functional tests while driving on a road test. During some functional tests, the ECM makes changes to ignition timing, fuel delivery, and other engine functions, which may affect engine operation and vehicle control.

How and what information is presented on the screen varies according to the type of test being performed.

There are four types of functional tests:

- **Information Tests**—are read-only tests, like selecting “VIN” from a Functional Tests menu to display the VIN of the identified vehicle.
- **Toggle Tests**—switch a component, such as a solenoid, relay, or switch, between two operating states.
- **Variable Control Tests**—command a certain value for a system or component, such as varying the spark timing in 1° increments or the EGR valve duty cycle in 10% increments.
- **Reset Tests**—reset the adaptive, or learned, values that are stored in the electronic control module.

Typical functional test options may include:

- CKP Variation Learn
- EVAP Service Test
- Injector Balance

Selecting a **Functional Test** opens the test. A typical test includes on-screen instructions ([Figure 4-47](#)) followed by a test screen ([Figure 4-48](#)) that provides a changeable value or switch that is manually entered or actuated on-screen and a list of displayed PID(s) to monitor their behavior while performing the test.

With transmission in park/neutral, set parking brake, block drive wheels. Start and idle engine.

Figure 4-47 Typical instructions

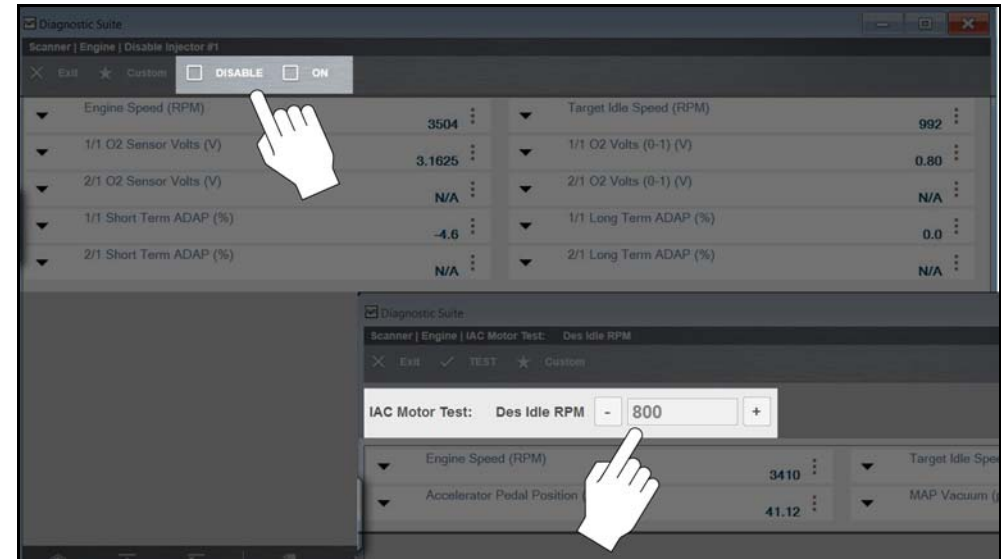





Figure 4-48 Sample functional test controls

Functional test controls allow you to activate/deactivate or change the test signal. The controls will vary depending on the test, a few examples are shown in the following table.

Icon	Description
Test	
	Activates the test.
Change List	
	Allows you to switch data lists.



Icon	Description
Custom	
 Custom	Allows you to select which parameters display during the functional test.
Minus	
	Switches an item to low or off, or incrementally reduces a variable signal.
Plus	
	Switches an item to high or on, or incrementally increases a variable signal.

4.30.1 Functional Resets and Procedures

Functional Resets allow you to manually reset certain control module values (e.g. reset fuel trim values, or turn off the oil change indicator) directly from the diagnostic tool (if supported by the vehicle).

Functional Resets Procedures are step-by-step instructions to guide you through an on-vehicle reset procedure. These instructions may be provided in certain applications (if available) when on-tool functional resets are not supported.

Functional resets are not available for all vehicles, and will vary depending on vehicle support. A screen message may display “Functional Reset is not available for this vehicle”.

4.31 Generic Functions

Selecting **Generic Functions** from the Vehicle Systems Test/Function menu opens a submenu of available OBD-II/EOBD tests and functions for 1996 and newer vehicles.

For additional information on generic OBD-II functions refer to the *Global OBD Vehicle Communications Software Manual*.

Typical OBD-II/EOBD tests and functions include:

- **MIL Status** - displays the ID and status of the Malfunction Indicator Lamp (MIL)
- **Troubleshooter** - displays a menu of available experience-based tests and tips

- **Readiness Monitors**—displays the status of the OBD-II/EOBD required monitors
- **(\$01) Display Current Data** - displays a screen containing Generic OBD PID data
- **(\$02) Freeze Frame**—displays data stored in ECM memory when a DTC is set
- **(\$05) Oxygen Sensor Monitoring**—displays on-board oxygen sensor monitoring test results
- **(\$06) On-Board Monitored Systems**—displays the status of system monitors
- **(\$08) Request Control of On-Board System**—establishes bidirectional ECM communication
- **(\$09) Calibration Identification**—displays the ECM calibration identification numbers
- **(\$09) Calibration Verification Number**—displays the ECM calibration
- **(\$09) In-Use Performance Tracking**—displays a monitoring conditions report
- **(\$09) Vehicle Identification Number**—displays the VIN
- **(\$0A) Emissions Related Fault with Permanent Status**—displays a record of permanent codes

4.32 Troubleshooter

Troubleshooter is a database of experience-based information of validated real-world repair strategies that have been compiled by top-notch technicians. Troubleshooter simplifies the diagnosis process, as it contains information on virtually all common diagnostic trouble code (DTC) problems and driveability symptoms.

Selecting **Troubleshooter** from the Vehicle Systems Test/Function menu opens a submenu of options (options may vary).

- **Code Tips**—provides detailed information on setting conditions, testing, and interpreting test results for specific codes.
- **Symptom Tips**—provides diagnostic tests and procedures based on vehicle operation.
- **Time Savers**—provides supplemental information, such as firing order and #1 cylinder location, that may be needed to make a diagnosis.
- **Tests and Procedures**—explains how to perform certain tests on the specific test vehicle. Some tips provide specifications and installation information as well.

Troubleshooter information is organized into a series of diagnostic tips that are designed to quickly lead you to the root cause of a particular problem. The tips are



vehicle-specific, which means only tips that relate to the identified vehicle are presented.

i NOTE

Troubleshooter appears in a Scanner menu only if tips are available for the system selected on the identified vehicle.

4.33 Demonstration Modes

Two training (demonstration) modes are provided to help you to become familiar with Scanner functions:

- Scanner Demonstration
- OBD Training

These training modes allow you to navigate through normal Scanner and OBD-II Direct operations and menus, without connecting to a vehicle. Sample data and test results are provided to help you learn the menus and basic operations.

This section provides examples for the Scanner Demonstration only.

IMPORTANT

Do not connect the compact scan module to a vehicle while using the demonstration program.

4.34 Scanner Demonstration (Introduction to Intelligent Diagnostics)

The Scanner demonstration program allows you to navigate through many functions of the Scanner, and displays vehicle data (PIDs) and trouble codes (captured from an actual vehicle) to simulate what you might see on an actual vehicle.

Demo Setup - Before you begin

Before starting these demos, connect the AC power supply to the diagnostic tool, and connect the compact scan module (CSM) to the diagnostic tool using the USB

cable. This ensures the diagnostic tool battery does not discharge, and supplies power to the CSM allowing it to pair with the diagnostic tool.

IMPORTANT

Do not connect the compact scan module to a vehicle while using the demonstration program.

Vehicle Identification

The first process in communicating with any vehicle is identifying the vehicle. The following walk-through will guide you through this process using the Scanner demonstration mode.

1. From the Home screen, select **Scanner** .
2. The manufacturer (vehicle make) menu displays. If needed expand the list to see all makes, then select **Demonstration**.
3. The demo menu displays two options, the “**Demo Vehicle**” (may vary) and **OBD Training Mode**. Select the **Demo Vehicle (Captive CGII)**.
The simulated Vehicle ID process starts.
4. Select **No**, when asked if you want to scan a real vehicle, and then follow the prompts onscreen to identify the vehicle.
5. The vehicle confirmation screen displays, select **OK**. (Selecting OK loads the specific vehicle database, in this instance it's our demonstration database).
6. A demo mode confirmation message displays, Select **Continue**.

After the vehicle has been identified, a systems menu displays. This menu shows all of the vehicle systems available (supported by the vehicle) for testing. Typical systems choices may include:

• Code Scan	• Body Control Module	• Radio
• Clear All Codes Read by Code Scan	• Door Module - Driver	• Seat Module - Driver
• Engine Management	• Door Module - Passenger	• Suspension (ESC).
• Transmission	• Heating and Air Conditioning	• Theft Deterrent



<ul style="list-style-type: none"> • Antilock Brakes 	<ul style="list-style-type: none"> • Instrument Panel Cluster 	<ul style="list-style-type: none"> • Tire Pressure Monitor
<ul style="list-style-type: none"> • Airbag 	<ul style="list-style-type: none"> • Passenger Presence System 	<ul style="list-style-type: none"> • Transfer Case

Most of the system menu choices are directly related to a specific vehicle system (e.g. Engine, Airbag, Tire Pressure Monitor), with the exception of Code Scan and Clear All Codes Read by Code Scan. Code Scan is a time-saving feature that allows you to scan all supported vehicle systems at once for diagnostic trouble codes (DTCs).

Choosing a vehicle system opens the main menu for that system, which provides options for you to analyze and interact with that system. You can choose to scan for DTCs, clear DTCs, view parameter data (PIDs), perform functional tests and more.

Scan for Engine Codes and View Code Specific Information using the Intelligent Diagnostics Demo

This demonstration simulates performing a typical check for engine trouble codes, and then using Intelligent Diagnostics to view code-specific information and PIDs.

1. Select **Engine Management**.
2. Select **Codes**.

Intelligent Diagnostics demonstration starts.

Normally when you select Codes, a list of codes is displayed (if found) ([Figure 4-49](#)). If codes are found, you have the option to select the **Diagnose** icon of a code to open Intelligent Diagnostics and access code specific information. However, in demonstration mode the Intelligent Diagnostics interactive demonstration starts.

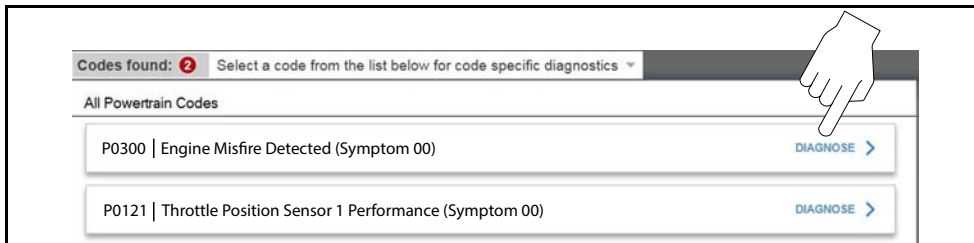


Figure 4-49 Typical - Code list and Diagnose icon

The Intelligent Diagnostics interactive demonstration explains the features of Intelligent Diagnostics, and allows you to choose any of the Intelligent Diagnostics modules to learn more about them.

i NOTE

Navigation icons are provided on applicable screens to continue forward or go back. Other screens require you to make a selection to continue.

3. Select **Next** on the Intelligent Diagnostics demo start screen ([Figure 4-50](#)), and the following screens to continue.

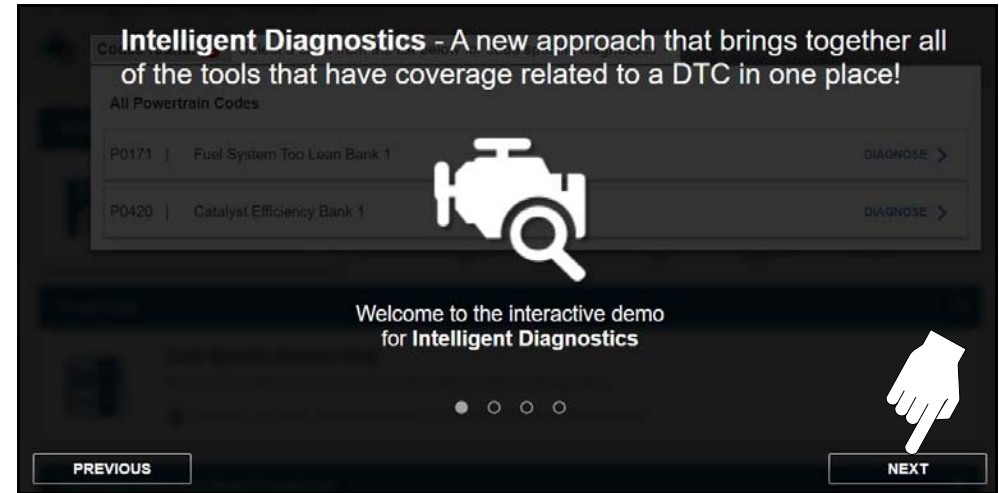


Figure 4-50 Intelligent Diagnostics Demo Welcome

4. As the demo continues, navigational hints and code-specific features are described ([Figure 4-51](#)). Select **Next** to continue.

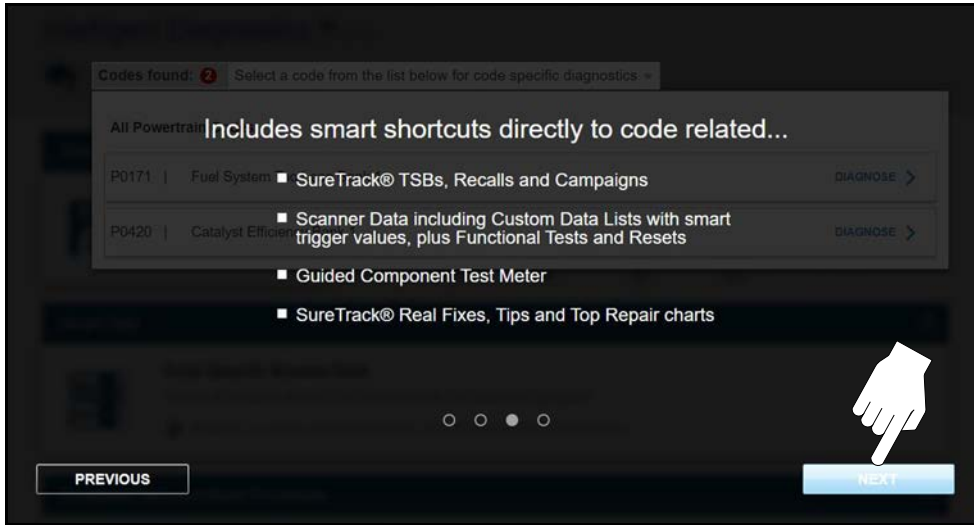


Figure 4-51 Intelligent Diagnostics Feature Descriptions

- The demo explains that two codes are available in the code list for this demo, and to choose the code shown onscreen on the next screen (Figure 4-52).

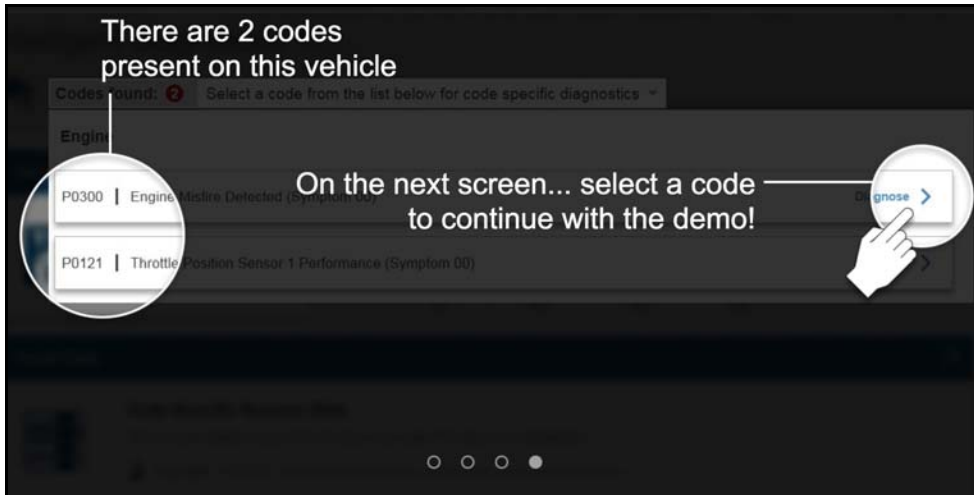


Figure 4-52

- Select the code noted on previous screen to continue (Figure 4-53).

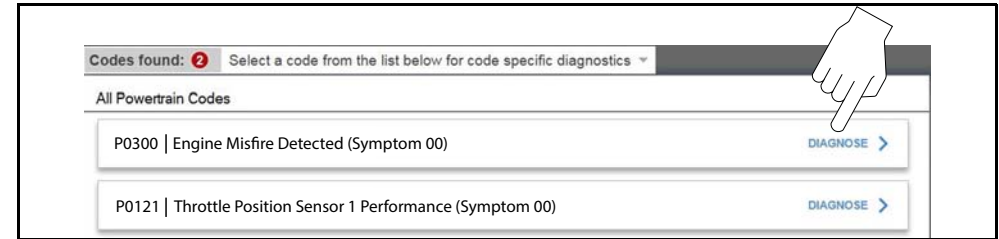


Figure 4-53

- The Intelligent Diagnostics main menu opens (Figure 4-54). Descriptions are provided for the various options, select “GIVE IT A TRY” to continue.



Nice! You're connected to **Intelligent Diagnostics**

Scroll down to learn more...

Click the **Smart Data** card for a code specific Custom Data List that's setup for you automatically and highlights unexpected PID values

Code Switcher Button

- replaced intake manifold gasket (402)
- replaced fuel filter (219)
- replaced oxygen sensor (150)
- replaced spark plug (76)
- replaced mass airflow sensor
- replaced fuel pump (56)

Smart Data

Code Specific Scanner Data

Real world data shows the **Top Repairs** for the vehicle when this code is present

Functional Tests and Reset Procedures

Code Specific Functional Tests and Reset Procedures

Use bi-directional vehicle controls including **Functional Tests & after repair Resets**

Guided Component Test Meter

Code Specific Guided Component Tests

Test sensors and other components at the source... **Guided Component Tests** will show you how to test, where to connect and what results to look for!

Sure Track

Real Fix - P0131, P0171, P0300

A quick look at the highest count 'Real Fix' shows what technicians in the field have determined to be the cause and what they did to correct it

Complaint

The customer states the check engine light is on.

Cause

Connected a scan tool and found codes: P0131 - O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1), P0171 - System Too Lean (Bank 1) and P0300 - Random/Multiple Cylinder Misfire Detected. Connected spark testers to all spark plugs and a fuel pressure gauge mine after the fuel filter using the correct adapters. Started the engine and found the spark tester illuminated at all the cylinders and the measured fuel pressure was within specifications. Performed a visual inspection of the engine for any broken or disconnected vacuum lines but no faults were found. Connected a smoke machine to the intake manifold, reduced smoke on the air intake system to check for leaks, but no smoke was found leaking. With the engine at idle, used the scan tool to monitor live engine data and found oxygen sensor (B1-S11) remained below specifications, which indicated a lean condition. With the engine idling, reduced propane into the air intake to force the system rich, but oxygen sensor (B1-S11) did not respond to the rich condition. Disconnected the harness connector from oxygen sensor (B1-S11) for inspection but found no loose or damaged terminals on the harness connector or oxygen sensor (B1-S11). The result of these tests confirmed oxygen sensor (B1-S11) was faulty.

Correction

Plus more Real Fixes, Tips, and Repair Information

Real Fixes

Industry Expert Information

OEM Repair

All the diagnostic tools related to your code are right here, **saving you hundreds of steps.**

GIVE IT A TRY

Figure 4-54 Intelligent Diagnostics

8. Select any card (e.g. Technical Service Bulletins, Smart Data, Real Fixes, etc.) to learn more about the code-specific information that is provided.

9. When finished, select **Exit**, to return to Scanner demonstration mode.
10. Select **Back** until the Main Menu (Engine) displays.

For additional information about Intelligent Diagnostics, see [Intelligent Diagnostics](#) on page 66.

To become familiar with other capabilities of the Scanner function, navigate through the other services and menu options within the Scanner Demonstration Mode.



Introduction

NOTE

Intelligent Diagnostics is not supported on U.S. (United States) and AU (Australian) vehicles.

Intelligent Diagnostics provides access to the latest **code-specific** data, information, and tests, all obtained from actual shop repair orders and industry professionals.

Intelligent Diagnostics may include the following **code-specific** information and data (if available):

- **Technical Bulletins** - View Safety Recalls, Technical Service Bulletins (TSB's), and OEM Campaigns
- **Top Repairs Graph** - View a graph of the specific parts and procedures most frequently used to fix the selected code or symptom.
- **Smart Data** - View custom code-specific PID lists developed to show you just the data you need related to the code. Smart Data also highlights PIDs that are operating outside known-good values.
- **Functional Tests and Reset Procedures** - Test components using command functionality directly from the diagnostic tool and reset service indicators.
- **Guided Component Tests** - Test components quickly and accurately with Guided Component Tests that include step-by-step instruction, component specifications and troubleshooting information.
- **Real Fixes and Troubleshooter** - View code-specific procedures, tests, and tips that have been gathered from actual shop repair orders and industry professionals.

5.35 Main Topic Links

- [Accessing Intelligent Diagnostics](#) page 66
- [Main Menu and Basic Navigation](#) page 67
- [Code Results Dropdown Menu](#) page 68
- [Top Repairs Graph](#) page 69
- [Technical Bulletins \(OEM Information\)](#) page 69
- [Smart Data](#) page 70
- [Functional Tests and Reset Procedures](#) page 71
- [Guided Component Tests \(GCTs\)](#) page 72
- [Real Fixes](#) page 74
- [Troubleshooter](#) page 74
- [Repair Information](#) page 74

5.36 Accessing Intelligent Diagnostics

Intelligent Diagnostics is accessed by selecting the **Diagnose** icon from the Scanner code results list. For code results list information, see [Codes Menu \(Viewing Codes\)](#) on page 43.

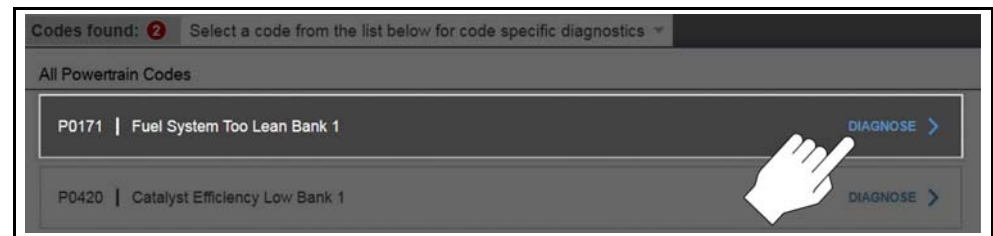


Figure 5-1 Diagnose icon

To review basic Scanner operation procedures, see [Basic Scanner Operation \(Quick Start\)](#) on page 38.

5.37 Main Menu and Basic Navigation

Intelligent Diagnostics information modules are contained in one multi-card main menu. This allows you to easily select a card (e.g. Technical Bulletins, Smart Data, Real Fixes, etc), view the data and then quickly return to the main menu to open another card.

NOTE

Some Intelligent Diagnostics functions are similar to Scanner functions and may share navigation and controls instructions. These topics use cross references to the applicable common information.

The following descriptions are used with [Figure 5-2](#).

- 1. Wi-Fi Connection Status Indicator** - A Wi-Fi connection indicator (cloud icon) is provided on the top of the screen ([Figure 5-2](#)). This icon is also used to indicate service expiration, the icon changes color to red, and displays the word “Expired” in the event your software version is not upgraded to the latest available version.
- 2. Code Results Dropdown Menu** - Displays selectable list of all present codes.
- 3. Top Repairs Graph** - Graphical display of the specific parts and procedures most frequently used to fix the selected code or symptom
- 4. Technical Bulletins (card)** - Lists code-specific Safety Recalls, Technical Service Bulletins (TSB’s), and OEM Campaigns
- 5. Smart Data (card)** - Displays code-specific PIDs and highlights PIDs operating outside known-good limits.
- 6. Functional Tests and Reset Procedures (card)** - Perform code-specific functional component tests directly from the diagnostic tool.
- 7. Guided Component Tests (card)** - Test code-specific components quickly and accurately with Guided Component Tests that include step-by-step instructions, component specifications, and troubleshooting information.
- 8. Real Fixes (card)** - Provides a list of code-specific procedures and tests that have been gathered from actual shop repair orders and presented in a complaint, cause, and correction format.
- 9. Troubleshooter (card)** - Opens a list of code-specific tips gathered from industry experts.
- 10. OEM Repair Information (card)** - Provides a link to an optional information service. See [Information](#) on page 134.

The screenshot shows the Intelligent Diagnostics multi-card menu. At the top, there is a header with a Wi-Fi connection indicator (1), a code results dropdown menu (2), and a top repairs graph (3). Below the header are several cards: Technical Bulletins (4), Smart Data (5), Functional Tests and Reset Procedures (6), and Guided Component Test Meter (7). At the bottom, there are three more cards: Real Fixes (8), Tips (9), and Repair Information (10). The Real Fixes card shows a detailed repair order for a 'Real Fix - P0171, P0174, Replaced Mass Airflow Sensor, Oxygen Sensor (B1-S1)' with 655 fixed instances. The Real Fixes card also includes a 'Complaint' section stating 'The customer states the check engine light is on.', a 'Cause' section describing the diagnostic process, and a 'Correction' section detailing the repair steps.

Figure 5-2 Multi-card menu



Intelligent Diagnostics Navigation

Basic navigation is accomplished by selecting the desired menu card.

Use the **Back** icon (shown in [Figure 5-3](#) and [Figure 5-4](#)) to navigate back to the previous screen.

To expand a card to full size, select anywhere in the card ([Figure 5-3](#)). See typical expanded card example in ([Figure 5-4](#)).

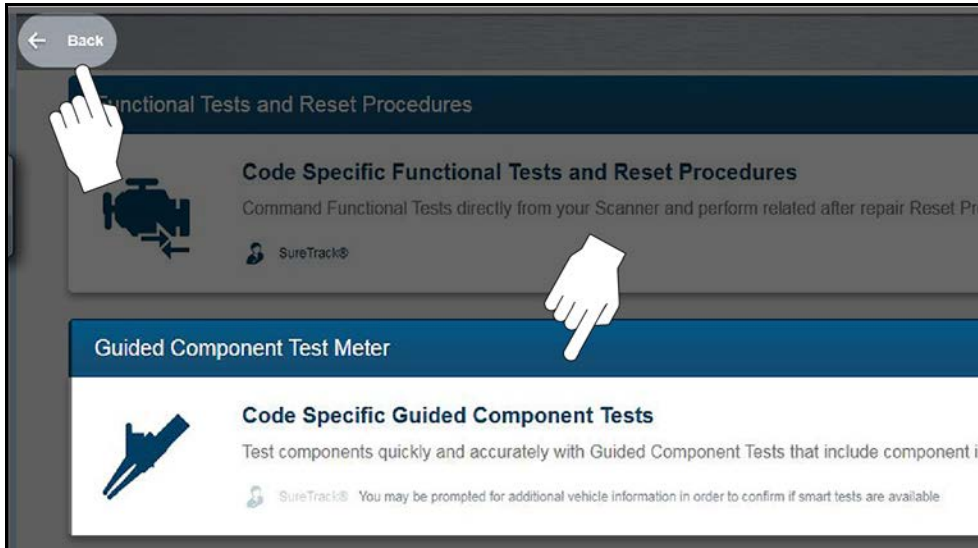


Figure 5-3 Back icon and selecting a card

To close the card, select the **Exit** "X" icon ([Figure 5-4](#)).

Some applications provide print functionality to print the screen results. Select the **Print** icon on the right side of the upper toolbar ([Figure 5-4](#)). See [Printing / Printer Setup](#) on page 19.

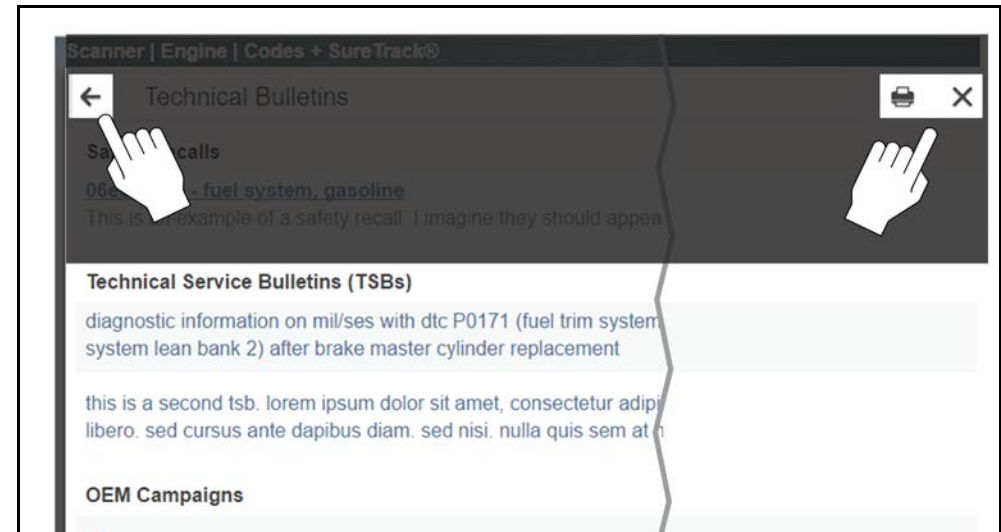


Figure 5-4 Expanded menu card and icons

5.38 Code Results Dropdown Menu

The Code Results Dropdown menu allows you to quickly choose any of the scanned codes from the code list, without having to exit Intelligent Diagnostics. Select a code to view specific data about that code within Intelligent Diagnostics.

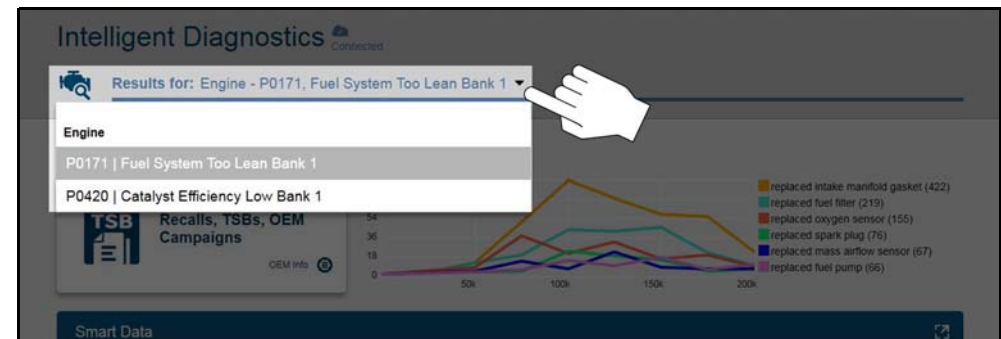


Figure 5-5 Dropdown Menu

5.39 Top Repairs Graph

The Top Repairs Graph (*Figure 5-7*) shows the most common verified fixes using the parts listed.

Example - In the graph shown below, the most common fix for the code was replacing the intake manifold gasket. This fix occurred 413 times, with the most occurrences (85) at 100k miles in vehicles with up to 200k miles.

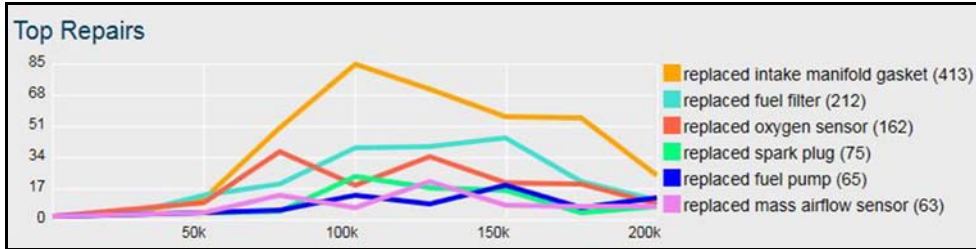


Figure 5-6 Top Repairs Graph (multiple components)

Depending on the information available, the graph may also include probable causes. See example in *Figure 5-7* “cleaned mass airflow sensor”.

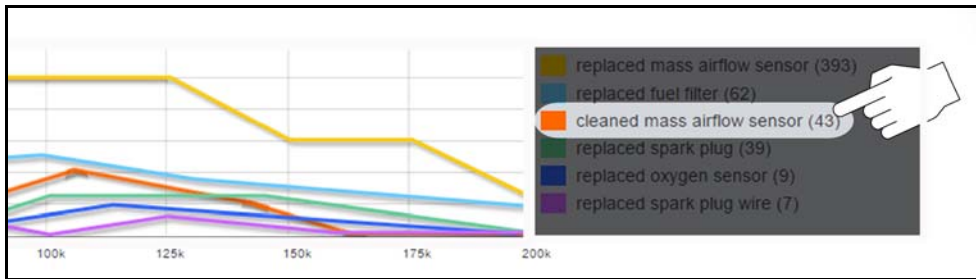


Figure 5-7 Example - Probable Cause within Top Repairs Graph

5.40 Technical Bulletins (OEM Information)

The Technical Bulletins card (*Figure 5-8*) provides a quick link to OEM Recall, TSB and Campaign information that may be available for the selected code.

- A red icon (*Figure 5-8*) indicates the total number of Recalls, TSBs, and OEM Campaigns that have been found.
- A green icon indicates a search was performed and no results were found.

Selecting the Technical Bulletins card (*Figure 5-9*) provides a detailed list view of the available OEM Recalls, TSBs, and Campaigns (*Figure 5-10*).



Figure 5-8 Technical Bulletins card

Select a topic from the list (*Figure 5-9*) to view detailed information on the topic (*Figure 5-10*).

Select the Print icon to print the topic (*Figure 5-9*). *Printing / Printer Setup on page 19*.

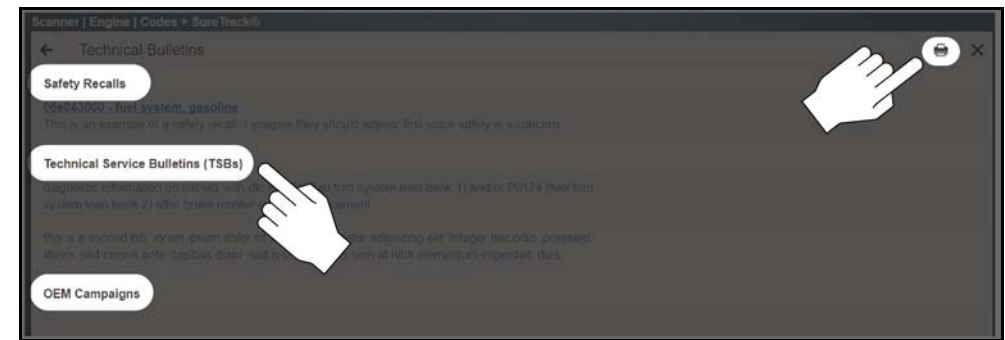


Figure 5-9 Bulletin, Recall, Campaign list and Print icon

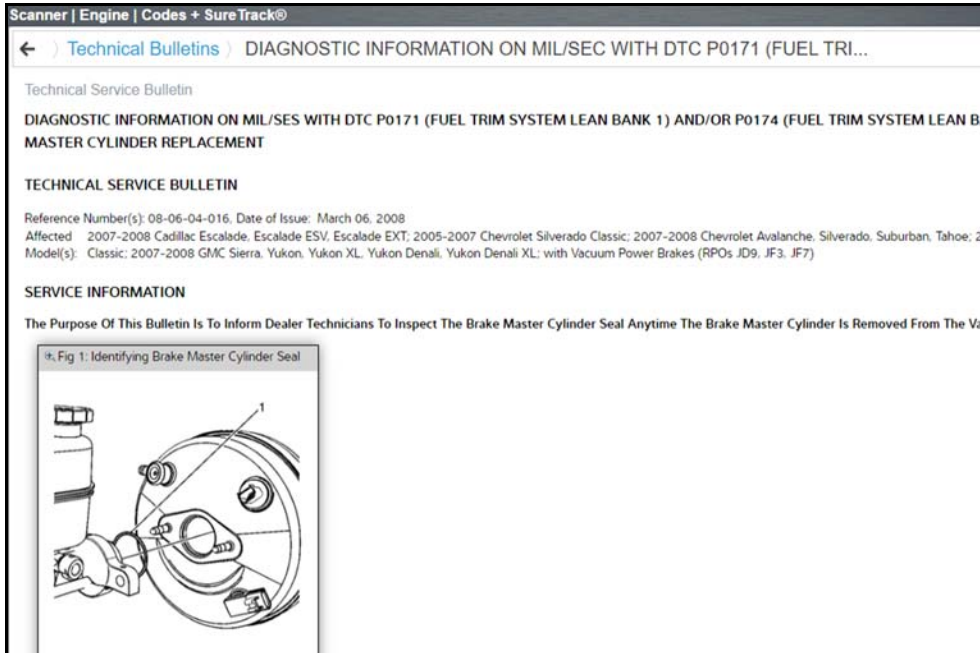


Figure 5-10 TSB example

5.41 Smart Data

Smart Data filters out all non-relevant PIDs and shows you a custom list of PIDs only related to the selected code. In addition, specific PIDs in the list are prearmed using known-good upper and lower trigger values.

IMPORTANT

Smart Data works best when the vehicle is idling at operating temperature with no load present. Always refer to OEM service information for specific PID range limit information.

Selecting the Smart Data card ([Figure 5-11](#)) opens the Smart Data main menu ([Figure 5-12](#)), which includes additional data list options (bottom of screen).

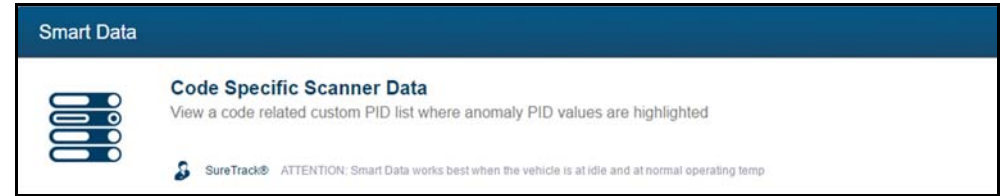


Figure 5-11

Selecting the Smart Data List ([Figure 5-12](#)) opens the custom code-specific PID list ([Figure 5-13](#)).

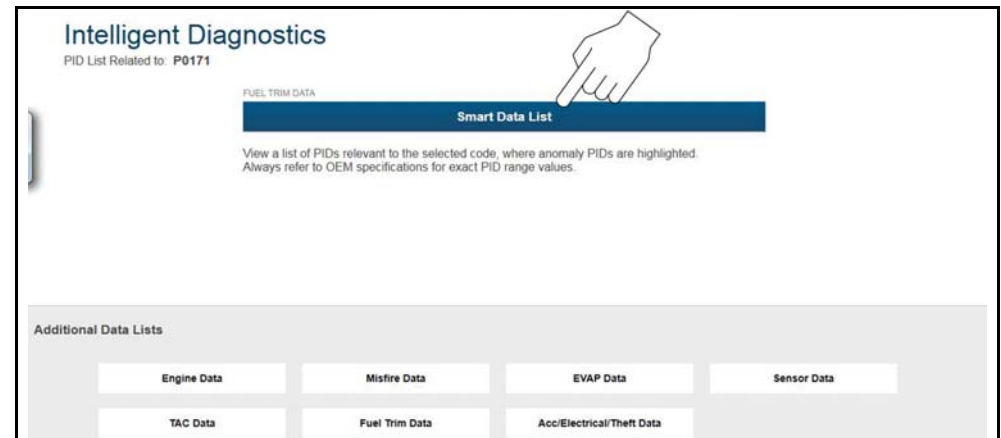


Figure 5-12

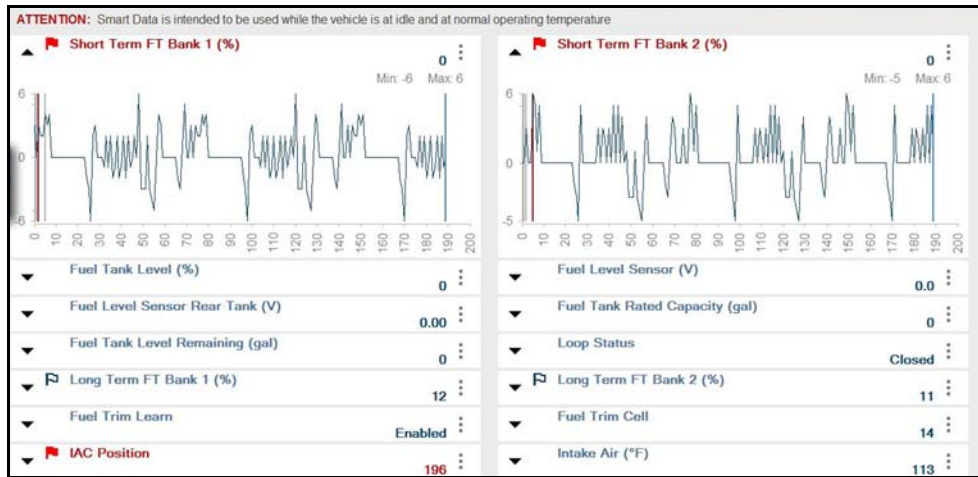


Figure 5-13 Typical Smart Data PID list

5.41.1 About Preamed Smart Data PIDs

Features and operation of preamed Smart Data PIDs:

- Any PID with a flag displayed has been preset and preamed.
 - A red flag indicates the PID is operating out of range and the trigger has been activated.
 - A blue outlined flag indicates the PID is armed, and operating within its limits (trigger not activated).
- PID trigger points (upper/lower value limits) are automatically set using known-good upper/lower limit values.
 - **Note** - Upper/lower limit lines are not displayed on the graph, and values are not displayed in settings.
- A PID trigger is activated when the PID value exceeds the upper/lower trigger point.
- After a PID trigger has been activated a red cursor is placed on the graph and a short data movie is automatically saved.
- Smart Data PID triggers can be (overridden) set manually, see [Trigger Setup](#) on page 57 for instructions.
 - **Note** - Manually setting trigger values will override the preconfigured Smart Data values.
 - **Note** - Manually set triggers will display upper and lower trigger limit lines in the graph.

5.42 Functional Tests and Reset Procedures

Selecting the Functional Tests and Reset Procedures card ([Figure 5-14](#)) opens the Tests main menu ([Figure 5-15](#)), which displays a list of bi-directional tests and procedures related to troubleshooting the selected codes. Functional tests and reset procedures allow you to manually control certain component operations (e.g. turn fuel pump on/off) and reset certain control module values (e.g. reset fuel trim) directly from the diagnostic tool to confirm the operation of components and validate repairs.

Intelligent Diagnostics Functional Tests and Reset Procedures operation and navigation is similar to the Functional Tests within the Scanner function. For additional information see [Functional Tests](#) on page 60.

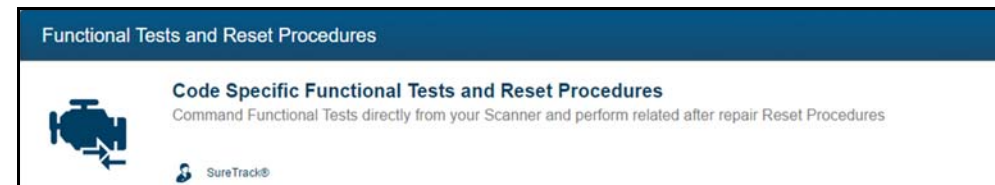


Figure 5-14

Additional Functional Tests and Reset options may be displayed at the bottom of the screen, depending on the vehicle. These options are not DTC related, but are vehicle specific related, and may be useful in troubleshooting or validating repairs.

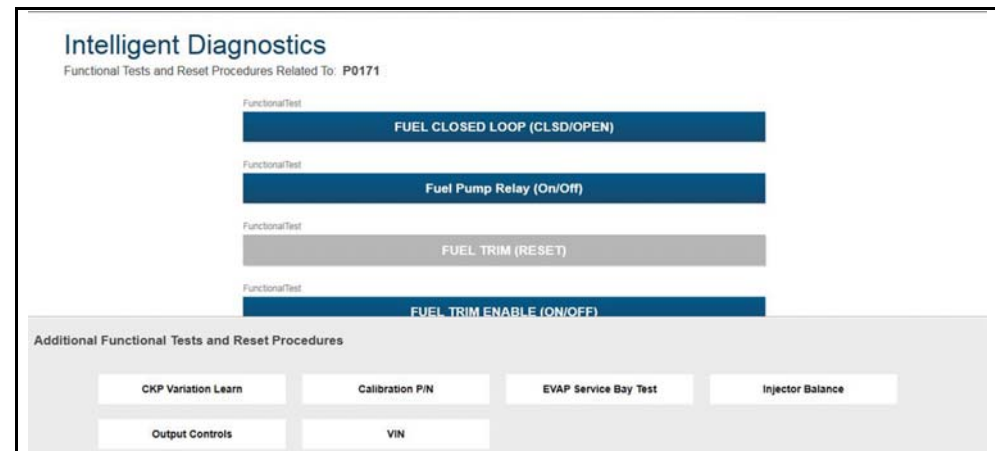


Figure 5-15

5.43 Guided Component Tests (GCTs)

Selecting the Guided Component Tests card (Figure 5-16) opens the Components Tests main menu (Figure 5-17), which displays a menu list of tests related to the troubleshooting of the selected codes.

Intelligent Diagnostics Guided Component Tests operation and navigation is similar to the main Guided Component Tests function accessed from the Home screen. For additional information see *Guided Component Tests on page 80*.



Figure 5-16

Additional Component Tests may be displayed at the bottom of the screen (Figure 5-17) depending on the vehicle. These options are not DTC related, but are vehicle specific related, and may be useful in troubleshooting or validating repairs.

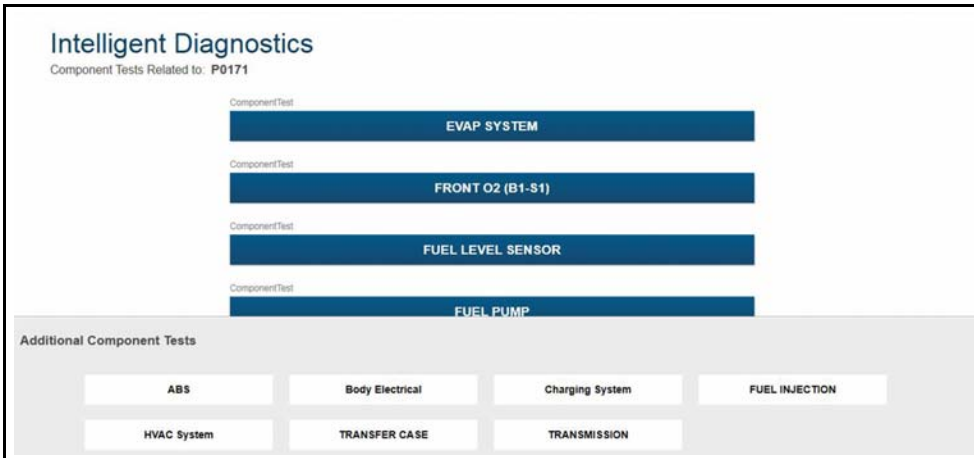


Figure 5-17

After a test is selected a component test sub-menu opens. The component test sub-menu may include various test options and a Component Information selection (Figure 5-18) if supported.



Figure 5-18

Guided Component Tests are tests with step-by-step instructions (Figure 5-19) to guide you through the process of performing component tests. They may include specifications, tips, and directions on how and where to connect the test meter leads. Some tests may also automatically configure the multimeter or lab scope to perform the selected test.

Selecting the **View Meter** icon (Figure 5-19) opens the meter/scope display (Figure 5-20) and allows you to review the guided instructions and monitor the signal simultaneously.

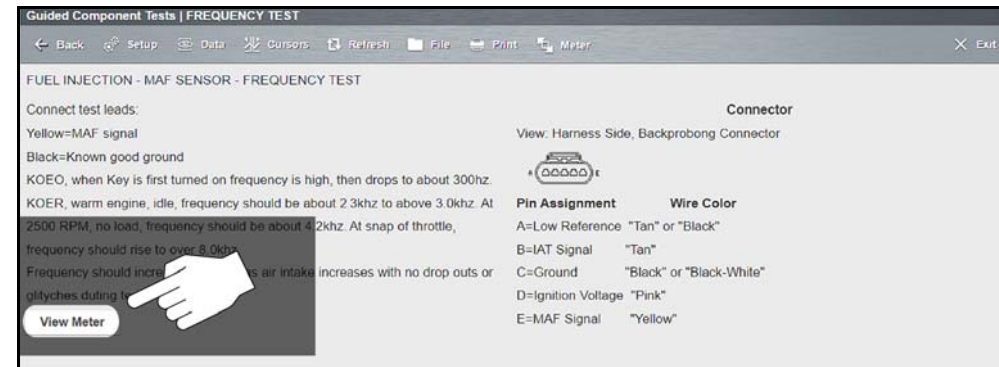


Figure 5-19 View Meter

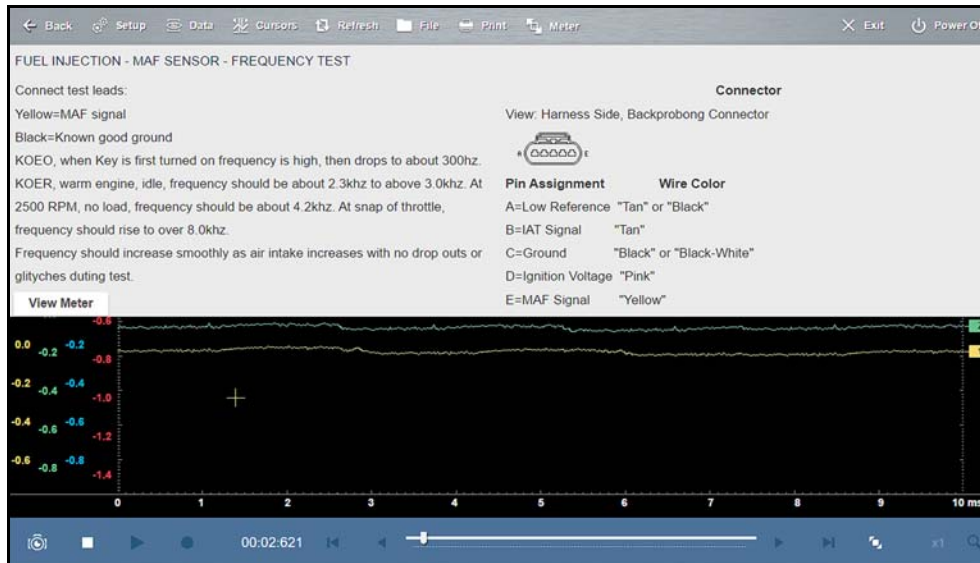


Figure 5-20

For GCT upper toolbar control icon descriptions, see [Scope/Meter \(Upper\) Toolbar on page 99](#).

For Scope/Meter toolbar control descriptions, see [Record/Playback Control Toolbar on page 121](#).

Selecting **Component Information** (if available) provides details on specific vehicle components to provide a better understanding of the components prior to diagnosis. The Component Information screens ([Figure 5-21](#)) contain information to assist you with testing. The screens are divided in sections to help quickly guide you to the correct information.

- **Operation**—provides a general description of normal component operation.
- **Connector**—displays the component connector and lists pin assignments.
- **Location**—identifies the component location and the best place for testing it.
- **Tech note**—provides Guided Component Test-related tips (for example, common failures or faults) as well as update or recall information.

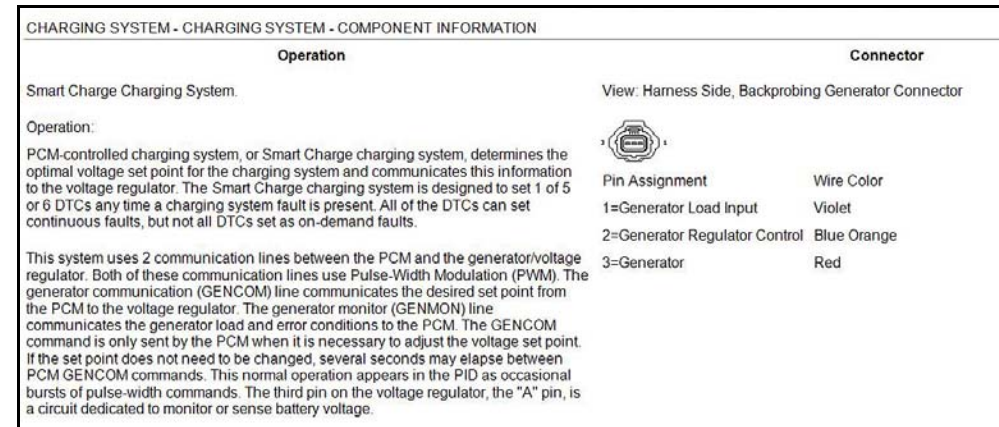


Figure 5-21

5.44 Real Fixes

Select the **Real Fixes** card ([Figure 5-22](#)) to view a list ([Figure 5-23](#)) of code-specific procedures and tests that have been gathered from actual shop repair orders.



Figure 5-22

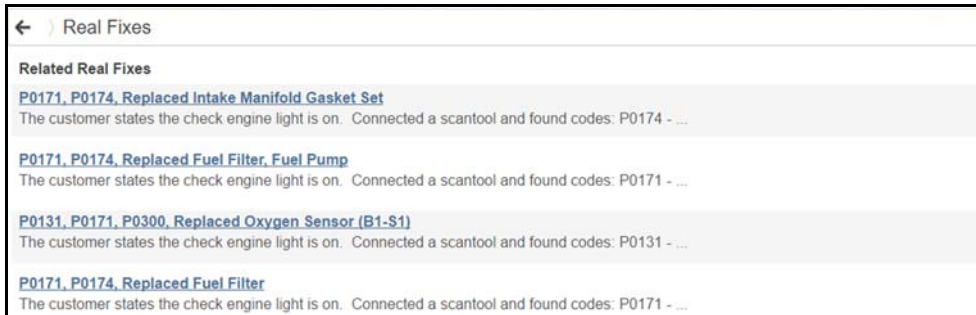


Figure 5-23

Select a Related Real Fix from the list ([Figure 5-23](#)) to view detailed information about the fix ([Figure 5-24](#)) in a Complaint - Cause - Correction format.

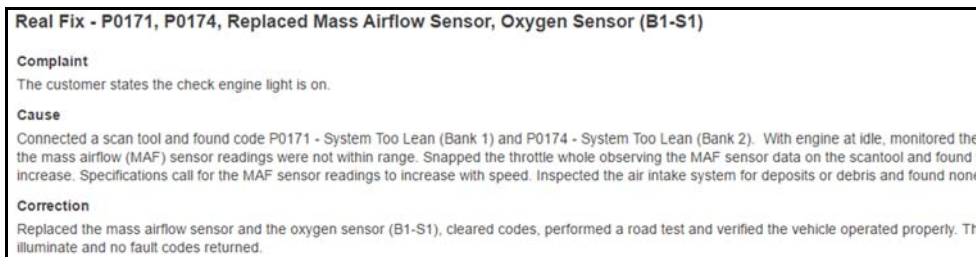


Figure 5-24

5.45 Troubleshooter

Select the **Troubleshooter** card ([Figure 5-25](#)) to view a list ([Figure 5-26](#)) of code-specific tips gathered from industry professionals.



Figure 5-25

Select a **Related Tip** from the list ([Figure 5-26](#)) to view the information.

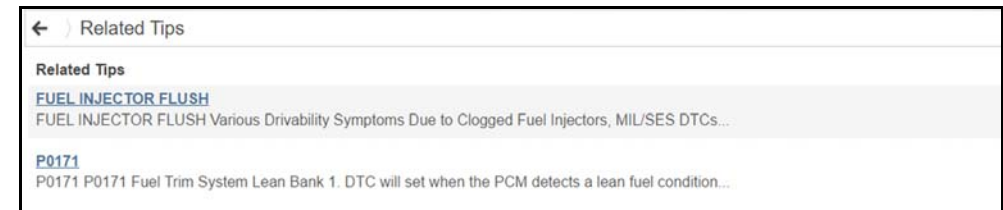


Figure 5-26

5.46 Repair Information

Selecting the **Repair Information** card ([Figure 5-27](#)) opens the Information service interface. For additional information, see [Information on page 134](#).



Figure 5-27



Introduction



This section describes the basic operation, and navigation of the OBD Direct function.

OBD Direct allows you to access global OBD-II/EOBD vehicle data and tests, without having to identify the vehicle.

You can use OBD Direct to:

- Perform an OBD Health Check
- Check and clear OBD-II diagnostic trouble codes (DTCs)
- Check malfunction indicator lamp (MIL) status
- Check readiness monitor status, prior to emissions testing
- Access OBD-II modes (e.g. \$01, \$02, \$06, \$09, etc.)

i NOTE

*OBD Direct provides global (generic) OBD-II/EOBD information. To access enhanced OBD-II/EOBD data, select **Scanner** from the Home screen.*

Main Topic Links

- [Main Menu](#) page 75
- [OBD Diagnose](#) page 75
 - [Start Communication](#) page 75
 - [Readiness Monitors](#) page 76
 - [OBD-II Modes](#) page 77
 - [MIL Status](#) page 77
 - [Fast-Track® Troubleshooter](#) page 77
 - [Connector Information](#) page 78
 - [Manual Protocol Selection](#) page 78
- [OBD Health Check](#) page 78

6.47 Main Menu

Selecting **OBD Direct** from the Home screen opens a menu with two options ([Figure 6-1](#)):

- **OBD Diagnose** - provides access to available OBD vehicle readiness monitors, service modes, trouble codes, and data. See [OBD Diagnose](#) on page 75.
- **OBD Health Check** - provides quick access to check and clear codes, check the readiness monitors, and check MIL status. See [OBD Health Check](#) on page 78.

i NOTE

To use the OBD Direct functions the Compact Scan Module (CSM) must be connected to the vehicle and communicating with the diagnostic tool.

6.48 OBD Diagnose

Selecting OBD Diagnose provides the following menu options (described in the following sections):

- [Start Communication](#)
- [Connector Information](#)
- [Manual Protocol Selection](#)

6.48.1 Start Communication

Selecting Start Communication, initiates an OBD test session.



To access OBD data and tests:

1. Select **Start Communications**.
2. Connect the Compact Scan Module to the vehicle.
3. Select **Continue**.

The following information may be displayed ([Figure 6-1](#)):

- Number of ECM's detected



- The communication protocol being used
- Which ECM is actively communicating
- Vehicle Identification Number (VIN)

4. Select **Continue**.

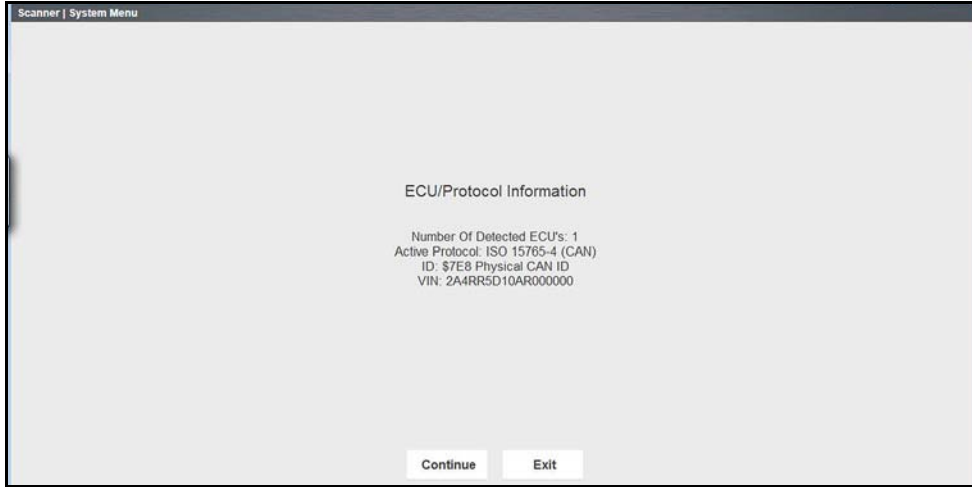


Figure 6-1

5. Make a selection from the available service menu options (Figure 6-2).

Common options are described in the following sections.

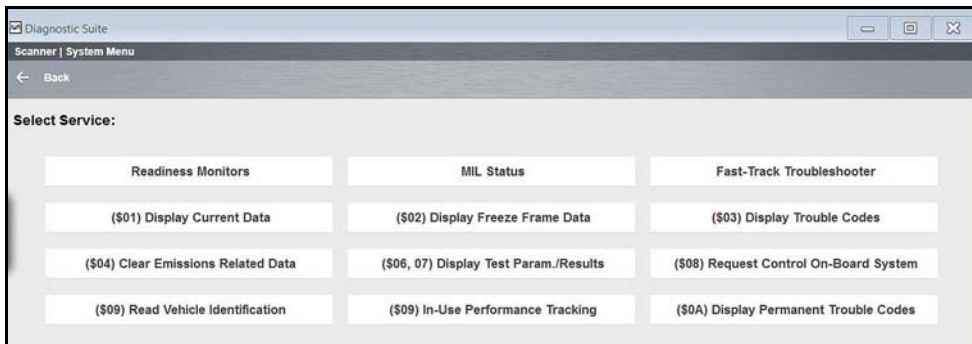


Figure 6-2

Readiness Monitors

Selecting Readiness Monitors provides the following menu options:

- **Monitors Complete Since DTC Cleared**—displays the results of all monitor tests that have run since the last time the electronic control module (ECM) memory was cleared.
- **Monitors Complete This Cycle**—displays only the results of monitor tests that ran during the current drive cycle, they reset when the ignition is switched off.

Readiness Monitors is used to check the status of the OBD-II/EOBD monitored systems. Certain emission-related OBD-II/EOBD systems are self monitored by running continuous or periodic tests. Test results (e.g. Test Complete, Test Not Complete, Test Not Supported, etc.) are shown in the data viewer (Figure 6-3).

Functionality and toolbar options are similar to using the PID Display within Scanner.

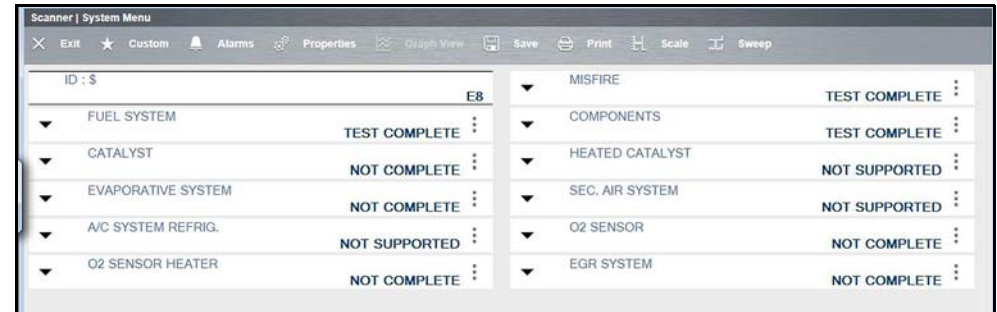


Figure 6-3



OBD-II Modes

OBD-II Modes include emission related data and tests supported by the vehicle manufacturer. Vehicle manufacturers are not required to support all modes.

Name	Description
(\$01) Display Current Data	Displays the current emission related data (PIDs) from the selected electronic control module (ECM) of the vehicle. Displayed data includes analog inputs and outputs, digital inputs and outputs, and system status information broadcast on the vehicle data stream.
(\$02) Display Freeze Frame Data	Displays freeze frame data for any stored emission related diagnostic trouble codes (DTC). In most cases the stored frame is the last DTC that occurred. Certain DTCs, those that have a greater impact on vehicle emission, have a higher priority. In these cases, the highest priority DTC is the one for which the freeze frame records are retained. Freeze frame data includes a "snapshot" of critical parameter values at the time the DTC set.
(\$03) Display Trouble Codes	Displays any stored emission related DTCs reported by the various ECMs.
(\$04) Clear Emissions Related Data	Clears all emission related diagnostic data such as, DTCs, freeze frame data, and test results from the memory of the selected ECM.
(\$05, 06, 07) Display Test param./ Results	Opens a submenu of test parameters and test results from various sensors, monitor test results, and a record of DTCs detected during the last drive cycle. The menu includes: <ul style="list-style-type: none"> - Oxygen Sensor Monitoring (\$05) - On-Board Monitored Systems (\$06) - DTCs Detected During Last Drive (\$07)
(\$08) Request Control of On-board System	Allows enable/disable control of select components, allowing you test component operation and monitor data during the test. Available options vary by make, model, and year of the test vehicle.
(\$09) Read Vehicle Identification	Displays: <ul style="list-style-type: none"> - Vehicle Identification Number (VIN) - Calibration Identification - Calibration Verification Number (CVN)

Name	Description
(\$09) In-use Performance Tracking	Displays the "In-use Performance Tracking" of monitored data (total number of times each monitored test has completed).
(\$0A) Emission Related DTC with Permanent Status	Displays a record of any "permanent" codes on late-model vehicles if the vehicle supports Service \$0A. A permanent status DTC is one that was severe enough to illuminate the MIL at some point, but the MIL may not be on at the present time. Whether the MIL was switched off by clearing codes or because the setting conditions did not repeat after a specified number of drive cycles, a record of the DTC is retained by the ECM. Permanent status codes automatically clear after repairs have been made and the related system monitor runs successfully.

MIL Status

MIL Status is used to check the current status of the malfunction indicator lamp (MIL). Additional information, such as which ECM commanded the MIL on, and also (if supported) the distance traveled while the MIL is on, can also be displayed.


Fast-Track® Troubleshooter

Fast-Track® Troubleshooter is a database of experience-based information of validated real-world repair strategies that have been compiled by top-notch technicians since 1988. The Troubleshooter system simplifies the diagnosis process, as it contains information on virtually all common diagnostic trouble code (DTC) problems and driveability symptoms for most vehicles covered by the vehicle communication software.



6.48.2 Connector Information

Selecting Connector Information provides you access to vehicle data link connector (DLC) location information.

-  **To find DLC location information:**
1. Select **Connector Information**.
 2. Select a vehicle manufacturer.
 3. Select a vehicle model.
DLC location information displays.
 4. Select **Continue**.
A menu option to start vehicle communication, or return to the previous menu displays.
 5. Select **Yes** or **Return**.

6.48.3 Manual Protocol Selection

A communication protocol is a standardized way of transmitting data between an ECM and a scan tool. Normally the scan tool automatically connects to an available protocol, which displays on the connection message ([Figure 6-1](#)). Some vehicles communicate using more than one protocol, therefore the Manual Protocol Selection option is used to switch to a different protocol.

Selecting **Manual Protocol Selection** displays a warning message advising you to make sure you know the correct protocol for the test vehicle before continuing. An incorrect selection may activate warning lamps, and set CAN related faults on the vehicle.

Selecting **OK** displays a menu of protocol options ([Figure 6-4](#)).

Select the desired protocol to continue.



Figure 6-4

6.49 OBD Health Check

The OBD Health Check option is intended as a time-saver, allowing you to quickly access a few key global OBD-II services.

The OBD Health Check menu ([Figure 6-5](#)) options include the following (descriptions are provided in the following sections):

- Check global diagnostic trouble codes (DTCs)
- Clear global diagnostic trouble codes (DTCs)
- Check readiness monitors, see [Readiness Monitors on page 76](#)
- Check MIL Status, [MIL Status on page 77](#)

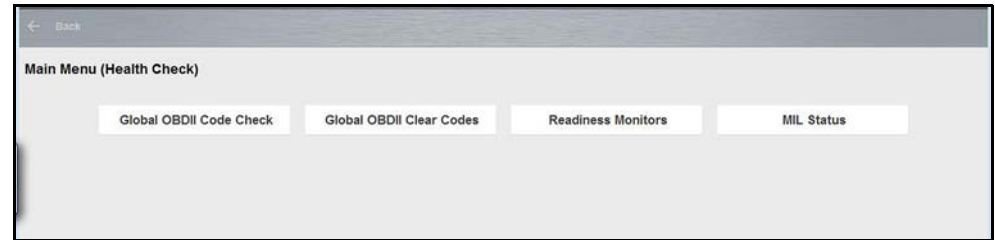


Figure 6-5

6.49.1 Global OBD II Code Check

Global OBD II Code Check displays any stored emission related generic DTCs reported by the ECM. Two menu options are available:

- Codes
- Pending Codes

Codes

Codes displays a list of current emission related DTCs. OBD-II/EOBD Codes have a priority according to their emission severity, with higher priority codes overwriting lower priority codes. The priority of the code determines the illumination of the MIL and the code erase procedure. Manufacturers rank codes differently, so expect to see differences between makes.



Pending Codes

Pending Codes enables the scan tool to obtain “pending” or maturing diagnostic trouble codes. These are codes whose setting conditions were met during the last drive cycle, but need to be met on two or more consecutive drive cycles before the DTC actually sets.

The intended use of this service is to assist after vehicle repair and after clearing diagnostic information, by reporting test results after a single driving cycle.

- If a test failed during the driving cycle, the DTC associated with that test is reported. If the pending fault does not occur again within 40 to 80 warm-up cycles, the fault is automatically cleared from memory.
- Test results reported by this service do not necessarily indicate a faulty component or system. If test results indicate another failure after additional driving, then a DTC is set to indicate a faulty component or system, and the MIL is illuminated.

6.49.2 Global OBD II Clear Codes

Global OBD II Clear Codes clears all emission related diagnostic data such as, DTC records, freeze frame data, and test results, from ECM memory. Although OBD Direct only displays generic OBD-II data, clearing codes erases all of the stored data including any enhanced codes.

A confirmation screen displays when the clear codes option is selected to prevent accidental loss of data. Select **Yes** on the confirmation screen to continue.

Introduction



Selecting Guided Component Tests provides you with an extensive collection of vehicle specific component tests and reference information for engine, transmission, ABS, charging, transfer case, and suspension systems. It is like having access to a complete library of automotive repair manuals for testing multiple vehicle

components.

The preconfigured meter tests and reference information provided are vehicle specific and designed to help save you diagnostic time, verify faulty components, and verify the repair.

Detailed instructions and reference information are provided to guide you through the testing process, from locating the component, to selecting the appropriate test, showing test lead connections, and illustrating electrical connector and pin configurations. In addition, test results (including waveform examples), procedures, tips, and specifications may also be provided.

i NOTE

Availability of tests and information may vary.

Main Topic Links

- [Safety Information](#) page 80
- [General Information](#) page 81
- [Configuring the Favorites List](#) page 81
- [Menu Icon](#) page 82
- [Vehicle Identification](#) page 84
- [Component Information](#) page 85
- [Tests](#) page 85

7.50 Safety Information



WARNING

Risk of electrical shock.

- **Read the *Important Safety Instructions* document provided separately for messages on the safe use of this product.**
- **This product is intended for Measurement Category I (for example, automotive 12V systems), do not use this product for Measurement Categories II, III, and IV.**
- **Measurement Category I is for performing measurements on circuits not directly connected to MAINS or MAINS circuits (an example of a MAINS circuit is 120V AC or 240V AC household or industrial electricity), do not connect this product to MAINS or MAINS circuits.**
- **Do not apply the Black Ground Lead to test points other than ground/system return/vehicle chassis.**

Electrical shock can cause personal injury, equipment damage, and/or circuit damage.

IMPORTANT

Maximum rated transient over voltage impulse is 500 volts, do not exceed the rated transient over voltage.

7.51 General Information

7.51.1 Configuring the Favorites List

Once a Guided Component Test database is loaded, a list of manufacturers displays. This list is often long and includes makes that are not frequently used. A toolbar at the top of the screen allows you to custom configure the manufacturer list to display only the makes you frequently service.

Alfa Romeo	All Others (Global)	Audi	BMW	Citroen
Dacia	Fiat	Ford	Honda	Hyundai
Iveco	Jaguar	Kia	Land Rover	Lexus
Mazda	Mercedes-Benz	Mini	Nissan	Opel/Vauxhall
Peugeot	Porsche	Renault	Seat	Skoda
Smart	Toyota	Volkswagen	Volvo	Training & Classes

Figure 7-1 Sample manufacturer list



To configure a favorites list:

1. Select **Configure Favorites** on the toolbar.
A list of selectable manufacturers displays.

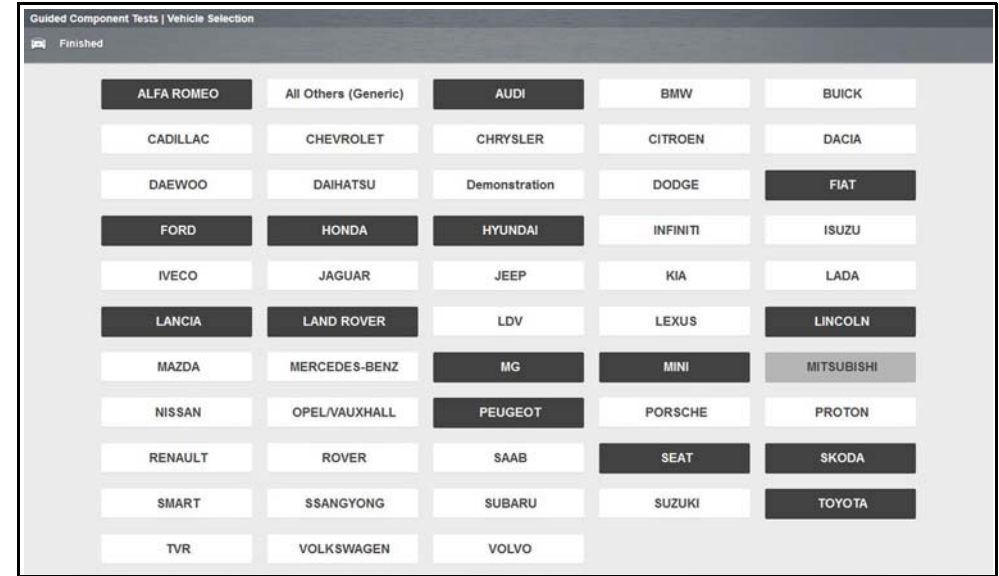


Figure 7-2 Sample Configure Favorites screen

2. Select each manufacturer you want to include, selected manufactures are highlighted.

NOTE

Manufacturers appear on the favorites list in the order in which they are selected. Therefore, if you select the makes you work on most frequently first, they will appear at the top of the list.

3. Select **Finished** on the toolbar once your selections have been made.
The screen returns to the manufacturer list, but only the makes you selected display. Note the “Favorites” toolbar selection now reads “Full list”.
4. Select **Full List** on the toolbar to view the complete list of manufacturers.
5. Select **Back** on the toolbar at any time to return to the previous screen.

Your favorites list is what will display whenever a Guided Component Test database is started in the future. The list can be modified at any time by selecting Configure Favorites from the toolbar.

7.51.2 Menu Icon



Selecting the **Menu** icon from the lower toolbar provides the following options:

- [Safety Information](#)—opens the *Important Safety Instructions* document. See [Safety Information](#) on page 1 for additional information.
- See [File](#) on page 82

File

Selecting **File** opens a menu of print options (see [Printing / Printer Setup](#) on page 19):

- **Print Article**—selecting has one of two results:
 - If a printer is connected, the file is sent to the printer.
 - If a printer is not connected, the article is saved as a (.xps) file, which can be retrieved, moved, or copied and printed at a later time.
- **Print Preview**—opens a representation of what the printed file will look like.
- **Page Setup**—allows you to adjust margins and paper orientation.

7.51.3 Training and Classes

Training and Classes is a companion feature to the Guided Component Tests function and can be selected from the vehicle make menu ([Figure 7-3](#)), select **Training and Classes**. This resource includes a wide collection of common (non-vehicle specific) reference information and tests, such as measuring fuel pump current ramp, and monitoring CKP and CMP signals simultaneously. Also included are; basic component operation and theory information, testing procedures, tips, definitions, illustrations, diagnostic tool feature descriptions, and accessory information.

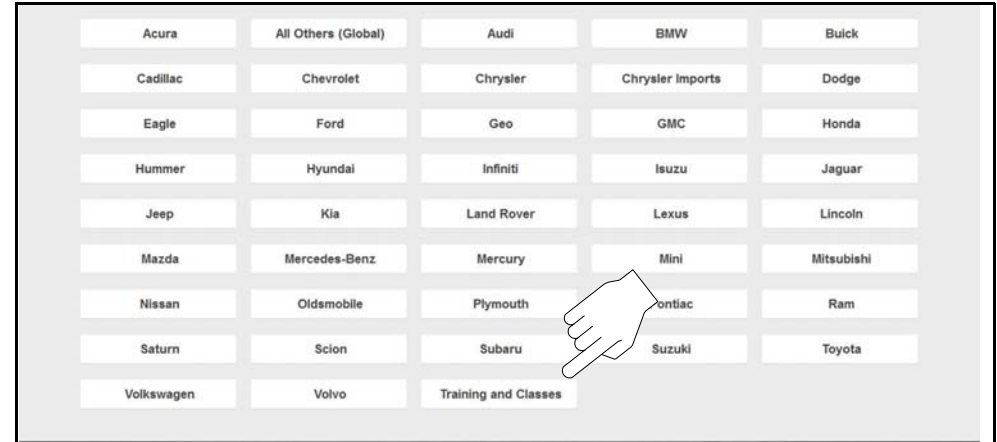


Figure 7-3

Selecting Training and Classes provides the following options (each option is described in the following sections):

- [Power User Tests](#)
- [How To Guide](#)
- [Features and Benefits](#)

NOTE

The information listed in the following sections is not inclusive, actual content may vary.

Power User Tests

Power User Tests provide you quick access to preconfigured meter tests for a number of common automotive system tests. Most tests provide onscreen help and testing information along with a description of the test and the expected results, including known good waveforms.

Here is a sample listing of the types and specific tests that may be available within Power User Tests:

- [Current Probe Tests](#) - provides common tests configured to use the Snap-on Low Amp Current probes or generic Low Amp Current probes. Snap-on Low Amp Current Probe operation information is also provided within the *Snap-on Low Amp Probe Reference Manual* option.
 - Fuel Injector Current Ramp (multiple types)



- Fuel Pump Current Ramp
- Fuel Pump RPM Calculation
- Ignition Coil Current Ramp (multiple types)
- Parasitic Draw
- Snap-on Low Amp Probe Reference Manual
- **Two Channel Tests** - provides common tests configured to measure or compare two signals
 - CAN-BUS High/Low
 - CKP and CMP Relationship
 - EGR Solenoid and Position Sensor
 - EVAP Solenoid and Diagnostic Switch
 - FlexRay Bus
 - Injector and Oxygen Sensor
 - Knock Sensor and EST
 - MC Dwell and Oxygen Sensor
 - Pre and Post Cat Oxygen Sensors
 - Throttle Positions 1 & 2
 - WSS (Hall Effect Type)
- **Transducer Tests** - provides common single and dual channel tests configured to measure various types of pressures, voltage and current. Transducers are available as optional equipment.
 - A/T Line Pressure and Shift Solenoid
 - A/T Line Pressure Test
 - EGR Temperature Sensor and EGR Vacuum
 - Exhaust Back Pressure Test
 - Fuel Pressure and Fuel Pump Current
 - Fuel Pressure and Fuel Pump Voltage
 - Fuel Pressure Test
- **Secondary Ignition Tests** - provides common information and tests configured to measure secondary ignition output of various types. Secondary ignition lead adapters are available as optional equipment.
 - Coil near plug
 - Coil on plug
 - Conventional
 - Distributorless

How To Guide

The **How To** option provides multiple topics and references ranging from instructional and basic theory to troubleshooting and testing instructions. Menu options may include:

- **10-minute Electronic Classes**—provides basic electrical theory and testing information. Topics may include:
 - Ohm's Law
 - Variable Resistors
 - Amperage
 - Diode Continuity
 - Electrical Circuits
 - Guided Voltage Drop Test
 - Other Electrical Measurements
 - Resistance
 - Scientific Notation
 - Voltage
- **15-minute Ignition Class**—provides basic introductory ignition system information. Topics may include:
 - Introduction
 - Coil on Plug (COP)
 - Conventional
 - Waste Spark
- **Illustrated Terms & Definitions**—provides common term definitions, illustrations, and tips associated with automotive component testing.
- **No-Start Basics**—provides basic step-by-step procedures for the diagnosis of a no-start condition on carbureted and fuel injected vehicles.
- **O2 Sensor & Feedback System Analysis**—provides basic definition and theory information for the following O2 sensor topics:
 - Air Fuel Ratio Sensors
 - Correct PCM Response (includes configured meter test)
 - Heated Oxygen Sensor
 - Non-Heated Oxygen Sensor
 - Open and Closed Loop
 - Oxygen Sensor Types
 - Understanding Oxygen Sensors (includes configured meter test)
- **Test Tips**—provides basic testing information, tips and procedures for specific tests and meter operations. Topics may include:
 - Alternator Ripple Test
 - EVP Sensor Test

- Frequency, Pulse Width and Duty Cycle Test
- Graphing AC Voltage
- Injector Pulse Width Test
- Parasitic Draw Test
- Reading Pulsed DTC's
- TPS Sweep Test
- Using Cursors
- Using Pressure Transducers
- Using Triggers
- Wiggle Test
- Zirconia Oxygen Sensor Rise Time
- Theory and Operation—provides basic theory information for the following topics:
 - Oxygen Sensors and Relays
- **20-minute Current Ramp Classes**—provides an introduction to current ramp testing using the Snap-on Low Amp Current Probes. Snap-on Low Amp Current Probe operation information is also provided within the *Snap-on Low Amp Probe Reference Manual* option. Topics may include:
 - Fuel Injector Current Ramp (multiple types)
 - Fuel Pump Current Ramp
 - Fuel Pump RPM Calculation
 - Ignition Coil Current Ramp (multiple types)
 - Parasitic Draw
 - Snap-on Low Amp Probe Reference Manual
 - Using Fuse Box for Current Test Hard to Reach Wiring

Features and Benefits

Selecting **Features and Benefits** provides basic feature description and operational information about the diagnostic tool. Additional information is provided for ShopStream Connect, and optional accessories. Selections include:

- **Accessories**—provides descriptions for the optional accessories available for the diagnostic tool. Accessory topics may include:
 - Low Amp Probe
 - Pressure/Vacuum Transducers
 - ShopStream Connect
 - Test Leads and Clips
- **Product Description**—provides an overview of diagnostic tool capabilities and operations.

7.52 Vehicle Identification

Guided Component Test information is vehicle specific, therefore a vehicle must be identified first.



Identifying a vehicle:

1. Identify the vehicle. The vehicle identification process is the same as the process used for the Scanner function, see [Identifying the Vehicle on page 38](#) for additional information.

NOTE

Selecting **All Others (Global)** from the vehicle make list allows you to use the Guided Component Tests function without identifying a vehicle. General (non-vehicle specific) testing information is provided.

Once the vehicle is identified, a menu displays available systems and components to test.

2. Make a selection to continue.

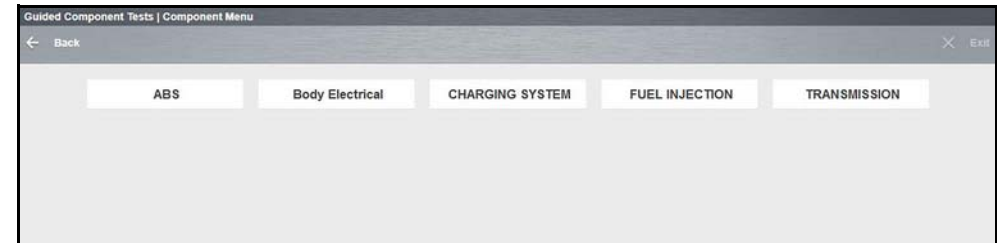


Figure 7-4 Typical System menu options

3. Continue to follow the screen prompts to make your desired selection. Final menu options include two typical selection types (descriptions are provided in the following sections):
 - [Component Information on page 85](#)
 - [Tests on page 85](#)

7.53 Component Information

Component Information provides specific operational information (if available) on the selected component, and may also include electrical connector and pin location and function details

The Component Information screen (*Figure 7-5*) contains information to assist you with testing, and is divided into sections:

- **Operation**—provides a general description of normal component operation.
- **Connector**—displays the component connector and lists pin assignments.
- **Location**—identifies the component location and the best place for testing it.
- **Tech note**—provides Guided Component Test-related tips (for example, common failures or faults) as well as update or recall information.

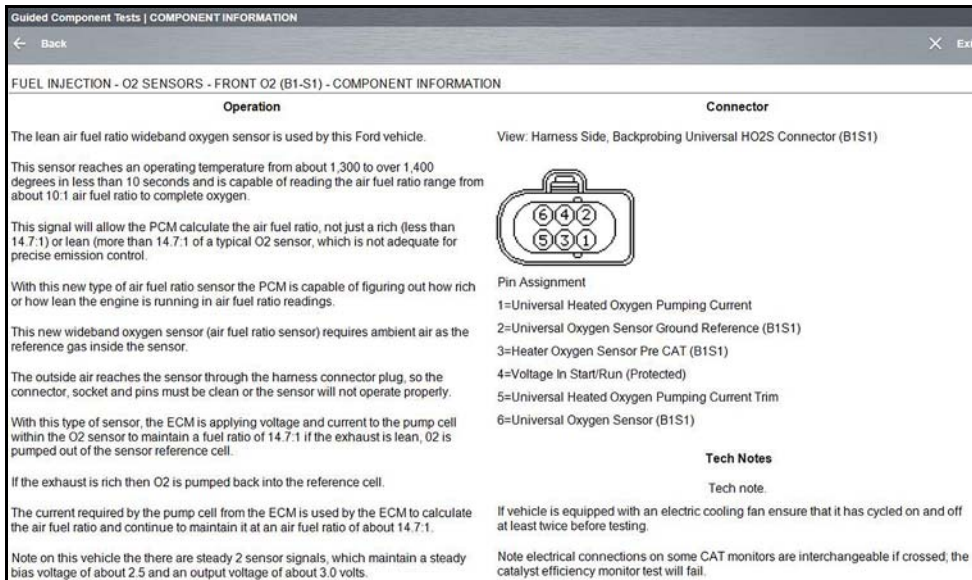


Figure 7-5 Typical Component Information screen

7.54 Tests

Tests provide specific instructions (if available) to help you perform tests on components. Selecting a component test opens a preconfigured meter to start the test, and typically also provides connection instructions, specifications, and testing tips.

A typical Test screen (*Figure 7-6*) may contain multiple test options, and information to assist you perform the test.

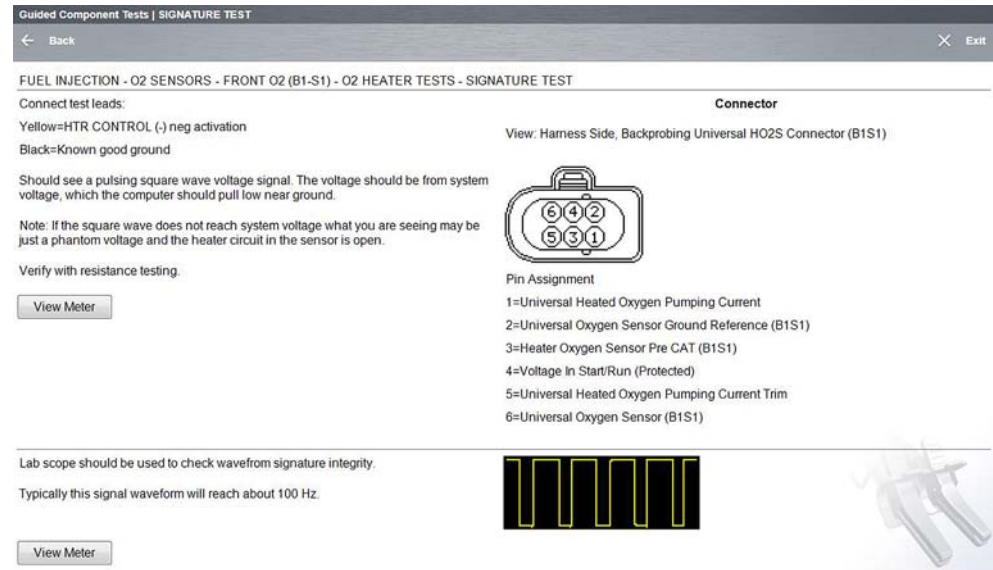


Figure 7-6 Typical Signature Test screen

NOTE

Test screens and menus will vary, and in some instances more than one selection may be available and/or open a submenu.

Test screens may contain icons and hyperlinks that link to other supporting information or open test screens. Common links are:

- **View Meter**—see *View Meter on page 86*
- **Show More Information**—opens a new screen with additional information.

7.54.1 View Meter

View Meter opens a live meter set up to perform the test in the lower portion of the screen (*Figure 7-7*). Once the meter view is open, the Guided Component Test toolbar at the top of the screen is replaced by the Scope Multimeter toolbar, which allows you to make adjustments to the settings. See *Scope/Meter (Upper) Toolbar* on page 99 for toolbar icon information.

The Meter icon, is only available Guided Component Test view meter mode (*Figure 7-7*).

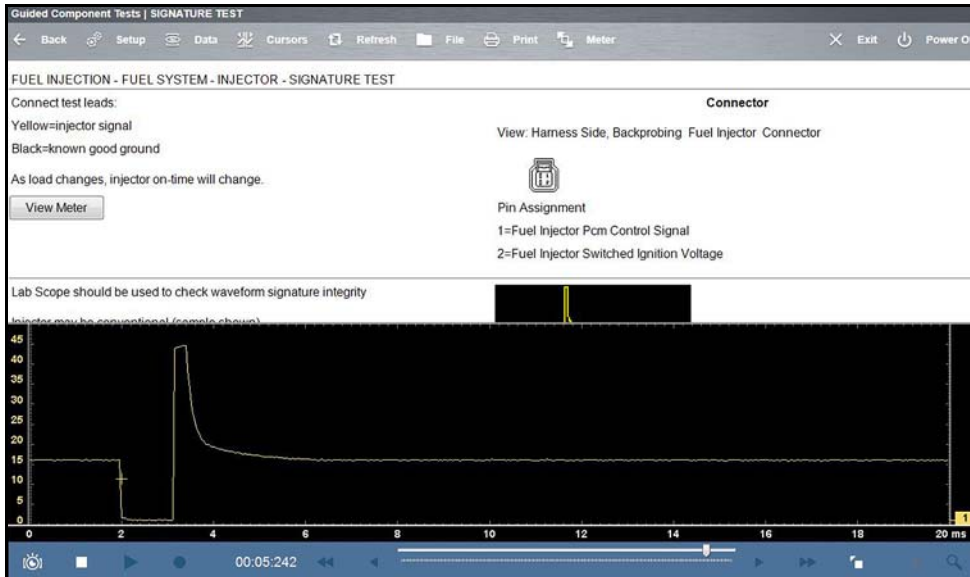


Figure 7-7 Sample view meter window

Three view meter options are available:

1. With View Meter active (*Figure 7-7*), select the **Meter** icon on the toolbar once and the meter expands to fill the entire screen.
2. Select the **Meter** icon a second time and the meter will open as a separate window (*Figure 7-8*). This window can remain open if you switch to the Scan Module and can be accessed from the Windows toolbar at the bottom of the screen. You can also resize and reposition the meter window on the screen.

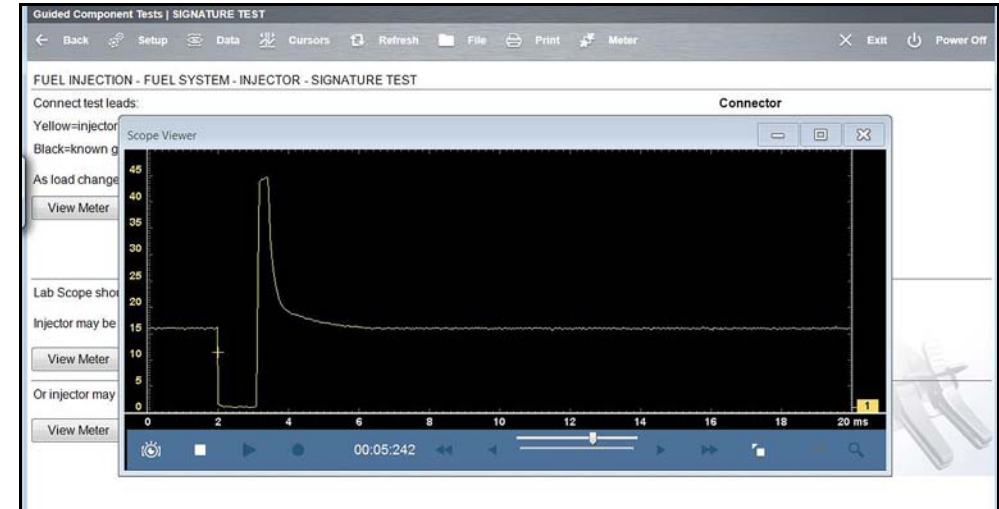


Figure 7-8 Sample meter view in a separate window

Selecting the **Close (X)** icon when viewing the meter in a separate window closes the meter and returns you to the Guided Component Test screen.

3. Select the **Meter** icon a third time to close the separate window and return to the standard meter view as shown in *Figure 7-7*.

Select **Exit** from the toolbar to close meter view and return to the Guided Component Test screen.

7.54.2 Performing a Test

To perform a Meter Test follow the on-screen instructions to connect the test leads to the component. Follow the instructions carefully, as certain Guided Component Tests require the use of specific leads.

Once the leads are connected, select the **View Meter** icon to display the results. Review the on-screen information to verify the test results.



Introduction



This section describes the basic operation and navigation of the Scope Multimeter function.

Selecting Scope Multimeter provides access to all the tools needed for performing electrical circuit tests and monitoring signals. The Scope Multimeter function works interactively with other functions.

Selecting “View Meter” from a Guided Component Test or Scanner Test opens the Scope Multimeter function.

The Scope Module easily separates from the diagnostic tool and connects with a USB cable so that test results can be remotely monitored as you perform other tasks.

8.55 Main Topics Links

(Select topic to link to section)

- [Component Locations](#) page 89
- [Control Panel and Settings](#) page 106
- [Control Panel \(Trace Controls Quick Reference\)](#) page 108
- [Cursors](#) page 118
- [Digital Multimeter \(DMM\)](#) page 91
- [General Instructions](#) page 95
- [Graphing Multimeter \(GMM\)](#) page 92
- [Ignition Scope \(Secondary Ignition Tests\)](#) page 94
- [Lab Scope](#) page 93
- [Main Screen and Toolbars](#) page 98
- [Pairing and Hardware Status Icons](#) page 97
- [Tests and Capabilities \(Quick Reference\)](#) page 90
- [Test Leads and Accessories](#) page 124
- [Testing Capabilities](#) page 90
- [Triggers](#) page 116

- [Trigger Setup Menu](#) page 100
- [Safety](#) page 87
- [Saving and Reviewing Scope / Multimeter Data Files](#) page 120
- [Setup Menu \(Preferences\)](#) page 99
- [Scope/Meter \(Upper\) Toolbar](#) page 99
- [Trigger Operation](#) page 117
- [Using the Scope Module Remotely](#) page 96
- [Using the Zoom Function](#) page 123

8.56 Safety



! WARNING

Risk of electrical shock.

- **Read the Safety Information** provided for important warnings on the use of this product
- This product is intended for Measurement Category I (for example, automotive 12V systems), do not use this product for Measurement Categories II, III, and IV.
- Measurement Category I is for performing measurements on circuits not directly connected to MAINS or MAINS circuits (an example of a MAINS circuit is 120V AC or 240V AC household or industrial electricity), do not connect this product to MAINS or MAINS circuits.
- Do not apply the Black Ground Lead to test points other than ground/ system return/vehicle chassis.

Electrical shock can cause personal injury, equipment damage, and/or circuit damage.

IMPORTANT

Maximum rated transient over voltage impulse is 500 volts, do not exceed the rated transient over voltage.



8.56.1 Measurement Out of Range Indicator

A group of arrows display when a measurement is out of range for the scale selected:

- Arrows pointing UP—measurement over maximum range
- Arrows pointing DOWN—measurement under minimum range

Voltage measurements also display arrows in place of live values when the voltage exceeds the input rating of the meter.

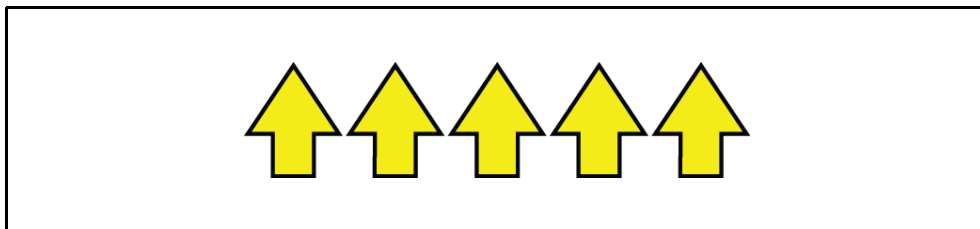


Figure 8-1



Risk of electrical shock.

- **Do not exceed voltage limits between inputs as indicated on the rating label.**
- **Use extreme caution when working with circuits that have greater than 40 volts AC or 24 volts DC.**

Electrical shock can cause personal injury, equipment damage, and/or circuit damage.

IMPORTANT

If arrows are displayed in the live voltage values, discontinue circuit testing.

Correct an out-of-range condition by selecting a scale setting appropriate for the signal being sampled. See [Trace Controls Menu](#) on page 99 for more information.

8.57 Getting Started

Use the following procedure to open a scope multimeter function.



To start the scope multimeter:

1. Select the **Scope Multimeter** icon on the Home screen.
The Scope Multimeter main menu displays the following options:
 - Lab Scope
 - Ignition Scope
 - Graphing Multimeter
 - Digital Multimeter
 - Presets
2. Select a testing option.
A submenu of scope or meter configuration will display.
3. Select a configuration to continue.
4. See [Control Panel and Settings](#) on page 106 for control setting information.

When finished or to change meter functions, select **Back** from the upper menu to stop all scope/meter functions and return to the menu.



8.58 Technical Specifications (Scope Module)

Item	Description / Specification
USB Power	5V @ 500mA (supplied by diagnostic tool)
Agency Approval - Rating	IEC 61010-1, UL Listed 61010-1 - Category 1
Width	6.3 in. (160 mm)
Height	4.6 in. (118 mm)
Depth	1.1 in. (28 mm)
Weight	0.62 lb (0.28 kg)
Operating Temperature Range (ambient)	At 0 to 90% relative humidity (non-condensing) 32 to 113°F (0 to 45°C)
Storage Temperature (ambient)	At 0 to 70% relative humidity (non-condensing) -4 to 140°F (-20 to 60°C)
Operating Altitude	Maximum 2000 m
Environmental Conditions	This product is intended for indoor use only
	This product is rated for Pollution Degree 2 (normal conditions)

8.59 Component Locations



1. Auxiliary (DB9) Connector The auxiliary connector is used for connection of the optional RPM inductive pickup and the pressure transducer split lead adapter. For additional information contact your sales representative, and see [Using the Scope Module Remotely](#) on page 96.
2. Channel 4 Jack
3. Channel 3 Jack
4. Channel 2 Jack
5. Channel 1 Jack
6. Common (Ground) Jack)

Figure 8-2 Scope Module, removed from Diagnostic Tool



8.60 Testing Capabilities

Selecting **Scope Multimeter** provides the following options (*select topic to link to section*):

- [Digital Multimeter \(DMM\)](#)
- [Graphing Multimeter \(GMM\)](#)
- [Lab Scope](#)
- [Ignition Scope \(Secondary Ignition Tests\)](#)
- [Presets](#)

8.60.1 Tests and Capabilities (Quick Reference)

The following chart lists the available DMM, GMM, and Lab Scope tests.

i NOTE

Not all the tests listed are described in this manual. This list is intended as reference only.

D M M	G M M	L S	Test	Function
		X	Four Channel Lab Scope	Displays four Lab Scope channels automatically.
	X		Four Channel Graphing Meter	Displays four Graphing Multimeter channels automatically.
		X	Ignition Probe	Measures secondary Ignition voltage 2 to 50kV. Displays secondary ignition (kV) waveforms.
X	X	X	Volts DC	Measures DC (direct current) voltage. DC voltage is measured through test leads connected to a DC circuit.
X	X		Volts DC - Average	Measures DC voltage using a filter to determine the average voltage over a period in time. DC voltage is measured through the two test leads connected to a DC circuit.
X	X		Volts AC RMS	Measures the effective AC voltage, not the peak voltage which results in measurements with higher accuracy. The AC RMS (root mean square) voltage value can be defined as the equivalent DC voltage of the AC voltage measured. RMS values are commonly used in AC electrical measurement, as they are more representative of DC measurements.

D M M	G M M	L S	Test	Function
X	X		Ohms	Measures electrical resistance (opposition to current) 0 to 4 M Ohms. Scope supplied DC current is passed through the circuit to measure the resistance between the two connected test leads.
X			Diode/Continuity	Measures voltage drop across a diode and continuity through a diode. Scope supplied DC current is passed through the diode to measure the voltage drop between the two connected test leads. Typical setup for positive to negative current flow - positive lead (anode +/side) and negative (cathode -/side).
	X		Frequency	Measures the number of times a signal repeats itself per second. Used to measure frequency of signals such as CKP, CMP and wheel speed sensors.
	X		Pulse Width	Measures the on-time of various components (e.g. components that cycle on and off like the EGR, or canister purge valve).
	X		Injector Pulse Width	Measures fuel injector on-time when checking for variances when engine load is changed and/or physical problems with the injector.
	X		Duty Cycle	Measures the ratio of the pulse width to the complete cycle width, the on-time of components that cycle on and off like EGR, or canister purge from 0–100%.
X	X	X	Low Amps (20)	Used to measure amperage of typical devices (e.g. ignition coils, injectors, fuel pumps) that may draw up to 20A peak (startup) when initially started. Also used to measure parasitic draw.
X	X	X	Low Amps (40)	Used to measure amperage of typical motors and devices that may draw up to 40A peak (startup) when initially started.
X	X	X	Low Amps (60)	Used to measure amperage of larger motors and devices that may draw up to 60A peak (startup) when initially started.
	X		MC Dwell (60)	Measures carburetor Mixture Control Solenoids (0–60°). The duty cycle of the solenoid is expressed in the dwell angle of a 6 cylinder engine: 100% = 60 deg.
	X		MC Dwell (90)	Measures fuel system Mixture Control Solenoids (0–90°). The duty cycle of the solenoid is expressed in the dwell angle of a 4 cylinder engine: 100% = 90 deg.
	X	X	100 PSI Vacuum	Used to measure vacuum up to 20 in.Hg, using the 0–100 psi transducer.



D M M	G M M	L S	Test	Function
	X	X	100 PSI Pressure	Used to measure pressures for typical systems such as, fuel, oil, EVAP, hydraulic/transmission fluid etc. up to 100 psi, using the 0–100 psi transducer.
	X	X	500 PSI Pressure	Used to measure pressures for typical systems such as, hydraulic/transmission fluid pressure, cylinder compression, and AC high side up to 500 psi, using the 0–500 psi transducer.
	X	X	5000 PSI Pressure	Used to measure pressures for typical systems such as, ABS, power steering, and heavy-duty hydraulic system fluid up to 5000 psi, using the 0–5000 psi transducer.

8.60.2 Digital Multimeter (DMM)

The digital multimeter gives you the ability to quickly make precise common electrical measurements (e.g. DC and AC voltage, resistance and amperage) on circuits and components to verify operation. The meter displays measurements in a digital numerical format, and is typically used for measuring signals that are not rapidly changing.

The DMM is ideal for performing basic tests on most standard automotive circuits, and displays the results in a large easy to see format.

To use the DMM, select the **Scope Multimeter** icon from the home screen, then select **Digital Multimeter** from the menu. See [Tests and Capabilities \(Quick Reference\)](#) on page 90 for a list of available testing functions.

DMM Specifications

Function	Range	Accuracy/Comments
Signal Measurement	Ch. 1—yellow jack	Channel 1 input is referenced to common ground (GND—black jack)
VDC (Full Scale)	75VDC	Do not measure greater than 75VDC
VAC (Full Scale)	50VAC	Do not measure greater than 50VAC (rms)
Signal Measurement Input Impedance	10 MΩ	-
Ohm Measurement Diode Test Continuity Test	Ch. 3—blue jack Ch. 4—red jack	-
Ohms	40 Ω–4 MΩ	Fixed scales or Auto Ranging
Glitch capture	Approximately 50 uS	-
Diode Test	2 V Scale	-



8.60.3 Graphing Multimeter (GMM)

Unlike the DMM, the graphing multimeter plots a visual graphing line of the signal instead of displaying digital values. The GMM displays a signal's measurements over time on a two-dimensional grid. This plotted graph is basically a graphical history (histogram) of the signal's measurements over time.

The GMM uses a higher sample rate (than a DMM) to calculate signal measurements. This characteristic along with the visual graph, make the GMM ideal for finding intermittent dropouts or glitches that may not be obvious when viewing a digital value. A key advantage of the GMM is being able to capture a signal over a long time interval and then review it's graphical history, to visually see if and when dropouts have occurred.

In addition, the GMM uses a combination of filter and peak detect modes to provide a good balance between detecting fast glitches and preventing unwanted noise from displaying.

Unlike the lab scope, the sweep scales used with typical GMM tests are of longer time intervals, and may range from seconds to minutes, compared to the lab scope sweep scales that use relatively short time intervals (e.g. milli and microseconds). This allows you to monitor a signal over a longer period of time when looking for erratic glitches or dropouts.

To use the GMM, select the **Scope Multimeter** icon from the home screen then select **Graphing Multimeter** from the menu. See [Tests and Capabilities \(Quick Reference\)](#) on page 90 for a list of available testing functions.

GMM Specifications

Function	Range	Accuracy/Comments
Signal Measurement	Ch. 1—yellow jack Ch. 2—green jack Ch. 3—blue jack Ch. 4—red jack	Each channel input is referenced to common ground input (GND—black jack)
Sample Rate	1.5 MSPS	Continuous sampling, MSPS = mega samples per second
Bandwidth	DC—3 MHz	3 db point @ 3 MHz
Input Impedance	10 M Ω @ DC 4 k Ω @ 3 MHz	Channel 1–4
VDC (Full Scale)	75VDC	Do not measure greater than 75VDC
VAC (Full Scale)	50VAC	Do not measure greater than 50VAC (rms)
Ohm Measurement Diode Test Continuity Test	Ch. 3—blue jack (-) Ch. 4—red jack (+)	-
Ohms	40 Ω —4 M Ω	Fixed scales
Low Amp Probe	20A scale (100mV/ Amp) 40A scale (10mV/ Amp) 60A scale (10mV/ Amp)	Connect the positive (+) Amp Probe lead to the yellow jack on the diagnostic tool for values on Ch.1, or to the green jack for values on Ch. 2. Connect the negative (-) lead to GND (black jack) ¹ .

¹ Do not use the Low Amp Probe to measure current on conductors at a potential greater than 46VAC peak or 70VDC.



8.60.4 Lab Scope

Similar to the GMM, the lab scope (oscilloscope) plots a visual image line of a signal's measurements over time on a two-dimensional grid. The visual line that is displayed is commonly called a trace, and the graphical form created by a signal is called a waveform.

Unlike the DMM the lab scope allows you to visually see a signal's waveform, which in turn allows you to see the strength and shape of the signal, as well as any noise that may be occurring in the circuit. The lab scope also samples signals at a high rate, which allows you to see a higher level of detail in shorter samples of the signal, especially in signals that change rapidly. In addition, the lab scope also provides more control over the acquisition of the signal and in how it is displayed through the use of triggers and channel controls. All of these features allow you to analyze signals in great detail when performing diagnostics.

To use the lab scope, select the **Scope Multimeter** icon from the home screen then select **Lab Scope** from the menu. See [Tests and Capabilities \(Quick Reference\)](#) on page 90 for a list of available testing functions.

Lab Scope Specifications

Function	Range	Accuracy/Comments
Signal Measurement	Ch. 1—yellow jack Ch. 2—green jack Ch. 3—blue jack Ch. 4—red jack	Each channel input is referenced to common ground input (GND—black jack)
Sample Rate	For 50uS sweep 6MSPS For 100uS sweep 3MSPS For all other sweeps 1.5 MSPS	Continuous sampling, (MS/s) = mega samples per second
Bandwidth	DC–3 MHz	3 db point @ 3 MHz
Input Impedance	10 M Ω @ DC 4 k Ω @ 3 MHz	Channel 1–4
VDC (Full Scale)	100mV–400V	Do not measure greater than 75VDC
VAC (Full Scale)	100mV–400V	Do not measure greater than 50VAC (rms)
Low Amp Probe	20A scale (100mV/ Amp) 40A scale (10mV/Amp) 60A scale (10mV/Amp)	Connect Low amp Probe (+) to Ch. 1 (yellow jack) and (–) to GND input (black jack) ¹ .
¹ Do not use the Low Amp Probe to measure current on conductors at a potential greater than 46VAC peak or 70VDC.		

i NOTE

200V to 400V scales are not to be used to measure signals greater than 50VAC (rms) or 75VDC. Do not use the Scope/Meter to measure greater than 50VAC (rms) or 75VDC.



8.60.5 Ignition Scope (Secondary Ignition Tests)

The following options are available for secondary ignition testing:

- Parade
- Cylinder
- Raster
- Superimposed
- Single Cylinder Ignition

Selecting one of the main menu options opens the lab scope configured to display secondary ignition waveforms for conventional and select CIC and COP systems. To display secondary ignition waveforms, optional secondary ignition coil adapter(s) and a coil adapter lead assembly are required.

Contact your sales representative to purchase the optional adapter leads and/or Secondary Ignition Clip-on or COP/CIC Adapters.

- Adapter lead assembly needed:
 - Secondary Coil Adapter Lead Assembly - connects the diagnostic tool to a secondary ignition adapter (yellow and black scope connectors and black RCA type adapter connector). See [Secondary Ignition Coil Adapter Lead and Clip-on Adapter \(optional\)](#) on page 126.
- Secondary Ignition Adapters available:

Different secondary ignition coil adapters are available as optional equipment. These adapters attach to either the secondary lead (spark plug lead) or directly to the secondary ignition coil in order to pick up the secondary ignition signal.

 - Universal kV Ignition Clip-on adapter - clips over a spark plug or coil lead. See [Secondary Ignition Coil Adapter Lead and Clip-on Adapter \(optional\)](#) on page 126.
 - Universal stick and flag type adapters - are positioned next to or on a secondary ignition coil.
 - General purpose single flag pick-up.
 - General purpose stick pick-up.
 - Vehicle specific Clip-on adapters are directly attached to (or next to) a secondary ignition coil (COP type) or to a distributor cap (CIC type). Secondary ignition coil-on-plug (COP) and coil-in-cap (CIC) adapters are available for universal and engine specific applications. All the adapters listed are available individually.
 - OEM specific COP adapters:
 - *Ford (COP-1)*
 - *Chrysler (COP-2)*

- *VW/Audi (COP-3)*
- *Acura/Honda/Isuzu (COP-4)*
- *Volvo/BMW (COP-5)*
- *Mercedes-Benz (COP-6)*
- *Mercedes-Benz Dual Type (COP-7)*
- *BMW (COP-8)*
- *Lexus (COP-9)*
- *Chrysler/Jeep/Lexus/Toyota (COP-11)*
- OEM specific CIC adapters:
 - *GM HEI (CIC-1)*
 - *Toyota/Honda (CIC-2)*



Connecting the Secondary Coil Adapter Leads:

1. Connect the black (ground) lead into the diagnostic tool test lead ground jack.
2. Connect the yellow lead into the diagnostic tool test lead channel 1 jack.
3. Connect the adapter lead ground clamp to vehicle ground. If a jumper wire is used to extend the length of the adapter lead ground clamp lead, keep it as short as possible.
4. Connect the adapter lead RCA plug into the secondary ignition "clip-on" or COP/CIC coil adapter as needed.
5. Clamp the secondary clip-on adapter over a spark plug or coil lead, or attach the applicable COP/CIC coil adapter to the vehicle ignition coil.
6. Isolate the leads from other components to avoid any unwanted noise that may be induced into the signal.
7. From the lab scope function, select the Ignition Probe (probe setting).
8. If needed, turn the Invert function on.

Once a signal is displayed, further channel settings may be required to display the pattern characteristics you are looking for.

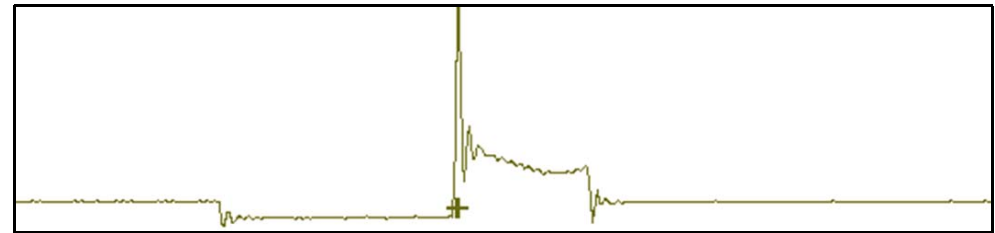


Figure 8-3 Typical Secondary Ignition Signal



8.60.6 Presets

Selecting **Presets** opens a menu of pre-configured tests ([Figure 8-4](#)). Presets are tests set up with pre-configured control settings for common component tests.

In addition to the built-in presets, you can create your own custom test configurations and save them as presets, see [Saving Data Files / Configurations](#) on [page 120](#) for additional information.

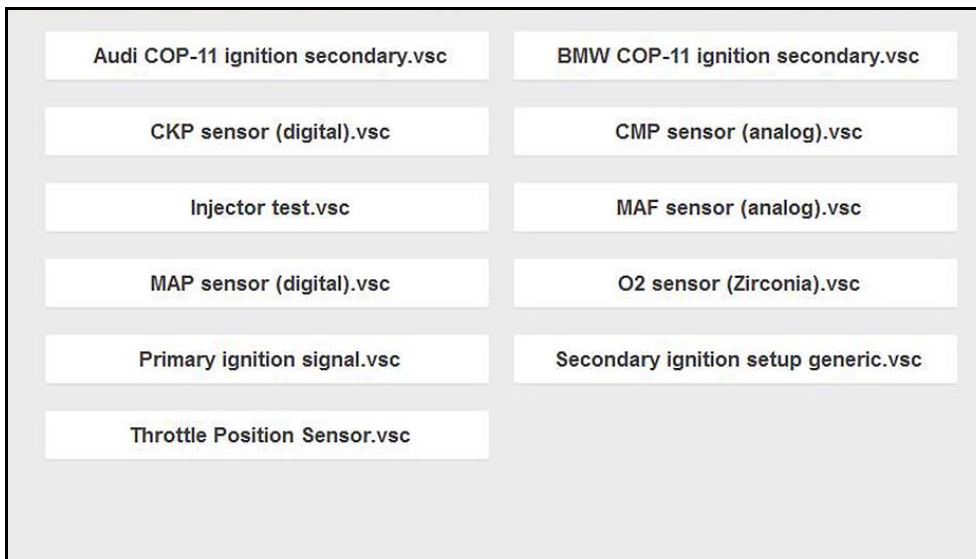


Figure 8-4 Preset Examples

8.61 General Instructions

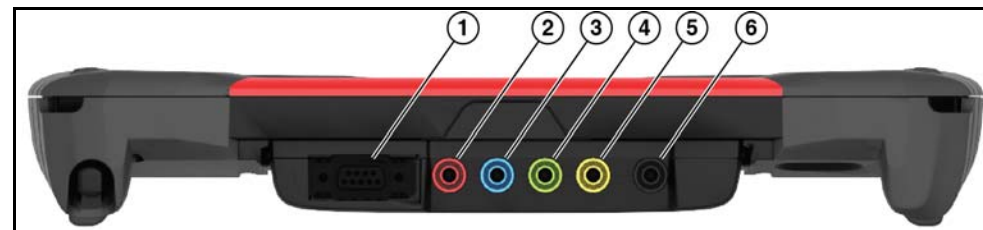
8.61.1 Test Lead / Probe Connection

Standard “safety type” test lead jacks are located on the top of the diagnostic tool, and are compatible with many test leads and probes. Insert the applicable test lead or probe terminal end into the jack to complete the connection.

For information on test leads, see [Test Leads and Accessories](#) on [page 124](#).

IMPORTANT

To avoid damaging test leads, do not pull on the wire when removing the leads from their jacks. Pull only on the lead terminal end.



1. Auxiliary (DB9) Connector The auxiliary connector is used for connection of the optional RPM inductive pickup and the pressure transducer split lead adapter. For additional information contact your sales representative and see, [Using the Scope Module Remotely](#) on [page 96](#).
2. Channel 4 Jack
3. Channel 3 Jack
4. Channel 2 Jack
5. Channel 1 Jack
6. Common (Ground) Jack

Figure 8-5 Scope Multimeter Test Lead Jacks



8.61.2 Using the Scope Module Remotely

If needed, the Scope Module can be removed from the diagnostic tool, then connected to the diagnostic tool with a USB cable. This increases the range of mobility for the diagnostic tool while monitoring signals on the test vehicle. Use the Type A/B USB cable, which is provided with your kit, to make the connection.

NOTE

When used remotely, the scope module must be connected to the lower (black) USB jack on the diagnostic tool.

As general practice, the Scope Module should only be undocked from the diagnostic tool when it is off. To prevent accidental loss of data, make it a practice to first save the current data if desired, then select either the **Power Off** or **Back** icon from the Scope Multimeter toolbar to stop meter operation. Power Off saves the current settings, but does not save data.

NOTES

If the Scope Module:

- *Is undocked from the diagnostic tool when it is on, or*
- *Is exposed to a electro static discharge (ESD) while it is being used remotely*

the following will occur:

- *Communication between the diagnostic tool and the Scope Module will be terminated.*
- *All current data and settings will be lost.*
- *An error message (e.g. **Meter/Scope Not Found**) will display to indicate that Scope Module communication has terminated.*

When communication is reestablished (after a communication loss), the Scope Multimeter application is restarted and the Scope Multimeter main menu page is displayed.



To setup the Scope Module for remote operation:

1. Depress the Scope Module release tab located on the top of the diagnostic tool (*Figure 8-6*).

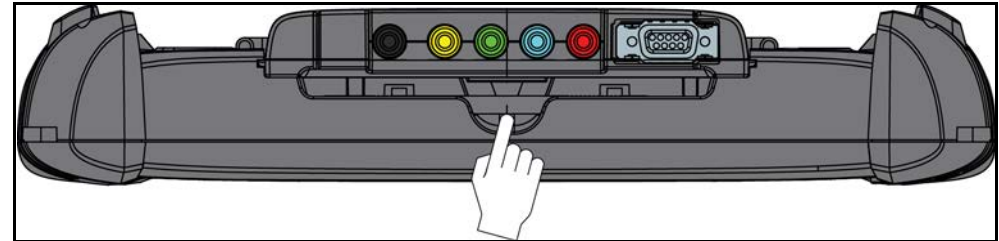


Figure 8-6 Scope Module release tab

2. Slide the Scope Module off of the diagnostic tool.
3. Locate the USB jack on the bottom of the Scope Module (*Figure 8-7*).

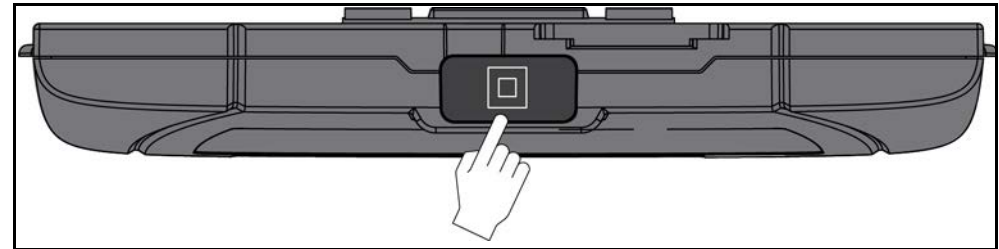


Figure 8-7 Scope Module USB jack location

4. Connect the square end of the USB cable to the jack on the Scope Module.

NOTE

When used remotely, the M4 must be connected to a USB jack on the diagnostic tool.

5. Connect the rectangular end of the USB cable to a USB port on the diagnostic tool.
The Scope Module is now ready for remote use.

8.61.3 Pairing and Hardware Status Icons

When the Scope Module is connected (docked or USB cable), it automatically pairs with the diagnostic tool.

▶ To check the paired status of the Scope Module:

1. Select **System Settings > Paired Devices**.

The paired devices screen opens (*Figure 8-8*).

The Paired Devices screen lists all of the devices paired to the diagnostic tool, and also indicates whether or not there is active communication occurring.

The Scope Module will be listed as SCOPE MODULE M4 or similar.

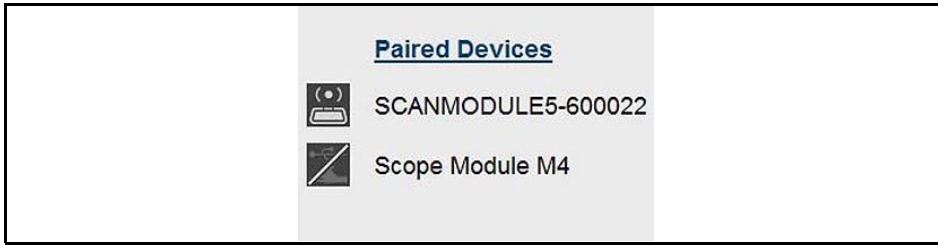


Figure 8-8 Typical Paired Devices screen

If the Scope Module is not shown in the Paired Devices list, check to make sure it has a good connection. Use the Hardware Status icons to determine connection status, see *Hardware Status Icons on page 97*.

Hardware Status Icons

The hardware status indicators in the lower-right corner of the Home screen provide a quick reference to connection status.

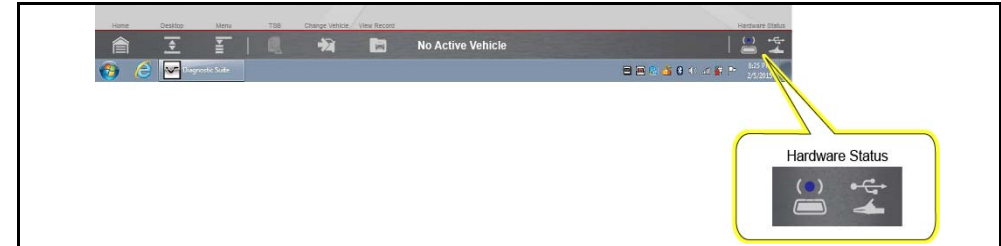


Figure 8-9 Home screen - Hardware status icons

Status/Icon	Action
Not Paired	Indicates the Scope Module is not paired or connected to the diagnostic tool.
	Pair the Scope Module to the diagnostic tool. See <i>Pairing and Hardware Status Icons on page 97</i> for instructions.
Paired and Communicating	Indicates the Scope Module is connected and allowing communication.
Paired but Not Communicating	Indicates the Scope Module USB cable is not connected, or is connected but not allowing communication. Check to ensure the Scope Module is properly connected with the USB cable.

8.61.4 Test Lead / Probe Calibration

Certain tests may display a confirmation prompt asking “Do you wish to calibrate this probe?” before continuing with the test. As general practice, it is important to ensure the test probe is calibrated before testing, to ensure accurate results.

Typical resistance, pressure, and vacuum tests will display the calibration message, reminding you to calibrate the probe. To perform the probe calibration, select **Yes** at the prompt (*Figure 8-10*) and continue to follow the onscreen instructions to complete the calibration.

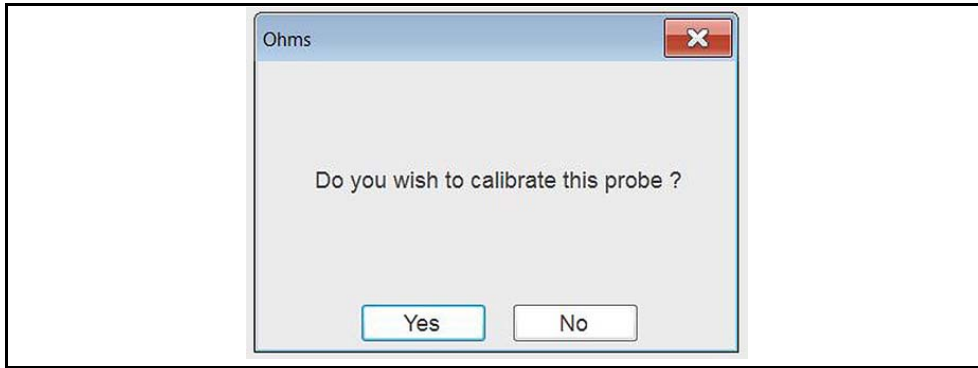


Figure 8-10 Probe calibration confirmation

Example: For the ohms (resistance) calibration process, once completed, zero ohms should be displayed (Figure 8-11) when the leads are connected together. When the leads are separated, the upward arrows on the display indicate infinite resistance or an open circuit.

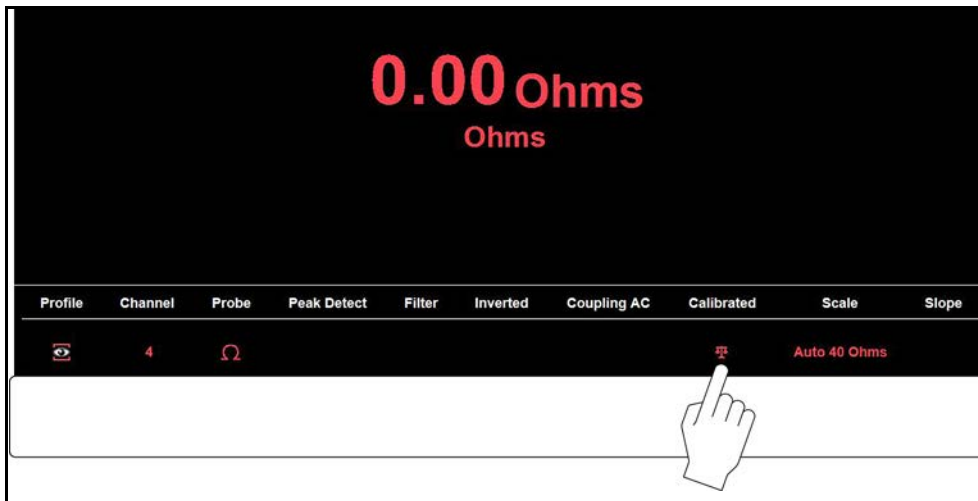




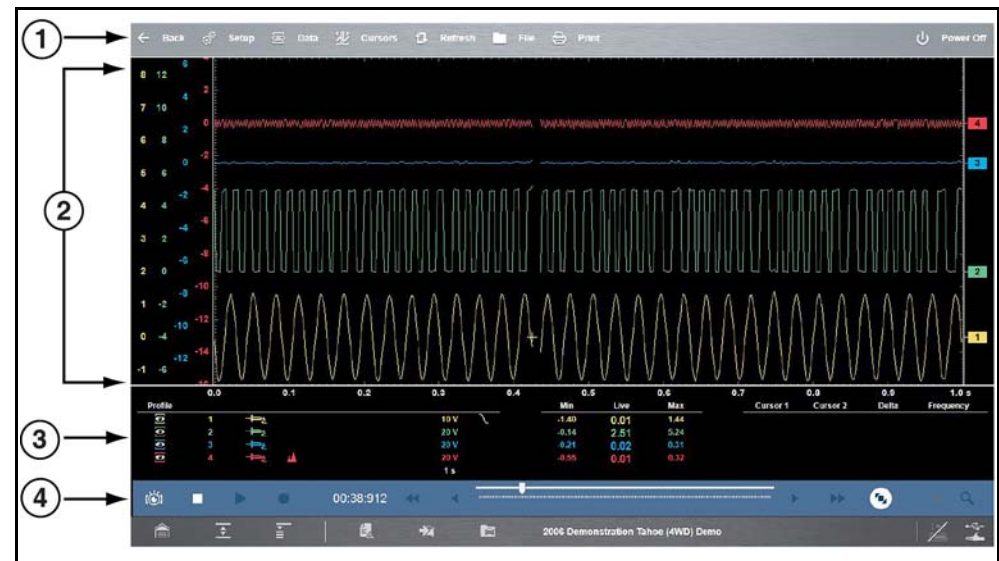
Figure 8-11 Typical Ohms “zeroed” calibration screen and calibration icon

During an ohms test or a pressure test, a manual probe recalibration can be initiated by selecting the **Calibration** icon from the Control Panel (Figure 8-11).

Icon	
Calibrated	
	graphic of a balance scale
Not Calibrated	
	graphic of a balance scale with an “X” through it

8.62 Main Screen and Toolbars

The scope/meter screens typically include the following sections (Figure 8-12):



1. **Scope/Meter Toolbar** - contains various navigational, and control icons
2. **Main Body** - contains the meter/scope display
3. **Control Panel** - contains channel/trace controls [Control Panel and Settings on page 106](#)
4. **Record/Playback Control Toolbar** - allows you to record and navigate through paused data [Record/Playback Control Toolbar on page 121](#)

Figure 8-12 Scope Multimeter screen layout



8.62.1 Scope/Meter (Upper) Toolbar

The Scope/Meter toolbar is used to set up the tool for testing and to configure the settings for each trace. The following table provides brief descriptions of the control icons on the toolbar:

Name	Icon	Description
Back		Returns to the previously viewed screen.
Setup		See Setup Menu (Preferences) on page 99.
Data		Switches the display between three states. See Display Modes on page 107.
Cursors		See Cursors on page 118
Refresh		Clears the minimum, maximum and live measurements displayed. Uses: <ul style="list-style-type: none"> Track the variation in a component or circuit under a certain condition. If the condition changes, Refresh lets you start tracking again to see the change. Verify that a connection problem you found by looking for a dropout or spike in min/max values has been fixed.
File		Allows you to select options for saving data. See Saving Data Files / Configurations on page 120
Print		Opens a standard Windows Print dialog box. See Printing / Printer Setup on page 19.
Power Off		Switches the Scope Multimeter off. This retains the settings and reduces battery drain when switching to a different module. The Play and Record icons on the Playback toolbar can be used to switch the meter back on.

8.62.2 Main Body of the Screen

The main body of the screen varies depending on what display options have been selected. Up to four traces, along with digital readouts of current signal values, signal status and triggering conditions, can be displayed simultaneously on the main body of the screen. Adjustments to the display are made through the scope toolbar as explained above.

Each trace is displayed as voltage over time on a standard oscilloscope screen. Voltage level is recorded on the vertical, or “y-axis” and time is presented on the horizontal, or “x-axis” of the screen. Values are shown for each graduation on the scales.

When using transducers, the pressure being sensed by the transducer is converted into a voltage signal. However, the values are shown as pressure on the display screen rather than voltage.

8.63 Setup Menu (Preferences)



Selecting Setup (upper toolbar) opens a menu including the following options:

Traces - see [Trace Controls Menu](#) on page 99

Sweep - see [Sweep Scale \(X-axis\)](#) on page 112

Trigger - see [Triggers](#) on page 116

View - see [View Controls](#) on page 100

Setup - see [Setup Controls](#) on page 104

8.63.1 Trace Controls Menu

Trace controls are used to adjust individual characteristics of how the signal is sampled and displayed for each of the four traces.



To adjust trace controls using the menu:

1. Select **Setup** (upper toolbar).
The Scope Multimeter Preferences dialog box opens.
2. Select **Traces**.
3. Select the trace to be configured from the submenu.
The traces dialog box displays ([Figure 8-13](#)).

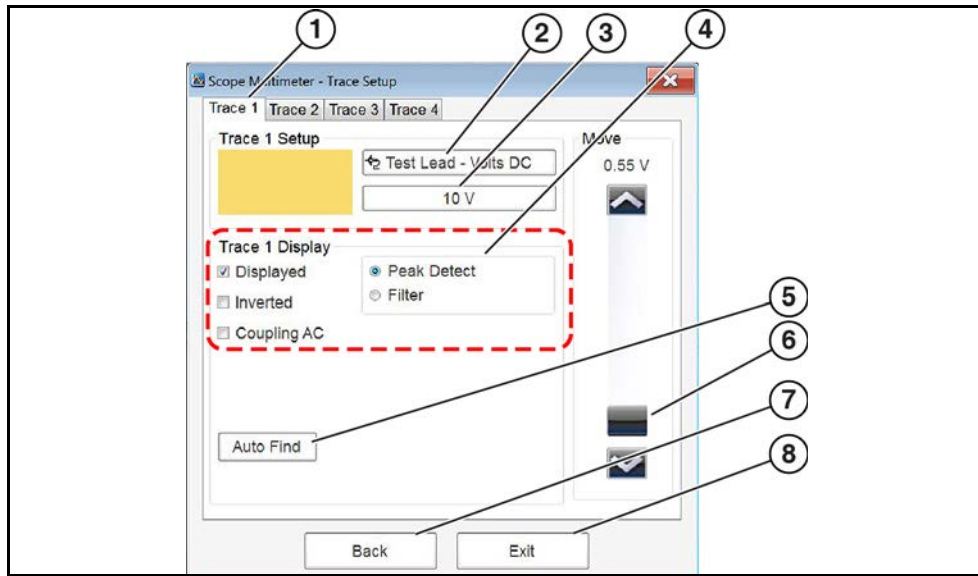


Figure 8-13 Traces dialog box

1. Trace Setup Tabs - Individual tabs for each trace (channel)
2. Probe Selection Icon - Opens probe selection menu
3. Scale (Vertical) Setting Icon - Opens Scale value selection menu
4. Trace Settings - Select or deselect the trace characteristic items as needed:
 - **Displayed** - display or hide the trace
 - **Inverted** - see [Invert Icon](#) on page 111
 - **Coupling AC** - see [Coupling AC Icon](#) on page 111
 - **Peak Detect** - see [Peak Detect Icon](#) on page 109
 - **Filter** - see [Filter Icon](#) on page 110
5. Auto Find - Sets the scope to sample the signal and internally calculate the best way to display it.
 - A scale and the vertical position for the zero line of the trace that allows the whole waveform to fit on the screen is established when Auto Find is selected.
 - If Auto Find is selected on an armed trigger, it also sets the trigger level halfway between the minimum and maximum value of the signal to provide a stable waveform.
6. Zero Baseline Adjustment - use the slider and arrows to precisely adjust the zero baseline
7. Back - closes the dialog box to return to the Preferences dialog box
8. Exit - closes the dialog box and returns to the scope

8.63.2 Trigger Setup Menu

See [Triggers](#) on page 116.

8.63.3 View Controls

Use the view controls to set display attributes.



To adjust view controls:

1. Select **Setup** from the Scope Multimeter toolbar.
The Scope Multimeter Preferences dialog box opens.
2. Select **View** to open a submenu.
3. Select an option from the submenu dialog box. Option details are explained below.
Four options are available on the submenu:
 - **Back**—use to return to the Preferences dialog box, or select **Exit** to close the dialog box and return to the scope.
 - **Display**—use to adjust what information displays and how it appears
 - **Layout**—use to set how many traces display and how they display on the screen
 - **Units**—use to adjust time and voltage interval settings

Display Settings

Selecting **Display** from the View submenu opens the Display dialog box (Figure 8-14).

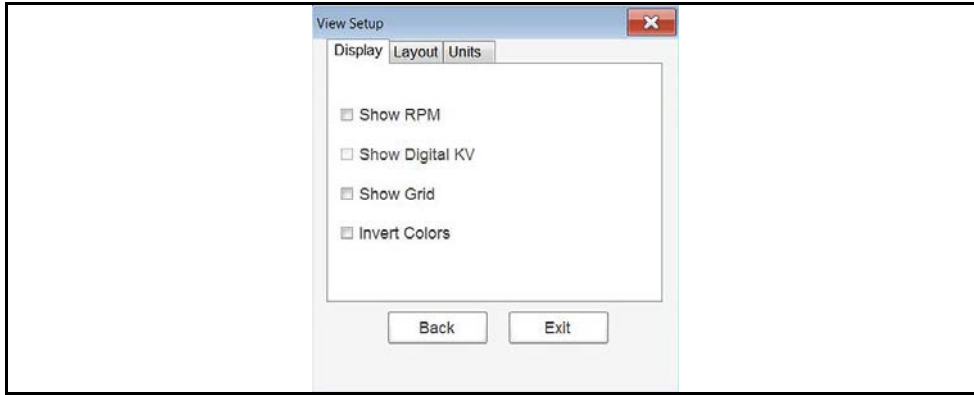


Figure 8-14 Sample Display dialog box

The following options are available from the Display dialog box:

- **Show RPM**—adds an engine speed field at the top of the screen (Figure 8-15).

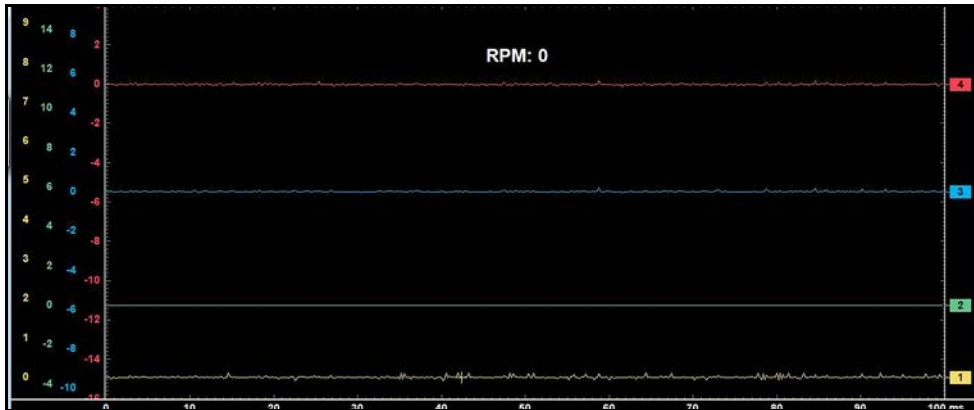


Figure 8-15 Sample Show RPM selected

- **Show Digital KV**—available only in ignition scope, displays digital kilovolt readings, rather than waveforms, on the screen (Figure 8-16).

Power	Firing kV (FKV)			Spark kV (SKV)			Min
	Min	Max	Actual	Min	Max	Actual	
1	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---
3	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---
Waste	Min	Max	Actual	Min	Max	Actual	Min
3	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---
1	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---

Figure 8-16 Sample Show Digital KV selected

- **Show Grid**—switches grid lines on the screen off and on (Figure 8-17).

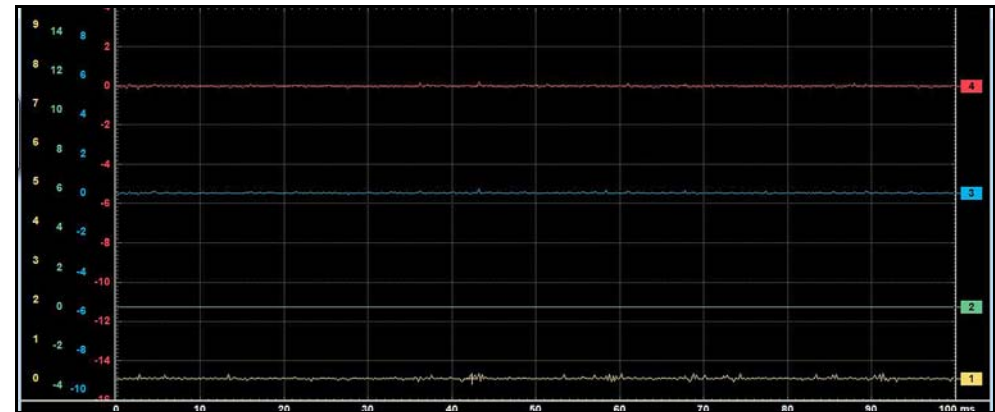


Figure 8-17 Sample grid selected

- **Invert Colors**—switches the screen background to white.



Layout Settings

The selected radio knob on the Layout dialog box shows which setting is active. Use your finger or the stylus to switch between settings:

- **1 window**—shows all traces on the same screen ([Figure 8-17](#)).
- **2 windows**—shows two separate traces in two ways: horizontal, one below another ([Figure 8-18](#)) or vertical, side-by-side ([Figure 8-19](#)).
- **3 windows**—shows three traces, one below another, on the same screen ([Figure 8-20](#)).
- **4 windows**—shows four traces, one below another, on the same screen.

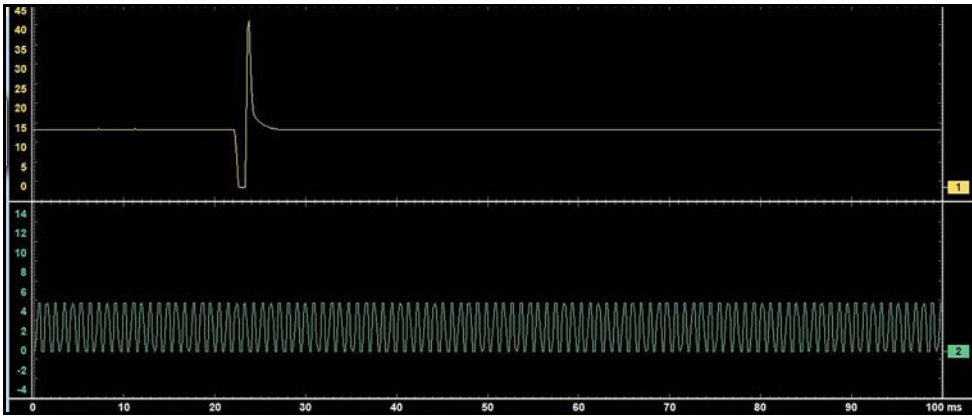


Figure 8-18 Sample 2 Windows horizontal display

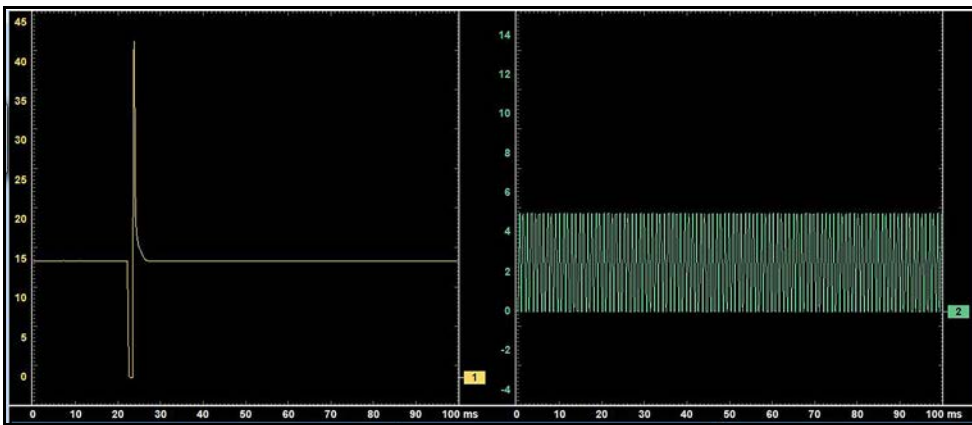


Figure 8-19 Sample 2 Windows vertical display

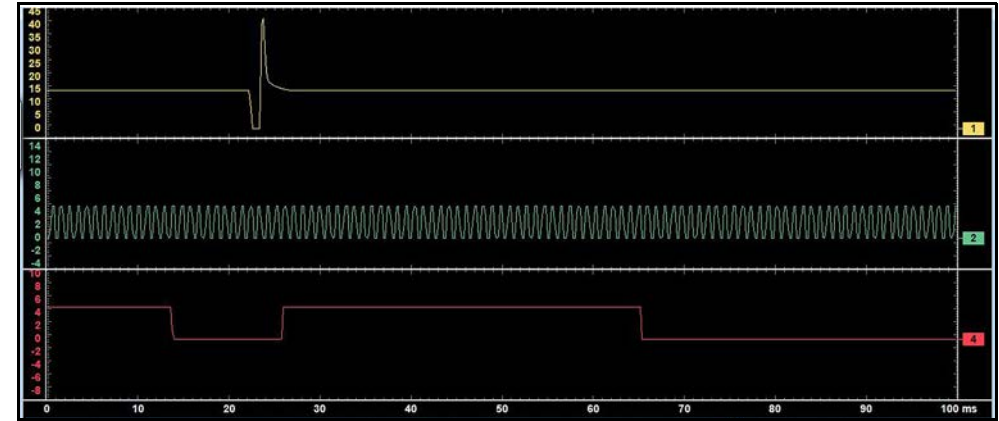


Figure 8-20 Sample 3 Windows display

Unit Setup

The Unit Setup dialog box allows you to switch between Full Scale or Per Division settings for the trace setup and the display settings. Selecting Full Scale configures the units to the full viewing area of the screen, while Per Division adjusts the units to a single division (one tenth) of the screen.

The selected radio knob on the Units dialog box shows which setting is active. Use your finger or the stylus to switch between settings ([Figure 8-21](#)).

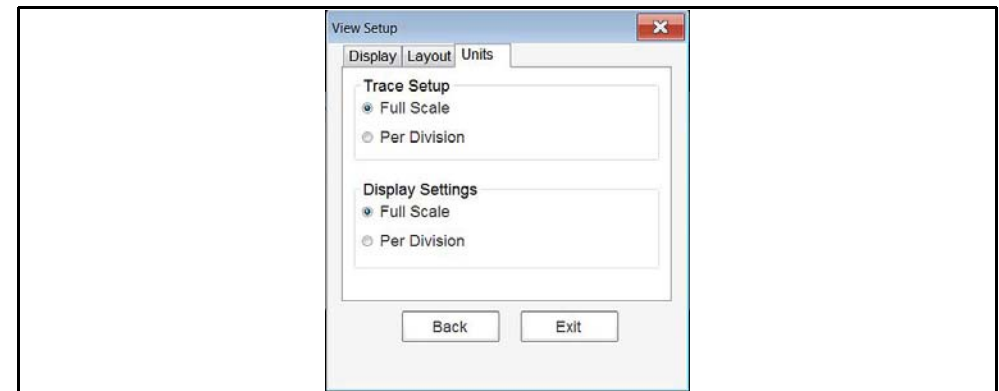


Figure 8-21 Sample View Units dialog box

Trace Setup

The Trace Setup option allows you to change how the vertical scale menu selections are represented.

NOTE

This setting *ONLY* changes the vertical scale, the sweep (horizontal) scale is *NOT* changed.

NOTE

When adjusting the vertical scale setting, it is important to remember that the vertical scale is divided into 10 major divisions, and all scale adjustments reflect this factor of 10. The division set of 10 cannot be changed, divisions cannot be added or removed.

Trace Full Scale - changes the dropdown vertical scale menu selections to full scale mode, which represents the selected unit of measurement over the entire (full) scale.

Example (Figure 8-22): Selecting 10V, changes the vertical scale to a 10V volt scale. The vertical scale is “always” divided by 10, therefore each division is incremented by 1V.

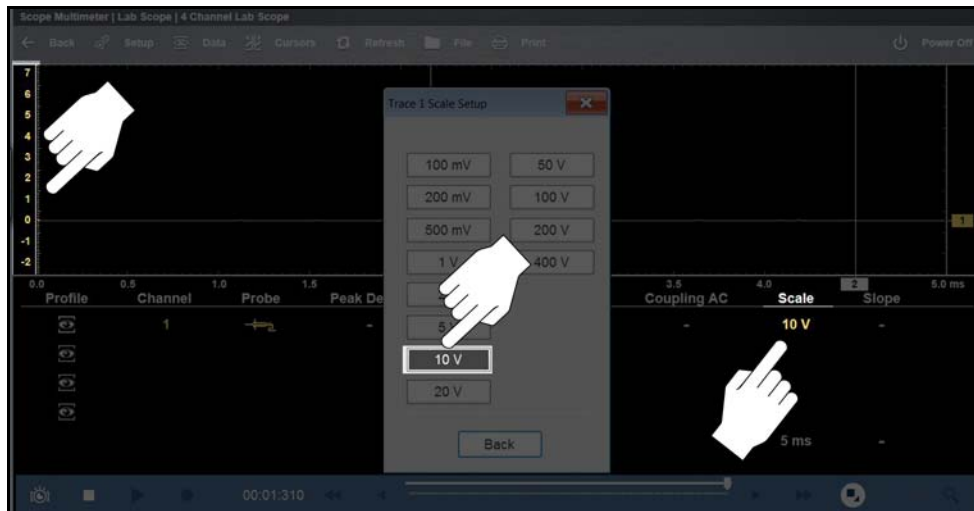


Figure 8-22

Trace Per Division - changes the dropdown vertical scale menu selections to **##/div** mode, which in turn changes the vertical scale to represent **##** by division.

- represents (variable) what is being measured (voltage, amperage, pressure etc.)

Example (Figure 8-23): Selecting 1.0V/div, displays a vertical scale divided by 10. The vertical scale is “always” divided by 10, therefore each division is incremented by 1.0V, thus a 10V scale.

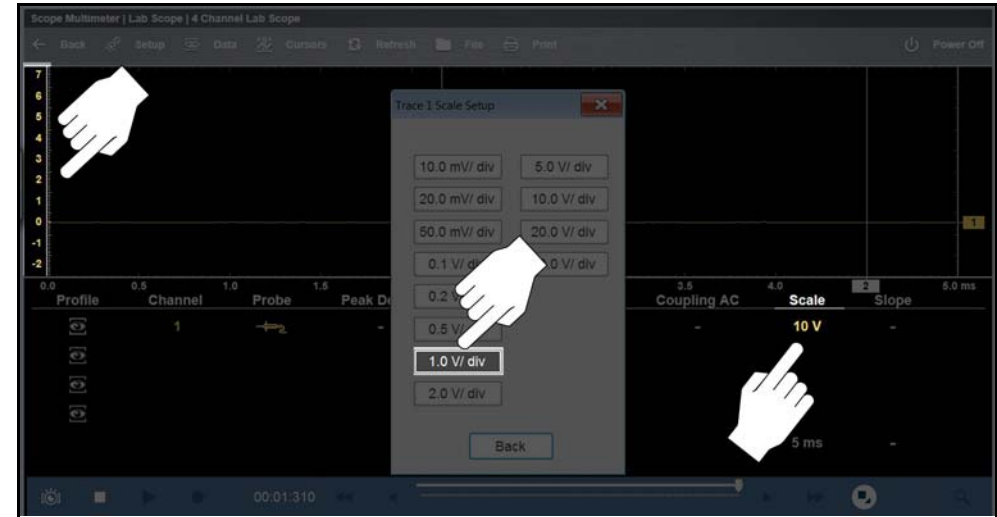


Figure 8-23

Display Settings

The Display setting allows you to change the displayed value in the Vertical Scale icon to your preference.

i NOTE

This setting ONLY changes the value displayed in the Vertical Scale icon.

Display Full Scale - displays the value of the entire (full) scale

Example (Figure 8-24): If the vertical scale is set to 1V, the value displayed is 1V.

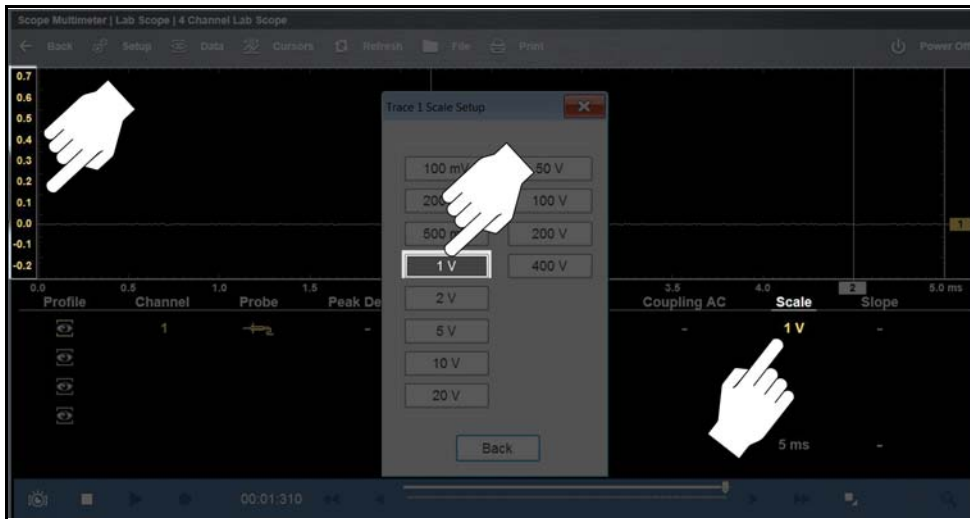


Figure 8-24

Display Per Division - displays the graduation value of the major scale divisions

Example (Figure 8-25): If the vertical scale is set to 1V, the value displayed is 0.1V.

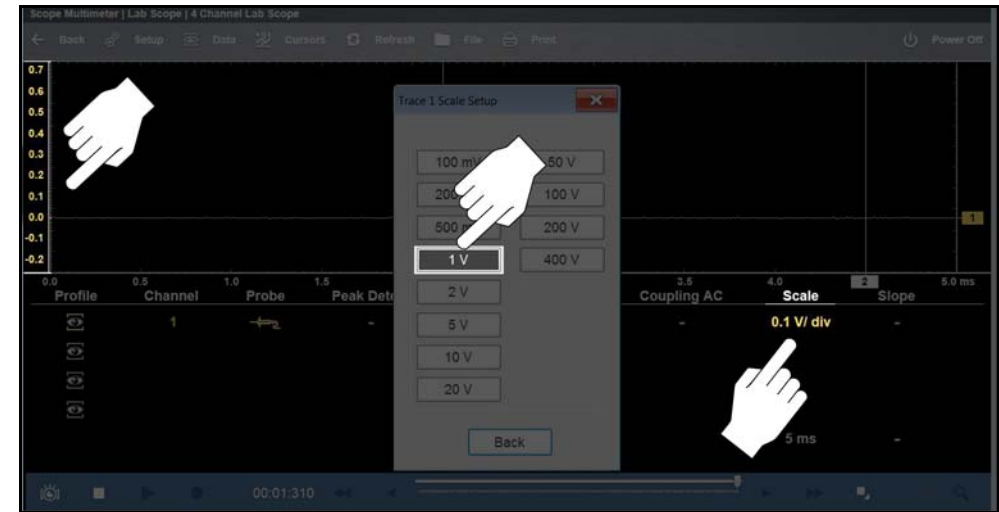


Figure 8-25

8.63.4 Setup Controls

Basic tool settings are adjusted here.



To adjust setup controls:

1. Select **Setup** from the Scope Multimeter toolbar.
The Scope Multimeter Preferences dialog box opens
2. Select **Setup** from the dialog box.
A submenu of options displays:
 - **Back**—use to return to the Preferences dialog box.
 - **Units**—set how measurement values display, US standard or metric.
 - **Snapshot**—adjust the percentage of data captured after a snapshot is initiated.
 - **Ignition**—configure the ignition scope for the test vehicle.
 Selecting from the submenu opens a dialog box for that item. Dialog box options for each item are discussed in the following sections.
3. Make dialog box selections as needed.
4. Select **Exit** to close the dialog box and return to the scope.

Units

Selecting Units opens the Setup dialog box. The units of measurement can be changed between US customary or metric. The selected radio knobs on the Setup dialog box show which settings are active ([Figure 8-26](#)).

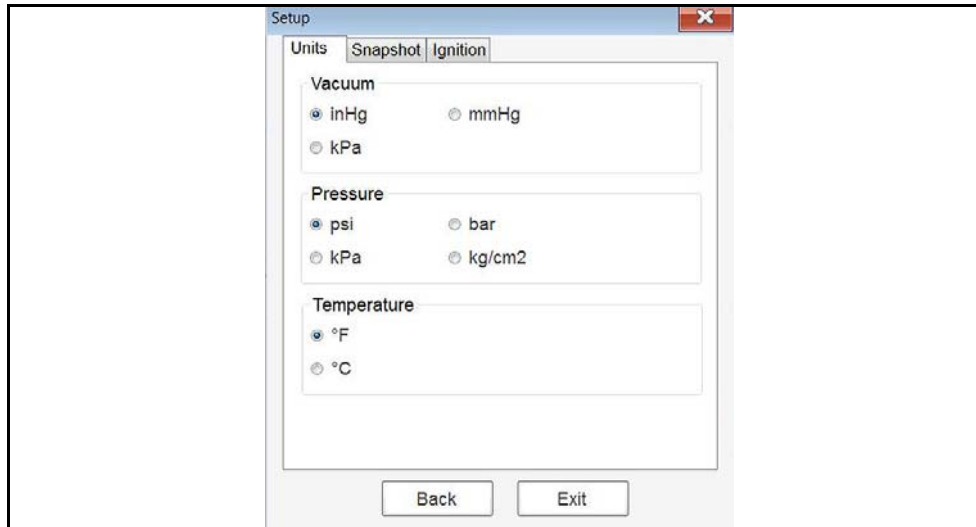


Figure 8-26 Sample Setup Units dialog box

Abbreviation	Description
bar	bar
inHg	inches of mercury
kg/cm2	kilograms per centimeter squared
kPa	kilopascal
mmHg	millimeters of mercury
psi	pounds per square inch

Snapshot

The Snapshot tab opens a menu ([Figure 8-27](#)) that allows you to select how much data is captured after a snapshot is initiated. Make a (%) selection, then select **Back** or **Exit** to close the dialog box.

See [Snapshot Icon](#) on page 122 for information on using the snapshot feature.

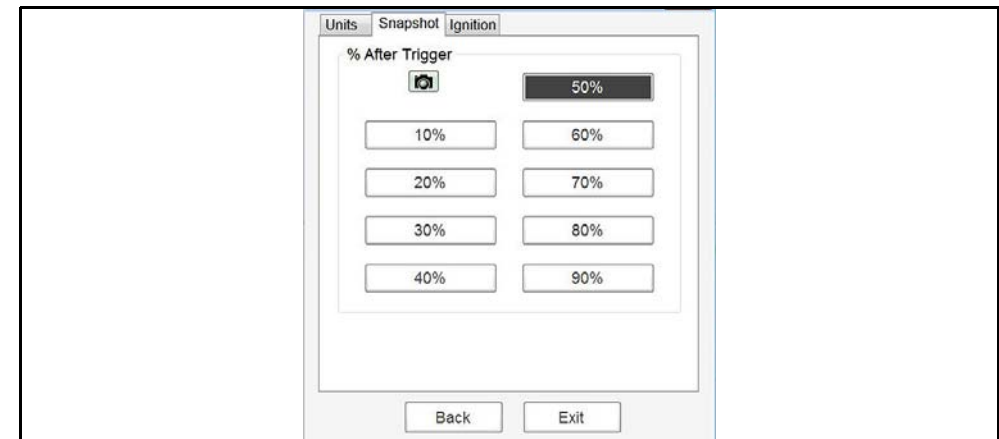


Figure 8-27



Ignition

The Ignition tab of the Setup dialog box is used to configure the scope for displaying secondary ignition patterns. There are two main selection fields (Type and Cylinders) and the fields vary depending upon the type of ignition system selected in dialog box (Figure 8-28).

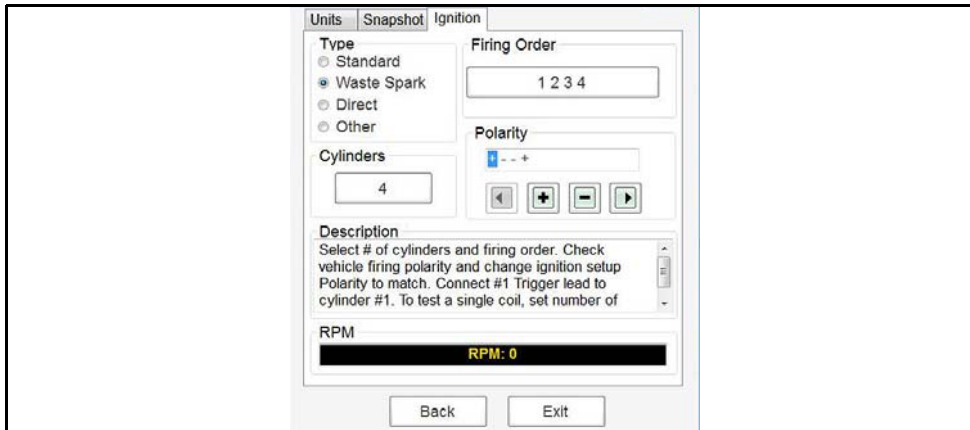


Figure 8-28 Sample Setup Ignition dialog box



To setup Ignition tests

1. Select the **Setup** icon to open the Setup dialog box.
2. Select the **Ignition** tab of the dialog box.
3. Highlight the ignition system for the test vehicle in the “Type” field:
 - **Standard**—use for systems with a distributor
 - **Waste Spark**—use for coil pack systems that fire 2 plugs simultaneously
 - **Direct**—use for coil-on-plug systems
 - **Other**—use for systems that do not fit any of the above categories
4. Select the number of cylinders for the test vehicle in the “Cylinders” field. Scroll through the list using the up and down arrows on either side of the number.
5. This step varies depending upon the type of ignition system:
 - If testing a Standard system, select the Firing Order.
 - If testing an Other system, select the RPM Factor. Scroll through the list of available choices using the up and down arrows below the displayed firing order or RPM factor.
6. This step also varies depending upon the type of ignition system:

- On a Standard or Direct system, choose between Coil and Plug for the Number 1 Trigger.
 - On a waste Spark system, select the polarity of the firings using the +, –, and arrow icons.
7. Select **Back** to return to the Preferences dialog box, or select **Exit** to close the dialog box and return to the scope.

8.64 Control Panel and Settings

This section provides a general overview of all the trace setting control features used across all Scope Multimeter functions.

The control panel is common to all three Scope Multimeter functions, and contains the trace (or “channel”) controls that are used to monitor and adjust the signal being measured.

The trace control icons within the Control Panel open the same control setup menus as are available from the **Trace Setup** menu.

Adjustments are made by selecting the item to be changed on the touch screen. A dash (–) indicates a function that is not selected, and an icon indicates an active function.

The information in the following sections is intended as a guide and general overview of the controls and functions used within the Scope Multimeter. Not all the settings or controls described throughout this section are applicable with all functions, some may be “grayed out” or not active (applicable), depending on the function or test.

8.64.1 Display Modes



The control panel has three display modes, and can be changed by repeatedly selecting the **Expand/Collapse** icon from the Playback/Record toolbar, or the **Data** icon on the toolbar.



- **Normal** —control setting icons are displayed (e.g. Profile, Channel, Probe, Filter, Scale, etc) ([Figure 8-29](#))

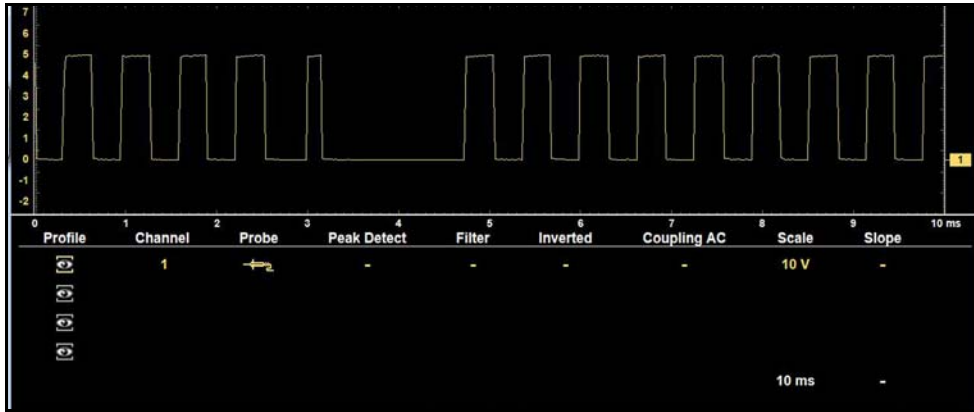


Figure 8-29

- **Expanded**—a limited set of control settings are displayed and the Min. Max. Live and Cursors panels are displayed ([Figure 8-30](#))

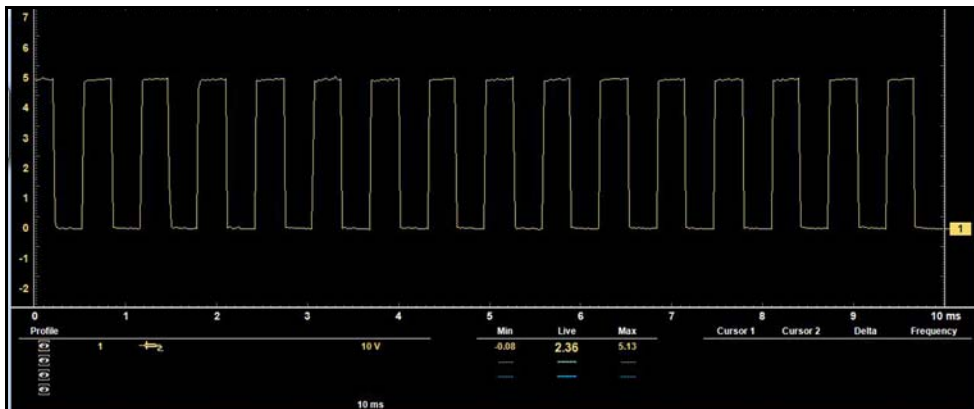


Figure 8-30

- **Control Panel Off**— the control panel is not displayed, only the meter screen is shown ([Figure 8-31](#))

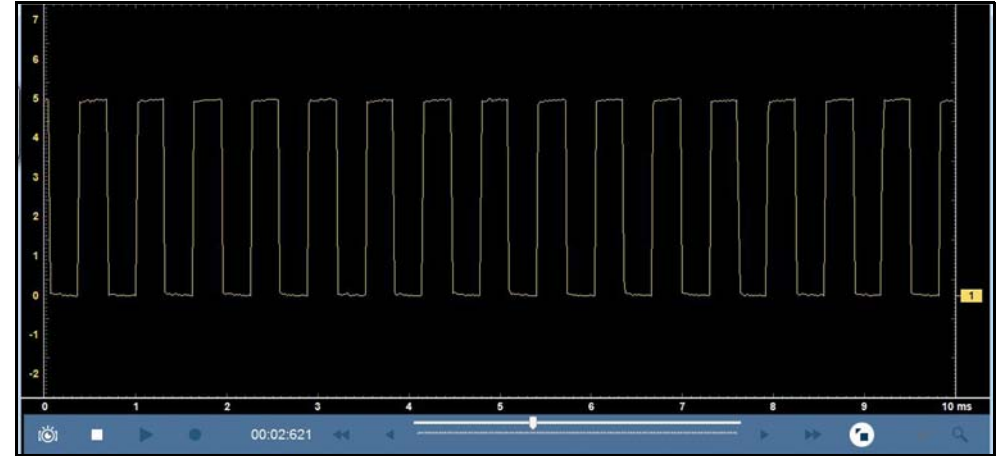


Figure 8-31

8.64.2 Control Panel (Trace Controls Quick Reference)

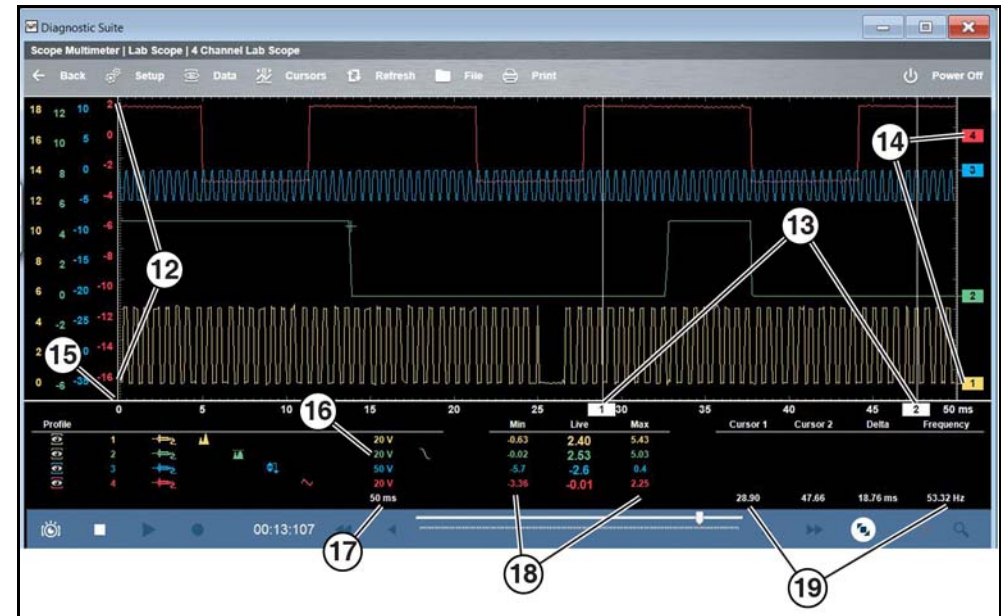
Trace (channel) settings and controls can be accessed in the Control Panel and the Trace Setup menu. Graphic and value icons are used in the control panel to access the settings. Applicable settings are displayed depending on the test.

Various control icons are shown in the following images, select a callout description (blue text) to link to that topic.



- 1. [Profile Icon](#)
- 2. [Channel Icon](#) on page 109
- 3. [Probe Icon](#)
- 4. [Peak Detect Icon](#)
- 5. [Filter Icon](#)
- 6. [Invert Icon](#)
- 7. [Coupling AC Icon](#)
- 8. [Slope \(Trigger\) Icon](#)
- 9. [Snapshot Icon](#)
- 10. [Expand/Collapse Icon](#) - see [Display Modes](#)
- 11. [Trigger Setup Menu Icon](#) - see [Trigger Setup Menu](#)

Figure 8-32



- 12. [Scale \(Vertical / Y-axis\)](#)
- 13. [Cursor Indicators](#) - see [Cursors](#)
- 14. [Zero Baseline Indicators](#) - see [Zero Baseline Adjustment](#)
- 15. [Sweep Scale \(X-axis\)](#)
- 16. [Channel Scale Indicator Icons](#) - see [Scale \(Vertical / Y-axis\)](#)
- 17. [Sweep Indicator Icon](#) - see [Sweep Scale \(X-axis\)](#)
- 18. [Min, Live and Max Display Panel](#)
- 19. [Cursor Control Panel](#) - see [Cursor Measurements Panel](#)

Figure 8-33

8.64.3 Profile Icon



The Profile icons (variable) allow you to hide or display channels onscreen.

Selecting an icon turns a channel on and off.

Profile Icons (Typical)	
On (Channel displayed)	Off (Channel not displayed)



8.64.4 Channel Icon



The Channel icons (variable) identify the channel numbers (1 to 4). Selecting an icon opens the trace setup menu. See [Trace Controls Menu on page 99](#).



8.64.5 Probe Icon



The Probe icons (variable) allows you to change the type of probe for the test you are performing. Selecting an icon opens the probe setup menu. Changing the probe, also changes the vertical scale to the applicable type of measurement.

For probe calibration information, see [Test Lead / Probe Calibration on page 97](#).

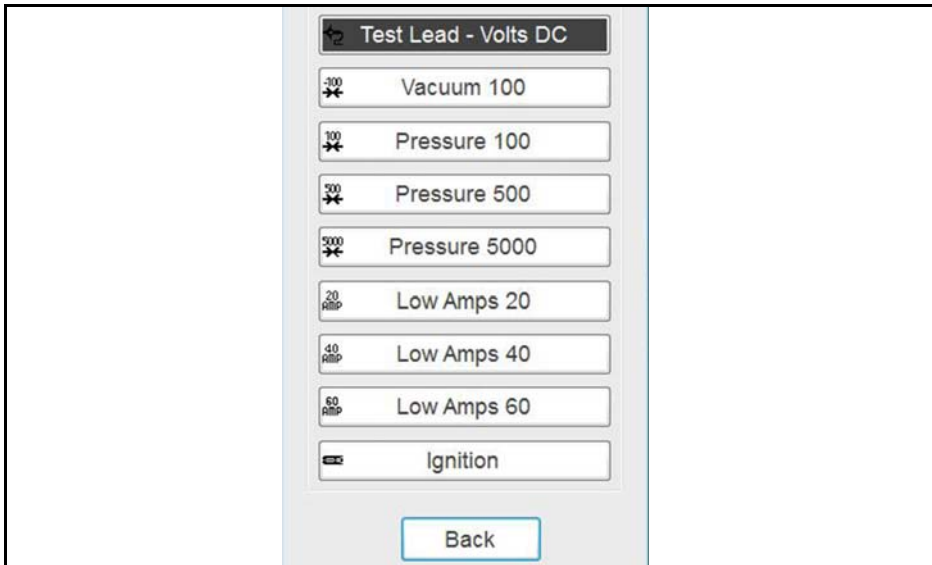


Figure 8-34 Probe option menu

Probe "test" Options	
Menu Option	Probe / Device Used
Test Lead - Volts DC	Standard Channels 1 to 4 test leads with alligator clips or test probes
Vacuum 100	(optional) 0-100 psi pressure transducer with pressure adapter
Pressure 100	
Pressure 500	(optional) 0-500 psi pressure transducer with pressure adapter
Pressure 5000	(optional) 0-5000 psi pressure transducer with pressure adapter
Low Amps 20	(optional) Low Amp Probe
Low Amps 40	
Low Amps 60	
Ignition	(optional) Secondary ignition adapter lead with desired secondary ignition coil adapter

8.64.6 Peak Detect Icon



Peak Detect allows you to maximize the signal sampling rate in order to capture fast events, such as spikes, glitches and other anomalies, that may normally be undetected.

Peak Detect Icons (Typical)	
On (Sampling maximized)	Off (Sampling not maximized)

Peak Detect Off

When peak detect is off, the scope samples at a high rate but saves just enough sample points to the data buffer memory to plot a waveform across the screen. No preference is given to any point during the selection process.

**NOTES**

— Turning peak detect “off” is suitable for basic measurements, and viewing waveforms (e.g. oxygen (O₂) or Cam sensor) when capturing fast events is not necessary.

— The longer the time sweep, the greater the chance a glitch could be missed because it occurred in between the sample points saved to the data buffer memory. To increase the chance of capturing a glitch with peak detect “off”, a shorter time sweep should be selected.

— Turning peak detect “off” avoids the need for an external filter to decrease the display of unwanted noise, which can make diagnosis more difficult.

Example: With a time sweep of 10 seconds on a screen 100 points wide, the effective sample rate would be 10 times a second. Decreasing the time sweep to 1 second, increases the effective sample rate to 100 times a second. At this time setting, a fast occurring event is more likely to be captured due to the increased rate. This is the standard mode of operation for many scopes.

Peak Detect On

When peak detect is “on”, all sample points are evaluated. The points stored to the data buffer memory are intelligently selected to capture fast events that might be missed at slower effective sample rates. Peak Detect captures fast events, spikes and glitches for signals going in both positive and negative directions.

NOTES

— Turn peak detect “on” when capturing fast events (e.g. ignition firing voltage, glitches, and intermittent events).

— Turning peak detect “on” may capture unwanted noise, therefore, using peak detect may not be suitable for some tests (e.g. oxygen (O₂) sensor), as the waveform may be more difficult to evaluate due to the additional noise that may be displayed.

— Peak Detect decreases the possibility of waveform aliasing.

8.64.7 Filter Icon

Depending on which function it is used with, Filter can minimize or smooth out signal spikes and fast variations, when the signal is disrupted by noise or other interference.

Filter Icons	
On (Interference is suppressed)	Off (Interference is not suppressed)

Filter - Lab Scope

Using the filter with the lab scope, smooths out fast spikes, which helps to provide a good balance between noise suppression and signal integrity.

Using the filter is useful when working with scales of 5 volts and below, as the lower the voltage scale, the more likely noise can occur.

Example: Using the filter is helpful when testing components such as, an O₂ sensor (1 or 2 volt scale), or when performing a throttle position (TP) sensor sweep test (5 volt scale).

In addition, the filter is also helpful for low amp probe tests, as a low voltage scale is used to measure the output of the probe (due to the conversion factors of the probe).

Example: For a probe with a conversion factor of 100 mV/A connected to a 2 amp load, the scope uses a 200 mV scale to measure the output of the probe. The scope converts the measured output to 2 amps for display on the screen.

Filter - GMM

Using the filter with the GMM minimizes noise by ignoring or smoothing out fast signal spikes.

- For a direct measurement test, such as volts, amps, or pressure, the filter minimizes the display of very fast spikes by averaging the sampled data when filter is active.
- For a calculated measurement test, such as frequency, pulse width, dwell, or duty cycle, extremely fast spikes (20 μS and faster) from sources like the ignition system are ignored when filter is active.



8.64.8 Invert Icon



Invert is used to switch signal polarity, so the trace appears upside down (inverted) on the screen. This is typically used when measuring amperage using the low amp probe, or high-voltage signals like secondary ignition.

Invert Icons	
On (Polarity is inverted)	Off (Polarity is not inverted)

Example: A signal that normally rises from 0 to +5 volts, if inverted would show falling from 0 to -5 volts.

8.64.9 Coupling AC Icon



Coupling AC subtracts the average value of a signal so that small variations can be seen in the waveform. This is accomplished by blocking the direct current (DC) portions of a signal in order to amplify (show) the alternating current (AC) portions of the signal, without driving the trace off of the screen.

Using coupling AC can be helpful when testing and diagnosing alternator ripple or fuel pump amperage, by allowing you to see any abnormal small variations or events.

Coupling AC Icons	
On (DC signal portion blocked)	Off (DC signal portion not blocked)

8.64.10 Slope (Trigger) Icon

See [Trigger Operation](#) on page 117 for additional information.

8.64.11 Scale (Vertical / Y-axis)

The vertical scale (Y-axis) represents what is being measured (voltage, amperage, pressure etc.), and the unit of measurement it is being measured in. The vertical scale is “always” divided into 10 major divisions; how these divisions are defined, sets the scale of measurement.

NOTE

Vertical scales (any channel) can be set independently.

To adjust the vertical scale unit of measurement, select the **Vertical Scale** icon to open the vertical scale menu. The value displayed in the vertical scale icon indicates the active value. Adjustment can also be made using the Trace Controls menu, see [Trace Controls Menu](#) on page 99.

Example: Selecting 10V, changes the vertical scale to a 10V volt scale. The scale is “always” divided by 10, therefore each division is incremented by 1V.

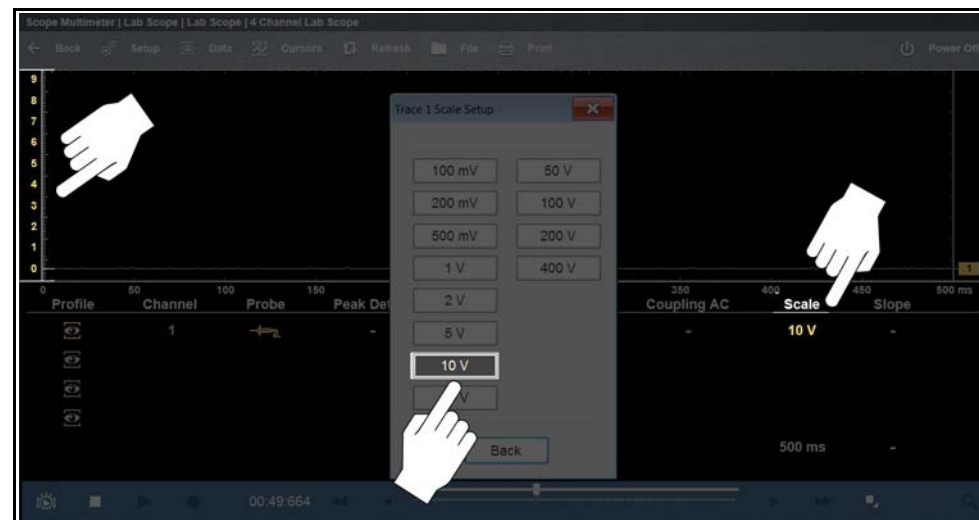


Figure 8-35



Example: Selecting 50 psi displays a 50 psi scale that is divided by 10, therefore each division is incremented by 5 psi.

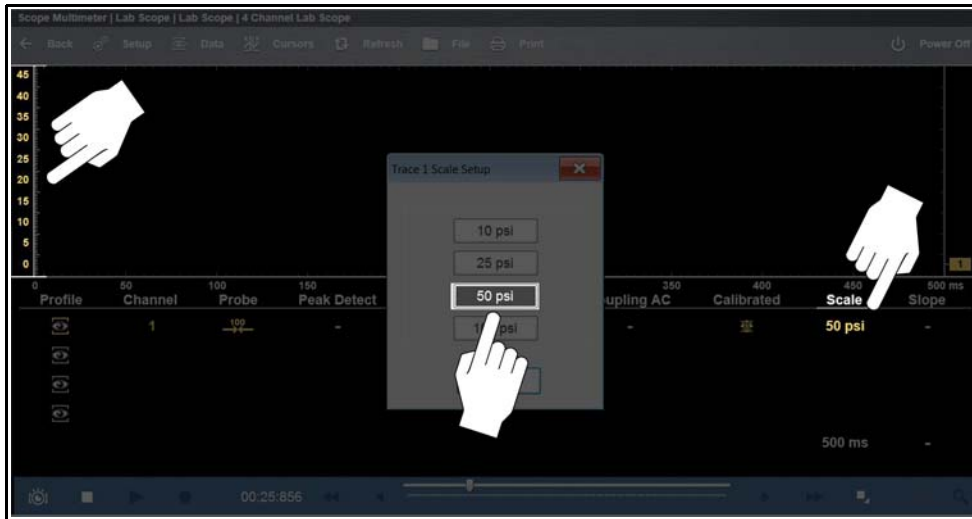


Figure 8-36

8.64.12 Sweep Scale (X-axis)

The Sweep Scale or horizontal scale (X-axis) represents time, and the unit of measurement it is being measured in. The horizontal scale is “always” divided into 10 major divisions. How these divisions are defined sets the scale of measurement. The value displayed in the sweep Scale icon indicates the active sweep setting.

NOTE

The sweep setting applies to all channels and cannot be set independently per channel.

To adjust the sweep scale, select the **Sweep Scale** icon from the Control Panel to open the sweep scale menu. The value displayed in the Sweep Scale icon (white color) indicates the active value.

Adjustment can also be made using the Trace Controls menu, see [Trace Controls Menu](#) on page 99.

Example: Selecting 50ms, changes the sweep scale to a 50ms scale. The scale is “always” divided by 10, therefore each division is incremented by 5ms.

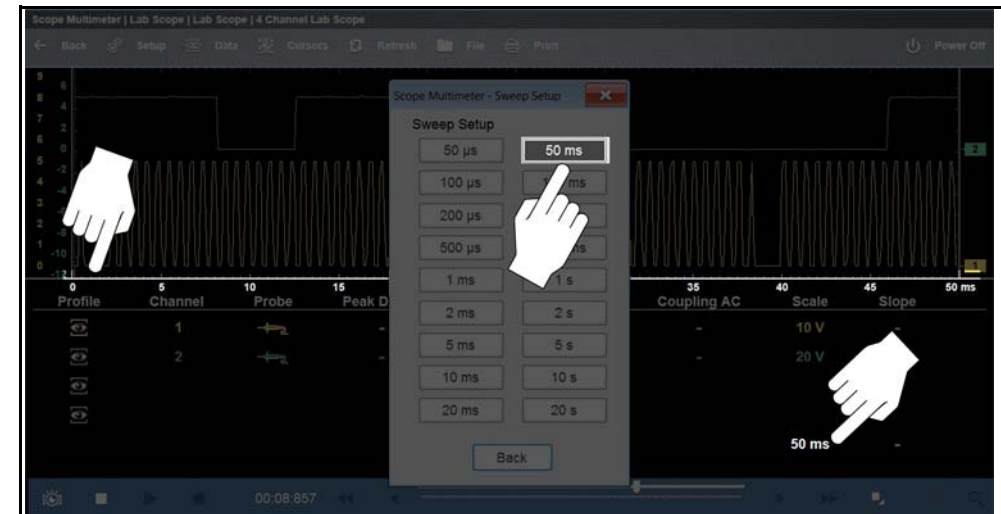


Figure 8-37



8.64.13 Min, Live and Max Display Panel

When using Expanded mode the Min, Live and Max display panel ([Figure 8-30](#)) shows each channel's active signal minimum and maximum recorded measurements and live measurement.

- **Min** - lowest measurement recorded for the signal since the test was activated, or from the last time Refresh was selected
- **Max** - highest measurement recorded for the signal since the test was activated, or from the last time Refresh was selected
- **Live** - represents the “live” running average measurement of the signal being measured

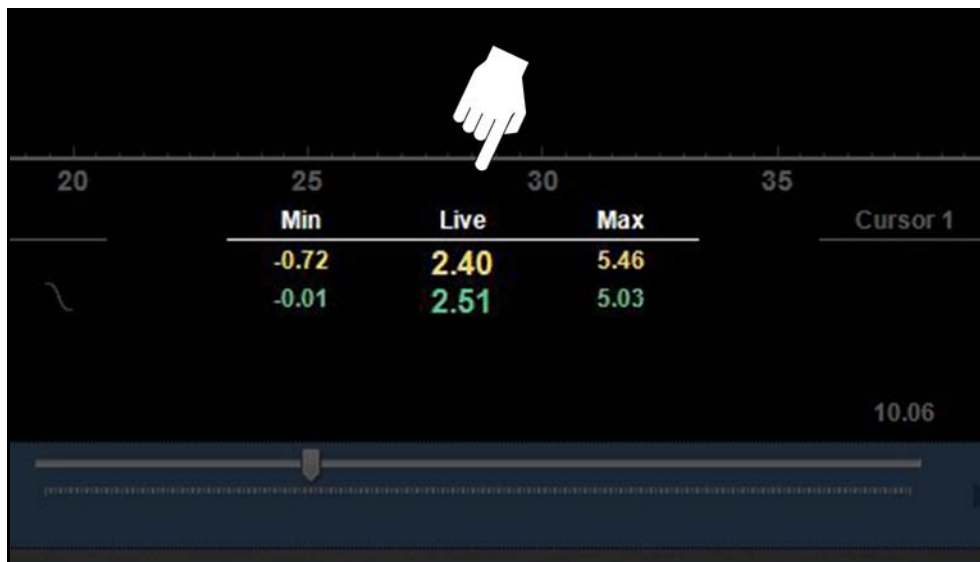


Figure 8-38

8.64.14 Zero Baseline Adjustment

To adjust the vertical position of the zero baseline (0 value) of a trace, either touch and drag the baseline marker up/down on the screen ([Figure 8-39](#)), or open the trace setup menu to make precise adjustments, see [Trace Controls Menu](#) on page 99.

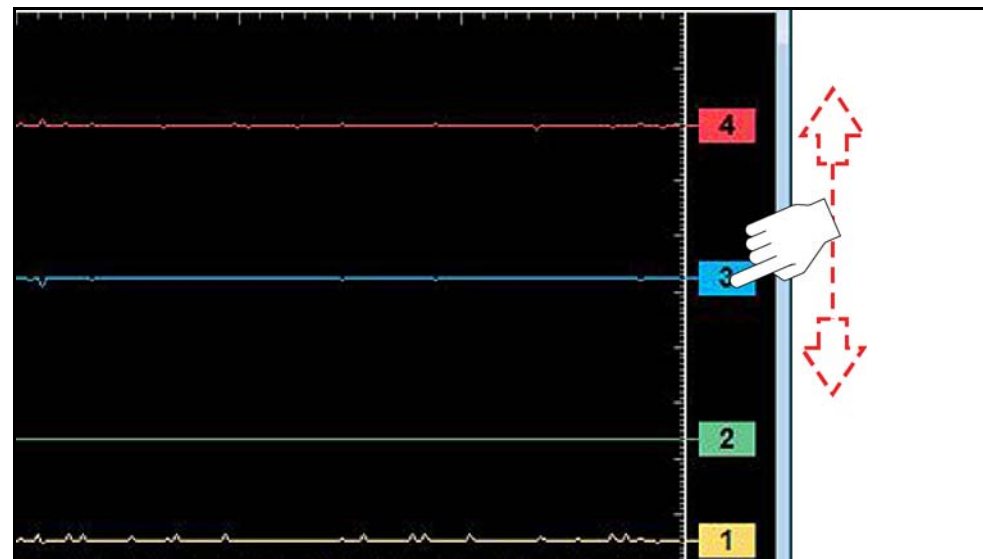


Figure 8-39

8.64.15 Threshold Auto/Manual (GMM Only)

NOTE

The Threshold function is only available in the Graphing Meter function for specific tests. These functions may also be referred to as Auto Threshold Select (ATS) or Manual Threshold (MT).

The Threshold function can be used, to display and obtain a more accurate measurement when measuring signals (e.g. Frequency, Duty Cycle, MC Dwell and Pulse Width) that may be difficult to display or have noise or other undesirable variations in the signal.

When **Auto Threshold** is selected, the Threshold function automatically sets a trigger and determines a threshold level in the middle of the signal range

(calculated from the Min and Max measurements) to be used as a reference point to calculate the measurement. The falling edge (slope) of the signal is used in determining the threshold level. Once selected, the Threshold function remains active until the test is exited.

Selecting **Manual Threshold**, allows you to manually set the value and slope.

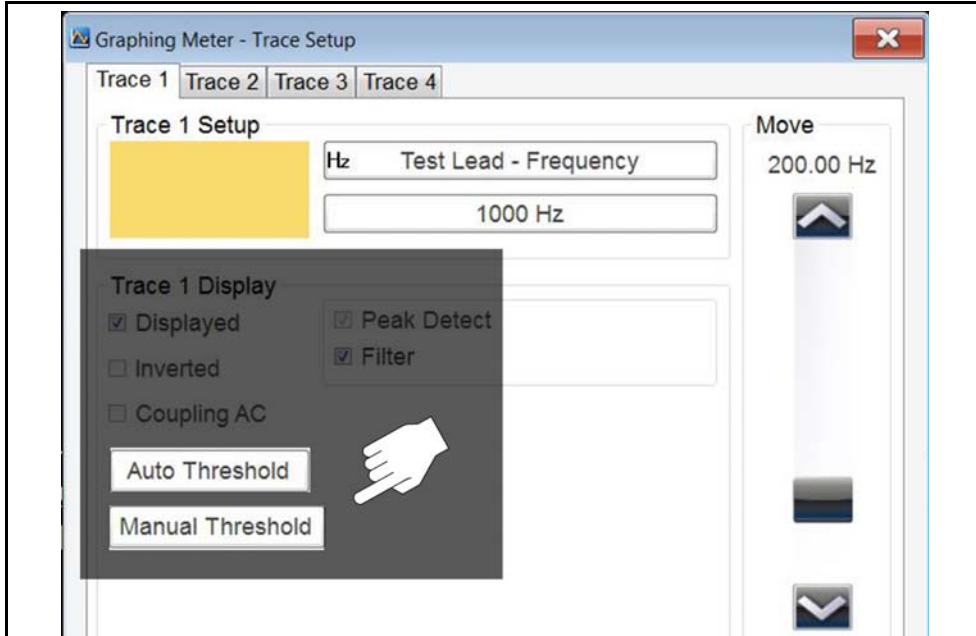


Figure 8-40

The following examples are provided, showing some common setup issues you may experience when using this function

If after enabling the Threshold function the signal is displayed as a flat line at zero (0) (Figure 8-41), reduce the vertical scale setting, as it may be set too high.

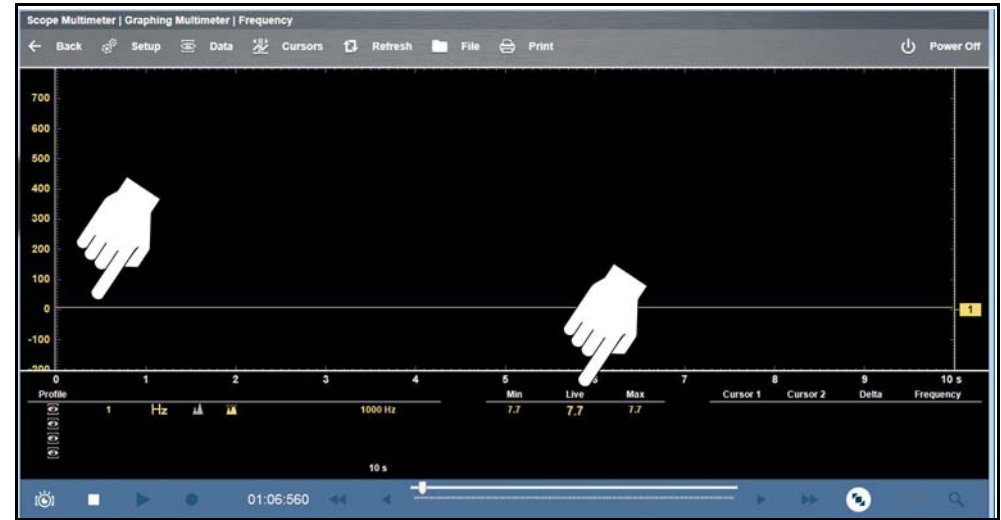


Figure 8-41 Scale at 1000Hz, frequency appears to be zero (is actually 7.7Hz)

If the scale is changed to 50Hz, it is easier to see the signal at 7Hz (Figure 8-42).

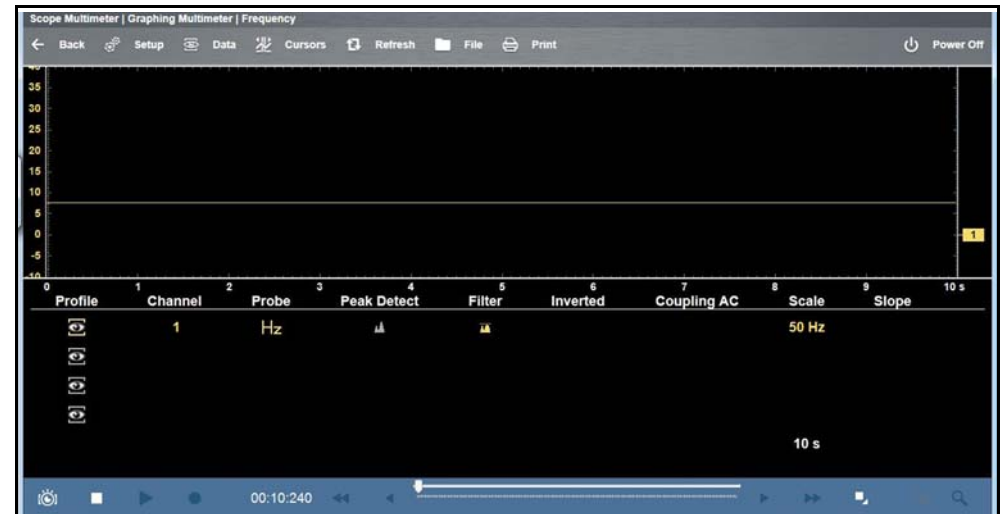


Figure 8-42 Scale at 50Hz

In some instances a signal with unequal spacing may display as a band or ragged signal, depending on the sweep setup or the measurement type being displayed. As example, a Cam sensor signal Hz graph (shown in [Figure 8-43](#)) may look like this with a lot of variation.

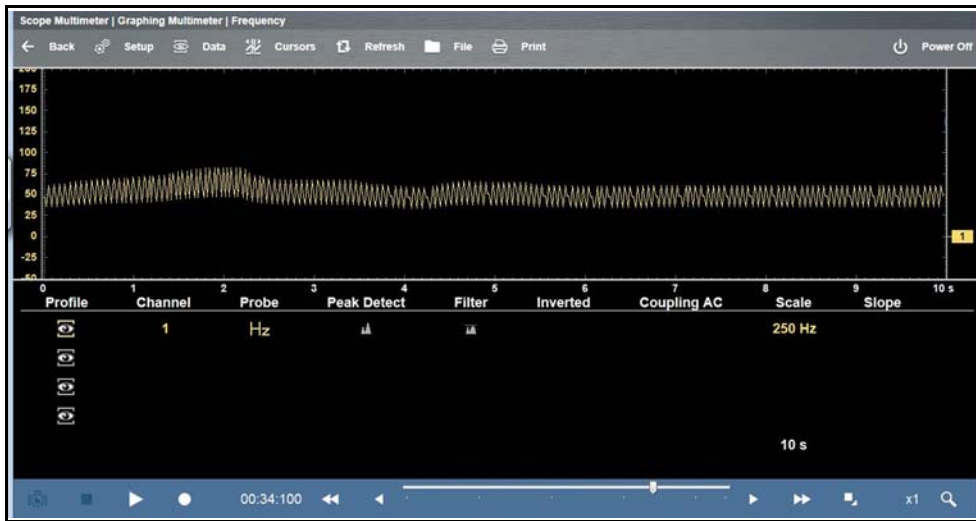


Figure 8-43 Cam signal (GMM frequency)

In this situation, you can use the lab scope to verify the signal integrity and spacing. Displayed in Lab scope ([Figure 8-44](#)), it can be seen there is actually variation which the Hz graph is not displaying.

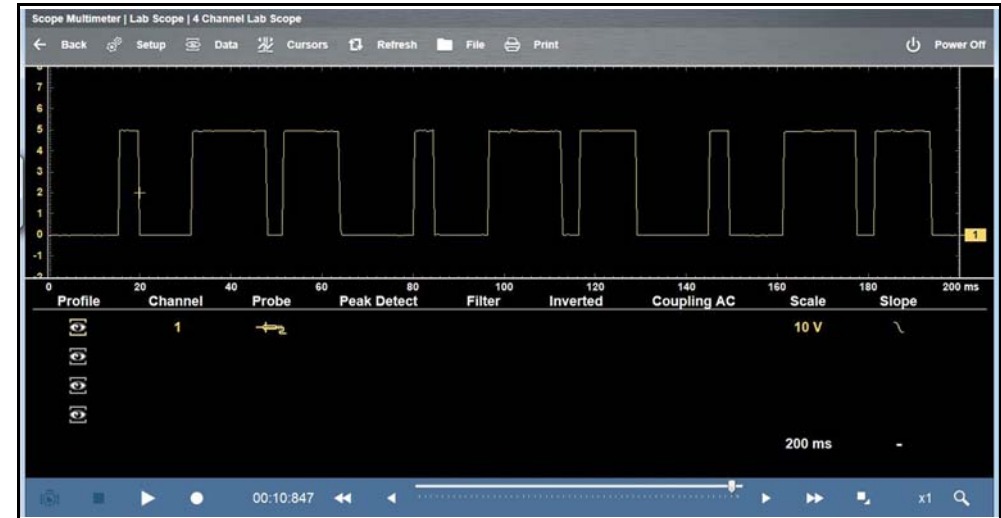


Figure 8-44 Cam signal (Lab Scope)

8.65 Triggers

Triggers are only available in the lab scope function.

A trigger can be used to stabilize a changing or erratic signal (a signal that may flicker or drift as it refreshes), so that it is easier to view or diagnose. This stabilization effect is accomplished by basically displaying the same part of the trace repeatedly from the same starting point, thus the flicker or drift is minimized.

A trigger is basically a “specific point” on the display, at which a trace will start to display (start the sweep) if it crosses that point.

The trigger feature allows you to set the conditions of that “specific point” also called a “trigger point”. When the trigger conditions are set, and a trace “meets” those conditions (crosses the trigger point), the trace will start.

Trigger conditions:

- **Vertical scale position** (amplitude)
- **Sweep position** - the horizontal scale position, or position in time
- **Slope direction** - the direction the trace must be moving (up/rising or positive) or (down/falling or negative) when crossing the trigger point.

NOTES

Triggers can be set on any channel, however only one trigger can be activated (used) at a time.

If a trigger is set outside the range of the scales, a yellow marker (e.g. arrow with plus symbol) will be displayed indicating the trigger is out of range and a confirmation screen will display.

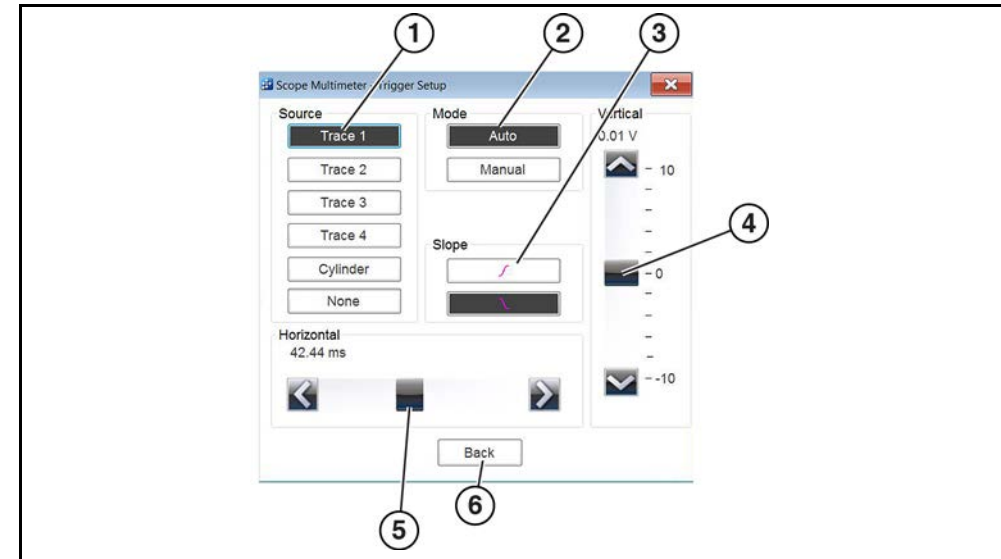
When a trigger is set on a channel, and more than one channel is active (displayed), trigger conditions must be met for that channel in order to display all the other channels.

The trigger point is indicated by a plus marker (+) on the scope grid. The trigger marker sign can be dragged across the grid with the stylus to roughly position it. The trigger setup menu allows you to precisely position the trigger. See [Trigger Operation](#) on page 117.

8.65.1 Trigger Setup Menu

To access the trigger setup menu:

- Select the **Trigger Setup Menu** icon from the control panel, or
- from the upper toolbar select **Setup > Trigger**



1. Source:
 - Trace 1 to 4—sets the trigger for the applicable channel.
 - Cylinder—sets triggering to the firing of a cylinder detected by the optional RPM Pickup or Secondary Ignition Adapter.
 - None—switches triggering off.
2. Mode—sets the method of triggering:
 - Auto—see [Trigger Auto/Manual](#) on page 117
 - Manual—see [Trigger Auto/Manual](#) on page 117
3. Slope—sets triggering to the rising (top icon) or falling (lower icon) slope of the signal waveform.
4. Vertical—sets the vertical trigger position
5. Horizontal—sets the trigger timing position (left and right on the grid)
6. Back—closes Trigger Setup Menu

Figure 8-45 Trigger setup menus



Trigger Auto/Manual

NOTE

The Auto and Manual Trigger modes allow you to set the criteria used to display signals on the screen. To change the trigger mode, the trigger must be set on one of the channels.

In both Auto and Manual Trigger mode the screen is updated when the signal crosses the trigger point in the selected direction (rising or falling), however:

- **Auto Trigger**—(default mode)
 - when Auto Trigger is on, even if the signal does not cross the trigger point, the screen automatically updates after a short period (allowing you to see the waveform). When this occurs, the message "Waiting for the trigger" is displayed on the screen. The trigger point can then be set to optimize viewing.
- **Manual Trigger**
 - when Manual Trigger is on, if the signal does not cross the trigger point the screen will not update. This allows you to capture intermittent events onscreen, as the screen only updates when the signal meets your trigger selection.

NOTE

When using Manual Trigger, it may be easier to initially set the trigger point using Auto Trigger, as the screen will update regardless if the signal crosses the trigger point. Once the trigger point is set, then switch to Manual Trigger mode.

8.65.2 Trigger Operation

Trigger Slope Icons

Trigger slope icons are displayed in the control panel.

Trigger Slope Icon	Description
	Rising (up or positive) - Indicates trigger is turned on to start the trace on the rising edge (as signal begins to rise)
	Falling (down or negative) - Indicates trigger is turned on to start the trace on the falling edge (as signal begins to fall)
	Off - Indicates trigger is turned off. (Select to turn trigger on)

Turning Triggers on/off



To turn a trigger on/off:

A trigger can be turned on by:

- selecting the trigger (off) icon from the control panel.
- opening the Trigger Setup Menu see [Trigger Setup Menu on page 100](#), and selecting the desired Trigger tab from the menu.

A trigger can be turned off by:

- opening the Trigger Setup Menu see [Trigger Setup Menu on page 100](#), and selecting the desired Trigger tab from the menu. then selecting **None** under the Source options.

Setting Trigger Position



To set trigger position:

The trigger marker is indicated by a plus graphic (+) on the display (*Figure 8-46*). The trigger marker represents the trigger point and is displayed on the screen when the trigger is turned on.

- To roughly position the trigger marker, select and drag it into position using the touch screen.
- To position the trigger marker with accuracy, open the trigger setup menu. See [Trigger Setup Menu](#) on page 116, and use the vertical and horizontal slider controls to adjust the position.



1. Trigger Marker
2. Trigger Slope Icon (falling)
3. Trigger Setup Menu Icon (open setup menu)

Figure 8-46

8.65.3 Cursors



Cursors

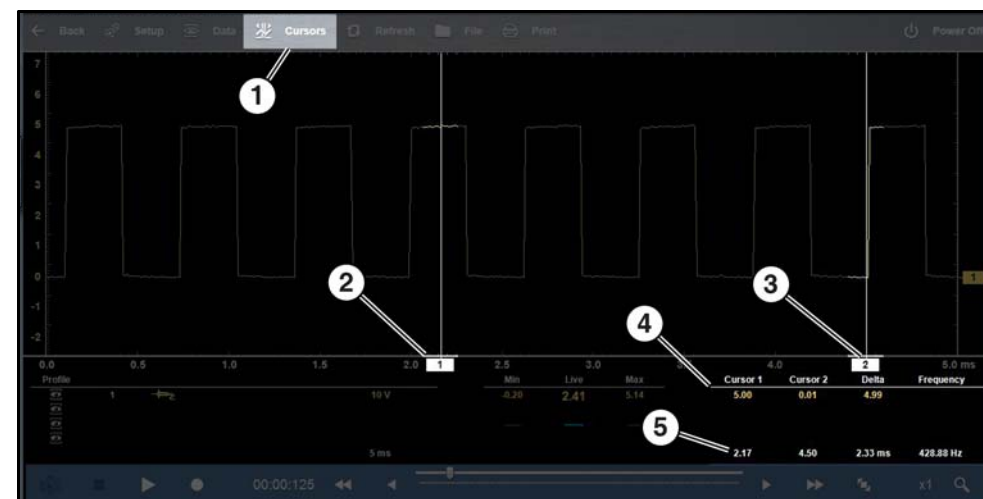
Cursors are only available in Lab Scope and Graphing Multimeter functions.

Two vertical cursors are provided that allow you to make precise signal measurements. This is most useful when determining signal characteristics such as amplitude at specific points, and cycle time (duration) or frequency.

Using cursors can also be helpful when performing diagnostic tests, such as:

- O2 sensor rich/lean switch time
- fuel injector pulse width frequency
- secondary ignition spark duration
- crankshaft position sensor frequency

Measurements can quickly be taken between the two cursors, when measuring a single cycle or across multiple cycles by positioning the cursors at the start and end of the cycle or multiple cycles. Cursor measurements are displayed in the Control Panel when using the cursors, providing you digital values of the cursor measurements.

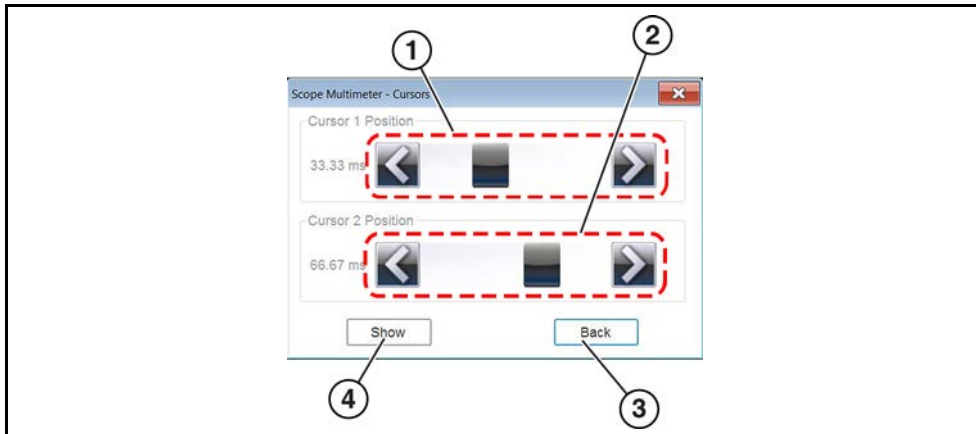


1. Cursors Icon
2. Cursor (no. 1)
3. Cursor Marker (no. 2)
4. Cursor Measurement Panel - amplitude and delta display
5. Cursor Measurement Panel - time and delta display

Figure 8-47

▶ To turn the cursors on/off:

1. Select **Cursors** (upper toolbar to open the Cursors dialog box ([Figure 8-48](#))).
2. To turn the Cursors on/off, select **Show** or **Hide** icon as applicable.



1. Cursor 1 position control
2. Cursor 2 position control
3. Show or Hide icon
4. Back icon

Figure 8-48 Cursor controls

▶ To position the cursors:

The cursors can be positioned anywhere within the range of the sweep scale by either dragging them horizontally on the graph, or using the cursors control menu.

- Control Menu - select **Cursors** from the upper toolbar, then drag the applicable slider or select the arrows to position the cursors. Each tap of the stylus moves the cursor incrementally in the direction of the arrows.
- Onscreen - select either cursor marker (base) and drag it to the desired position.

Cursor Measurements Panel

When the cursors are turned on, the cursor measurements panel can display the following signal and cursor measurements:

- Signal amplitude at two points
- Signal amplitude difference (delta) between two points
- Cursor position in time at two points

- Difference (delta) in time between the cursors
- Frequency - frequency of the signal for the time period between cursor 1 and 2

The cursor measurements panel contains values for each channel in two displays ([Figure 8-47](#)).

The time and delta display is gray in color and includes (shown when collecting data):

- **Cursor 1** - cursor position in time at cursor 1
- **Cursor 2** - cursor position in time at cursor 2
- **Delta** - difference in time between cursor 1 and 2
- **Frequency** - the frequency value (Hz) of the signal for the time period between cursor 1 and 2

The amplitude and delta display is shown in the channel specific color and includes (shown when data is paused):

- **Cursor 1** - signal amplitude at cursor 1 position
- **Cursor 2** - signal amplitude at cursor 2 position
- **Delta** - signal amplitude difference between cursor 1 and 2

❗ NOTES

Frequency is the number of times a signal repeats itself per second and is measured in hertz (Hz).

The frequency value displayed, is the inverse of the Delta value, and can also be calculated as 1 divided by Delta. The frequency value (Hz) shown is automatically calculated by the scope.

Example 1: Delta = 20.46ms, to get frequency divide 1 by .02046 ($1/.02046 = 48.87\text{Hz}$)

Example 2: Delta = 2.53ms, to get frequency divide 1 by .00253 ($1/.00253 = 395.27\text{Hz}$)

Use applicable decimal point placement during division as the Delta value changes.



8.66 Saving and Reviewing Scope / Multimeter Data Files

The following sections describe how the Data Buffer operates and the procedures used to save and review Scope/Multimeter and Guided Component Tests data files (test signals).

8.66.1 About the Data Buffer

The graphing multimeter and lab scope functions have the capability to save, store, and playback data (test signals) utilizing both internal storage memory and buffer memory.

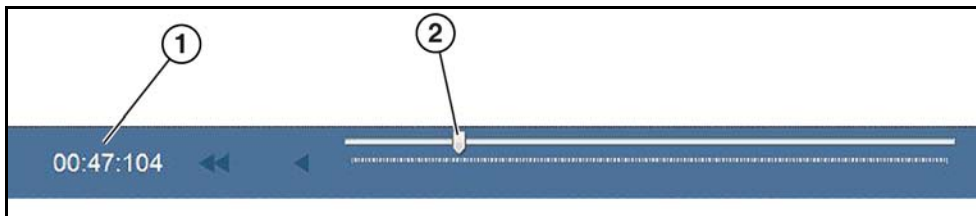
When a test function (e.g. Lab Scope > DC Volts) is selected and displays onscreen, a data buffer automatically starts to store data in buffer memory. The data buffer runs continuously (storing data) until the Stop icon is selected.

i NOTE

The data buffer starts and runs continuously with or without an active input test signal, when a test function is selected.

The Data Buffer slider (bottom of screen) indicates the position of the current screen in relation to the entire memory buffer contents.

The Data Buffer Position Counter displays a numerical value, indicating the position of the current displayed frame of data within buffer memory.



1. Data Buffer Position Counter
2. Data Buffer Indicator Slider

Figure 8-49

Buffer memory is limited to a predetermined “total” size. When buffer memory reaches its full capacity, the data buffer will continue to store new data, however earlier stored data will be removed to allow room for the new data being stored.

The most recent data is always available for review when the scope is stopped, and can be reviewed using the toolbar controls.

8.66.2 Saving Data Files / Configurations

Selecting the **File** icon from the toolbar provides options for saving data files or configurations.



- **Save Configuration**—saves the current setup values as a Preset. To open a saved Preset, select Preset from the main menu, see [Presets on page 95](#).
- **Save Single Frame**—saves the data currently on the screen only.
- **Save All Frames**—saves the current screen plus all the data stored in the buffer.

When either selection (Save Single Frame or Save All Frames) is made the data stored in buffer memory is written to a file. Saving data files is useful when trying to isolate an intermittent problem or to verify a repair during a road test. The saved file can be played back (similar to a movie clip) by selecting **Data Manager > Scope Multimeter Data Folder**. See [Viewing Saved Files on page 159](#) for additional information.



To save a file or configuration:

1. Select **File** from the toolbar.
2. Select a save option from the dialog box.

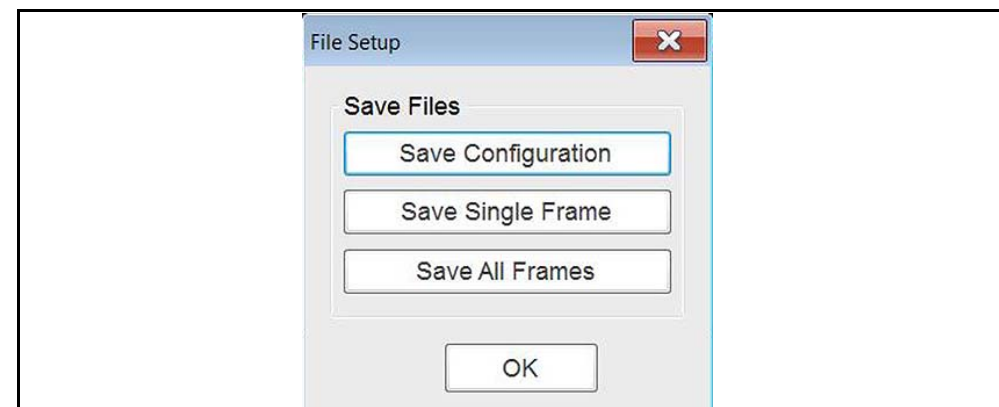


Figure 8-50 Sample file setup dialog box

The Save As Windows dialog box displays.



3. Enter the name of the file and location where it is to be saved, then select **Save**.

A configuration description dialog box will open.

i NOTE

The description entered here is what displays in the information panel of the Data Manager.

4. Enter a description of the file to be saved, select **OK**.
5. Select **OK** to close the file setup dialog box.

Once a configuration is saved it becomes available as a preset, see [Presets on page 95](#). Files are saved to the Scope Multimeter Data Folder and can be retrieved through the **Data Manager**.

8.66.3 Record/Playback Control Toolbar

The record/playback control toolbar at the base of the screen is used for recording data and for reviewing paused data. Use the stylus or your finger tip to activate the icons.

Use the toolbar icons to record and more precisely navigate the data.

Name	Icon	Description
Snapshot		Captures a "snapshot" of the sampled data, see Snapshot Icon on page 122 .
Step Back		Moves to the previous point in the recorded data
Back 1 Frame		Moves to the previous frame in the recorded buffer
Stop		Stops recording data
Record		Begins recording data

Name	Icon	Description
Play Recording		Plays the data recording in a continuous loop at actual speed
Forward 1 Frame		Moves to the next frame in the recorded data
Step Forward		Moves to the next point in the recorded data
Expand/Collapse		Expands and collapses the Trace Detail area on the display screen to allow for easier finger tip control
Zoom		Increases or decreases the magnification of the graph

8.66.4 Stopping and Reviewing Data Files

The record/playback toolbar at the base of the screen ([Figure 8-49](#)) is used for recording and reviewing data. See [Record/Playback Control Toolbar on page 121](#).

The Data Buffer Position Counter and slider control are described in [About the Data Buffer on page 120](#). The slider can be used to quickly move through paused data.

During normal scope multimeter operation, data is continuously being stored in buffer memory as it is displayed onscreen. The **Stop** icon, allows you to temporarily stop the data (signal) to review it in detail.

i NOTE

Glitches may cause drivability problems and may not turn on the MIL or set DTCs. As a general guide when looking for a suspected signal glitch, always try to verify the problem by duplicating the conditions while capturing data. Utilize the GMM to monitor the signal over longer time periods and review the histogram for possible faults.

**To stop and review a data file:**

Playback control icons are described in [Record/Playback Control Toolbar on page 121](#).

1. While viewing a signal (capturing data), select the **Stop** icon.
2. Select the desired playback control icon to step forward or backward through the data.

You can also use the data buffer indicator slider to quickly scroll through the captured data in buffer memory.

To resume data capture, select the **Record** icon.

8.66.5 Snapshot Icon



The Snapshot icon allows you to quickly record a “snapshot” of data.

To capture a data sample (while data is currently being collected) select the **Snapshot** icon.

A screen message displays “Collecting snapshot data. Please Wait.... Select OK if enough data has been collected.”

Select **OK** when you have collected the amount of data needed, then another screen message displays “Snapshot data has been collected”. Select **OK** to save now or **Cancel** to view and save later.

Selecting **Cancel** allows you to review the captured data using the playback controls, see [Record/Playback Control Toolbar on page 121](#). To save the data, select **File** (upper toolbar) and make the required entries to save the data file.

Snapshot (% after trigger options)

To set the amount of data captured after a snapshot is initiated:

1. Select **Setup** (upper toolbar)
2. Select **Setup** from the menu, then select **Snapshot**.
The Snapshot tab opens a menu ([Figure 8-27](#)).
3. Make a (%) selection, then select **Back** or **Exit** to close the dialog box.

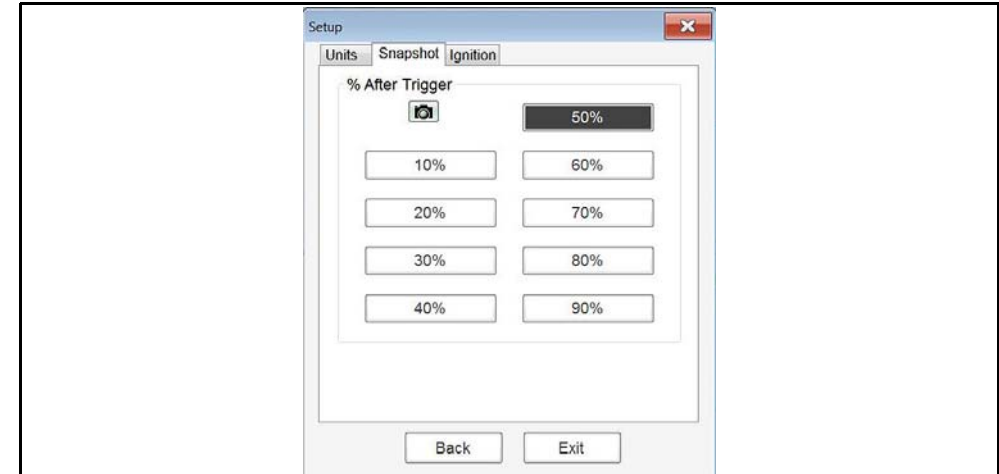


Figure 8-51

8.66.6 Using the Zoom Function

The zoom function allows you to change the magnification level of the signal sweep during data review. Changing magnification levels allows you to compress or expand multiple screens of data to quickly find glitches, or signal losses.

Example: While monitoring a MAF (Mass Air Flow Sensor) signal, the waveform displays normally. As the signal is being monitored, an erratic "condition" suddenly develops, then goes away, but may have not been observed on the screen. Stopping the data capture (when such an event occurs) allows you to analyze the waveform using a higher zoom level (wider view) to look for a glitch in the signal.

During data capture, the default magnification level is 1x. The zoom function is not available until data capture is stopped by pressing the **Stop** icon (Figure 8-52).

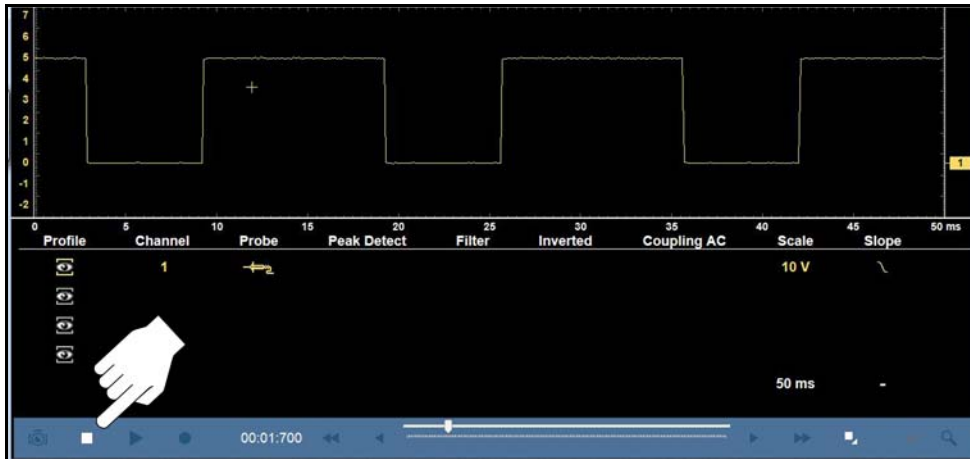


Figure 8-52

NOTES

Zoom playback controls are identical to the standard playback controls used when reviewing data files, with the following exception:

Skip Forward / Skip Back control icons - (press once) moves multiple steps relative to set magnification level (e.g. 2X setting, moves 2 steps; 16X setting, moves 16 steps)

Additional information on playback control icons are described in [Record/ Playback Control Toolbar](#) on page 121.



When the **Zoom** icon is selected (Figure 8-53) the display defaults to the "Max" magnification level and a dropdown scroll menu will display.

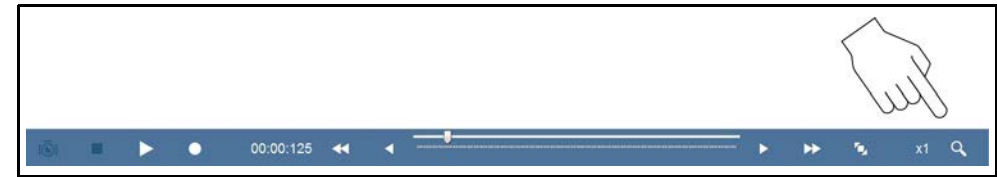
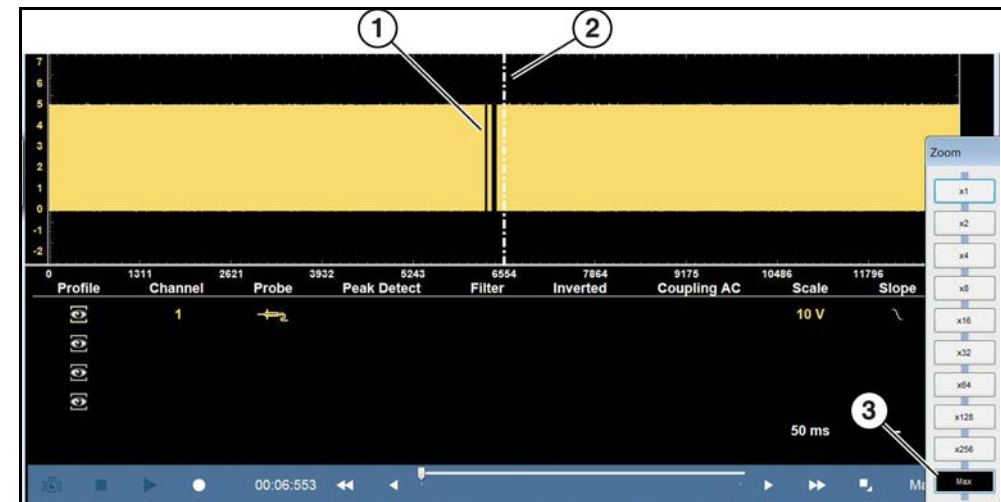


Figure 8-53 Zoom Icon

The dropdown menu allows you to select the display magnification level from a range of 1X to 256X. The "Max" (maximum) option displays all data captured on one screen (Figure 8-54).



1. Glitch(s)
2. Zoom Cursor Zoom Magnification Level (Max shown)
3. Zoom Magnification Level (Max shown)

Figure 8-54 "Max" Magnification Level - displays all captured data

When zoom levels of 2X and higher are selected, a Zoom cursor (vertical dashed line) (Figure 8-54) displays onscreen. The cursor is used to quickly mark and navigate to points of interest or glitch in a captured waveform.

NOTE

To quickly identify a glitch in a pattern, it may be easier to initially view the waveform at a higher magnification level (e.g. 256X or "Max") to display the entire captured waveform, then lower the zoom level to 8X or 2X to review in detail.

The Zoom cursor can be used to mark the approximate position of a glitch and can be manually dragged onscreen to the desired position. The new cursor position will be centered on the screen when a lower magnification level is selected. *Figure 8-55* shows an example at 64X with the Zoom cursor positioned in the area of a signal drop glitch.

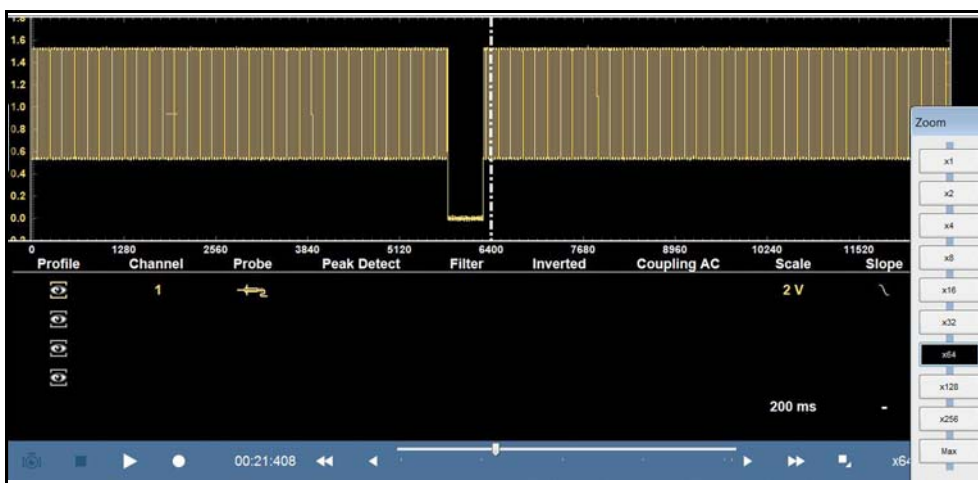


Figure 8-55

Figure 8-56 shows an example at 8X of the same waveform shown in *Figure 8-55*. In *Figure 8-56* at 8X, the glitch is easily seen as compared to higher magnification levels.

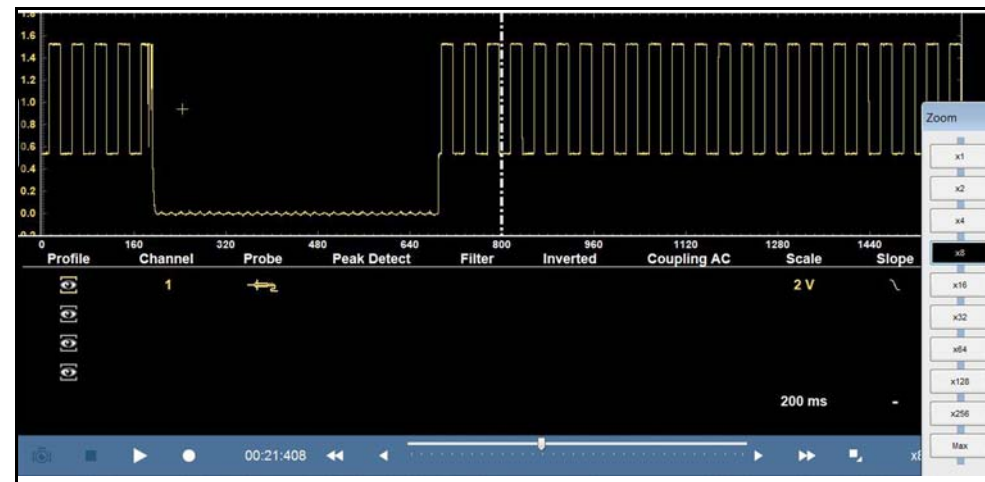


Figure 8-56

8.67 Test Leads and Accessories

Some of the leads, probes and adapters supplied with or that may be available, are explained in the following sections.

NOTE

Not all test leads and/or accessories may be available in all markets. Contact your sales representative for information, or to find out more about these and other available accessories.

IMPORTANT

Avoid damaging test leads, do not pull on the wire when removing the leads from their jacks. Pull only on the lead terminal end.



8.67.1 Channel 1 Lead

The shielded yellow lead is used with channel 1, and is color matched with the channel 1 jack on the diagnostic tool.

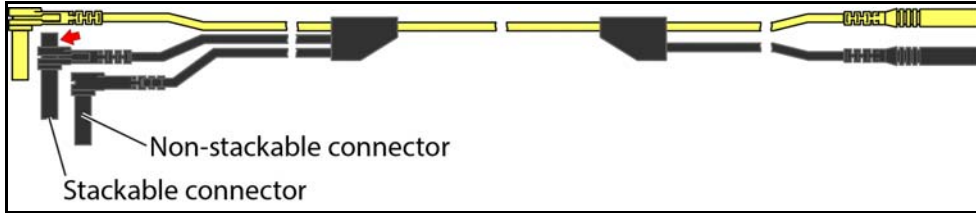


Figure 8-57 Yellow Channel 1 Lead

The channel 1 lead includes two black, right-angle common ground connectors:

- (1) **Non-stackable** - always connect to the ground (GND) jack on the diagnostic tool.
- (1) **Stackable** - connect to the channel 2 (green lead) stackable ground connector or other applicable lead ground connector.

The stackable ground lead is internally connected to the standard ground lead, therefore it does not need to be connected to the diagnostic tool ground jack.

8.67.2 Channel 2 Lead

The shielded green lead is used with channel 2, and is color matched with the channel 2 jack on the diagnostic tool. This lead also includes a black, right-angle stackable ground plug.



Figure 8-58 Green Channel 2 lead

8.67.3 Channel 3 Lead

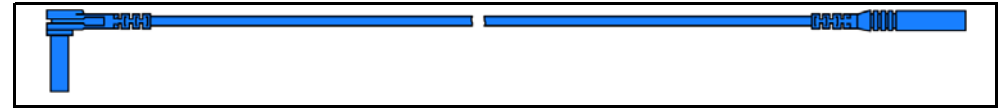


Figure 8-59 Blue Channel 3 lead

The non-shielded blue lead (*Figure 8-59*) is used for either Channel 3 or Digital Meter minus (-). The lead color matches the color of socket 3 on the Scope Module, as well as the color of trace 3 on the test screen.

8.67.4 Channel 4 Lead



Figure 8-60 Red Channel 4 lead

The non-shielded red lead (*Figure 8-60*) is used for either Channel 4 or Digital Meter plus (+). The lead color matches the color of socket 4 on the Scope Module, as well as the color of trace 4 on the test screen.

8.67.5 Alligator Clips and Probes

Insulated alligator clips and probes (pointed type) can be attached to the end of the test leads. Each alligator clip is color matched with a test lead, and the probes are available in red and black.

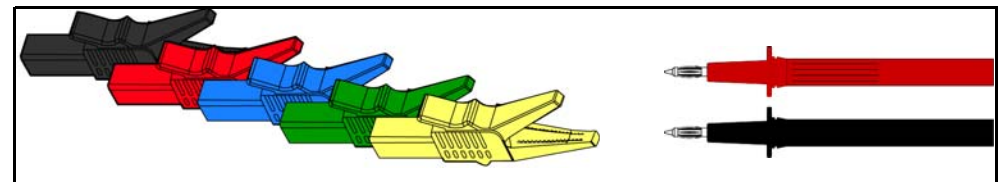


Figure 8-61



8.67.6 Secondary Ignition Coil Adapter Lead and Clip-on Adapter (optional)

The secondary ignition adapter lead can be used with the secondary ignition clip-on wire adapter, coil-in-cap (CIC), or coil-on-plug (COP) secondary ignition adapters to display secondary ignition signals. The clip-on adapter clips over a secondary ignition wire to pick up a signal, and the CIC and COP adapters attach to the ignition coil. The coil adapter lead includes a black, right-angle stackable ground plug, and a RCA type connector that is used to connect the lead to a secondary ignition adapter. The spring clamp is used to connect to a ground.

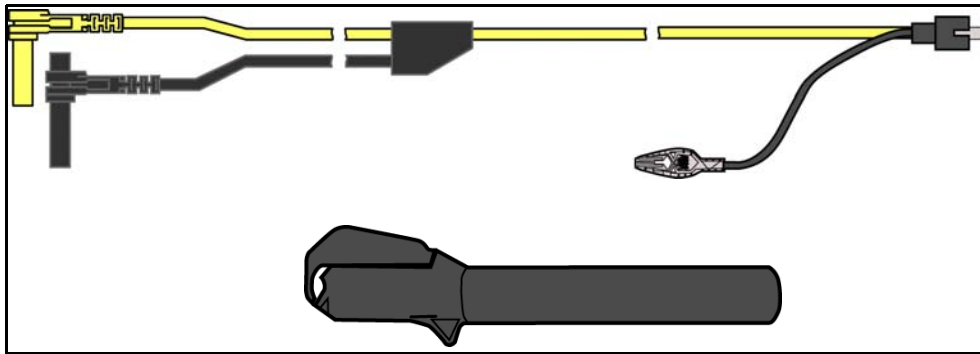


Figure 8-62 Secondary Ignition Coil Adapter Lead and Clip-on Wire Adapter

i NOTE

Contact your sales representative for additional information on OEM specific CIC and COP secondary ignition adapters.

8.67.7 Inductive RPM Pickup Adapter (optional)



Figure 8-63 Inductive RPM Pickup adapter

The optional Inductive RPM Pickup adapter ([Figure 8-63](#)) connects to the scope auxiliary connector of the diagnostic tool with a DB9F plug. It can be used to trigger

a waveform or display RPM. With the Ignition Scope, the RPM Pickup connects to cylinder number one to establish the firing order.

8.67.8 Low Amp Current Probe (optional)

The Low Amp Current Probe is used to measure AC or DC current up to 60A. This probe includes two scales (0 to 20A) and (0 to 60A) that can be used to provide accurate and reliable non-intrusive current measurement for components such as, ignition coils, fuel injectors, fuel pumps, relays, and electric motors.



Figure 8-64 Low Amp Current Probe

8.67.9 Temperature Probe Adapter (optional)

The temperature probe adapter can be used to measure temperatures ranging from -50°F to $1,800^{\circ}\text{F}$. Different probes are available for surface, fluid and air temperature measurements.



Figure 8-65



8.67.10 Pressure Transducers and Adapters (optional)

Different pressure transducers and adapters are available for measuring positive and negative gas and liquid pressures. Depending on the adapter, measurement capabilities range from 1 to 5000 psi and up to 29 inHg. Measurement and application capabilities vary per device.



Figure 8-66

8.67.11 Waveform Demonstration Tools (optional)

To help you sharpen your lab scope and graphing multimeter skills, optional waveform demonstration tools are available as a training aid. These demonstration tools generate common waveforms, and allow you to vary their display characteristics by turning glitches on/off, helping you to become more familiar with the lab scope controls. Common waveforms include, AC sine wave, variable frequency and pulse, secondary ignition, and more. There are two tools currently available, the standard model (Figure 8-67 left) and the vehicle simulator model (Figure 8-67 right) which produces waveforms (e.g. Crankshaft Position Sensor (CKP), Camshaft Position Sensor (CMP), Accelerator Pedal Sensor (APP), Wheel Speed Sensor (WSS) Signals, and more) representative of a 2012 BMW 328i Sedan.



Figure 8-67



8.68 General Reference

8.68.1 Basic Setup Tips (unknown signal type)

When conducting automotive diagnostics, situations may arise when you need to capture and analyze a signal that you are not familiar with, do not know what the intended waveform pattern should look like, or even how to set the scope to acquire the signal.

The following tips are intended to provide guidance, at the most basic level to assist you in your lab scope diagnostics.

Testing information and/or procedures for testing certain components may be available in the Guided Component Test function, see [Guided Component Tests on page 80](#) for additional information. If you have already narrowed down the system and/or component to test, ID the vehicle within the Guided Component Test function, and check the available tests first, as this may save you some time.

If the Guided Component Test function, does not have the test you are looking for, you need to determine a few things about what you are testing to get the scope / meter set up to capture a signal or make a measurement.

i NOTE

Testing information and known good waveform libraries may also be available from other sources. Obtaining correct testing reference information can be a key advantage in making sound repair decisions.

Listed below are a few basic questions to help narrow down the testing direction to follow.

- Are you looking to make or test a simple voltage or current level or maybe check resistance or continuity? Then you may want to use the DMM.
- Are you looking to check a circuit/component for an erratic dropout or make a frequency test? You may want to use the GMM.
- Do you need to see signal details (level, shape, frequency etc.)? The lab scope may be the best choice.
- Are you testing a DC or AC signal?
- What is the operating range of the circuit?
- Do you know what type or shape the intended waveform should be?

After answering the previous questions (at a minimum), you need to determine which Scope / Multimeter test function you are going to use (e.g. Lab Scope, DMM or GMM). See [Tests and Capabilities \(Quick Reference\) on page 90](#).

Once your test function is selected, you can now connect the test leads and select the applicable probe and scales:

Probe (test) type, see [Probe Icon on page 109](#)

Vertical scale, see [Scale \(Vertical / Y-axis\) on page 111](#)

Sweep scale, see [Sweep Scale \(X-axis\) on page 112](#)

Connect the test leads or probe, to the applicable test point(s). Always use the correct lead or probe designed for the test and ensure the signal and ground connections are clean and secure.

For the initial setup, you may wish to turn other channel settings off (e.g. Peak, Filter, Invert, AC Coupling, Threshold etc.), as these may affect the signal display. See [Control Panel and Settings on page 106](#).

As a default setting, trigger is normally off. The scope/meter uses internal circuitry to display a signal if present. However, in certain circumstances additional channel adjustments may be required, or the trigger mode may have to be turned on, for a signal that is present but not displayed. You may also need to readjust the vertical scale if set to low, in order to bring the signal into the viewable display area.

At this point you should have a visible signal on the screen. An ideal signal should be displayed within the area of the display.

- If the signal goes beyond the top and bottom of the display, try and readjust the vertical scale to a higher setting, to bring the signal into the viewable display area.

Use the zero baseline controls or move the zero baseline marker onscreen to move the zero baseline of the signal vertically on the screen to the desired position. See [Zero Baseline Adjustment on page 113](#).

- If the signal cycles are compressed (close to each other), try and readjust the sweep scale (horizontal scale) to a lower setting to display less cycles.

Once you have a usable signal displayed, if needed use the trigger function to stabilize a changing or erratic signal (a signal that may flicker or drift), so that it is easier to view. Try and set the trigger at the mid-point of the signal, and then adjust as needed from there. See [Triggers on page 116](#).

As all signals are different, and due to other variables, additional adjustments may be needed to get the signal displayed exactly how you need. Review the channel



settings section in this manual for additional information on using the settings. See [Control Panel and Settings](#) on page 106.

At this point you should have a signal displayed that will allow you to see the overall signal characteristics, and allow you to begin your diagnosis.

Comparing your captured waveforms to known good waveforms, can be a time saver and provide supporting evidence when trying to determine a fault. See the next section for additional information.

8.68.2 Using Known Good Waveforms

In some cases captured waveforms may not provide enough information to determine if a suspected sensor or circuit is at fault. Comparing the test vehicle waveforms to known good waveforms, can help to provide supporting evidence when trying to determine a fault.

Known good waveform examples may be available from different sources including the Guided Component Tests function, or from other sources.

As good practice, capturing waveforms before and after the repair will help you to build your own library of waveforms for future troubleshooting.

8.68.3 Troubleshooting Signals

When capturing signals, you may occasionally encounter problems with the way the signal initially displays. Noise, hash and fuzz are some of the terms used to describe unwanted signals displaying in or on the signal you are trying to capture, basically making the signal unclear. The following tips are intended to provide some basic guidance, to help resolve these types of issues if encountered.

- Make sure you have the correct test leads connected to the applicable test point(s) and test lead jacks on the diagnostic tool.
- Ensure the signal and ground connections are clean and secure, at the test points and diagnostic tool.
- Ensure the polarity of the test leads connections are correct.
- If using stackable connectors, try to isolate or only connect the leads being used to capture the signal.
- Make sure the ground lead is providing a direct ground from the circuit to the diagnostic tool test lead jack.
- Isolate the test leads from other components, leads, or systems that may induce unwanted noise into the signal being tested (e.g. electric motors, secondary ignition components, relays, alternators, etc.)

- Use the shortest test leads possible.
- Try different test leads, to verify the issue. Use the recommended snap-on leads or probes available for the diagnostic tool or equivalent. Shielded test leads are recommended.
- Check the test lead or probes for damage.
- Enable or disable channel controls also to help try and clean the signal:
 - [Peak Detect Icon](#)—maximizes sampling rate, but may pickup unwanted noise
 - [Filter Icon](#)—removes signal noise or interference
 - [Invert Icon](#)—switches signal polarity
 - [Coupling AC Icon](#)—blocks the DC portion of signal
 - [Threshold Auto/Manual \(GMM Only\)](#)—provides a more accurate measurement on select GMM tests where noise is present
 - [Scale \(Vertical / Y-axis\)](#)—adjusts vertical scale. Using a higher setting may provide a cleaner signal in some situations.

For signals that do not display or display off the screen, erratic, compressed etc.:

Use a trigger to help stabilize the signal. Try and set the trigger at the mid-point of the signal, and then adjust as needed from there. See [Triggers](#) on page 116.

If the signal wraps off the top and bottom of the display, try and readjust the vertical scale to a higher setting, to bring the signal into the viewable display area. See [Scale \(Vertical / Y-axis\)](#).

If the signal cycles are compressed (close to each other), try and readjust the sweep scale (horizontal scale) to a lower setting to display less cycles. Try a higher setting if the cycles are spread too far across the screen and seem flat. See [Sweep Scale \(X-axis\)](#).

Move the zero baseline marker to move the zero baseline of the signal vertically on the screen to the desired position. See [Zero Baseline Adjustment](#) on page 113.

- Check calibration of test leads or probe(s) if applicable. See [Test Lead / Probe Calibration](#) on page 97.



8.68.4 Units of Measurement / Conversions

Base Units	
(Symbol) / Unit Prefix	Typical Expressions
(μ) micro	0.000001 or 10^{-6} or 1/1,000,000
(m) milli	0.001 or 10^{-3} or 1/1,000
(c) centi	0.01 or 10^{-2} or 1/100
(k) kilo	10^3 or 1,000
(M) mega	10^6 or 1,000,000

Electrical Units	
(Symbol) / Description	Equivalents
(V) Voltage	$V = I \times R$
(I) Current	$I = V \div R$
(R) or (Ω) Resistance	$R = V \div I$
(Hz) Frequency	$f(\text{freq.}) = 1 \div T(\text{time})$ or 1 cycle per second

Voltage	
(μV) microvolt	1 μV = 0.000001 V
(mV) millivolt	1 mV = 0.001 V
(V) volt	1 V = 1000 mV
(kV) kilovolt	1kV = 1,000 Volts.

Ohms	
(mΩ) milliohm	1 mΩ = 0.001 ohms
(Ω) ohm	1 Ω = 1000 mΩ
(kΩ) kiloohm	1 kΩ = 1000 Ω
(MΩ) megaohm	1 MΩ = 1,000,000 Ω

Amperes	
(μA) microamps	1 μA = 0.000001 amps
(mA) milliamps	1 mA = 0.001 amps
(A) amps	1A = 1000 mA
(ka) kiloamps	1 ka = 1000 amps

Frequency	
(MHz) megahertz	1 MHz = 1,000,000 Hertz
(kHz) kilohertz	1 kHz = 1000 Hertz

Pressure Units	
(Symbol) / Description	Equivalents
(psi) pounds per square inch	1 psi = 6894.757 Pa 1 psi = 0.06894757 bar 1 psi = 2.036021 inHg
(bar)	1 bar = 14.50377 psi 1 bar = 100000 Pa 1 bar = 29.52999 inHg
(Mbar) Millibar	1 Mbar = 0.001 bar
(Pa) pascal	1 Pa = 0.0001450377 psi 1 Pa = 0.00001 bar 1 Pa = 0.0002952999 inHg
(kPa) KiloPasca	1 kPa = 1000 Pa
(MPa) Megapascal	1 MPa = 1,000,000 Pa
(inHg) inches of mercury	1 inHg = 0.03386388 bar 1 inHg = 0.4911541 psi 1 inHg = 3386.388 Pa

Pressure Conversions	
	psi x 0.0689 = bar
	psi x 6.8950 = kPa
	psi x 0.0703 = kg/cm ²
	bar x 14.5030 = psi
	bar x 100.0000 = kPa
	bar x 29.5300 = inHg (60°F)
	kPa x 0.1450 = psi
	kPa x 0.0100 = bar
	kPa x 0.0102 = kg/cm ²
	kPa x 0.295299 = inHg
	kg/cm ² x 98.0700 = psi
	kg/cm ² x 0.9807 = bar
	kg/cm ² x 14.2200 = kPa
	inHg (60°) x 0.0333 = bar
	inHg (60°) x 3.3770 = kPa
	inHg (60°) x 0.0344 = kg/cm ²
	inHg x 25.4 = mmHg
	mmHg x 0.003994 = inHg

**Temperature Units**

(Symbol) / Description	Conversions
(°C) degree Celsius	$^{\circ}\text{C} = 0.556 \times (^{\circ}\text{F} - 32)$
(°F) degree Fahrenheit	$^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$

Time Units

(Symbol) / Description	Equivalents
(μs) microsecond	$1 \mu\text{s} = 0.000001$ of a second
(ms) millisecond	$1 \text{ms} = 0.001$ of a second
(s) second	$1 \text{s} = 1000 \text{ms}$

Duty % to Dwell Conversions

Duty Cycle	Dwell		
	4 cyl	6 cyl	8 cyl
%			
10	9.0	6.0	4.5
20	18.0	12.0	9.0
30	27.0	18.0	13.5
40	36.0	24.0	18.0
50	45.0	30.0	22.5
60	54.0	36.0	27.0
70	63.0	42.0	31.5
80	72.0	48.0	36.0
90	81.0	54.0	40.5
100	90.0	60.0	45.0



8.68.5 Glossary of Common Terms

Term / Abbreviation	Description
AC	Alternating Current - electrical current that switches polarity at regular intervals.
Aliasing	An effect that causes an incorrect signal to be displayed and/or causes a trigger to malfunction, due to the input signal exceeding the sample rate of the scope.
Amperage	The strength of an electric current, expressed in amperes
Amplitude	Vertical magnitude (level or position) of a signal, or the varying quantity from its zero value.
Buffer	An electronic reservoir for temporary storage of data.
Cursor	Onscreen markers used to measure time, amplitude and frequency.
Coupling AC	Function used to subtract the average value of a signal so that small variations can be displayed in the waveform.
DC	Direct Current - electrical current that flows in one direction only.
Delta	Difference in time between two events.
Dropout	An intermittent or unwanted, vertical fall in a signal to zero that may cause an undesired result.
Duty cycle	Measurement of the length of a signals on time. Specified as a percentage (ratio), of the total cycle time.
Dwell	Used to measure a signals on time in degrees of dwell. Commonly used to measure mixture control solenoids on carbureted feedback engines and specified in duty cycle %.
Dwell 60	Measurement of the length of a signals on time displayed on a 0 to 60 degree scale. 0° = 0%; 30° = 50%; 60° = 100%.
Dwell 90	Measurement of the length of a signals on time displayed on a 0 to 90 degree scale. 0° = 0%; 45° = 50%; 90° = 100%.
Filter	Function used to filter or smooth out spikes and fast variations in signals.

Term / Abbreviation	Description
Frequency	The number of times a signal repeats in one second. Measured in Hertz (cycles per second).
Glitch	An intermittent or unwanted, error in a signal that may cause a false or undesired result.
Grid	The graph displayed on the scope screen that is made up of the x and y axis scales that aid in the measuring of signal characteristics.
Horizontal Scale	See Sweep Scale
Invert	Function used to switch signal polarity.
Lambda (λ)	Used to represent a numerical value denoting the actual measured air/fuel ratio with respect to the ideal air/fuel ratio at stoichiometry. Lambda equals one (1) when the actual air/fuel ratio is equal to the theoretical (stoichiometric) air/fuel ratio of 14.7 (14.66) to 1. Lambda less than 1 means excess fuel; greater than 1 means excess air.
Megasamples per second (MS/s)	Sample rate unit equal to one million samples per second.
Noise or Hash	Unwanted voltage, current or signal interference that is imposed on a signal.
Parasitic Voltage	Trace voltage in a circuit after the main power source is disconnected.
Peak	The maximum amplitude value present in a varying or alternating voltage. This value may be either positive or negative.
Peak Detect	Peak detect captures and evaluates all signal sample points, in order to display fast occurring events or glitches.
Pressure Transducer	Electronic device that converts pressures (negative/positive) to electrical signals.
Pulse	A signal with abrupt (fast) signal direction changes in a positive or negative direction, with consistent level and duration.
Pulse Period	One complete on and off cycle or time period.
Pulse Train	Collection of signal pulses traveling together.
Pulse Width (duration)	Measurement of a signals on time in a circuit that pulses on and off. Specified in units of time.
Pulse Width Modulation (PWM)	A signal that continuously cycles on and off while the on-time varies within each cycle.



Term / Abbreviation	Description
RMS	The RMS (root mean square) value of alternating currents and voltages is the effective current or voltage applied, rather than the peak current or voltage measurable. The AC RMS voltage value can be defined as the equivalent DC voltage of the AC voltage measured. RMS values are commonly used in AC electrical measurement, as they are more representative of DC measurements.
Sample Rate	Number of times (frequency) the scope/meter takes a sample of the signal. Specified in mega samples per second (MS/s).
Sampling	Process of obtaining a sequence of instantaneous values for a signal at regular or intermittent intervals. When a quantity of samples are collected the operational status of the device is determined.
Screen Update Rate	How often the captured data is (updated) displayed on the screen.
Signal	Detectable voltage, current, or magnetic field, by which specific information is transmitted in an electronic circuit or system.
Square Wave	A square or rectangular waveform (digital) which alternately switches high to low (on/off) for specific lengths of time, that has very fast rise and fall times.
Sweep Scale	The horizontal scale on the grid. Also referred to as time scale or x axis.
Threshold	The threshold function automatically sets a trigger and determines a threshold level in the middle of the signal range (calculated from the Min and Max measurements) to be used as a reference point to calculate the measurement.
Trace	The actual visible line displayed on the scope screen.
Trigger	A conditional function that initiates if and when a trace is drawn on the screen.
Trigger Slope	The slope that a trigger source signal must reach before the trigger circuit initiates a sweep.
VAC	Volts Alternating Current.
VDC	Volts Direct Current.

Term / Abbreviation	Description
Vertical Scale	The vertical scale on the grid or (y-axis) represents what is being measured (voltage, amperage, pressure etc.), and the unit of measurement it is being measured in.
Volt	Unit of electric potential difference.
Voltage	Electromotive force or potential difference, expressed in volts.
Voltage (inductive) Kick	A voltage, many times higher than the applied voltage, produced by the collapsing magnetic field in a coil when the current through it is abruptly terminated.
Waveform	The graphic representation (form) of a signal over time, which the trace displays on the screen.
Zero Base Line	Reference setting or 0% level of a graph scale.



The **INFORMATION** function provides you proprietary access to vehicle specific repair and diagnostic information, from our exclusive online **Snap-on Information** automotive repair database. The function is basically a one-stop-shop for all your troubleshooting reference needs, and includes detailed repair and maintenance information to help you fix the problem and get the vehicle back in service.

Snap-on Information Features:

- OEM recall and technical service bulletin information
- DTC lookup, providing descriptive DTC troubleshooting information
- Diagnostic step-by-step testing procedures
- Vehicle specific repair cost estimating with printable estimates
- Lubricant and fluid specifications
- Adjustment procedures and specifications
- Maintenance schedules and procedures, including printable forms
- Electrical connector and pin identification
- Printable component and system wiring diagrams
- Component locations, pictures and identification
- Battery connection and initialization information
- Component specifications
- Component operation/theory information
- Scope trace (waveform) examples
- CAN-Bus diagnostic and component reference information
- Dashboard warning light and indicator symbol information

.....and more!

i NOTE

Vehicle information (all types) may not be available for every vehicle, and or every vehicle system. Selections that are grayed out indicate information is not available.

Topic Links

- [Introduction](#) page 134
- [Getting Started](#) page 135
- [The Snap-on Information Application](#) page 136
- [Overview](#) page 140
- [Maintenance](#) page 140
- [Repair Data](#) page 142
- [Electronics](#) page 145
- [SmartPACK™](#) page 151

9.1 Introduction

The **Snap-on Information** service is included with current diagnostic tool system software. To use the **Snap-on Information** service you must have the current diagnostic software upgrade installed.

Approximately 30 days before expiration, a message ([Figure 9-1](#)) will be displayed as a reminder to keep your software current and retain your **Snap-on Information** access. Selecting **OK** will close the message and selecting **Snooze 1 Week** will close the message box for approximately one week and then it will re-appear.

i NOTE

To purchase software upgrades, see your Snap-on Representative.



Figure 9-1

9.1.1 Connection

To use the **Snap-on Information** service, you must have a strong Wi-Fi connection and access to the Internet. Internet access is required to connect to the exclusive online **Snap-on Information** site. To set up your Wi-Fi connection, see [Wi-Fi Setup on page 12](#).

Once you have established your Wi-Fi and Internet connection, select the **Information** icon ([Figure 9-2](#)) from home screen to begin using the service.



Figure 9-2 Information icon

9.1.2 Status (Alert) Messages

Depending on your software version and connection status the following messages may appear, informing you of status or action needed:

- **Content May Be Available!**—indicates content may be available, however you are not currently connected to the online site. This message may be caused by a Wi-Fi connection issue or if you do not have the current software upgrade installed.
- **Loading content**— indicates information is being updated from the online database.
- **A new diagnostic software upgrade is available. See your sales representative for details**—indicates your access to the online site will be expiring soon and you should contact your sales representative to purchase the current software upgrade.
- **Your access has expired. See your Snap-on representative to renew.**— indicates your access to the online site has expired and you should contact your sales representative to purchase the current software upgrade.
- **Network unavailable.**—indicates that you have a connection problem with your wireless network.
- **Device not Found.**—indicates that your diagnostic tool is not registered in the information database. Contact customer support for assistance.

9.2 Getting Started

9.2.1 Vehicle Identification

Select the **Information** icon from home screen to begin using the online **Snap-on Information** service. Then the vehicle selection or the vehicle confirmation screen will open, depending if a vehicle is currently identified or not.

i NOTE

Vehicle identification is required to filter and display the specific technical information for the vehicle selected.

- If a vehicle is currently identified, a confirmation screen is displayed and by selecting **OK**, the vehicle information is automatically loaded and opens the Main screen ([Figure 9-4](#)).
- If a vehicle is not identified, a series of vehicle identification screens are displayed to allow you to enter the applicable information.



Identifying a vehicle:

1. From the Vehicle Make selection screen ([Figure 9-3](#)), select the **vehicle make (manufacturer)**.

Select Make					
ABARTH	ALFA ROMEO	AUDI	BMW	BUICK	CADILLAC
CHEVROLET	CHRYSLER	CITROEN	DACIA	DAEWOO	DAIHATSU
DODGE	DS	FIAT	FORD	HONDA	HYUNDAI
INFINITI	ISUZU	IVECO	JAGUAR	JEEP	KIA
LADA	LANCIA	LAND ROVER	LDV	LEXUS	LINCOLN
MAZDA	MERCEDES-BENZ	MG	MINI	MITSUBISHI	NISSAN
OPEL/VAUXHALL	PEUGEOT	PORSCHE	PROTON	RENAULT	ROVER
SAAB	SEAT	SKODA	SMART	SSANGYONG	SUBARU
SUZUKI	TOYOTA	TVR	VOLKSWAGEN	VOLVO	

Figure 9-3 Vehicle manufacturer list

2. Continue through the screen prompts to identify the vehicle by selecting the following:
 - Model
 - Year
 - Engine
 - Engine Details

A vehicle confirmation screen is displayed.

3. Select **OK** or **Cancel** to continue.

Selecting OK from the confirmation screen, opens the **Snap-on Information** application.

Vehicle Section Toolbar Functions

Toolbar functions from the vehicle selection screen, are as follows:

- **Back**—allows you to return to the previous screen
- **Configure Favorites**—allows you to create a favorites list of frequently selected vehicle makes
- **Favorites/Full List**—toggles the displayed vehicle make list between the full and favorites list views

9.3 The Snap-on Information Application

9.3.1 Main Screen

The main screen ([Figure 9-4](#)) is the central portal to all vehicle information and includes multiple tabs and functions.

Main screen features are shown in the following illustration, and descriptions with links are provided in this section.

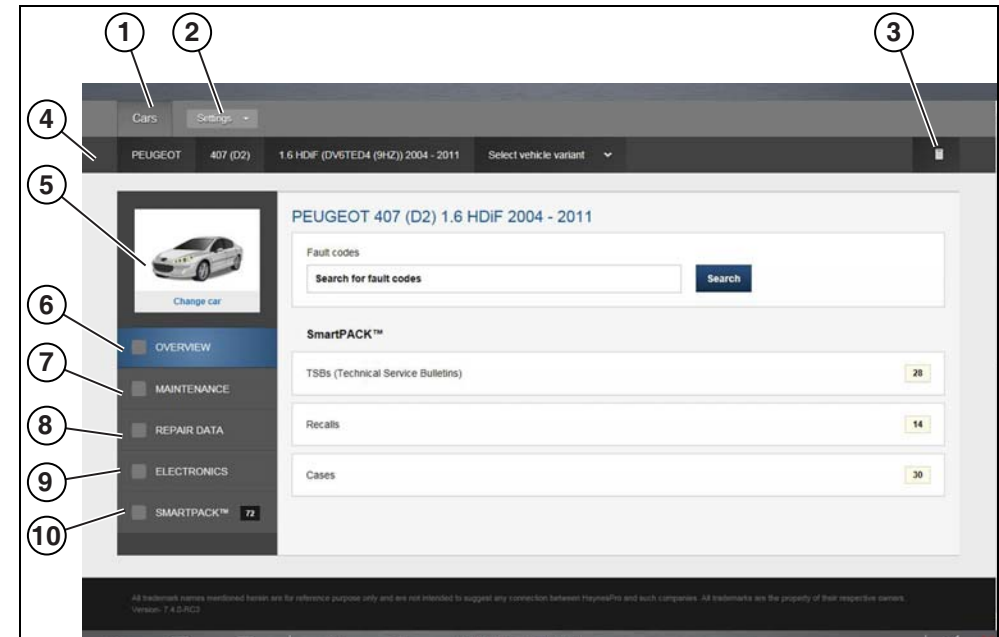


Figure 9-4 Main Screen Features

1. **Cars**—The Cars tab is available at all times from the main screen toolbar. Selecting Cars, allows you to change the vehicle and returns you to the Vehicle Selection screen. See [Selecting/Changing Vehicle](#) on page 137.
2. **Settings**—The Settings dropdown list is available at all times from the main screen toolbar and includes the following functions, Preferences, About and Logout. See [Settings](#) on page 137.
3. **Converter**—The Converter function is available at all times from the vehicle identification panel and provides basic metric to standard conversion functions for different units of measurement. See [Converter](#) on page 137.
4. **Vehicle Identification Panel**—Displays current vehicle model information in selectable tabs. Each vehicle category information tab can be selected to navigate back to that selection screen to make changes.
5. **Change Car Icon**—Selecting this icon allows you to quickly return to the vehicle model selection screen.
6. **Overview Tab**—[Overview](#) on page 140
7. **Maintenance Tab**—[Maintenance](#) on page 140
8. **Repair Data Tab**—[Repair Data](#) on page 142
9. **Electronics Tab**—[Electronics](#) on page 145
10. **SmartPack Tab**—[SmartPACK™](#) on page 151

Settings

The Settings dropdown menu is available at all times from the main screen toolbar and includes the following functions:

- **Preferences**
 - **User Information**—Allows you to enter and store your workshop contact information.
 - **Regional Settings**—Allows you to change system settings to your preferences.
 - **Financial Settings**—Allows you to set up to three different labor and Value-added Tax (VAT) rates to your preferences (used with cost estimating feature).
- **About**—Displays the **Snap-on Information** service license expiration date.
- **Terms of Service (“TOS”)**—Displays the **Snap-on Information** service end-user license agreement.

Converter

The Converter function ([Figure 9-5](#)) allows you to make basic metric to standard conversions for select units of measurement.



Figure 9-5 Converter Function (Pressure selected)

▶ To convert a value:

1. Select the desired unit of measurement tab from the left side.
2. Enter the numerical value.
3. Select **Convert**, then view the result.

Selecting/Changing Vehicle

▶ To change or select a new vehicle:

1. Select
 - the **Cars** tab, or
 - the current vehicle make from the vehicle information panel
 The vehicle make selection screen displays ([Figure 9-6](#)). The following display and search options are available:

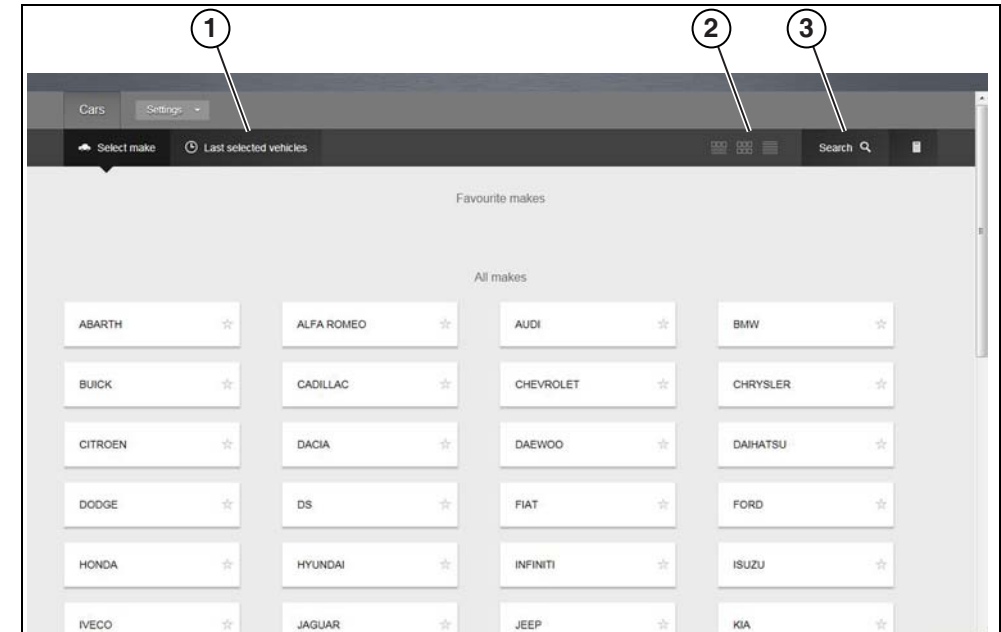


Figure 9-6 Vehicle Make Selection Screen Options (gallery view)

1. Last Selected Vehicles—select this tab to display and choose a vehicle from a previous session. see [To Choose a Previously Selected Vehicle or Open a Saved Work Order on page 139](#).
2. View display options—three view display options are available depending on your preference (list, gallery and split).
3. Search—use the search function to quickly find and choose a specific vehicle manufacturer.

After selecting the vehicle make, the Vehicle Base Model screen displays (Figure 9-7).

2. Select the **vehicle base model** from the list.

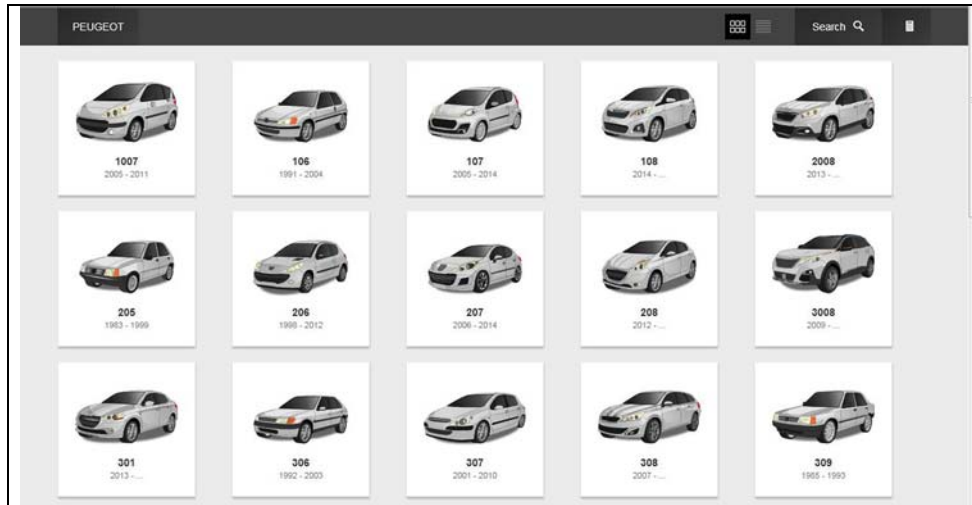


Figure 9-7 Vehicle Base Model Selection

After selecting the vehicle base model, the Vehicle Model Option screen displays (Figure 9-8).

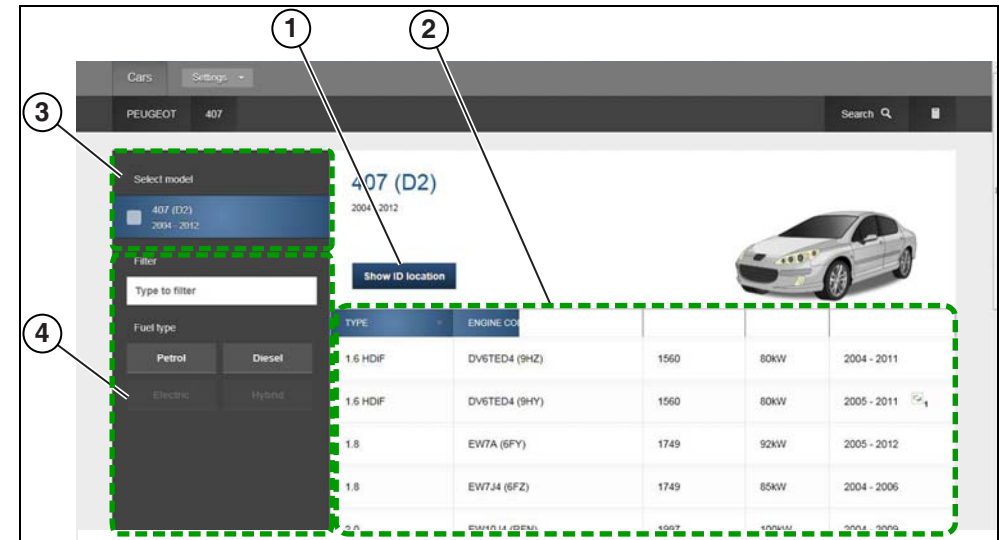


Figure 9-8 Vehicle Model Option Screen

1. Show ID Location icon—select to view the location of the vehicle ID
 2. Base Model Selection (specific)—select the specific base model by engine type, size and code
 3. Base Model Selection (general)—select the base model by general type
 4. Filter Criteria—use the filter criteria to sort by various categories (e.g. fuel type, vehicle type, etc.)
3. Select the specific vehicle model options from the menus.

NOTE

Several selections may be required to identify the vehicle model, follow the screen prompts and enter the required information.

- Select a general base model, then use the filter if needed to sort the results, and then choose a specific model from the list to continue.
- Each column in the detailed list is sortable, click on the column category tab to toggle the sort option between ascending and descending.

- If needed, select the **Show ID Location** icon, to access visual help information to find the location of vehicle identification numbers (*Figure 9-9*).

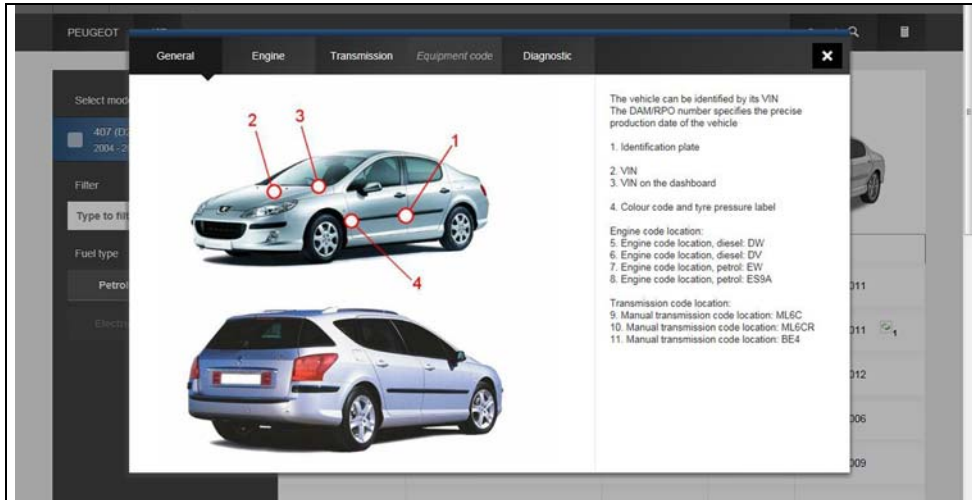


Figure 9-9 Show ID Location (result example)

When the vehicle selection is complete, the Main screen displays with the available vehicle information. See *Overview* on page 140 for additional information.

- To Choose a Previously Selected Vehicle or Open a Saved Work Order**
Select **Last Selected Vehicles** (*Figure 9-10*) from the vehicle make menu.

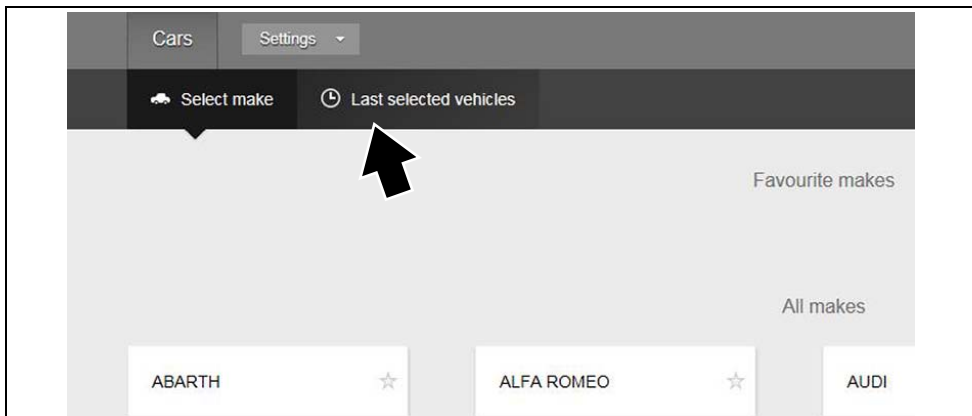


Figure 9-10

A list of the last ten vehicles selected is displayed. Vehicle records that include work orders are displayed with the work order number.

- To open the work order, select the **“Order number”** text (e.g. Order Number: 201711-0025) (*Figure 9-11* upper arrow).
- Selecting the vehicle description text or other areas in the frame will start a new session for that vehicle (*Figure 9-11* lower arrow).

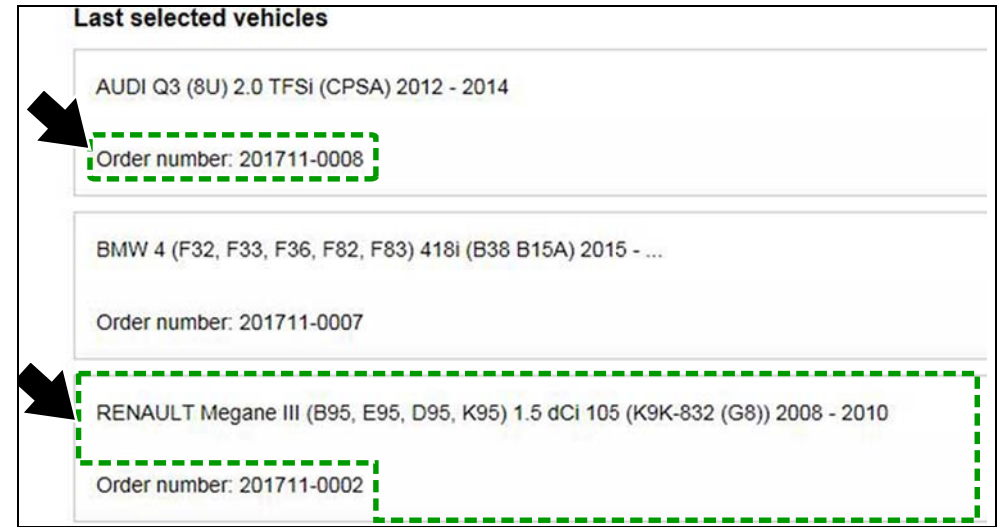


Figure 9-11

9.4 Overview

The Overview screen is a summary display of all available vehicle information, and includes multiple tab panels and functions ([Figure 9-12](#)). Overview screen features are shown in the following illustration, with descriptions provided below.

NOTE

To access the Overview screen at anytime, select the **Overview** tab from the main menu panel.

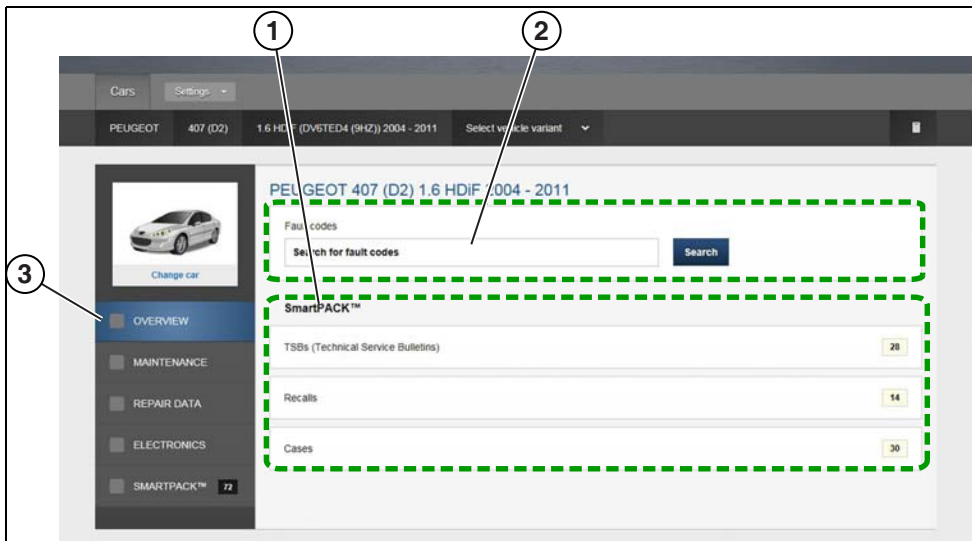


Figure 9-12 Overview Screen

1. SmartPACK Information Links—provides links to available diagnostic information (e.g. TSB's, Recalls, and Cases) [SmartPACK™ on page 151](#)
2. Fault Code Search—allows quick searches for specific DTCs, [Fault Code Search on page 140](#)
3. Overview Tab—displays the Overview screen

9.4.1 Fault Code Search

A search feature, is provided to help you quickly find vehicle specific DTC reference and related diagnostic information.

The DTC search results (if available) are displayed below the search field in a categorized list, by Electronic System, SmartCase, Recall data and TSB's.

Select the desired result, to view the information.

NOTE

After viewing the information, Select the **Back to Fault Codes Search** button to return to the result list.

Select the **Reset** button to clear the current code and start a new search.

9.5 Maintenance

Selecting Maintenance displays a submenu of all available vehicle maintenance information.

Submenu options may include the following:

- **Schedules** - ([Figure 9-13](#)) Vehicle specific maintenance schedules including estimated labour times, parts required, procedures and intervals.

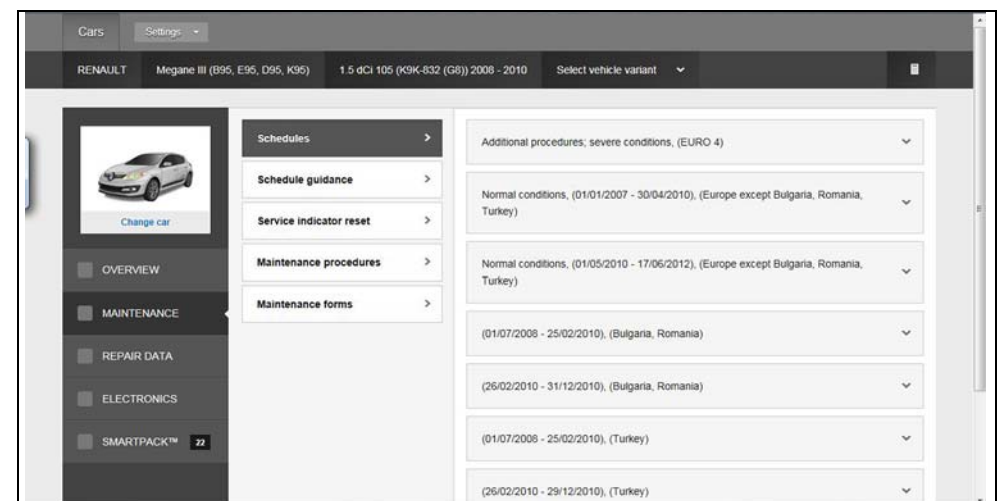


Figure 9-13



- **Schedule Guidance** - (Figure 9-14) Important notes and guidelines about the available schedules.

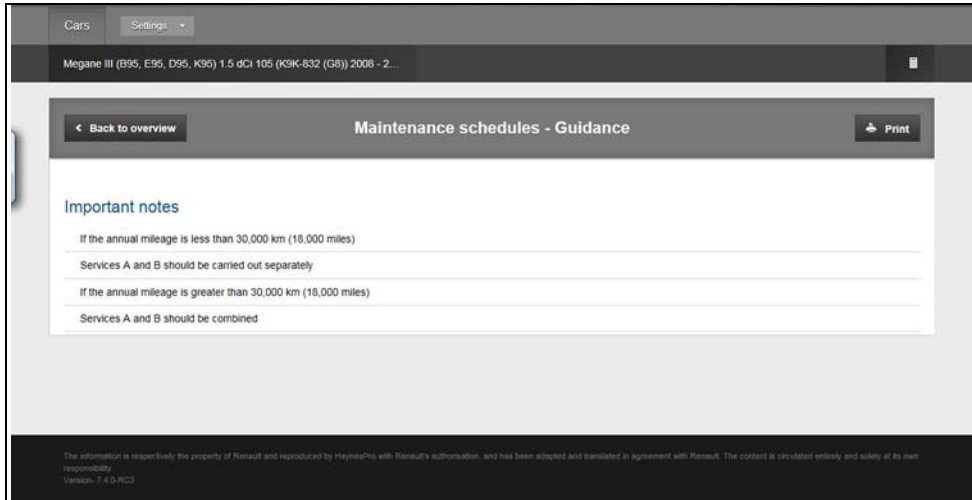


Figure 9-14

- **Service Indicator Reset** - (Figure 9-15) Indicator reset procedures.

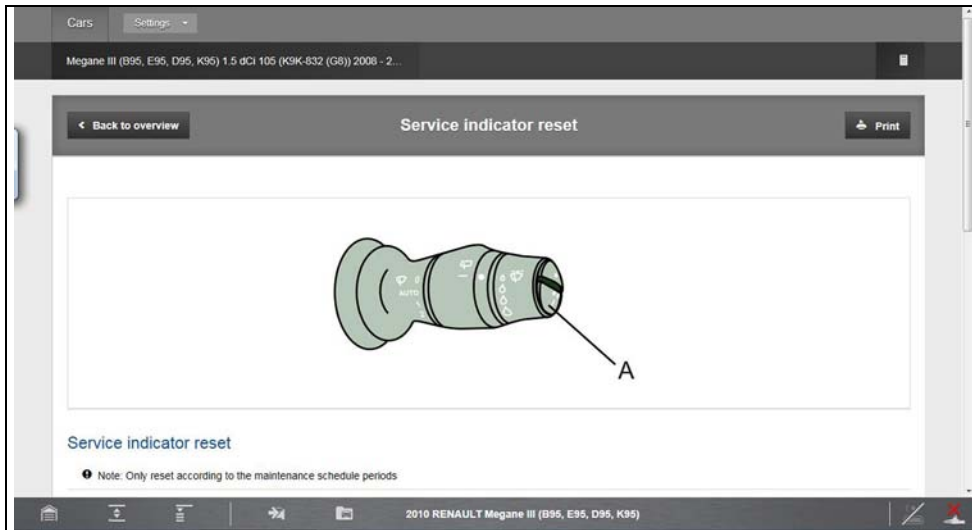


Figure 9-15

- **Maintenance Procedures** - (Figure 9-16) Instructions for common maintenance procedures.

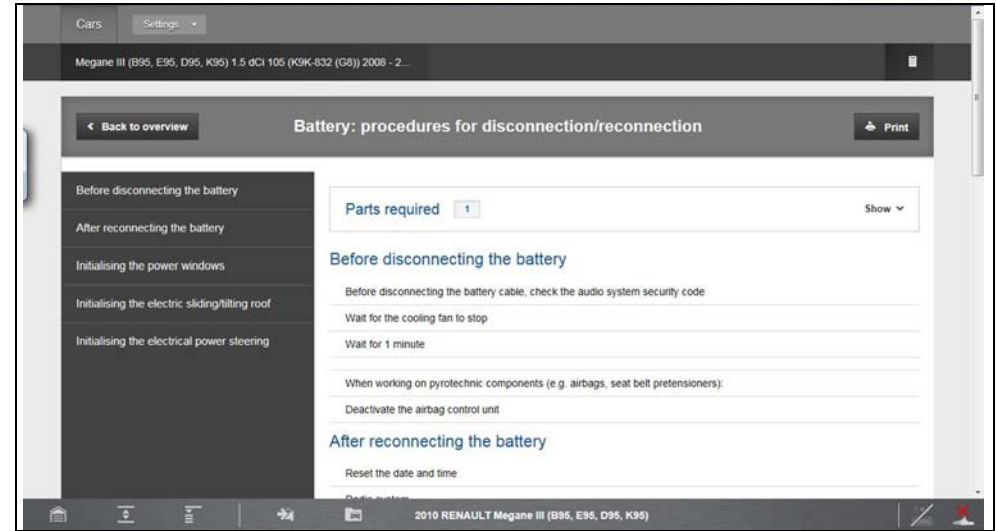


Figure 9-16

- **Maintenance Forms** - (Figure 9-17) Printable forms for common inspection reports.

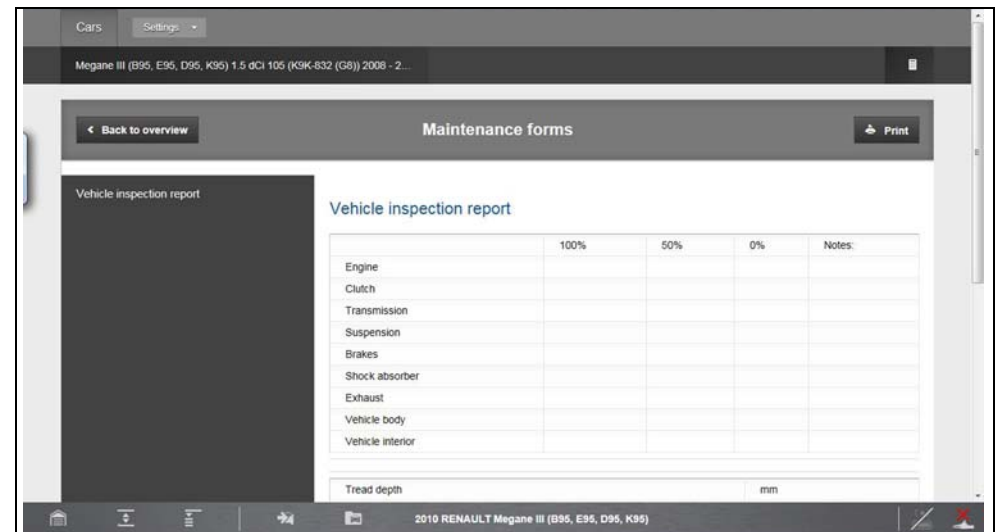


Figure 9-17

9.6 Repair Data

Selecting Repair Data, displays a submenu of all available vehicle repair information by system.

Submenu options may include the following systems ([Figure 9-18](#)):

- Engine
- Transmission
- Steering and Suspension
- Brakes
- Exterior/Interior

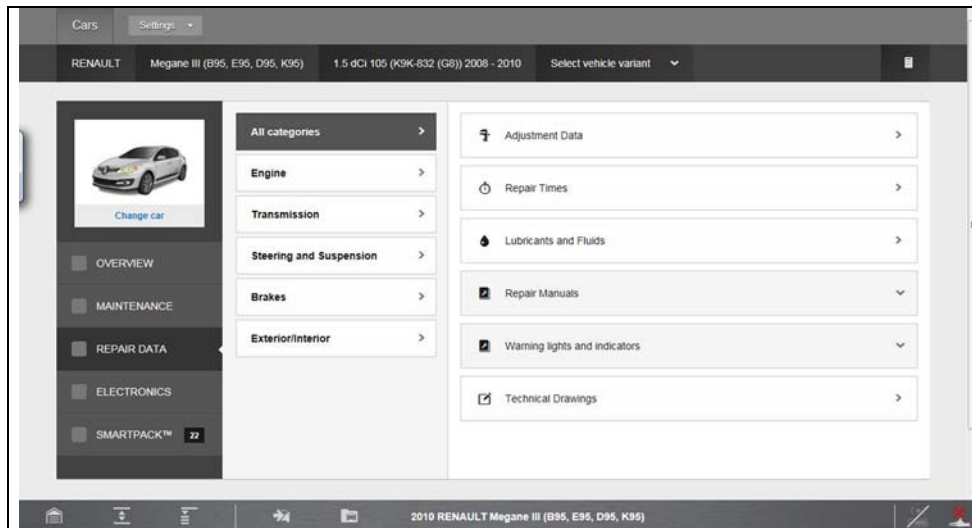


Figure 9-18

Repair Data information options may include ([Figure 9-18](#)):

- **Lubricants and Fluids** - Fluid and lubricant specifications, (e.g type, capacity, and fill/drain locations)
- **Repair Manuals** - Service and repair instructions, component installation and removal procedures
- **Warning Lights and Indicators** - Descriptions of the warning lights and indicators
- **Technical Drawings** - Illustrated and exploded drawings of assemblies with fastener torque specifications

- **Adjustment Data** - ([Figure 9-19](#)) General information and common vehicle maintenance and repair specifications

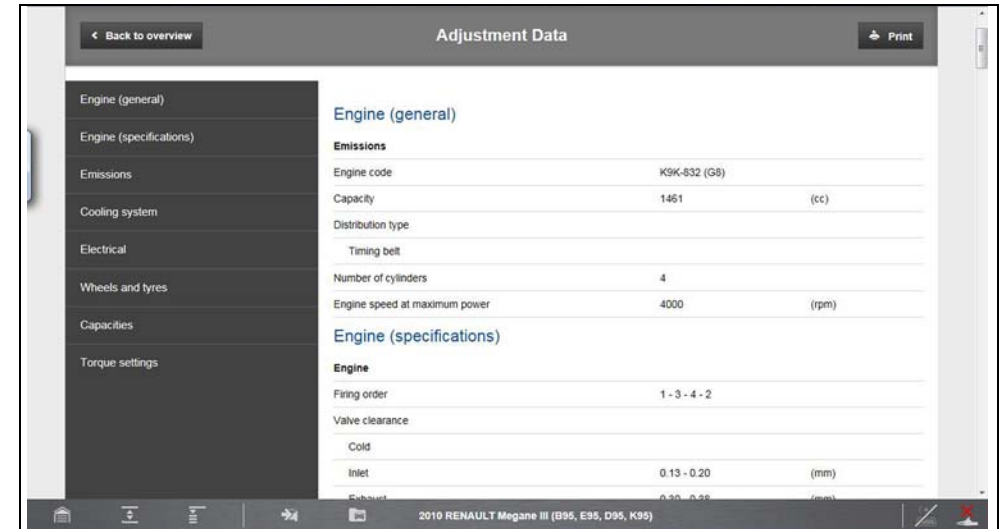


Figure 9-19

- **Repair Times** - Allows you to create a custom repair cost estimate for your customer using built-in recommended labor times and your shop labor rate.

- Create a custom cost estimate:**
1. Choose the applicable system (Figure 9-20) from the menu to display job options.

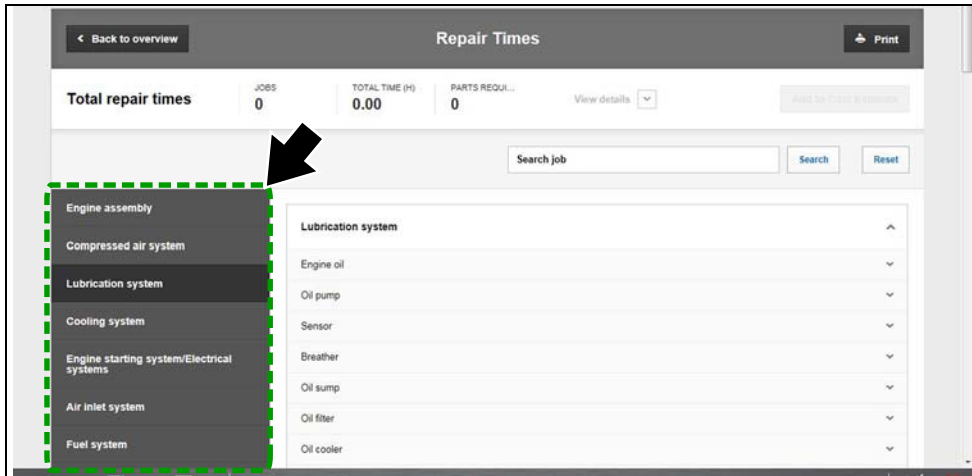


Figure 9-20

2. Choose the applicable job by selecting the + mark (Figure 9-21).

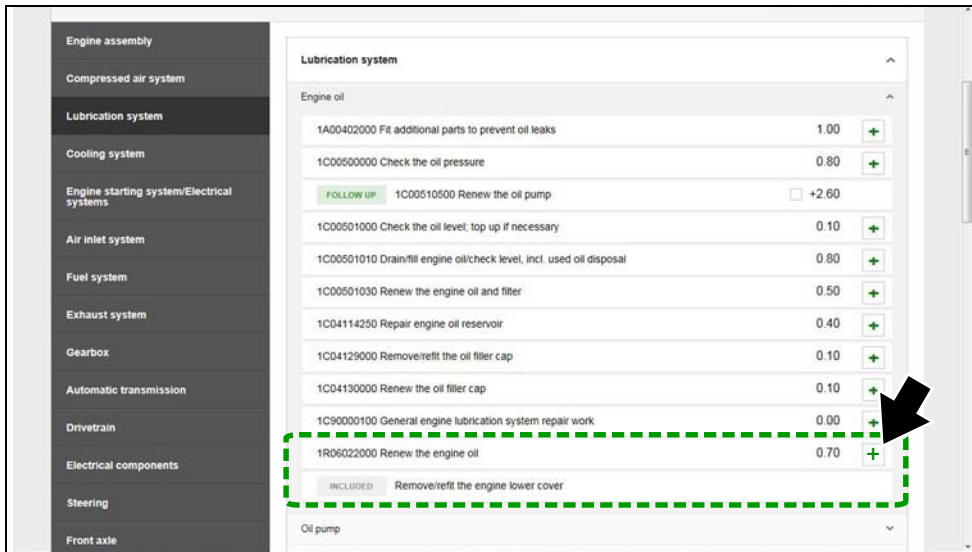


Figure 9-21

The selected job is added to the summary at the top of the page (Figure 9-22).

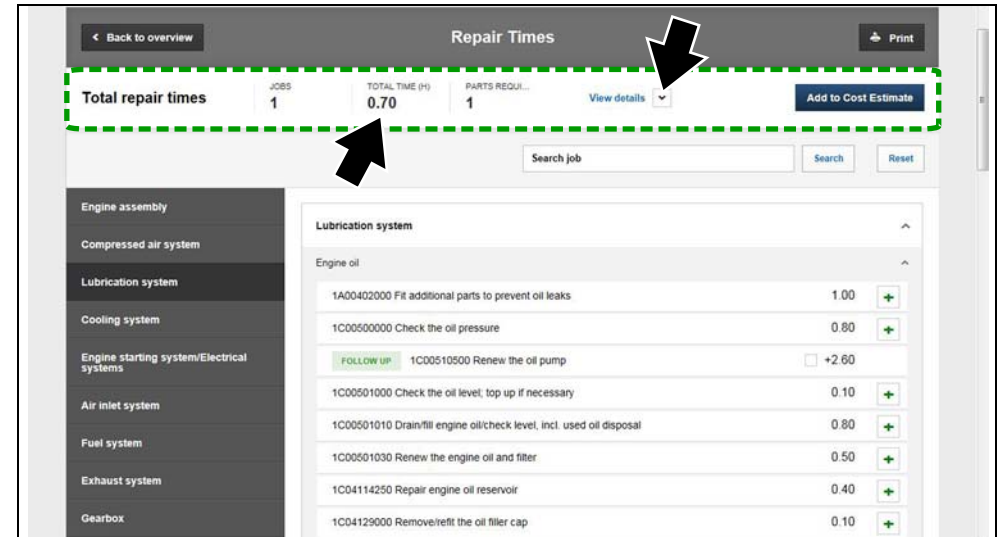


Figure 9-22

3. Select the **View Details** dropdown box to display your selections (Figure 9-23)

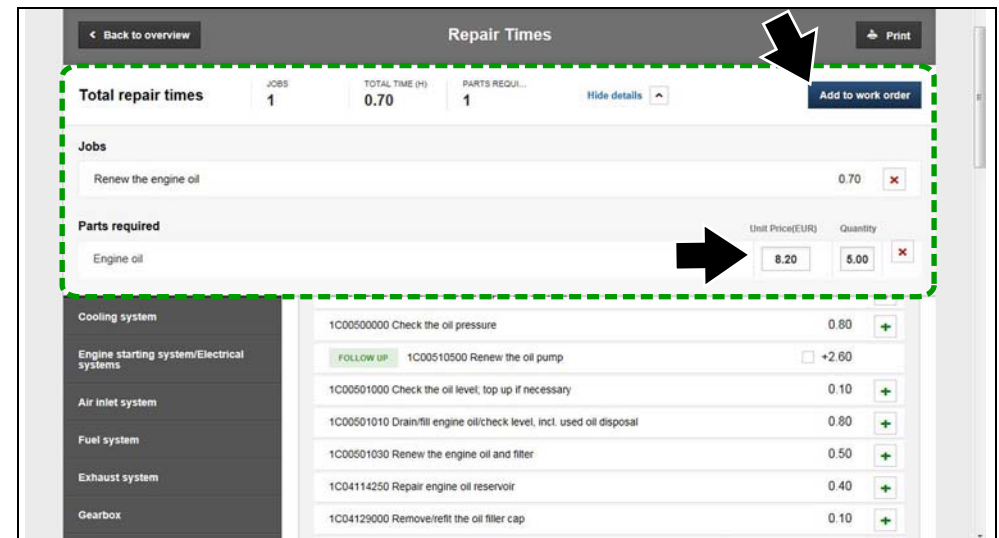


Figure 9-23



NOTE

To remove a job select the X mark.

4. Enter the “**Parts Required**” unit price and “**Quantity**” as needed (Figure 9-23). Select the + mark when finished.
5. When completed, select **Add to Cost Estimate** or **Add to Work Order** (Figure 9-23).

The Cost Estimate form displays (Figure 9-24).

RENAULT Megane III (B95, E95, D95, K95) 1.5 dCi 105 2008 - 2010
Add customer

VIN
254F6J890GD32D

Company name

First name
WILLIAM

Address

Post code

E-mail

Vehicle Registration Number
1235GFD

Phone

Last name
SMITH

Mobile Phone

City
ANY CITY

Notes/Customer observation

Enter vehicle and customer information

Jobs

	Rate (ALL)	Time (h)	With time margin (h)	Total (ALL)
Renew the engine oil	65.00	0.70	0.77	50.05
			Time margin 10 %	Total Time 0.77 (h)
+ Add Job				Subtotal ALL 50.05

* Parts may be required Repair Manuals Technical Drawings Lubricants and Fluids Adjustment Data

Parts

	Unit Price (ALL)	Quantity	Price (ALL)
Engine oil	6.00	6.00	36.00
+ Add Parts			Subtotal ALL 36.00

Grand Total	ALL 86
VAT Rate	20.00 %
VAT	ALL 17.21
Grand Total with	ALL 103.26

Reset
Save

Figure 9-24

6. Fill in all customer and vehicle information fields as required ([Figure 9-24](#)).
7. In the Jobs section of the form, select the applicable shop **labour rate** from the dropdown box ([Figure 9-24](#)).

i NOTE

You may set up to three custom labour rates. To setup shop labour rates, select the **Settings** dropdown box from the main screen and then select **Preferences**. Scroll down to the Financial Settings section to Labour Rates and VAT Rates. You may setup three labour rates and three VAT rates with custom names. Select **Save** when finished. These custom rate options are displayed in the dropdown boxes on the Cost Estimate form ([Figure 9-24](#)).

i NOTE

All editable value fields on the form may be changed manually. Select the field to make a change. Enter all applicable values using a decimal point.

8. Enter a **time margin percentage** if needed ([Figure 9-24](#)). The entered number will either increase or decrease the built-in "Time(h)" by the percentage entered. To enter a negative percentage (decrease %) enter "-" (e.g. -10.0).
9. In the Parts section of the form ([Figure 9-24](#)), make any needed changes.
10. Choose the applicable **VAT rate** ([Figure 9-24](#)). (As defined in Settings > Preferences, see note above).
11. When completed, select **Save** ([Figure 9-24](#)).

The Work Order manager screen displays ([Figure 9-25](#)). This is a list of all saved work orders. To open/edit a work order, select it from the list. Search and sort functions are provided to quickly find a record.

To view a saved work order after starting a new session, see [To Choose a Previously Selected Vehicle or Open a Saved Work Order](#) on page 139.

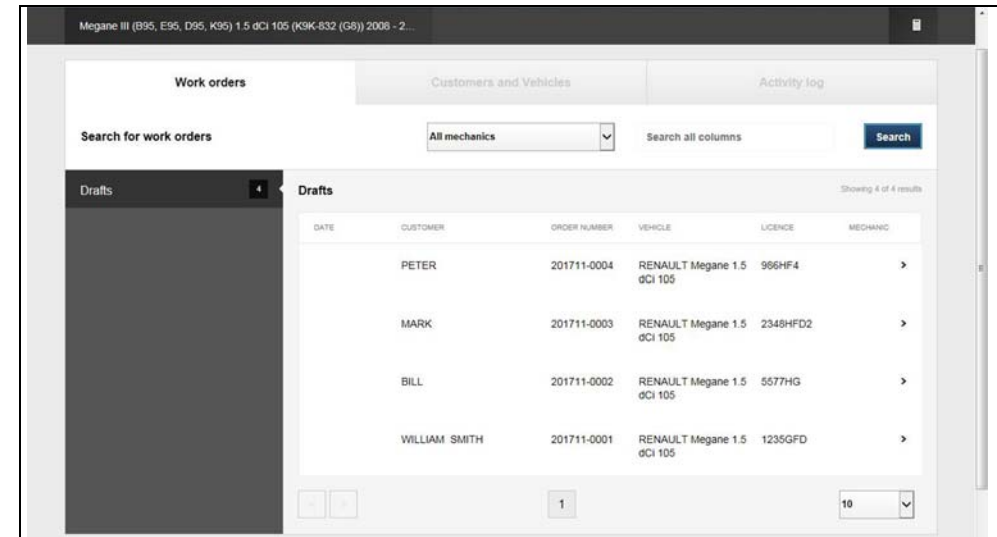


Figure 9-25

9.7 Electronics

Selecting the electronics tab, displays a submenu of all available vehicle electrical reference and testing information.

Submenu options may include the following:

- All Electronic Systems
- Engine
- Steering and Suspension
- Brake
- Exterior/Interior
- Fuses and Relays
- Locations
- Electronic Procedures
- Warning Lights and Indicators

i NOTE

To access the Electronics screen at anytime, select **Electronics** from the main menu panel.

The Electronics main screen feature locations are shown in the following illustration (*Figure 9-26*).

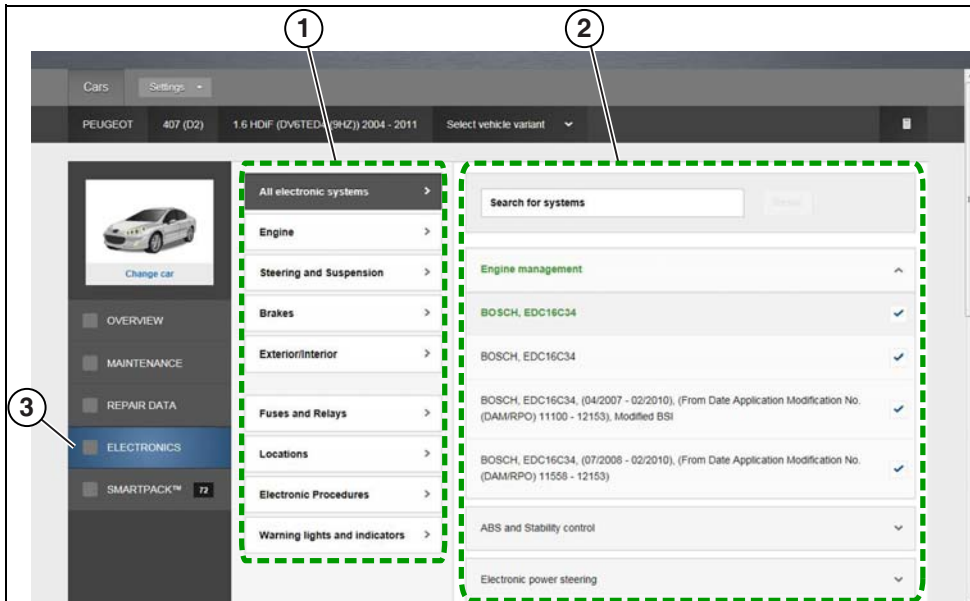


Figure 9-26 Electronics Main Screen

1. Submenu Panel—contains available electrical information category options. Select a tab to view the results.
2. Options Window—displays either additional option choices, or results depending on the category selected.
3. Electronics Tab

9.7.1 Electronic Systems

Electronic Systems can provide you with a summary of vehicle specific electronic systems diagnostic and reference data, by using selected filtering based on vehicle features and components. This ensures that the data results are correct for the specified vehicle.

▶ Navigating the Electronic Systems tab:

1. Select the **Electronic Systems** tab.
2. Choose the sub-menu system category.
3. Electronic vehicle system options are displayed in the options window (*Figure 9-27*).

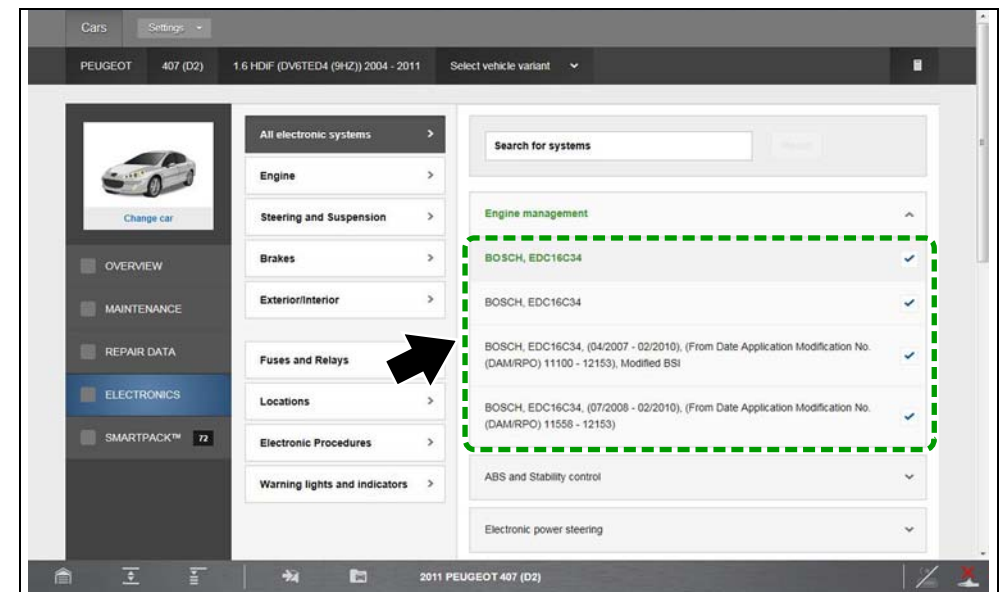


Figure 9-27 Electronic Systems Options Window

4. Choose the specific control system a system.
5. Scroll to the bottom of the options window and select the **Continue to Electronic Systems** button.

The Electronic Systems screen is displayed (*Figure 9-28*). This screen includes the following function tabs:

- Components
- CAN-Bus Overview
- Fault Code Diagnosis
- Locations

Each function is described in the following sections.

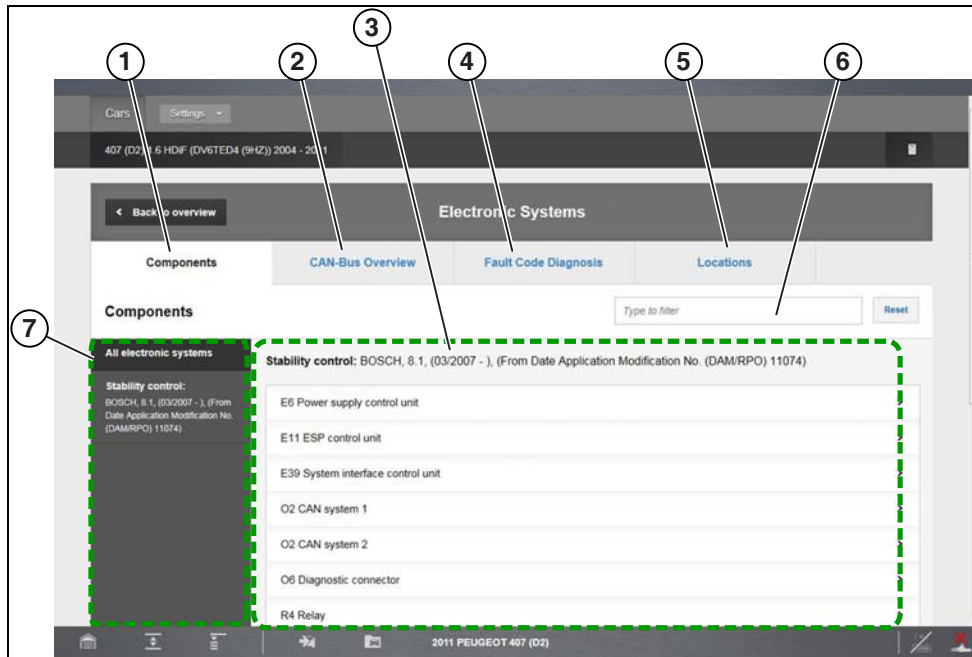


Figure 9-28 Electronic Systems Screen

1. Components Tab
2. CAN-Bus Overview Tab
3. System Component Results List
4. Fault Code Diagnosis Tab
5. Location Tab
6. Filter Results Field
7. List of All Systems

Components

The Components screen (*Figure 9-29*) provides detailed component diagnostic and reference information.

Selecting the **Components** tab displays:

- a list of the selected control systems
- a selectable list of all the components used within all the vehicle systems

To view specific component information, select a component from the list.

NOTE

Some diagrams may include “hotspots” (embedded links) on components, that are linked to related repair information or procedures.

The following is an example of some of the information found within the component information:

- diagnostic step-by-step testing procedures (scheme)
- wiring diagrams
- connector and pin identification
- component location
- component pictures and identification
- reference and initialization information
- specifications
- operation/theory information
- scope trace examples

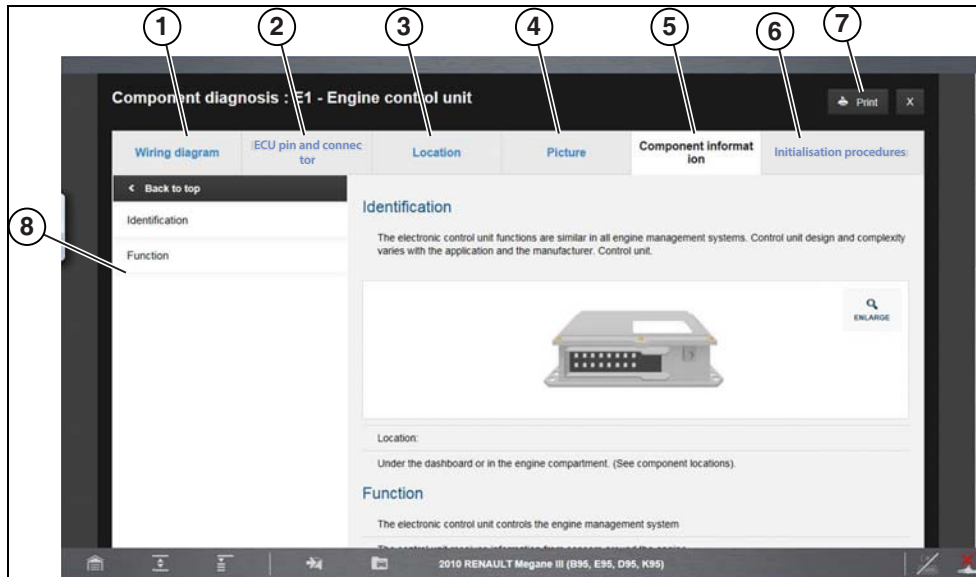


Figure 9-29 Component Information Screen (Component Information selected)

1. Wiring Diagram
2. ECU Pin and Connector
3. Location
4. Picture
5. Component Information
6. Initialisation Procedures
7. Print Icon (see [Printing / Printer Setup](#) on page 19)
8. Diagnostic Testing Procedure and Diagram

i NOTE

For a more detailed view of wiring diagrams, and images use touch screen pinch to zoom screen gestures to zoom in/out.

CAN-Bus Overview

The CAN-Bus Overview screen ([Figure 9-30](#)) provides detailed information about the components used on each Bus. A basic diagram of each Bus is provided to display the connected components/circuits contained within each Bus. Each component on the Bus diagram is selectable and linked to its own individual component information diagnostic screen. Select a component from the diagram to view the information.

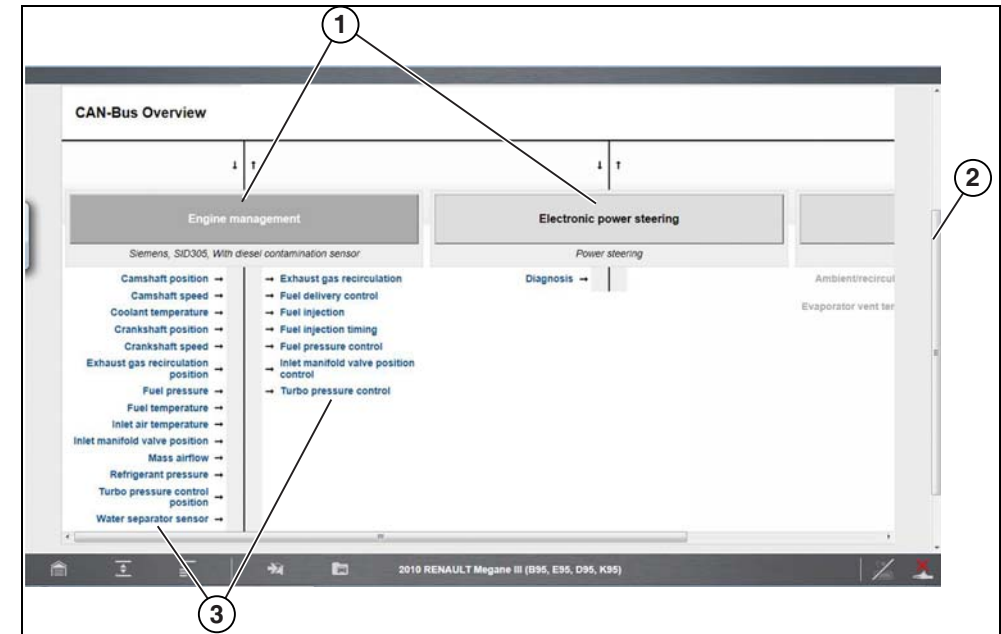


Figure 9-30 CAN-Bus Information Screen

1. CAN-Bus Diagrams
2. Scroll Bars (vertical and horizontal (*not shown*))
3. CAN-Bus Components (selectable)

Fault Code Diagnosis

Fault Code Diagnosis allows you to search (Figure 9-31) for a specific DTC, and view related component information for diagnostic purposes.

▶ Using the Fault Code Diagnosis Search Function:

1. Select the **Fault Code Diagnosis** tab.
2. Enter a DTC into the search field.
3. If results are available, select a DTC to display related component diagnostic information and/or links.
4. Select the desired component to display detailed component information.

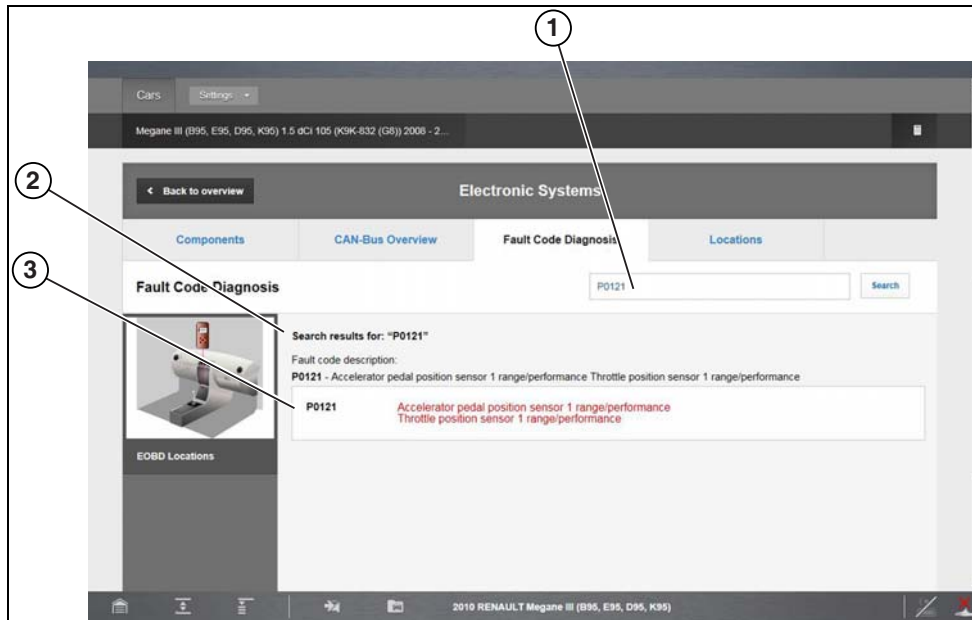


Figure 9-31 Fault Code Diagnosis Screen

1. Fault Code Search Field
2. Fault Code Results and Description
3. Fault Code Related Components (with selectable diagnosis links)

Locations

Locations allows you to quickly pick or search for specific component location. Components are categorized in the left menu panel and results are shown in the main screen (Figure 9-32). Filter your search either by selecting from one of the menu items or entering a keyword to search in the search field.

▶ Using the Fault Code Diagnosis Search Function:

1. Select the **Fault Code Diagnosis** tab.
2. Enter a DTC into the search field.
3. If results are available, select a DTC to display related component diagnostic information and/or links.
4. Select the desired component to display detailed component information.

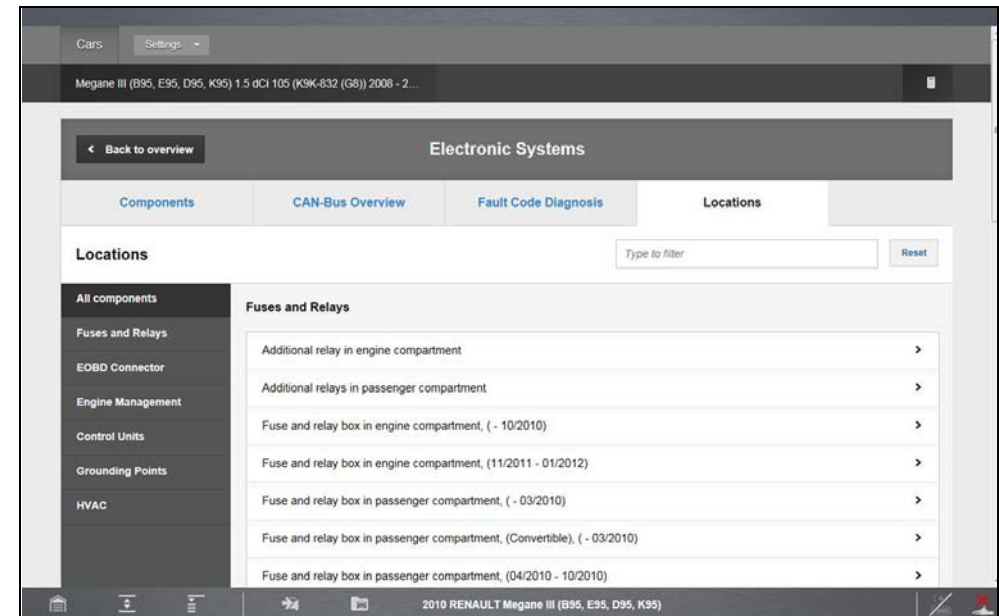


Figure 9-32 Component Location Screen

9.7.2 Fuses and Relays

This feature provides vehicle specific fuse, relay and related power distribution component location information ([Figure 9-33](#)). Descriptive and visual (e.g. diagrams and schematics) reference may be provided.

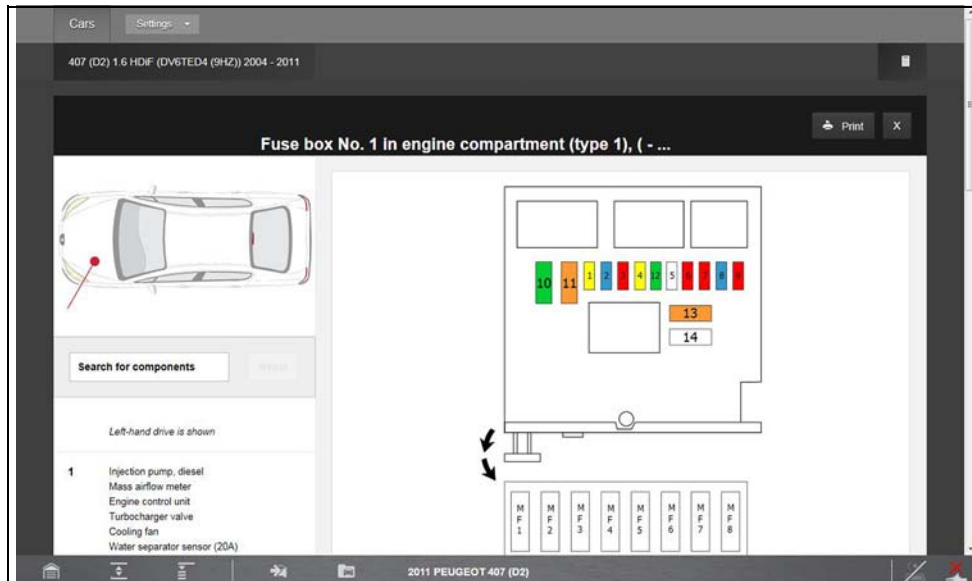


Figure 9-33 Fuse Box Fuse Identification example

9.7.3 Locations

The Locations features provides vehicle specific electrical component location information. Descriptive and visual (e.g. diagrams and schematics) reference may be provided for the following types of system components:

- Fuses and Relays
- EOBD Connector
- Engine Management Control Sensors and Modules
- Climate Control (HVAC) Sensors and Control Modules
- Grounding Points

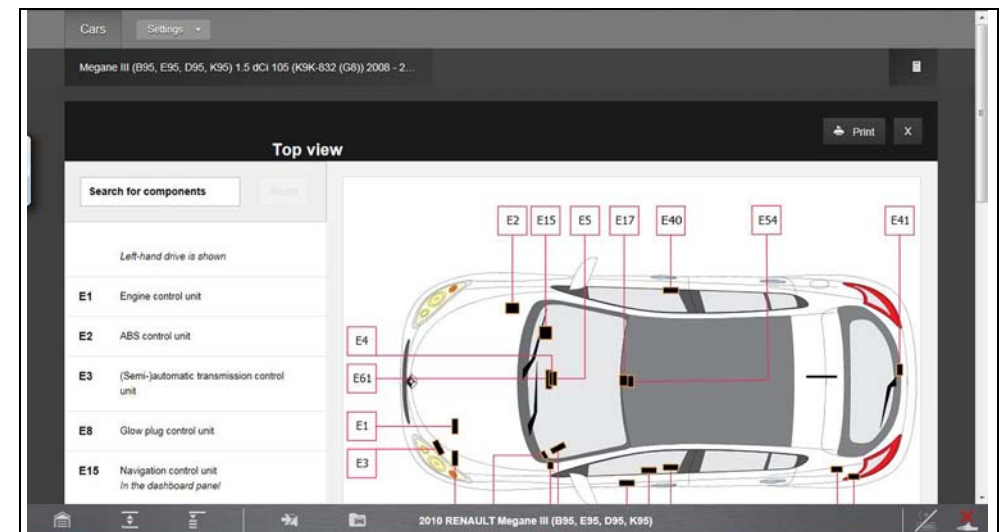


Figure 9-34 Component Location Information Screen (Control Module example)

9.7.4 Electronic Procedures

Electronic Procedures provides vehicle specific procedures for battery disconnection/connection, and reinitialization of electrical components or systems after battery connection.

9.7.5 Warning Lights and Indicators

Selecting **Warning Lights and Indicators**, provides access to a complete visual list of dashboard warning symbols, including descriptions and actions required.

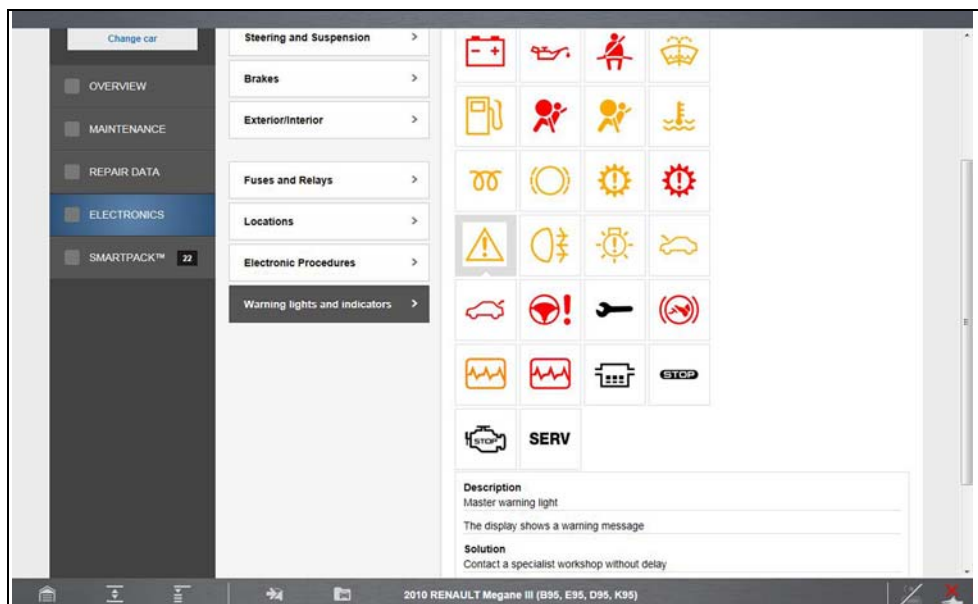


Figure 9-35 Warning Lights and Indicators Screen

9.8 SmartPACK™

Selecting the **SmartPACK** tab, displays a tab summary view of all available vehicle TSB's, Recalls and SmartCASE™ diagnostic and testing information. Each individual tab may be selected to view the applicable information.

NOTE

To access the SmartPACK screen at anytime, select **SmartPACK** from the main menu panel.

Results may be filtered using the **Vehicle Area** and **Fault Code** dropdown boxes located in the upper area of the main screen. Select the dropdown box and select a choice from the displayed options.

NOTE

The SmartPACK tab and the four main tabs (e.g. All, Recall Data etc.) include numerical indicators, to indicate the total number of records available.

The SmartPACK main screen feature locations are shown in the following illustration ([Figure 9-36](#)). The primary tab descriptions and functions are provided in the following sections.

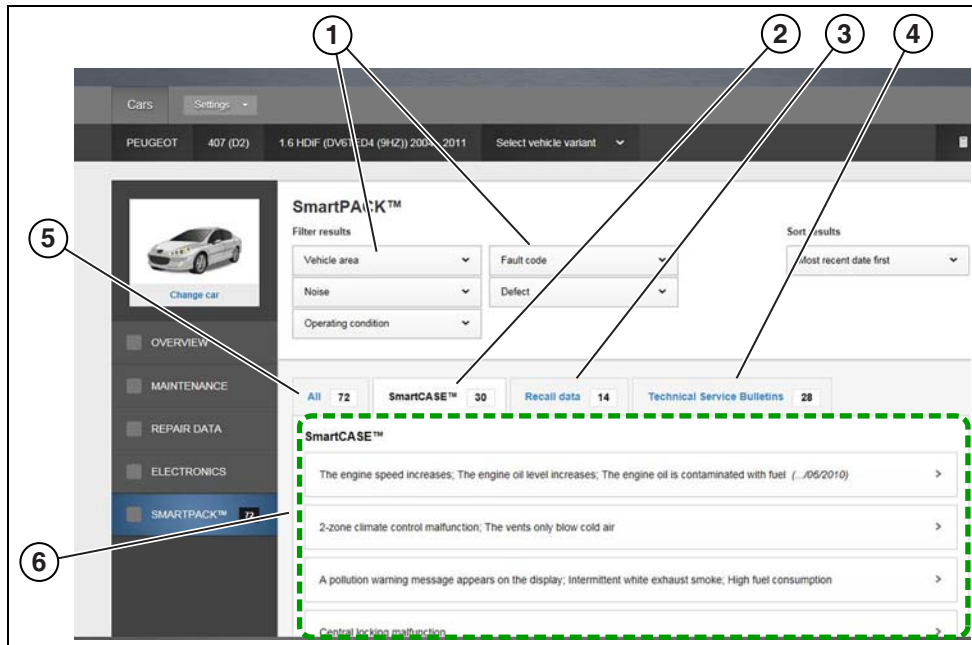


Figure 9-36 SmartPACK Main Screen (service bulletins tab selected)

1. Filter Results Dropdown Boxes—Vehicle Area and Fault Code criteria
2. SmartCASE Tab
3. Recall Data Tab
4. Technical Service Bulletins (TSB's) Tab
5. All Tab—displays a complete selectable list of all SmartCASE, Recall and TSB information
6. Main Window—displays results depending on the category selected

9.8.1 SmartCASE

SmartCASE is OEM-based technical (troubleshooting and repair) data for most European and Asian vehicles, sourced from industry experts. The data provided clearly describes technical problems, their causes and suggested solutions including verified fixes and tips.

Select a SmartCASE topic from the list of available topics to view detailed information about the problem including symptoms, causes, and solutions (Figure 9-37).

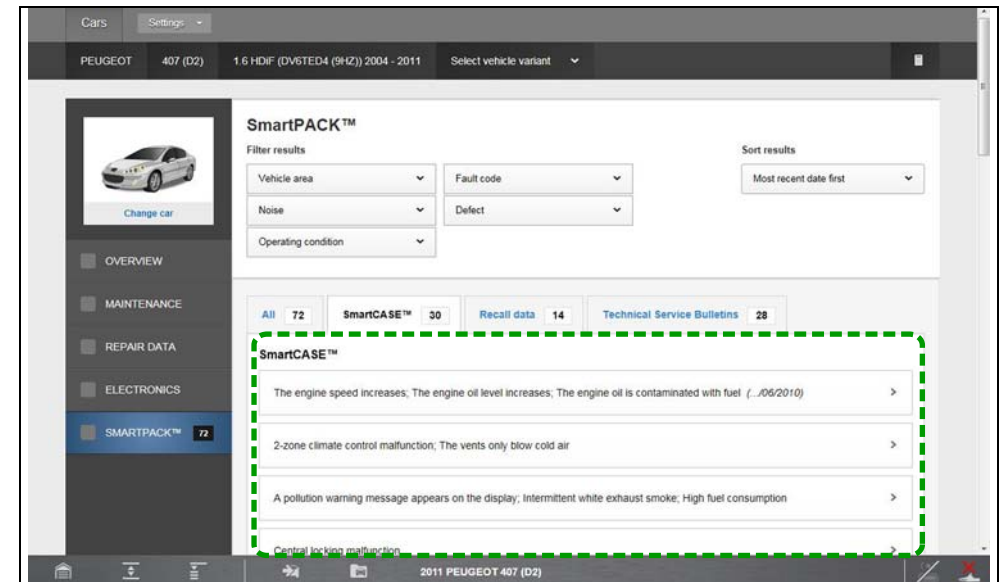


Figure 9-37 SmartCASE Results



9.8.2 Recall Data

Recall Data is OEM provided vehicle specific safety recall information. Each recall record includes a description of the defect and the required solution.

In addition, related subjects may be available which may provide additional applicable information related to the recall.

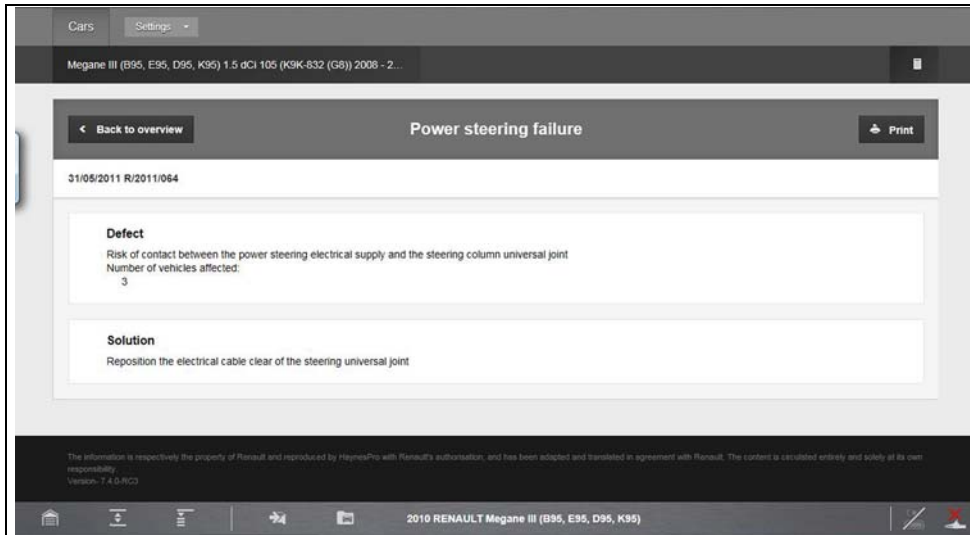


Figure 9-38 Recall example

9.8.3 Technical Service Bulletins

Technical Service Bulletins (TSB's) are OEM provided vehicle specific service information. Each TSB record includes a description of the symptom and cause, along with solutions, required parts, and suggested repair times.

In addition, Related subjects may be available which may provide additional applicable information related to the TSB.

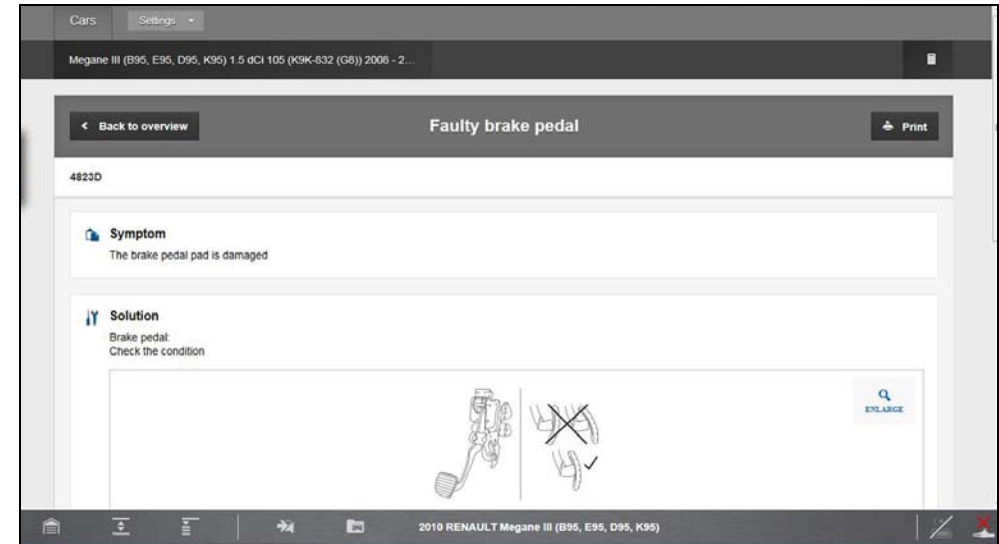


Figure 9-39 TSB example



Introduction



Selecting **Vehicle History** allows you to manage and retrieve vehicle records, for vehicles that have been previously identified. You can also reactivate a vehicle, eliminating the need identify a vehicle again when performing a retest after repairs have been made.

Main Topic Links

- [Vehicle Records List page 154](#)
- [Toolbar Icon Functions page 155](#)

10.9 Vehicle Records List

The Vehicle Records List screen (*Figure 10-1*) lists all of the available vehicle records.

Title	Year	Make	Model	SubModel	VIN	Color	Cust...	Post...	Status	Lice...	Tech...	Time-In	Created
2010 Chrysler Town & C...	2010	Chrysler	Town & Co...			2AMR						3/7/2017 3:32	3/7/2017 3:31 PM
1998 JEEP Cherokee	1998	JEEP	Cherokee									3/6/2017 7:5...	3/6/2017 7:52 AM
2006 Demonstration Ta...	2006	Demonstrat...	Tahoe (4W...			---K---						3/6/2017 7:4...	3/6/2017 7:49 AM
2006 Demonstration Ta...	2006	Demonstrat...	Tahoe (4W...			---K---						2/3/2017 3:3...	2/3/2017 3:31 PM
2008 LINCOLN MARK LT	2008	LINCOLN	MARK LT									2/2/2017 5:4...	2/2/2017 5:40 PM
1995 BUICK CENTURY	1995	BUICK	CENTURY									2/2/2017 4:1...	2/2/2017 4:14 PM
1997 BUICK CENTURY	1997	BUICK	CENTURY									2/2/2017 3:4...	2/2/2017 3:49 PM
2006 DODGE Magnum	2006	DODGE	Magnum									2/1/2017 2:1...	2/1/2017 2:11 PM
1995 BUICK SKYLARK	1995	BUICK	SKYLARK									1/31/2017 9:...	1/31/2017 9:49 PM
2006 Demonstration Ta...	2006	Demonstrat...	Tahoe (4W...			---K---						1/24/2017 3:...	1/24/2017 3:21 PM
2006 Demonstration Ta...	2006	Demonstrat...	Tahoe (4W...			---K---						1/24/2017 2:...	1/24/2017 2:04 PM
2006 Demonstration Ta...	2006	Demonstrat...	Tahoe (4W...			---K---						1/24/2017 1:...	1/24/2017 1:20 PM
2006 Demonstration Ta...	2006	Demonstrat...	Tahoe (4W...			---K---						1/23/2017 9:...	1/23/2017 9:15 PM
2006 Demonstration Ta...	2006	Demonstrat...	Tahoe (4W...			---K---						1/23/2017 4:...	1/23/2017 4:25 PM
2006 Demonstration Ta...	2006	Demonstrat...	Tahoe (4W...			---K---						1/20/2017 5:...	1/20/2017 5:55 PM
2006 Demonstration Ta...	2006	Demonstrat...	Tahoe (4W...			---K---						1/20/2017 3:...	1/20/2017 3:33 PM

1. Toolbar
2. Main Body (Records List)

Figure 10-1

By default, records are shown in the order in which they are entered. However, you can re-sort them by any of the categories shown as column headings. You can also resize the individual columns.



To sort records:

1. Select a category heading.
The listed items resort according to the selected category. A triangle appears alongside the name of the column that was used for the sort.
2. Select the triangle in the heading to reverse the sort order.

**To resize a column:**

1. Select the line separating two columns.
A line with arrowheads appears to show the column is ready for resizing.
2. Drag the line left or right to increase or decrease the column width.

10.10 Toolbar Icon Functions

The table below gives brief descriptions of the icons on the toolbar. Additional icon information is provided in the following sections.

Icon	Description
	Back - Returns to the previously viewed screen.
	Activate - Activates the selected vehicle, for use with other functions (e.g. Scanner, Guided Component Tests, etc). See Activate on page 155 .
	View - Opens the selected vehicle record. See View on page 155 .
	Delete - Deletes the selected vehicle record from memory. See Delete on page 156 .
	Manage - Opens the vehicle Manage Records screen. See Manage on page 156 .
	Search - Opens a window that allows you to locate a particular vehicle record. See Search and Show All on page 156 .
	Show All - Available only after a search, use to return to a complete vehicle records list. See Search and Show All on page 156 .
	Settings - Opens a window that allows you to configure which fields display on main records list screen. See Settings on page 157 .

10.10.1 Activate

Select **Activate** to activate a vehicle for use in other functions (e.g. Scanner, Guided Component Tests, etc.). The diagnostic tool will use the identification information stored in the vehicle history record to load the correct vehicle database, so there is no need to identify the vehicle again.

**To activate a vehicle:**

1. Locate and highlight the desired vehicle record on the records list screen.
2. Select **Activate** from the toolbar.
The Activate icon is removed from the toolbar once a vehicle has been selected.
3. Select the **Home** icon.
The Home screen displays with the activated vehicle shown on the toolbar.
4. Select a function icon from the Home screen to begin testing (e.g. Scanner).

10.10.2 View

Select **View** to open, edit, add notes, and print a vehicle record.

**To open and/or modify a vehicle record:**

1. Highlight the desired vehicle record from the vehicle records list screen, then double click it, or select **View** from the toolbar.

The record for the selected vehicle opens ([Figure 10-2](#)).

The vehicle record includes vehicle ID information, DTC data, and other data entry fields for owner and vehicle information, and technician notes.

Depending on the vehicle information that was used to identify the vehicle, some data may be already entered. The example below shows, DTC scan results from the last code scan performed, and an attachment "Vehicle System Report Data" PDF file.

Vehicle ID information is captured slightly different across the different functions (e.g. Scanner, Guided Component Tests, etc.), as some functions may capture more/less information during the process. Selecting the **Other Vehicle ID** button, opens a listing of the captured vehicle ID fields from each applicable function. If more than one function was used to ID the vehicle, you are given the option to use that vehicle ID set as the default ID for the vehicle record.

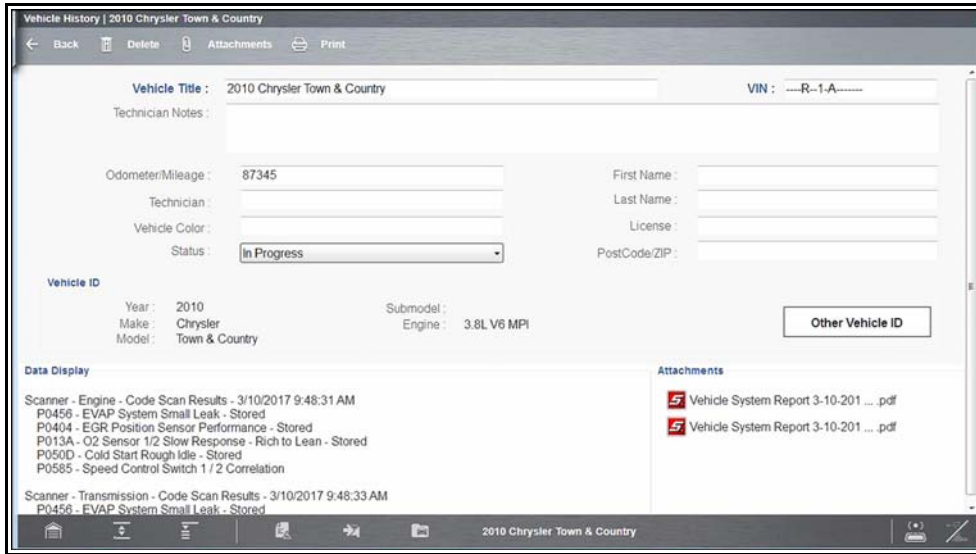


Figure 10-2 Sample vehicle record

NOTE

The virtual keyboard automatically opens the first time you select within one of the data fields.

2. Use the virtual keyboard to enter information in the data fields. The data is automatically saved.
3. Select **Back** to return to the vehicle records list screen.

10.10.3 Delete

Select **Delete** to remove an individual record from the vehicle records list. Highlight the record to remove, then select **Delete**.

10.10.4 Manage

Select **Manage** to quickly remove individual records, or all the vehicle records from the vehicle records list. Highlight the record to remove, then select **Delete**, or use the **Select All** or **Deselect All** options to remove all records (Figure 10-3).

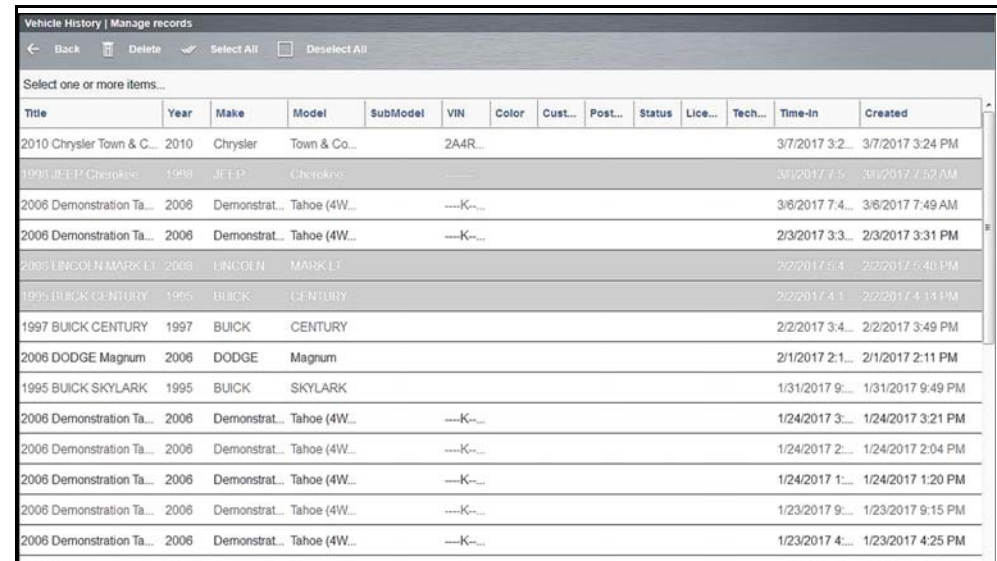


Figure 10-3

10.10.5 Search and Show All



To search vehicle records:

1. Select **Search** from the toolbar.
2. Enter the text to search for.
3. Select the **Search** icon.
Matching records are displayed.

Select **Show All** on the toolbar to restore the complete vehicle records list.



10.10.6 Settings

Use Settings to determine which categories display on the vehicle records list.



To change vehicle record list settings:

1. Select **Settings** to open the menu ([Figure 10-4](#)).

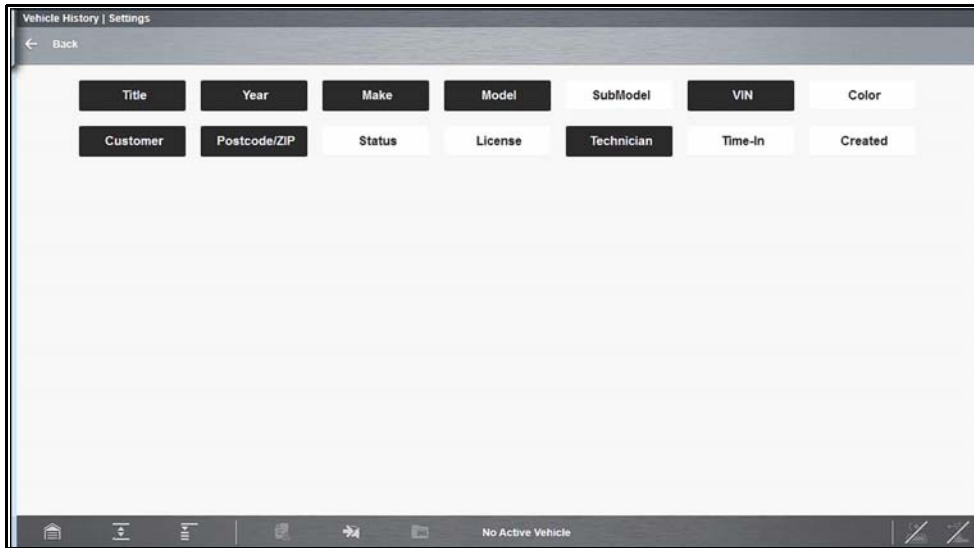


Figure 10-4

2. Select or deselect the desired categories:
 - Highlighted items - display
 - Non-highlighted items - do not display



Introduction



This section describes the basic operation, and navigation of the Data Manager function.

Data Manager is used to store, sort, and view saved files.

Main Topic Links

- [Data Manager Screen Layout](#) page 158
- [General Information](#) page 159
- [Toolbar Icon Functions](#) page 160
- [Vehicle System Report Viewer](#) page 162
- [Image Viewer](#) page 162
- [Scanner DataViewer](#) page 163
- [Scope File Viewer](#) page 168
- [ShopStream Connect™ \(Alternative Viewer\)](#) page 168

11.11 Data Manager Screen Layout

Selecting **Data Manager** opens the Data Manager screen displaying available file folders and a file viewer. This screen displays the contents of the Windows *My Documents > ShopStream* folder.

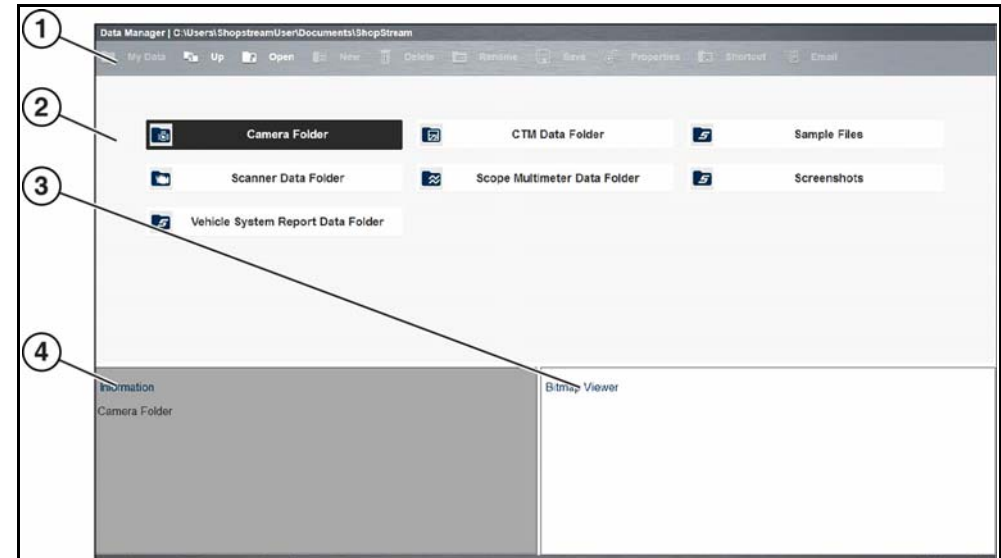


Figure 11-1 Typical - Data Manager main screen

1. Data Manager Toolbar
2. Folders Panel
3. Preview Panel - displays image files
4. Information Panel - displays a description of the selected file. Text changes are allowed for PID and Scope files, not image files. Use the **Save** icon to save changes.



The folders panel may includes these folders:

- **Camera Folder**—contains photos taken with the built-in camera. See [Image Viewer](#) on page 162.
- **CTM Data Folder**—contains saved Guided Component Test data files. See [Scope File Viewer](#) on page 168.
- **Sample Files**—contains an assortment of example data files.
- **Scanner Data Folder**—contains saved Scanner data files. See [Scanner DataViewer](#) on page 163.
- **Scope Multimeter Data Folder**—contains saved Scope Multimeter files. See [Scope File Viewer](#) on page 168.
- **Screenshots**—contains saved screen images. See [Image Viewer](#) on page 162.
- **Vehicle System Report Data Folder**—contains saved vehicle code scan reports. See [Vehicle System Report Viewer](#) on page 162.
- **ADAS Recalibration Report Data Folder**—contains saved ADAS reports. See [ADAS Recalibration Report](#) on page 194.

11.12 General Information

11.12.1 File Location

Files saved within the Diagnostic Suite (e.g. Screenshots, Data Files) are saved in the Windows My Documents > ShopStream folder, the Data Manager folder panel contains the same folders.

11.12.2 Moving / Copying Files

Using standard Windows operations, you can access, copy or move the saved files in the Windows My Documents > ShopStream folder at anytime.

The files may also be transfered to portable USB drives and then transfered to your PC.

11.12.3 Printing Files

See [Printing / Printer Setup](#) on page 19.

11.12.4 Viewing Saved Files

Screenshots/Photos - to view screenshots and photos taken using the built-in camera, see [Image Viewer](#) on page 162.

Vehicle System Report (Code Scan Report) - to view code scan reports saved while using the Scanner function, see [Vehicle System Report Viewer](#) on page 162.

Data Files - data type files (e.g. Scanner, Scope/Multimeter, Guided Component Tests) are saved using proprietary file extensions. To view these types of files, open them through the Data Manager folders panel. Each file type opens within a built-in proprietary viewer.

For Scanner files, see [Scanner DataViewer](#) on page 163.

For Scope/Multimeter files, see [Scope File Viewer](#) on page 168.

i NOTE

Data files are not viewable on a PC, however ShopStream Connect can be installed on a PC as an alternative way to view data files. See [ShopStream Connect™ \(Alternative Viewer\)](#) on page 168 for additional information.



11.12.5 About Saved Folder/File Structure

The Diagnostic Suite automatically creates folders to manage saved files. Whenever 60 files are saved into any of the Data Manager folders, a new folder is created. Folders may contain files for a day, week, month, or a year. An older folder, when available, goes to the next higher level in the files structure menu ([Figure 11-2](#)).

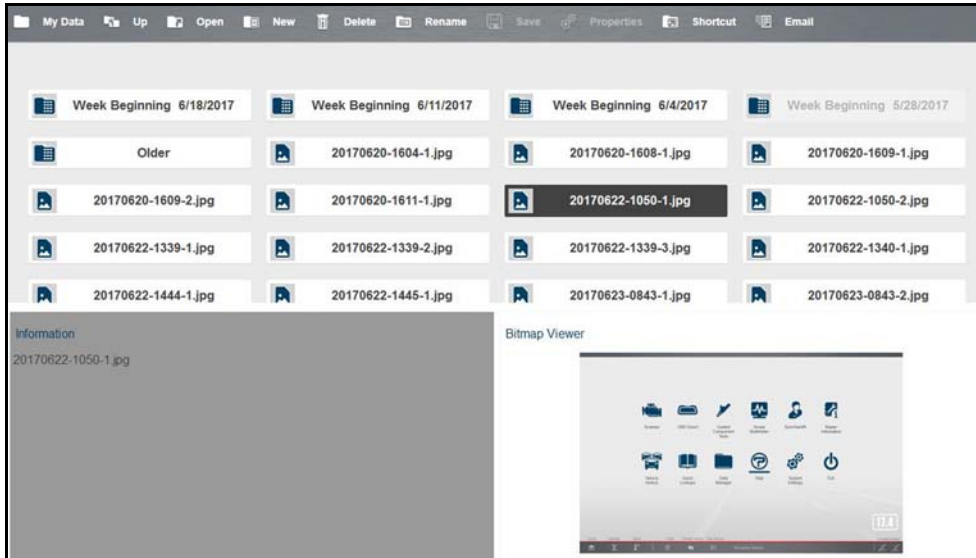


Figure 11-2 Saved file folder structure

11.13 Toolbar Icon Functions

The table below describes the toolbar icons.

Icon	Description
	My Data - Returns to the Data Manager main screen.
	Up - Selecting once, moves up one level in the file structure.
	Open - Opens the highlighted folder or file.
	New - Creates a new folder.
	Delete - Moves the highlighted file or folder to the recycling bin.
	Rename - Allows you to rename a selected file or folder.
	Save - Saves text changes made in the Information panel.
	Properties - Allows you to change the file name and assign identifying attributes to Scope / Multimeter data files.
	Shortcut - Creates a shortcut to the highlighted item on the Data Manager main screen.
	Email - Send data files as attachments, using Email. See Email on page 161 for information.
	More (optional) - Opens hidden menu options



11.13.1 Email

Selecting the **Email** icon from the Data Manager toolbar allows you to send a saved data or image file as an attachment using e-mail. To use this feature, you must install an e-mail client, and then either link your existing e-mail address to the client, or create a new address. The following instructions are intended as a guide only.



To attach a file from a Data Manager folder to an e-mail:



NOTE

The Email feature uses your system default email client. Refer to Windows Help for instructions on setting your default e-mail client. For an example on how to setup an e-mail client, see [E-Mail Client Setup](#) on page 16.

1. From the Data Manager main screen, select a file from within one of the folders (e.g. Camera, Scanner Data, Scope Multimeter, etc). In this example ([Figure 11-3](#)), a Vehicle Systems Report was chosen from the Vehicle Systems Report Data Folder.
2. With the file highlighted, select **Email** from the toolbar.

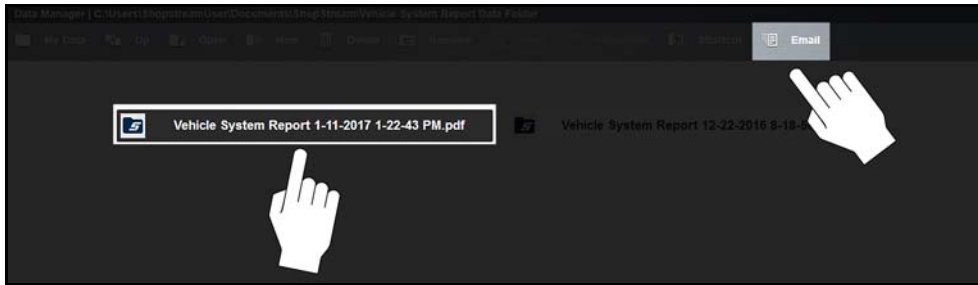


Figure 11-3

3. A new e-mail message window will display onscreen ([Figure 11-4](#)).

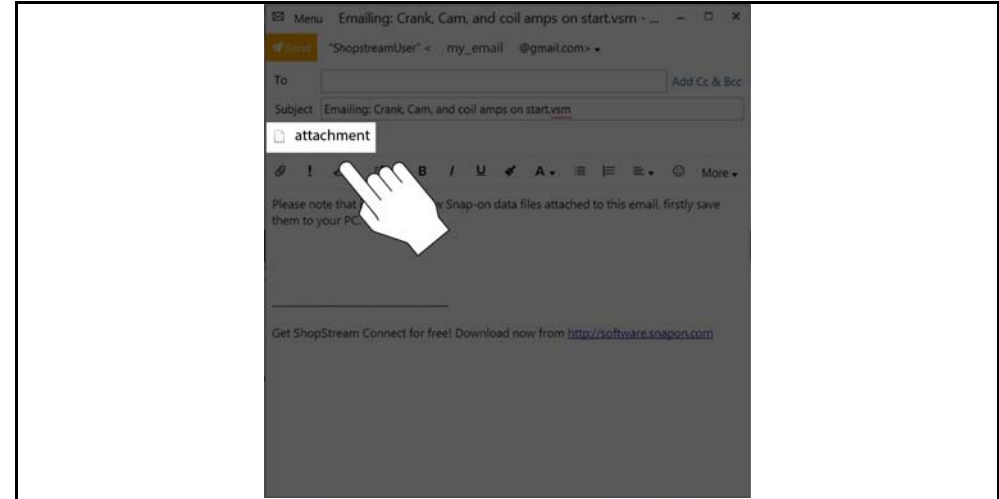


Figure 11-4

4. Enter the e-mail address of the recipient, and any other information needed.
5. Select the **Send** icon to send the e-mail.



NOTE

You must have an Internet connection to send e-mail.

11.14 Vehicle System Report Viewer

Code Scan (trouble code reports) are saved in .pdf format and are viewable by opening them from the Vehicle System Report Data Folder in the Data Manager folder panel, or from within the Vehicle System Report Data folder in the *Windows My Documents > ShopStream* folder.

The built-in PDF viewer allows you to open, view and print the Vehicle System Report. To print, see [Printing the Vehicle System Report on page 47](#).

The following example ([Figure 11-5](#)) shows a typical Vehicle System Report.

To hide/show the timestamp (time of day) located next to the date (upper right), see [Code Scan \(Timestamp\) on page 173](#).

SampleShop
Your Address
Your City,
Your Phone Number

2002 Mustang 4.6L V8 EFI

Date: 1/11/2017

Vehicle System Report

VEHICLE INFORMATION

VIN: KT6
YEAR: 2002
MAKE: Ford
MODEL: Mustang
ENGINE: 4.6L V8 EFI
SYSTEM

Code Scan Results

Systems Analyzed: 20

- Engine All Powertrain Codes Codes: 4
- Transmission All Powertrain Codes Codes: 4
- Antilock Brakes Codes: 0
- Airbag Codes: 0
- Body Control Module Codes: 0
- Door Module Driver Codes: 0
- Door Module Passenger Codes: 0
- Heating & Air Conditioning Codes: 0
- Rear Auxiliary Climate Control Codes: 0
- Rear Heating & Air Conditioning Codes: 0
- Instrument Panel Cluster Codes: 0
- Passenger Presence System Codes Codes: 2
- Radio Codes: 0
- Seat Module Codes: 0
- Suspension (ESC) Codes: 0
- Theft Deterrent Codes: 0
- Tire Pressure Monitor Codes: 0

OBDII Codes: 4

Engine All Powertrain Codes Codes: 4

- P0101 | Mass Air Flow Circuit Out Of Range
- P0455 | EVAP System Leak (Large)
- P0171 | Fuel System Too Lean Bank 1
- P0420 | Catalyst Efficiency Low Bank 1

Transmission All Powertrain Codes Codes: 4

- P0101 | Mass Air Flow Circuit Out Of Range
- P0455 | EVAP System Leak (Large)
- P0171 | Fuel System Too Lean Bank 1
- P0420 | Catalyst Efficiency Low Bank 1

Antilock Brakes Codes: 0

Airbag Codes: 0

Body Control Module Codes: 0

Door Module Driver Codes: 0

Door Module Passenger Codes: 0

Heating & Air Conditioning Codes: 0

Instrument Panel Cluster Codes: 0

Passenger Presence System Codes Codes: 2

- B1022 | Driver Loop Resistance Low
- B1061 | Lamp Circuit Failure

Radio Codes: 0

Seat Module Codes: 0

Suspension (ESC) Codes: 0

Theft Deterrent Codes: 0

Figure 11-5

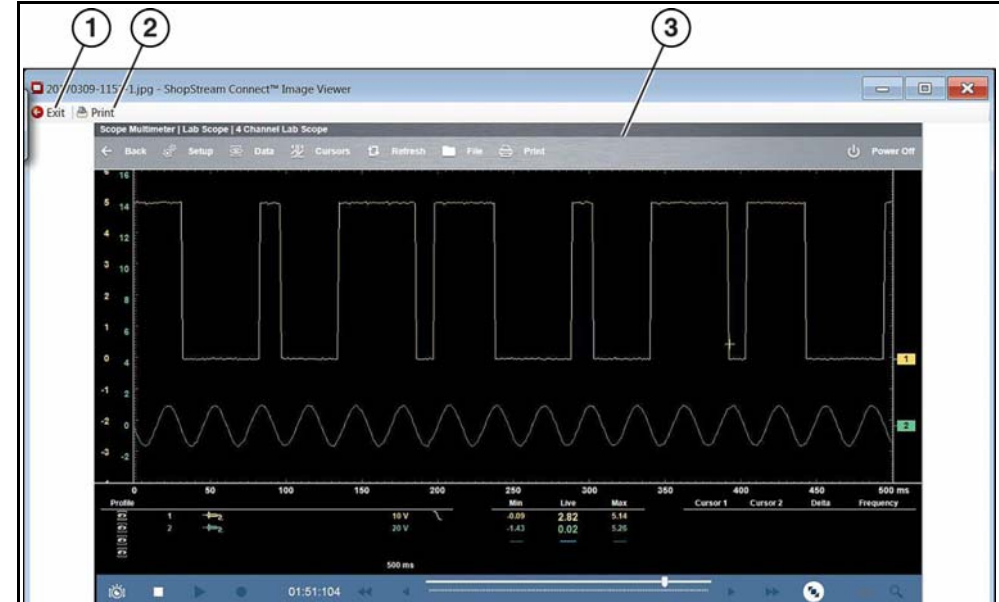
11.15 Image Viewer

Screenshots and photos taken using the built-in camera are saved in .jpg format and are viewable by opening them from the Screenshots and Images folders in the Data Manager folder panel, or from within the *Windows My Documents > ShopStream > Screenshots* folder.

The built-in Image Viewer allows you to open, view and print image files and screenshots.

NOTE

Image files can also be viewed on most PCs.



1. Exit - closes the Image Viewer
2. Print - prints the image
3. Captured Screen Image

Figure 11-6

11.16 Scanner DataViewer

Scanner data files are saved in a proprietary file format and are viewable by opening them from the Scanner Data Folder in the Data Manager folder panel, or from within the Windows *My Documents* > *ShopStream* > *Scanner Data* folder.

The built-in Scanner DataViewer (*Figure 11-7*) allows you to open, play and print Scanner data files.

Scanner DataViewer - Opens .pids, .scm, .scs, .scp and .spm file extensions

Figure 11-7 Scanner Data Viewer



1. Menu bar
2. Display toolbar
3. Graph display
4. Properties icon
5. Vertical Scroll bar
6. Zoom controls
7. Slider bar
8. Navigation toolbar
9. Parameter text list
10. Parameter configuration tabs

11.16.1 Menu Bar

The menu bar at the top of the screen contains the File, View, Tools, and Help menus.

File Menu

The File menu offers the following selections:

- **Load**—locate and open data files, launches a navigation window
- **Print**—print selected pids
- **Print Preview**—preview pids before printing
- **Exit**—closes Scanner DataViewer

When Print or Print Preview is selected, a dialog box opens and allows you to define the printed output. Print settings include, print as graphs or text, which pids to include, number of pids per page, display colors, and the text font (*Figure 11-8*).

See *Printing / Printer Setup* on page 19.

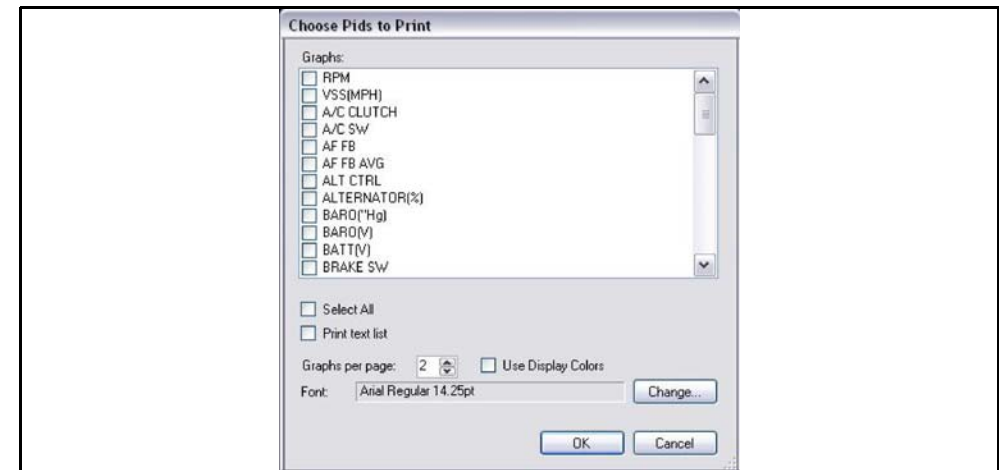


Figure 11-8 Pids print settings

▶ To print:

1. Select the desired pids. A checked box indicates the pid will be printed. Select again to deselect the pid.
2. Select **Change** to modify the font, this opens a standard Windows font dialog box.
 - a. Modify the font as desired.

- b. Select **OK** to close the font dialog box.
3. Once all selections are made, select **OK**.
 - A print dialog box opens.
 - a. If Print was selected, the file is sent to the printer.
 - b. If Print Preview was selected, a preview window opens. Select the printer icon (Figure 11-9) to send the file to the printer.

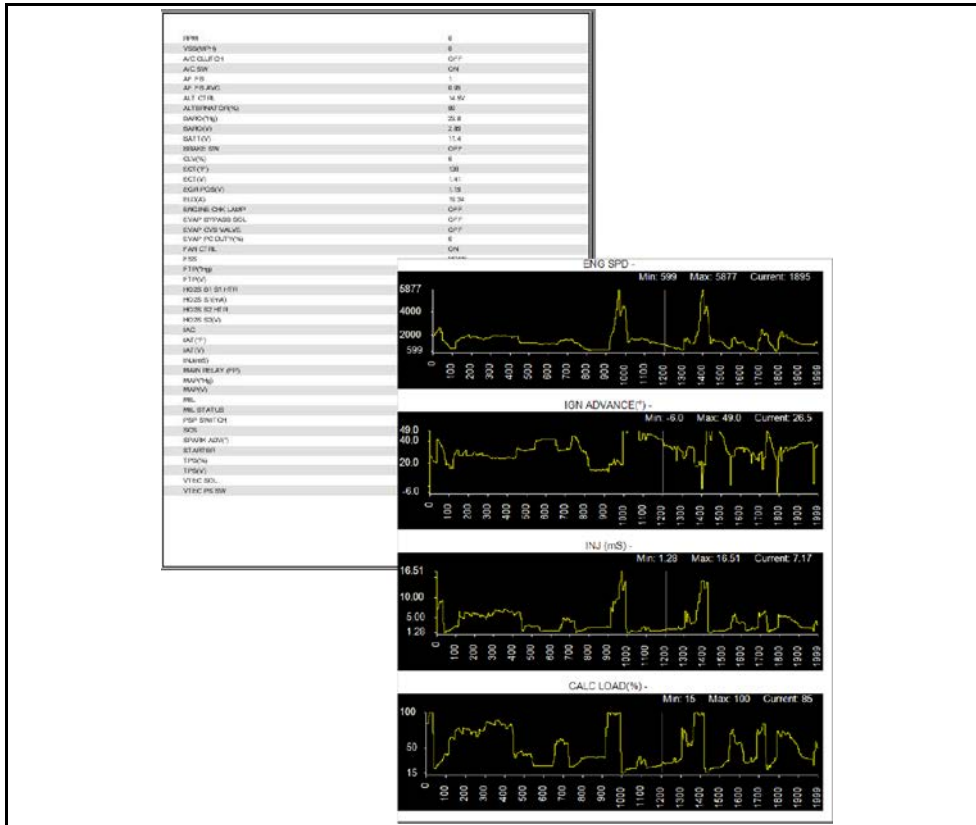


Figure 11-9 Print preview window (text list and graphs examples)

View Menu

The View menu allows you to change how data is displayed on the screen (Figure 11-10).

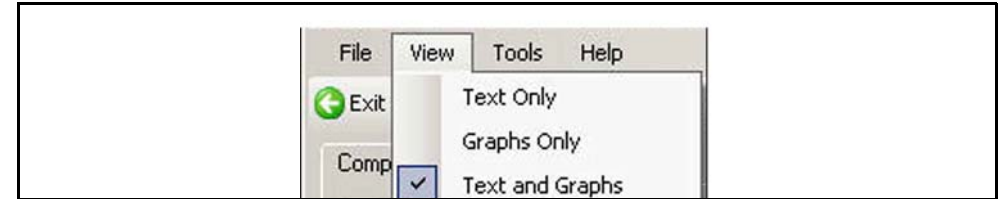


Figure 11-10 Scanner DataViewer View menu

Select from the following menu options:

- **Text Only**—shows all parameters and their values as text only
- **Graphs Only**—shows all parameters as graphs only
- **Text and Graphs**—shows all parameters and their values as text in the left panel of the screen, and shows them as graphs in the right panel of the screen

Tools Menu

The Tools menu opens the Properties dialog box which has two sections (Figure 11-11); Shared Graph Properties and Individual Properties. Shared Graph Properties apply to all graphs, and Individual Properties apply to the selected graph only.

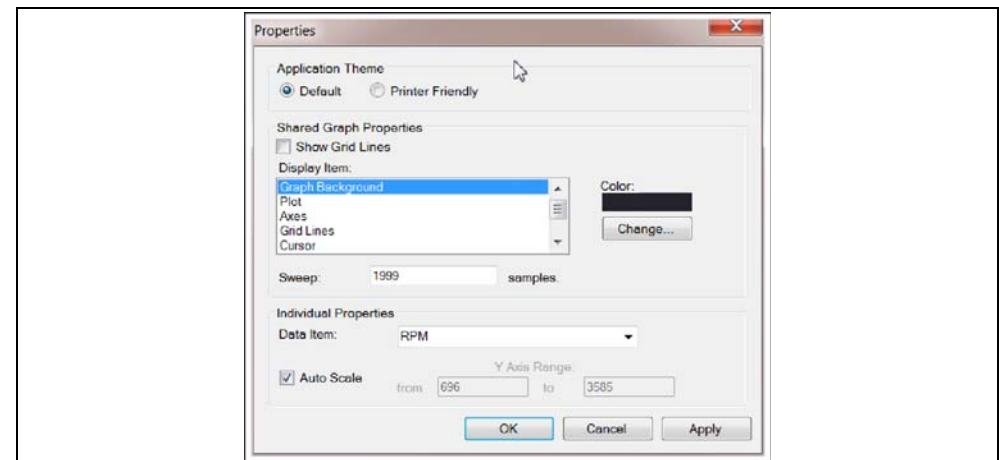


Figure 11-11 Properties dialog box



Properties dialog box selections include:

- **Grid Lines**—when selected, a line displays at each major division of the graphs.
- **Display Item**—use to view the display color of the listed items. Highlight an item and the current color appears in the Color box.
- **Change**—use to change the color of the highlighted item, select to open a color palate.
- **Sweep**—use to adjust the number of data frames that appear on the screen (zoom in or out), highlight and type in the desired number.
- **Reset Colors**—use to restore the default color settings.
- **Data Item**—use this pulldown menu to select individual graphs for modification.
- **Auto Scale**—minimum and maximum (Y axis) values automatically adjust to the signal when the box is checked, uncheck the box if you want to custom set the values.
- **Y Axis Range**—use to type desired minimum (from) and maximum (to) values in the selection boxes. This field is only active when Auto Scale is deselected.
- **OK**—applies the changes and closes the properties dialog box.
- **Cancel**—closes the properties dialog box without making changes.
- **Apply**—applies the changes and leaves the properties dialog box open.

i NOTE

The Properties icon on each graph also opens the Properties dialog box (Figure 11-7).

Help Menu

The Help menu provides Scanner Viewer software version information.

11.16.2 Display Toolbar

The Display toolbar provides the following controls (Figure 11-12).

- **Exit**—closes Scanner DataViewer.
- **Hide PID List**—toggles display between parameter text and graph views.
- **Display Views (1 to 16)**—determines how many graphs display at a time.
- **Scale**—switches the scale values shown to the left of the graph off and on.
- **Sweep**—switches the sweep values shown below the graph off and on.



Figure 11-12 Display toolbar



11.16.3 Navigation Tools

Playback Controls

The playback controls allow you to navigate through saved data (*Figure 11-13*).

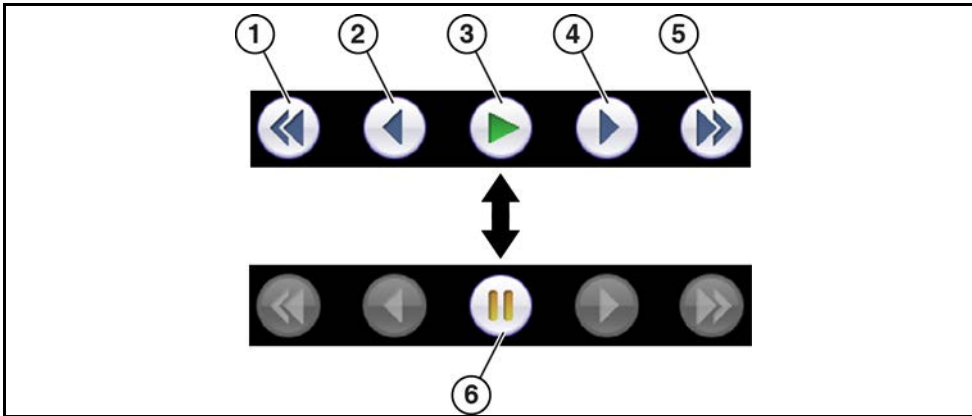


Figure 11-13 Playback controls

1. **Skip Back**—Allows backward movement in multiple steps.
2. **Step Back**—Allows backward movement in singular steps.
3. **Play**—Select to play.
4. **Step Forward**—Allows forward movement in singular steps.
5. **Skip Forward**—Allows forward movement in multiple steps.
6. **Pause**—Select to pause playback.

Zoom Controls

The zoom controls allow you to incrementally increase or decrease the screen magnification (*Figure 11-14*).



Figure 11-14 Zoom controls

Slider / Scroll Bars and Cursor

Use the slider bar to quickly navigate through the data (*Figure 11-15*). During playback the number displayed on the left side of the slider bar indicates the current position of the cursor in the data file. The cursor can be repositioned during playback or when paused by selecting and dragging.

Use the scroll bar (right side) to vertically scroll through the parameter list and graphs.



1. Cursor
2. Scroll bar
3. Slider bar

Figure 11-15

11.16.4 Customizing the Display

The parameter text list (left side) displays parameter names and current values.

The display can be customized by selecting and dragging parameters from the text list or graph display to a different location in the text list or in the graph display (Figure 11-16). The highlighted parameters in the text list indicate which parameters are displayed as graphs.

NOTE

The parameter text list is sortable by name and value. Select Name or Value at the top of the list to change the sorted view.

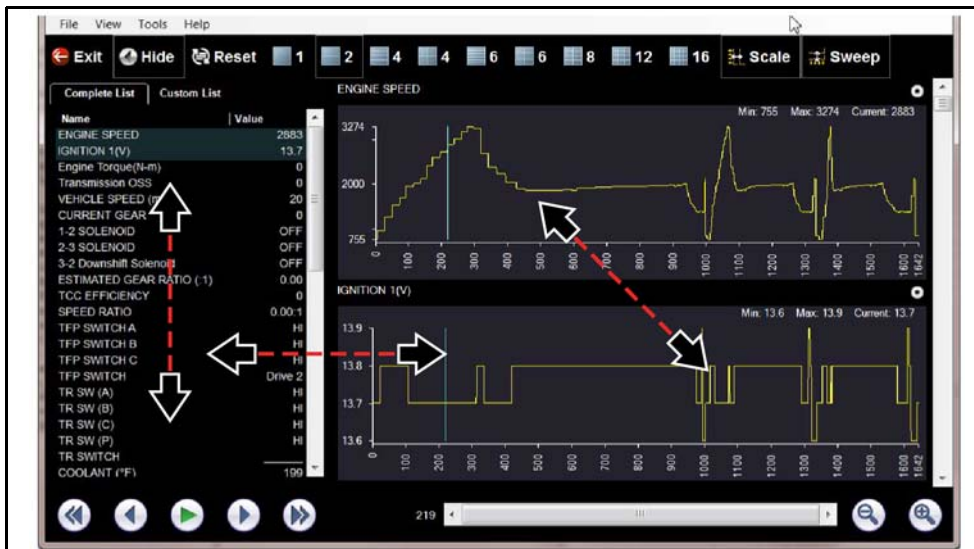


Figure 11-16

11.16.5 Customizing the Parameter List

The parameter configuration tabs allow you to choose between displaying all available parameters (Complete List), or only those from a (Custom List) (Figure 11-17).

To customize the parameter list:

1. Select the **Custom List** tab (Figure 11-17).
2. Select **Edit List** in the custom window.



Figure 11-17

1. Edit List
2. Custom List tab

A list of available parameters displays (Figure 11-18).

3. Select the parameters to include in your custom list. Select All and Deselect All controls are also available to assist in the selection process.

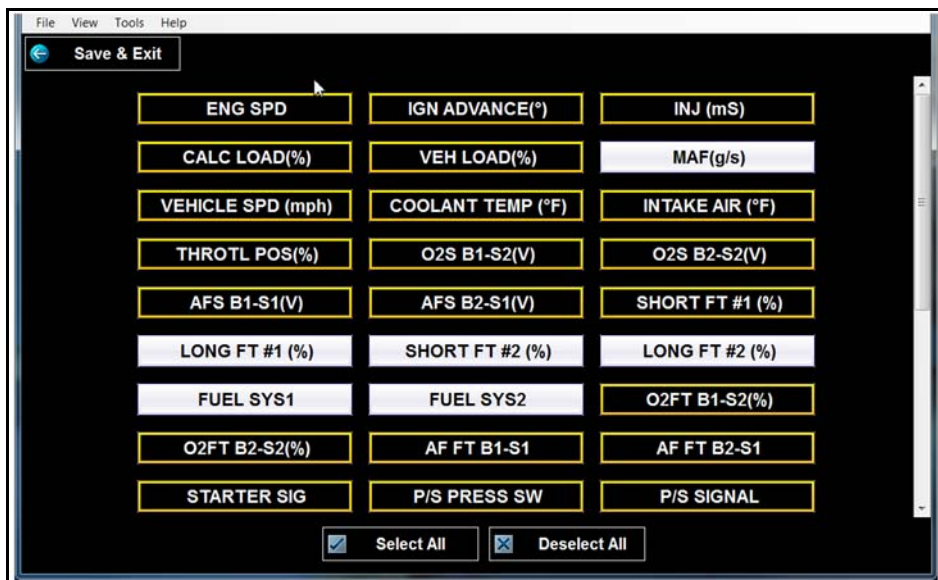


Figure 11-18 Creating a custom parameter list

4. Select **Save & Exit** to close the window.

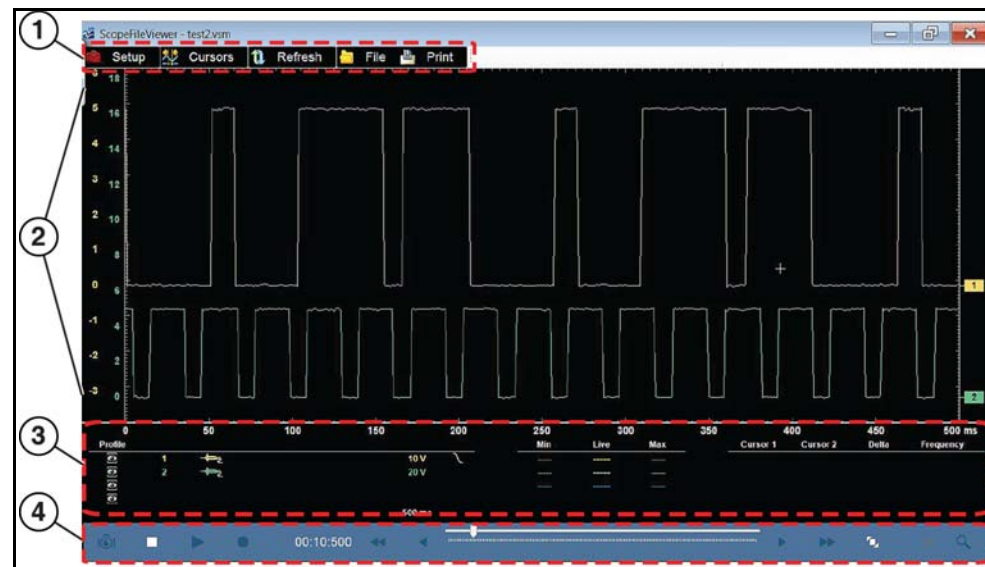
Only the parameters selected in your custom list are displayed.

11.17 Scope File Viewer

Scope data files are saved in a proprietary file format and are viewable by opening them from the Scope Multimeter and CTM (component test meter) Data Folders in the Data Manager folder panel, or from the Windows *My Documents* > *ShopStream* > *Scope Multimeter Data* folder.

The built-in Scope File Viewer ([Figure 11-19](#)) allows you to open, play and print recorded trace signals captured on your diagnostic tool.

Many of the navigation features are similar to those used in the operation of the Scope / Multimeter, see [Record/Playback Control Toolbar](#) on page 121. Some Scope File Viewer icons may not be available or grayed out, this is normal as those features are only applicable when viewing live trace signals.



1. Toolbar - contains control icons
2. Main Body - displays recorded trace results
3. Controls Panel - contains the channel/trace settings
4. Playback Control Toolbar - contains playback and display controls

Figure 11-19

11.18 ShopStream Connect™ (Alternative Viewer)

Saved data files are intended to be viewed using the built-in proprietary viewers within Data Manager and are not viewable on a PC, however ShopStream Connect can be installed on a PC as an alternative way to view data files.

ShopStream Connect is PC-based program that allows you to manage, view, and print data files using a PC. ShopStream Connect is a free program available for download from our website: <https://www1.snapon.com/ukssc>



Help



Selecting **Help** from the Home screen opens the Snap-on Diagnostics website (*Figure 12-1*). Wi-Fi connection is required.

From this web page you can view or download your diagnostic tool user manual and other related support information.

Home | Contact | Buy Parts | News Centre | Snap-on.com

Snap-on Diagnostic & Equipment

SEARCH

Diagnostics Software Training and Support Sun EZ ADAS™ Hofmann John Bean

Find out how our diagnostic tools and software will help you get to the fix faster and bring peace of mind to your customers.

ZEUS TRITON-D8 VERUS Edge MODIS Edge SOLLUS Edge ETHOS Edge

ZEUS™ DIAGNOSTIC AND INFORMATION SYSTEM
EEMS342W

Target the issue by focusing on the detail you need for the specific fault code and vehicle with Snap-on® Intelligent Diagnostics software live on ZEUS.

The first tool to feature Intelligent Diagnostics, ZEUS provides all the functions and repair tips you need to diagnose, repair and manage any issue.

But unlike any tool before, it practically anticipates your next move by guiding you through every step you need to find the solution, while avoiding the steps you don't by displaying only the information that's relevant to the specific vehicle and fault code.

From Technical Service Bulletins and scanner Smart Data to SureTrack™ Expert Information, ZEUS is the most sophisticated, intuitive shop management tool we've ever created.

Snap-on Intelligent Diagnostics Software:

- Scan for vehicle fault codes / diagnostic

Useful Links

- [ZEUS Online Training Modules](#)
- [ZEUS Support and Help](#)
- [ZEUS Diagnostic Quick Tips](#)
- [ZEUS + Intelligent Diagnostics Training Course](#)
- [Diagnostic Seminars Calendar](#)

Got Questions?

Contact our Customer Care Department:
Email: techsales.uk@snapon.com
Tel: (01553) 692422
Mon-Fri 8.45am-5pm

For Snap-on Tools or to contact your local dealer, call (01536) 413800
E-mail: kettcustserv@snapon.com

Software Subscription enquiries:
(01536) 413825 and choose option one

Figure 12-1



Introduction



This section describes the basic operations of System Settings.

Selecting **System Settings** from the Home screen opens a menu of options (Paired Devices, Shop Information, Data Backup, and Code Scan) to assist you in pairing the Compact Scan Module, create and edit your shop contact information, backing up or restoring your saved data, and setting the display option for the Vehicle System Report timestamp.

Topic Links

- [Paired Devices](#) page 171
- [Shop Information](#) page 171
- [Data Backup](#) page 172
- [Code Scan \(Timestamp\)](#) page 173

13.19 Get Connected

Selecting **Get Connected** displays the required account setup information ([Figure 13-1](#)) needed to create a Snap-on Cloud account.

For detailed account setup information see, [Registration - Getting Started on page 180](#).

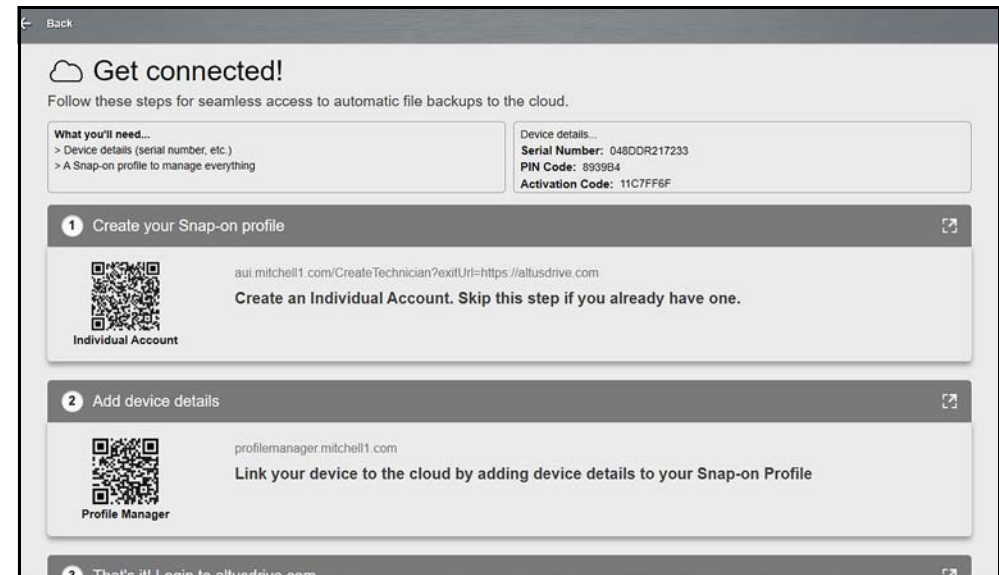


Figure 13-1

13.20 Paired Devices

Selecting **Paired Devices** displays the active devices that are paired to the diagnostic tool. To use the Compact Scan Module, and the Scope Module with the diagnostic tool they must be paired to the diagnostic tool.

- For **Compact Scan Module** pairing information, see [Pairing and Hardware Status Icons](#) on page 31.
- For **Scope Module** pairing information, see [Pairing and Hardware Status Icons](#) on page 97.

The Paired Devices screen lists all of the devices paired to the diagnostic tool ([Figure 13-2](#)). The icon indicates the connection and communication status.

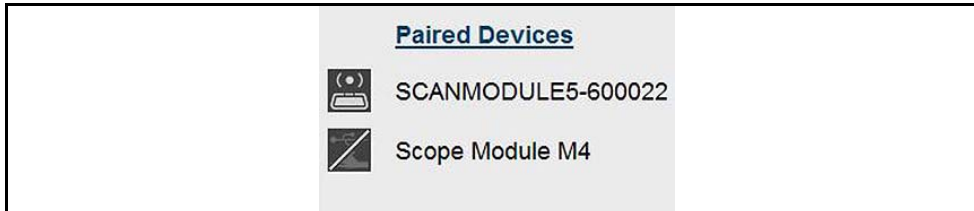


Figure 13-2

13.21 Shop Information

Selecting Shop Information allows you to add personalized shop information that can be included on printed data files.



To add/change Shop Information:

1. From the System Settings menu select **Shop Information**.
The Shop Information entry screen displays ([Figure 13-3](#)).

 A screenshot of the 'Shop Information' form. The form has a title bar with 'OK' and 'Cancel' buttons. The fields are:

- Shop Name: Sample Shop
- Shop Address: 1234 East St.
- City, State Zip: City (dropdown), State (dropdown), Zip Code (text)
- Shop Phone: ### ##-####
- Shop Fax: (empty)
- Slogan: (empty)
- Comment: (empty)
- Manager Name: Your Name
- Manager Title: (empty)
- Email: sample@abc.com
- Web Page: (empty)

Figure 13-3

2. Enter your shop information, using the virtual keyboard or USB connected keyboard.
3. Select **OK** when finished.

13.22 Data Backup

Selecting **Data Backup** from the Systems Settings main menu provides the following menu options:

- [Backup Settings \(message\)](#)
- [Backup](#)
- [Restore](#)

13.22.1 Backup Settings (message)

Backup Setting allows you to choose the interval for displaying the backup reminder message, or turn the reminder off. Message options are:

- Every Week
- Every 2 Weeks
- Every 4 Weeks
- Never

13.22.2 Backup

Backup allows you to back up your saved data to a designated file on the internal hard drive, or to an external drive (e.g. USB flash drive). This option can be used as general maintenance to ensure you have a safe backup of your saved data, or if an issue occurs where a system restore (see [Operating System Restore on page 22](#)) is necessary and you need to retain your saved data.

Only the following types of data are backed up:

- ShopStream Data (saved movie/data files)
- Lab Scope Settings (presets)
- Vehicle History Records and Favorites



To Backup data files:

1. From the Home screen select **System Settings**.
2. From the System Settings main menu select **Data Backup > Backup**.
The destination drive dialog box opens ([Figure 13-4](#)).
3. Select a drive destination.

NOTE

Drive designations (e.g. E:, F: etc.), are only visible when external drives are connected to the diagnostic tool.

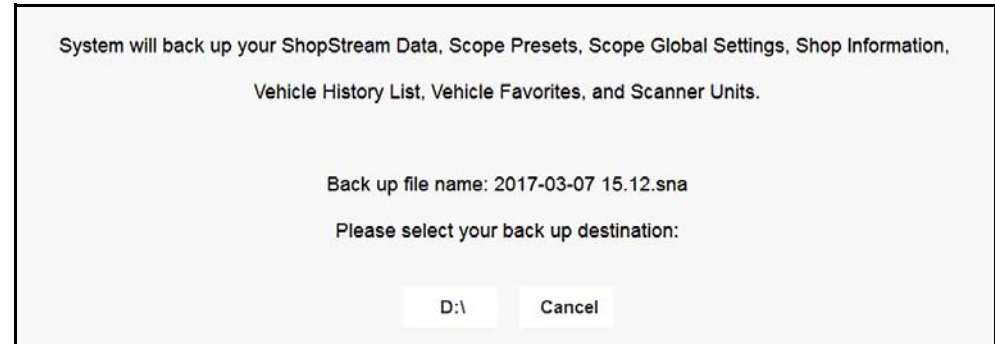


Figure 13-4

A progress screen is displayed as the backup file is saved to the root of the drive selected with a file extension of .sna. Then a confirmation screen is displayed.

4. Select **OK** to complete the procedure.

13.22.3 Restore

The Restore option is used to restore your backed up data, in the event that the data is lost or if a system restore (recovery) has been performed.

This function is only applicable when a backup file has been previously saved (file extension .sna). See [Backup on page 172](#) for additional information.



To perform a data Restore:

1. From the Home screen select **System Settings**.
2. From the System Settings main menu select **Data Backup > Restore**.
The restore file confirmation dialog box opens ([Figure 13-5](#)).
3. Select **Continue**.

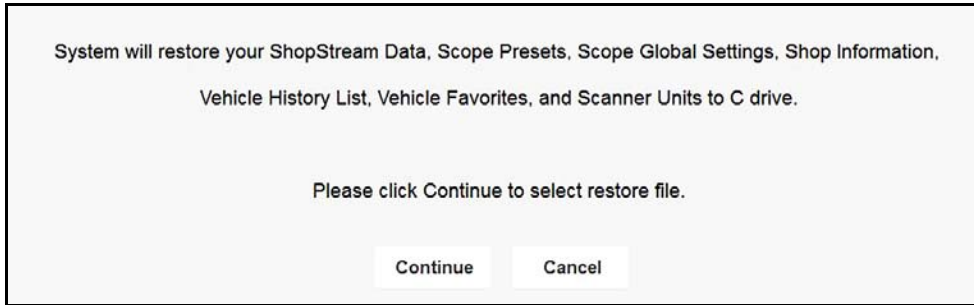


Figure 13-5

The Windows restore backup file path dialog box opens.

4. Select the backup file (file extension .sna) from your backup file location.
5. Select **Open** to restore the backup file.

Once the file has been restored a confirmation message is displayed.

6. Select **OK**, then close and restart the Diagnostic Suite program.

13.23 Code Scan (Timestamp)

Selecting **Code Scan** from the Systems Settings main menu allows you to hide/show the timestamp (time of day) on the Vehicle System Report.

Select the **On/Off** checkbox, then select **OK** from the toolbar to confirm the setting ([Figure 13-6](#)).

For additional information about the Vehicle System Report, see [Vehicle System Report Viewer](#) on page 162.



Figure 13-6



Introduction

This section describes the ShopStream Update Tool (SST), a maintenance program that automatically keeps your diagnostic software up-to-date.

SST downloads and installs:

- Diagnostic software upgrades
- Diagnostic software updates
- SST program updates

Whenever the diagnostic tool is connected to the Internet, the SST automatically checks for new software updates. This automatic check also occurs every time the diagnostic tool is turned on. If a software update is available, the SST will download it.

The SST is a low priority program that only downloads software updates when unused bandwidth is available. If other programs are running that communicate over the Wi-Fi network, such as a browser or instant messaging, the download may be temporarily suspended. This allows you to continue normal diagnostic tool operation, without interruptions or loss of performance.

i NOTE

As an alternative to downloading software in the background, you can select the Fast Download from the update status window, see Step 3 in [Manual Download](#) for details.

14.1 Terminology

The following terms are used in this section and throughout this manual as described below:

- **Software Upgrade** - a new diagnostic software version. Software upgrades include new and enhanced coverage and features.
- **Software Update** - a service release “update” for an existing diagnostic software version.

For clarity, throughout this document the term “software update(s)” will be used to collectively describe “software updates, upgrades and SST program updates” using the SST, except where noted.

The ShopStream Update Tool (SST) is a maintenance program that automatically keeps your diagnostic software up-to-date.

Topic Links

- [Basic Operation](#) page 175
- [End User License Agreement](#) page 175
- [Manual Download](#) page 176
- [Installing Software Updates](#) page 177
- [Installing Software Upgrades](#) page 178

14.2 Basic Operation

The SST program is normally running in the Windows background and available from the Windows taskbar notification area. The program can be accessed as follows:

- **SST icon in the notification area** - opens the SST program menu
- **SST program selection from the Windows “All Programs” or “Startup” menus** - starts the SST program and adds the SST icon to the notification area

NOTE

If necessary, select the **expand**  arrow to see the SST icon in the notification area.



Figure 14-1 SST Icon in notification area

Selecting the SST icon from the notification area provides the following menu choices:

- **Check for Updates** - Allows you to manually check for software updates anytime. See [Manual Download](#) on page 176.
- **Show Progress** - allows you to check the status of an active download
- **About** - displays the SST program software version number
- **Exit** - closes the SST program

14.3 End User License Agreement

Before software installation at initial purchase, and before all subsequent software updates/upgrades installations End User License Agreement (EULA) acceptance is required.

IMPORTANT

Use of Software is governed by the terms and conditions of the End User License Agreement. The diagnostic tool should not be initially operated until the End User License Agreement is read. Use of the device acknowledges your acceptance of the End User License Agreement. The Snap-on Incorporated Software End User License Agreement is available at: <https://eula.snapon.com/diagnostics>

To Accept: at the screen prompt ([Figure 14-2](#)) click the checkbox on the left side of the window, and then select **Agree and Continue**. The software will be installed automatically.

[Figure 14-2](#) below represents a typical EULA acceptance agreement screen.

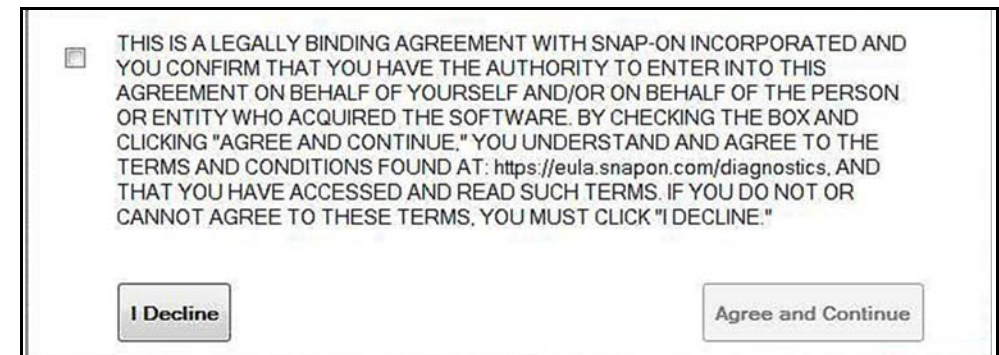


Figure 14-2 Typical EULA acceptance screen

To Decline: at the screen prompt ([Figure 14-2](#)) select **I Decline**. A confirmation message is displayed providing options to Go Back or Exit the software installation ([Figure 14-3](#)).

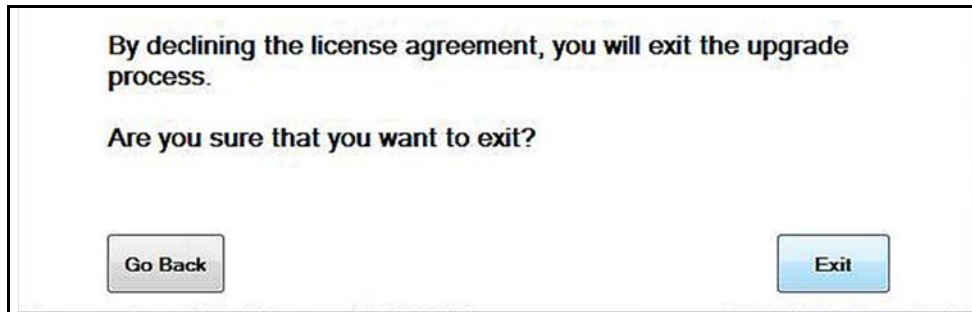


Figure 14-3 Typical EULA acceptance screen

14.4 Manual Download

This section describes the basic procedures for manually downloading software updates and upgrades.

Normally, the SST will automatically detect and download software. If necessary, use the following procedure to manually check for and download software.

NOTE

It is recommend that you download software upgrades when not actively using the diagnostic tool. Download times will vary as they are dependent on the file size of the upgrade (some upgrades may exceed 3Gb) and your connection speed. It is suggested that you start the download at the end of your day and let it run overnight. It is also suggested that you ensure a download of this size is within the available data allowance of the Internet connection or data plan being used. For software upgrade installation instructions, see [Installing Software Upgrades](#) on page 178.

To manually download software:

1. Select the SST icon in the Windows taskbar notification area to open the menu ([Figure 14-4](#)).

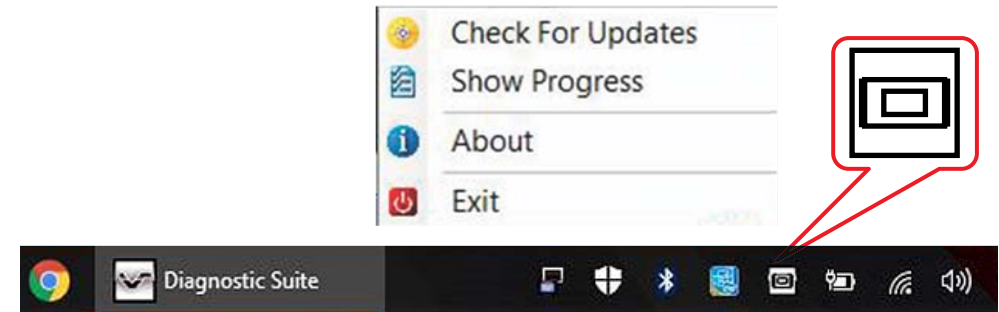


Figure 14-4 ShopStream Update Tool icon and menu

2. Select **Check for Updates** from the menu.

A series of message boxes will display as the SST searches for updates ([Figure 14-5](#)).



Figure 14-5 Typical - Checking for Updates message

Once the search is complete, one of two results are expected:

- If no updates are found, the message box closes and a “No updates available” message displays. Select the message to close it.
- If updates are found, they will automatically begin to download ([Figure 14-6](#)).

To view the update status window (Figure 14-6), select **Show Progress** from the SST icon menu (Figure 14-4).

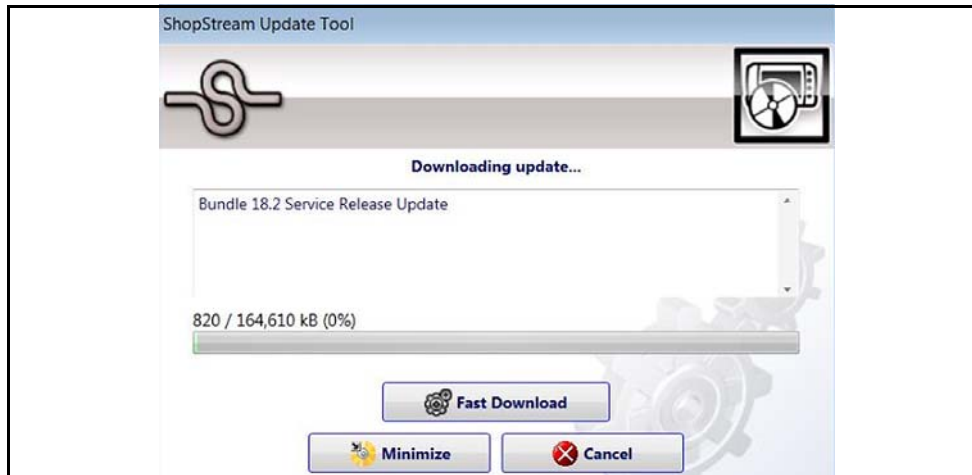


Figure 14-6 Typical - Update status window

NOTE

The percentage status bar may not always be displayed while downloading (Figure 14-6).

3. During an active download, two options are available:
 - **Fast Download**—selecting Fast Download provides the option to either initiate a faster download, or continue downloading the background. If Fast Download is selected, it may adversely affect diagnostic tool performance, only choose if you are not actively using the Diagnostic Suite.
 - **Minimize**—closes the message box. The download continues as a background task and the diagnostic tool can be used normally. Select **Show Progress** from the SST icon menu at any time to reopen the message box and check the status of the download.
 - **Cancel**—stops and cancels the download and closes the message box. If you select Cancel, and choose to re-start the download again, the download will start from the beginning.
4. Once the download completes, it must be installed. See the applicable instructions for [Installing Software Updates](#) on page 177 or [Installing Software Upgrades](#) on page 178.

For SST program updates (only) - if you have the Automatic Update setting "on", the update will be installed automatically. See Automatic Update setting in [Basic Operation](#) on page 175 for additional information.

If you have the Automatic Update setting "off", the SST program must be manually installed. See [Installing Software Updates](#) on page 177.

NOTE

If the Internet connection is interrupted during a download, the download is suspended and a "network unavailable" message displays. The message disappears and the download resumes automatically once the Internet connection is restored.

14.5 Installing Software Updates

When a software update is ready for installation, an installation update message will appear (Figure 14-7). You can select the message or the SST icon from the Windows taskbar notification area at anytime to start the software update installation process.

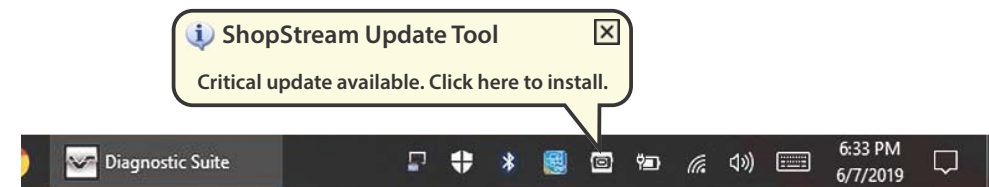


Figure 14-7 Typical update installation message

NOTE

Before installing a software update, have your Scan Module and USB cable available. The software update may include Scan Module firmware updates that need to be installed.

To install a software update:

1. Select the software update available message (Figure 14-7), or the SST icon from the notification area.
A software update installation window will display (Figure 14-8).



Figure 14-8 Typical update installation window

2. Select an installation option to continue:
 - **Install Now**—starts the software update installation. Proceed to step 3.
 - **Install Later**—closes the message. The message will reappear at a later time as a reminder.

NOTE

If **Install Later** is chosen, you can select the SST icon from the notification area to restart the installation at anytime.

3. Close the **ShopStream Diagnostic Suite** application. The ShopStream Diagnostic Suite should remain closed until the software installation has completed.
4. Follow the on-screen instructions to complete the installation.
5. After the installation is complete, open the **ShopStream Diagnostic Suite** application.
6. Select **Scanner** from the Home Screen. If a Scan Module firmware update has been received, a “Scan Module firmware update” message will display. Proceed to [Firmware Updates](#) on page 33.
 - If the Scanner opens normally and no update message is displayed, proceed to step 7.

7. Turn the diagnostic tool off, then turn it on (re-boot).
8. From the toolbar, select **Menu > Help > Version Info** to confirm the new version number is installed.

14.6 Installing Software Upgrades

NOTE

It is recommended that you perform software upgrade installations Monday – Friday, during business hours to ensure customer care representatives are available for support. The installation will take approximately 30 minutes. If the installation is interrupted, Contact Snap-on Diagnostics Customer Care for assistance. See the Snap-on contact information at the front of this manual.

NOTE

Before installing a software upgrade, have your Scan Module and USB cable available. The software upgrade may include firmware updates that need to be installed to the Scan Module.



To install a software upgrade:

1. Select the software upgrade available message ([Figure 14-9](#)), or the SST icon from the Windows taskbar notification area.

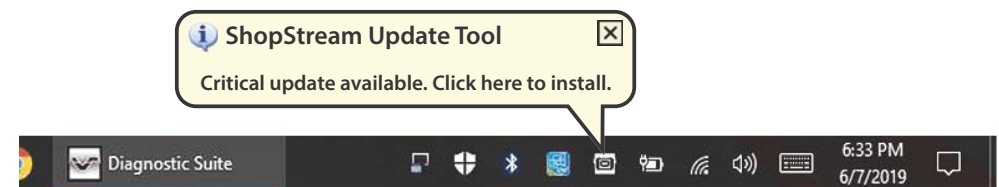


Figure 14-9 Typical upgrade installation message



An upgrade installation window will display ([Figure 14-10](#)).

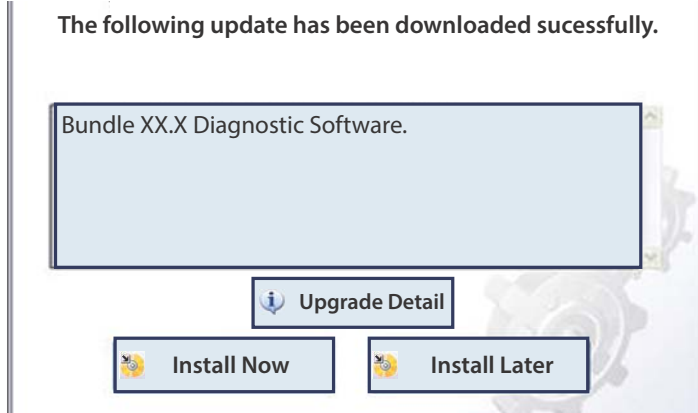


Figure 14-10 Typical upgrade installation window

2. Select an installation option to continue:

- **Upgrade Detail**—opens a PDF file describing the details of the software upgrade, including any accessories that may be required.
- **Install Now**—starts the software upgrade installation. Proceed to step 3.
- **Install Later**—closes the upgrade message. The upgrade available message reappears at a later time as a reminder.

i NOTE

*If **Install Later** is chosen, you can select the SST icon from the notification area to restart the installation at anytime.*

3. Close the **ShopStream Diagnostic Suite** application. The ShopStream Diagnostic Suite should remain closed until the software installation has completed.
4. Follow the on-screen instructions to complete the installation.

5. After the installation is complete, open the **ShopStream Diagnostic Suite** application.
6. Select **Scanner** from the Home Screen, if a Scan Module firmware update has been received, a “Scan Module firmware update” message will display, proceed to [Firmware Updates on page 33](#).
 - If the Scanner opens normally and no update message is displayed, proceed to step 7.
7. Turn the diagnostic tool off, then turn it on (re-boot).
8. From the toolbar, select **Menu > Help > Version Info** to confirm the new version number is installed.



This diagnostic tool includes a built-in feature that automatically transfers code scan reports, ADAS recalibration reports, screenshots and camera photos to the Snap-on Cloud (ALTUSDRIVE.com).

The Snap-on Cloud is a mobile-friendly cloud-based application designed for technicians to store, organize and share information.

See [Code Scan \(with Vehicle System Report\)](#) on page 44 for information on using Code Scan.

Main Topic Links

- [Registration - Getting Started](#) page 180
- [Using the Snap-on Cloud](#) page 182
 - [Snap-on Cloud - New User Registration](#) page 181
 - [Logging on the Snap-on Cloud \(registered user\)](#) page 182
 - [Navigating Snap-on Cloud \(Toolbars\)](#) page 183
 - [My Files](#) page 183
 - [Search](#) page 187
 - [Shop Files](#) page 187
 - [Favorites](#) page 189
 - [Profile](#) page 189
 - [Sharing/E-mail an Individual File \(Link icon\)](#) page 185
 - [Using Profile Manager](#) page 191
 - [My Network](#) page 190
 - [Logging Out of the Snap-on Cloud](#) page 193

15.1 Key Features

- Automatically transfer code scan reports, screenshots and camera photos to the Snap-on Cloud.
- Access and manage your Snap-on Cloud account, using your diagnostic tool, mobile device or PC.
- Share/send files via e-mail, or other mobile apps.
- Tag files (attach a descriptive key-name) to help you organize and search files.
- Use the Search function to quickly find files by Tag, Description and Title.

15.2 Important Notes

- To use the Snap-on Cloud, account setup and diagnostic tool Wi-Fi connection is required.
- The Snap-on Cloud is continuously monitored for inappropriate content. Abuse (as determined by moderator) will result in account deactivation.

15.3 Registration - Getting Started

To use the Snap-on Cloud:

- The diagnostic tool must be connected to a Wi-Fi network
- Account registration is required online
 - If you are a new user, you will need to create a new account, see [Snap-on Cloud - New User Registration](#).

i NOTE

Account setup is only required one time.

15.3.1 Snap-on Cloud - New User Registration

 If you are a new user, follow these steps to register and create a new account:

1. Connect the diagnostic tool to a Wi-Fi network, see [Wi-Fi Setup](#) on page 12.
2. From the Home screen, select **System Settings > Get Connected**, and write down the Serial Number, PIN and Code that are displayed ([Figure 15-1](#)).

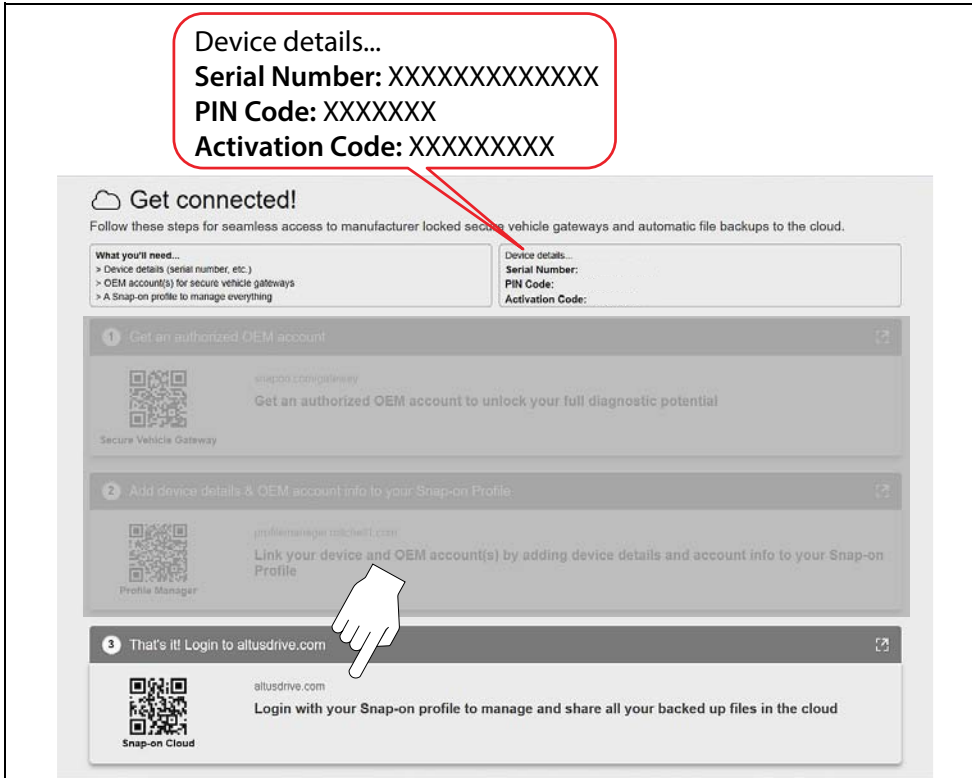


Figure 15-1

i NOTE

The PIN and Code numbers will change each time you view the Get Connected screen ([Figure 15-1](#)). This is normal, any displayed set of PIN and Code numbers may be used to register.

3. Select the weblink ([Figure 15-1](#)) to open the Login page.
4. Select **Create Individual Account**.
5. Enter the required information and create a **Username** and **Password**, then select **Create**.
6. At the “Success” confirmation screen, select **Done**.
7. Log in using your **Username** and **Password**.
8. Answer the security questions, then select **Submit**.
9. From Technician Profile Manager select the **Device Management** tab.
10. Select **Add Device**, then enter your **Serial Number**, **PIN**, **Code**, and Device Name and select **Save** when done.
11. Log out of Profile Manager and close the window.
12. Turn the diagnostic tool off, and then on (reboot).
13. To login and use the Snap-on Cloud, see [Using the Snap-on Cloud](#) on page 182.

Your diagnostic tool is now registered to your Snap-on Cloud online account. Files will be automatically sent (only when connected to Wi-Fi) to your online account from the device.

i NOTE

If the device is not connected to a Wi-Fi network, files will not be sent to your Snap-on Cloud account. Wi-Fi connection is required to upload files to the Snap-on Cloud.



15.3.2 Snap-on Cloud Get Connected Screen

From the Home screen, selecting **System Settings > Get Connected**, allows you view the diagnostic tool serial number, PIN and Code needed to register (*Figure 15-2*). Select the weblink to open the Login page (*Figure 15-2*).

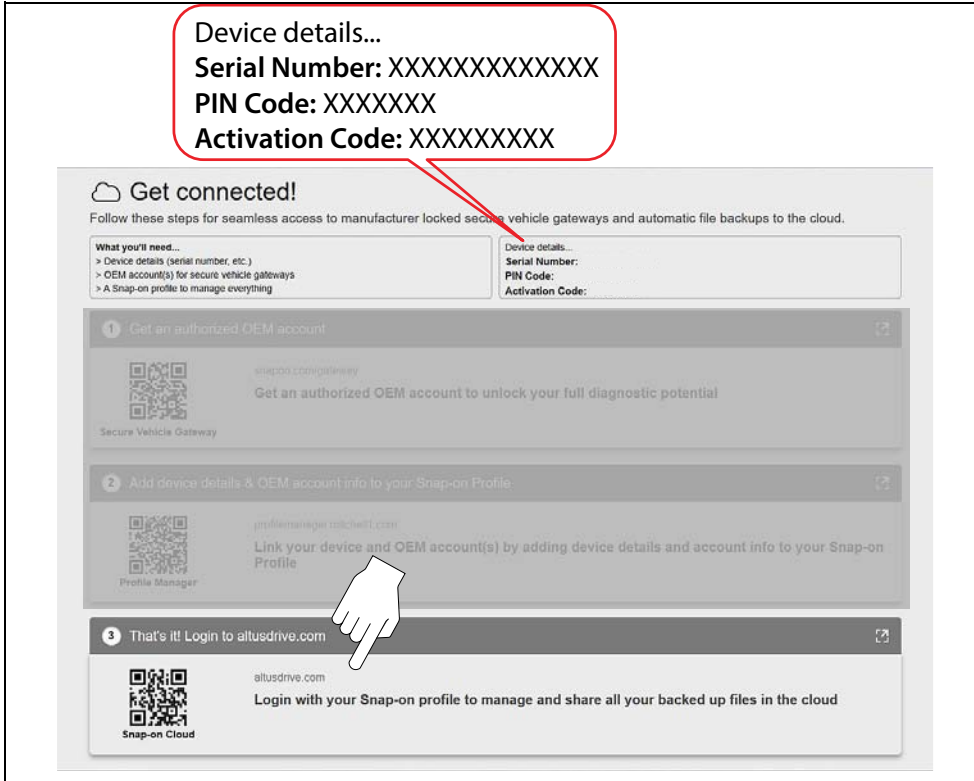


Figure 15-2

NOTE

The PIN and Code numbers will change each time you view the Snap-on Cloud Get Connected screen (*Figure 15-2*). This is normal, any displayed set of PIN and Code numbers may be used to register.

15.4 Using the Snap-on Cloud

To use the Snap-on Cloud:

- A Snap-on Cloud account is required, see [Registration - Getting Started](#) on page 180.
- The diagnostic tool must be connected to a Wi-Fi network, see [Wi-Fi Setup](#) on page 12.

15.4.1 Logging on the Snap-on Cloud (registered user)

▶ Logging in to Snap-on Cloud (registered user):

1. From the Home screen select the **Snap-on Cloud** icon (*Figure 15-3*). If using your mobile device or PC visit ALTUSDRIVE.com.
2. Select the **Login** icon (*Figure 15-3*).

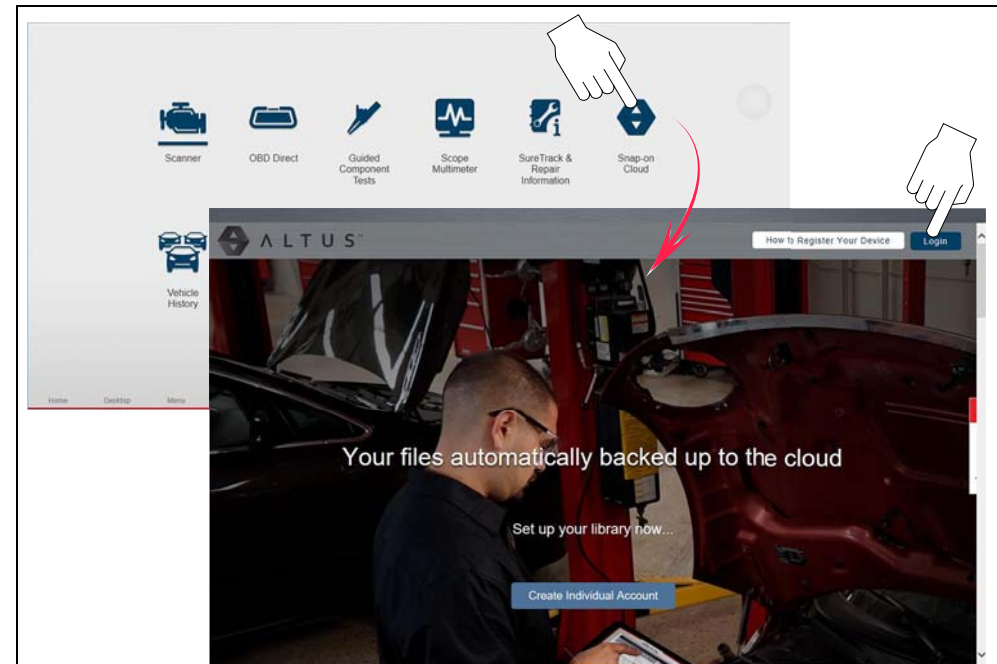


Figure 15-3

3. Log in using your **Username** and **Password** (Figure 15-4).

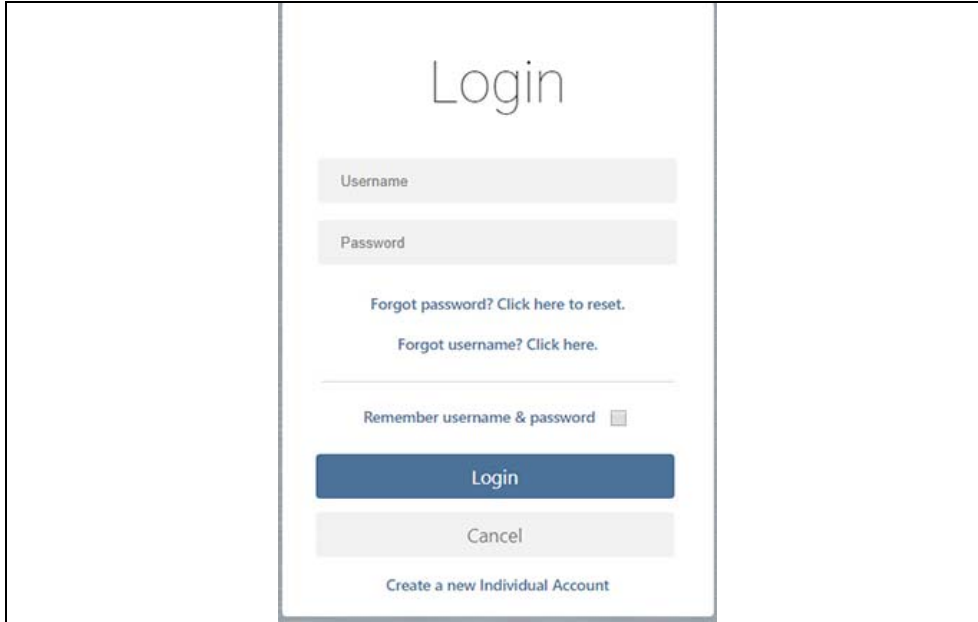


Figure 15-4

15.4.2 Navigating Snap-on Cloud (Toolbars)

The upper and lower toolbars are available from all screens.

The upper toolbar includes a menu icon (right side) (Figure 15-5). This menu allows you to share your entire gallery, see [Sharing all Files \(Share My Gallery\)](#) on page 186.



Figure 15-5

The lower toolbar (Figure 15-6) includes the following links:

- [My Files](#), see page 183
- [Search](#), see page 187

- [Favorites](#), see page 189
- [Profile](#), see page 189



Figure 15-6

15.4.3 My Files

My Files displays all the files uploaded from the diagnostic tool (Figure 15-8). Each file is displayed in a navigation card.

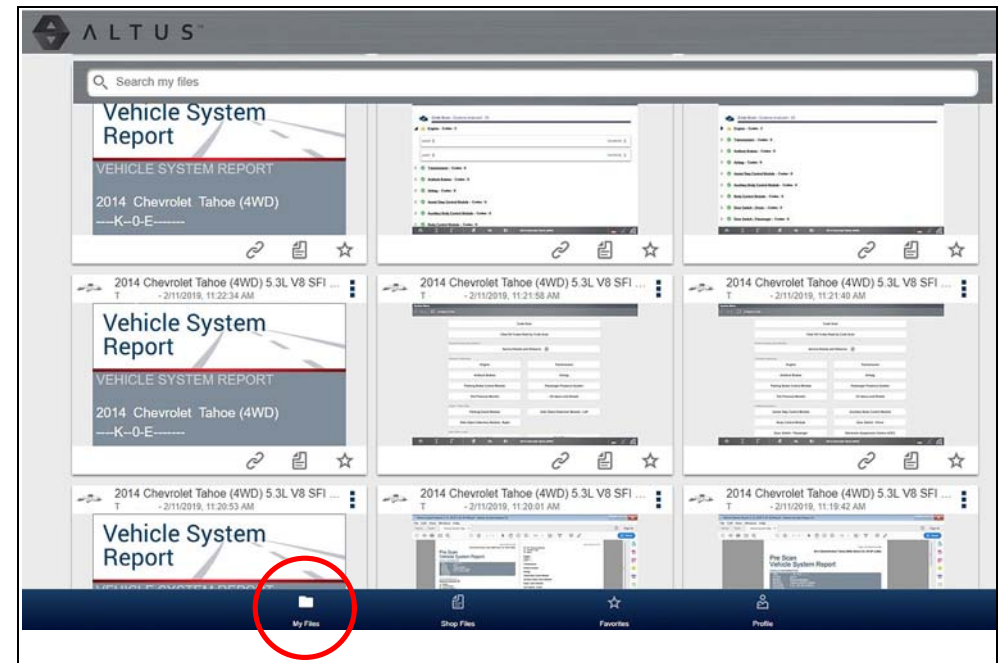


Figure 15-7

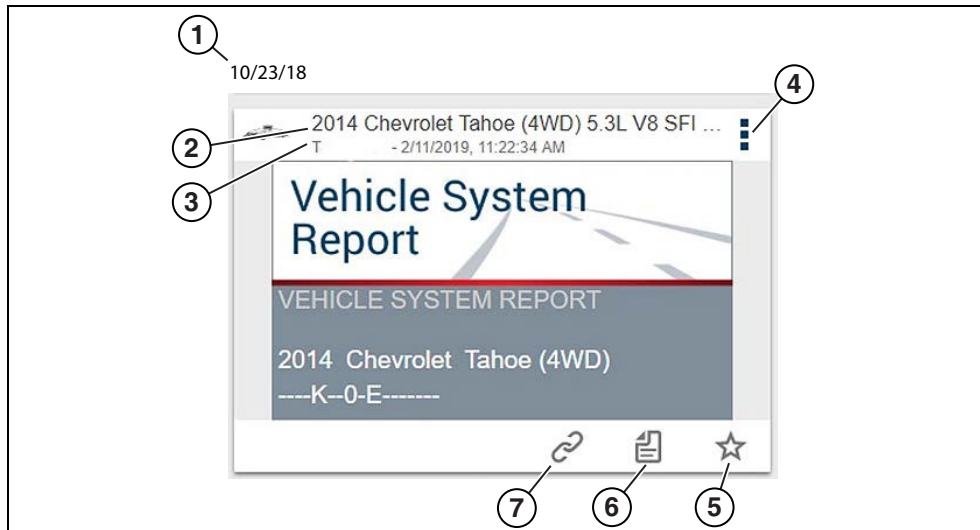


Figure 15-8

- 1— **File Upload Date** - Files are displayed with the most recent uploads at the top. The file upload date is displayed at the upper left. The date is shown once at the top of the series of files, scroll up / down to see all files within a specific date.
- 2— **File Name** - See [File Detail \(Tags\)](#) on page 184 for additional information.
- 3— **Your Account Username (and timestamp)** - See [Account](#) on page 191 for additional information. The timestamp indicates the date/time the file posted on ALTUSDRIVE.com
- 4— **Menu Icon** - options:
 - **Download** - Select to download the file to your device.
 - **Delete** - Select to delete the file from the Snap-on Cloud.
- 5— **Favorites Icon** - See [Favorites](#) on page 189 for additional information.
- 6— **Shop Files** - See [Shop Files](#) on page 187 for additional information.
- 7— **Link icon** - See [Sharing/E-mail an Individual File \(Link icon\)](#) on page 185 for additional information.

Selecting a file opens the File Details. The File Detail screen allows you to edit file metadata. See [File Detail \(Tags\)](#) on page 184.

File Detail (Tags)

As shown in [Figure 15-10](#) selecting (touching) a file from My Files opens the File Detail card. Selecting the file again opens that file in a new browser tab.

NOTE

Opening the file in a separate browser tab may allow you to use the browser viewer tools to print or download the file. This feature may not be available in all browsers.

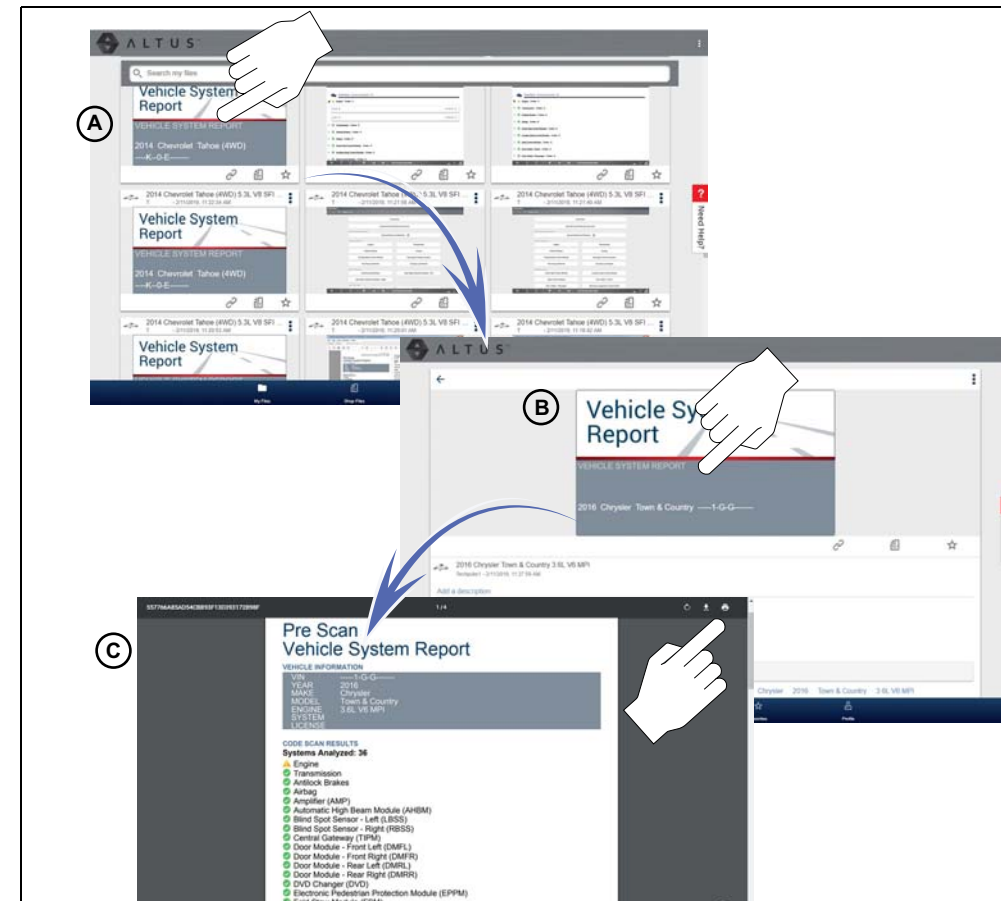


Figure 15-9

The following describes File Detail card features.



Figure 15-10

- 1— **Back Icon** - Returns to My Files
- 2— **File Name** (user entered searchable text) - Select the file name to open the editor. Enter text (alphanumeric) in the field as desired.
- 3— **Your Account Username (and timestamp)** - See [Account](#) on page 191 for additional information. The timestamp indicates the date/time the file posted on ALTUSDRIVE.com
- 4— **Description** (user entered searchable text) - Enter text (alphanumeric) in the description field as desired.
- 5— **Known Good / Bad Checkboxes** (user defined and searchable) - Selecting a checkbox automatically creates a tag (e.g. #good) and is displayed in the Active Tag(s) field.
- 6— **Tag** (user entered searchable text) - Enter text (alphanumeric) in this field as desired. Tagging a file allows you to associate (tag) descriptive text to a file. Tagging can be used to associate multiple files with a common tag. The tag text then can be used when performing a search to find all files with the same tag. Each text entry (word) that is separated by a space (return) is added as a tag, and is displayed in the Active Tag field.

7— **Active Tag(s)** - Displays the active tag(s). Tags can include the “good” or “bad” entry from the Known Good / Bad checkboxes, and text entered in the file Name, Description and Tag fields. Each entry is automatically preceded with the “#” symbol.

Sharing/E-mail an Individual File (Link icon)

To share a file:

1. Select the **Link icon** ([Figure 15-11](#)) on the file card.



Figure 15-11

2. Choose an option how to send the file ([Figure 15-11](#)).

NOTE

Some selections may be grayed out or not shown, indicating the option is not supported on your device/system.

- **Select a Link from your Network** - see [My Network](#) on page 190 for information on how to add contacts.
- **Send via SMS** (Short Message Service) - this option is used with supporting mobile devices, and will typically open a new text message with the link attached, ready to be sent.
- **Send via Email** - your system default e-mail application will open a new message with the link attached, ready to be sent.
- **Copy to Clipboard** - open your (e-mail, text, social media, etc.) application and paste the URL into a message to share with others.

The pasted URL link that is sent only displays:

- The File
- File Name
- Your User Name
- Date File was posted
- File Description

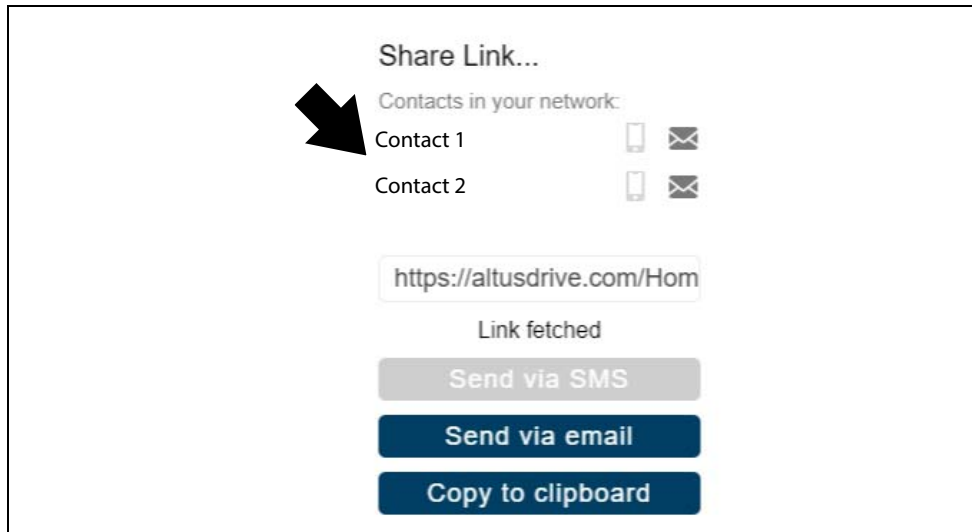


Figure 15-12

Sharing all Files (Share My Gallery)

To share your entire gallery (all files in My Files):

1. Select the **Menu** icon (*Figure 15-14*) from the upper toolbar.



Figure 15-13

2. Select **Share My Gallery**.
3. Select **Copy to Clipboard** (*Figure 15-14*) from the pop-up window.



Figure 15-14

4. Open your (e-mail, text, social media, etc) app and paste the URL into a message to share with others.

The URL link that is sent is only displays:

- The Files
- File Names
- Your User Name
- Date the Files were posted
- Files Descriptions

15.4.4 Search

The Search screen allows you to perform text searches on all uploaded files and view the results.

To search for a specific file or set of files, enter a **search term** in the search box and select the **magnifying glass** icon (Figure 15-15) (or press Enter).

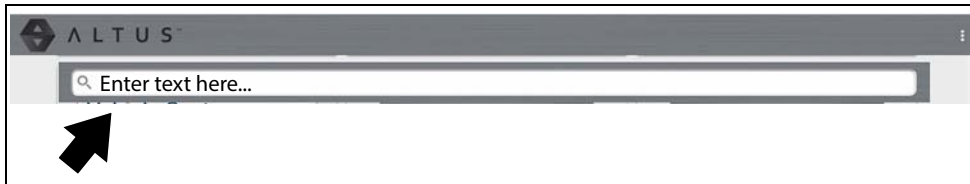


Figure 15-15

Search queries the following to find results:

- **File Name** - name can be either system assigned or user assigned
- **Known Good / Bad Checkboxes** - selecting a checkbox automatically creates a searchable tag (e.g. good or bad)
- **Description** - user entered text
- **Tag** - user entered text

See [File Detail \(Tags\)](#) on page 184 for additional information on the above “user entered” text.

15.4.5 Shop Files

Shop Files allows you to share a file(s) with others via e-mail, text, social media, etc, from a permanent location in the cloud. Unlike sharing a file(s) from My Files, the link is permanent and will work, even if the original file is deleted.

Shop Files links are useful when sharing a file with a customer that is not a registered Snap-on Cloud user, that just needs to see the file, and/or may need access to the file in the future.

Note: The file details displayed in a shared link will be different depending if the message recipient is logged into the Snap-on Cloud or not. If the recipient is not logged in, only limited details are displayed.

To add a file(s) to Shop Files:

From [My Files](#), select the **Copy icon** (Figure 15-16) on the file card to copy the file to Shop Files. This copies the file to a permanent location in the cloud.

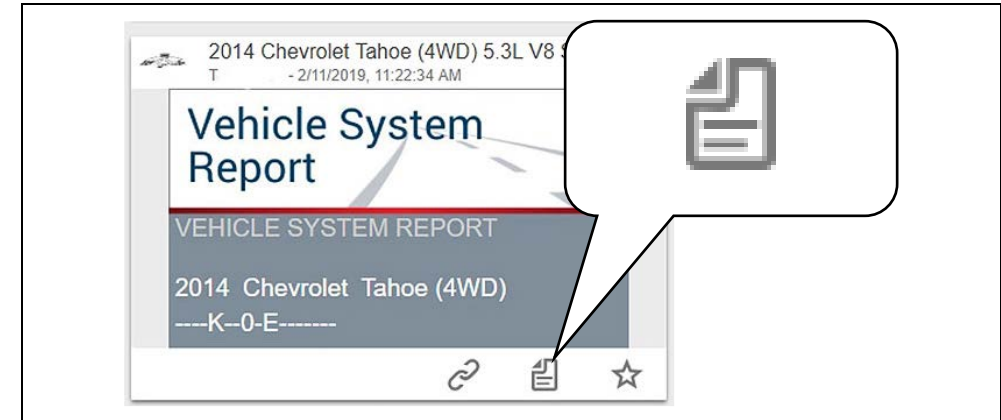


Figure 15-16

To share an individual Shop File:

1. From [Shop Files](#), select the **Copy icon** (Figure 15-17) on the file card.

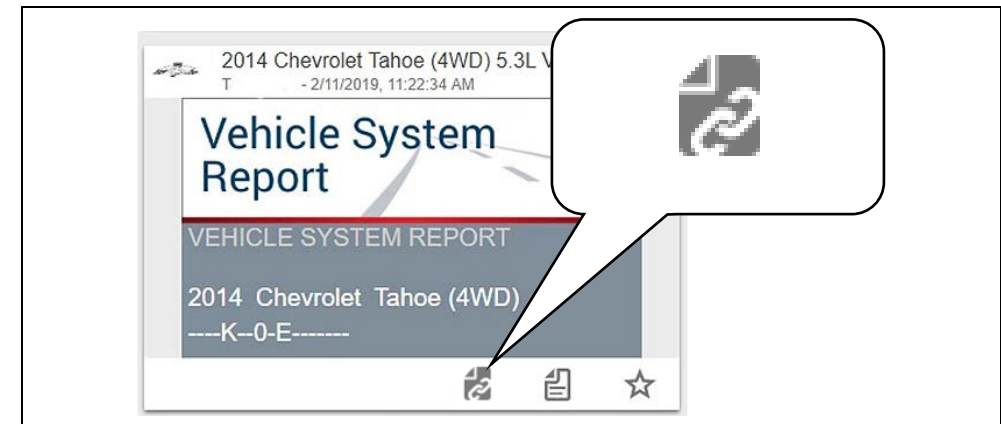


Figure 15-17

2. Select an option ([Figure 15-18](#)) from the pop-up window.

NOTE

Some selections may be grayed out or not shown, indicating the option is not supported on your device/system.

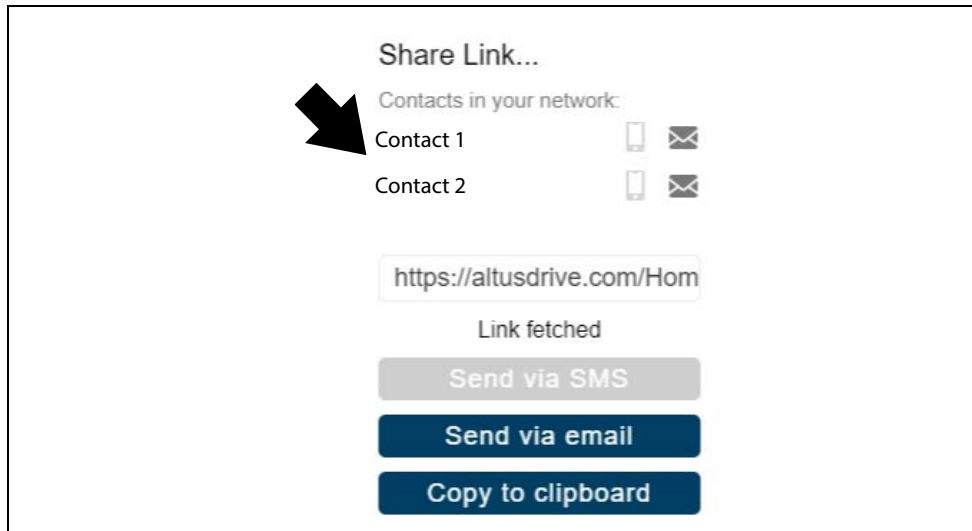


Figure 15-18

- **Select a Link from your Network** - see [My Network](#) on page 190 for information on how to add contacts.
- **Send via SMS** (Short Message Service) - this option is used with supporting mobile devices, and will typically open a new text message with the link attached, ready to be sent.
- **Send via Email** - your system default e-mail application will open a new message with the link attached, ready to be sent.
- **Copy to Clipboard** - open your (e-mail, text, social media, etc.) application and paste the URL into a message to share with others.

To share all files in Shop Files:

1. From Shop Files, select the **Menu** icon ([Figure 15-19](#)) from the upper toolbar.



Figure 15-19

2. Select **Share My Shop Files**.
3. Select **Copy to Clipboard** ([Figure 15-20](#)) from the pop-up window.



Figure 15-20

4. Open your (e-mail, text, social media, etc) application and paste the URL into a message to share with others.

15.4.6 Favorites

The Favorites screen displays all the files selected as favorites (Figure 15-21).

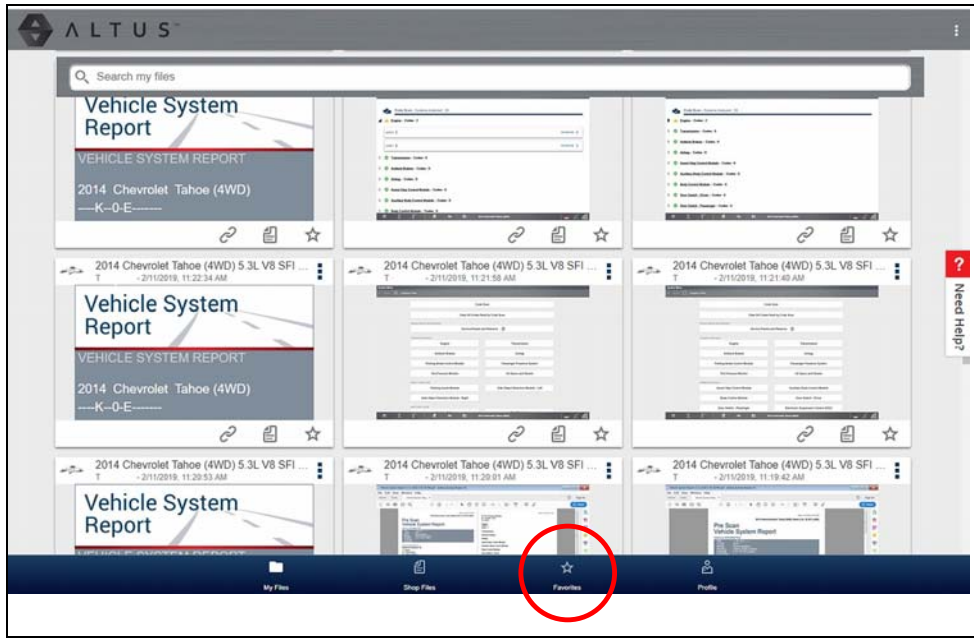


Figure 15-21

To set a file as a "Favorite", select the **Favorite** icon (star symbol) to highlight the icon.

Description	Icon
Favorite (on)	
Favorite (off)	

The Favorites icon can be selected/deselected at anytime when displaying files.

15.4.7 Profile

Select Profile (Figure 15-22) to open the Profile Manager menu.

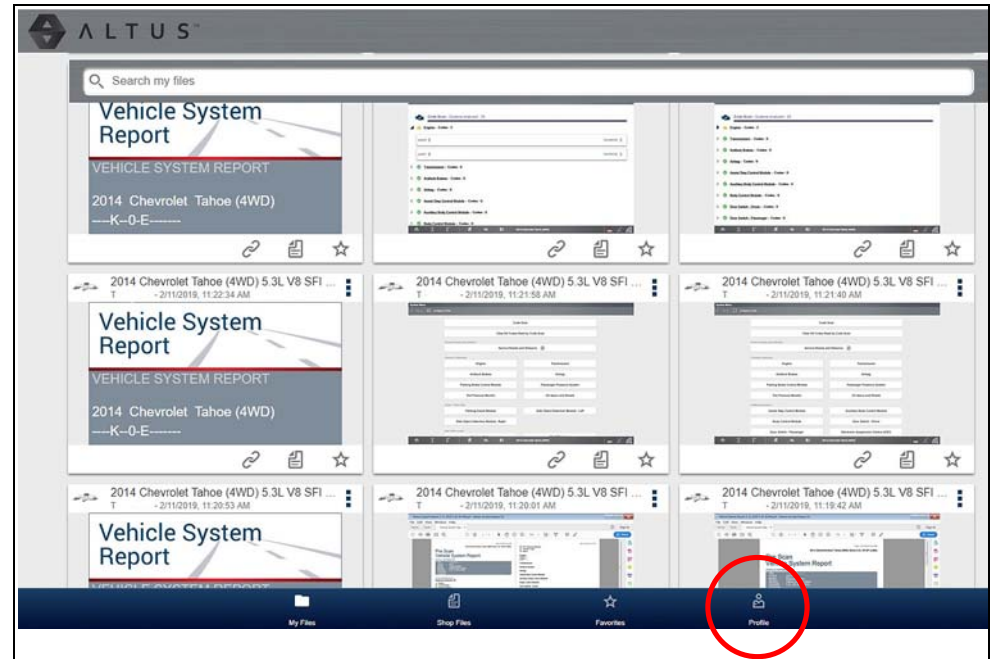


Figure 15-22

The Profile Manager Menu screen (*Figure 15-23*) allows you to:

- Open Profile Manager, see *Using Profile Manager on page 191*
- Logout of the Snap-on Cloud, see *Logging Out of the Snap-on Cloud on page 193*
- Add others to your Network, see *Logging Out of the Snap-on Cloud on page 193*
- Open online Help, to assist in Registering Your Device

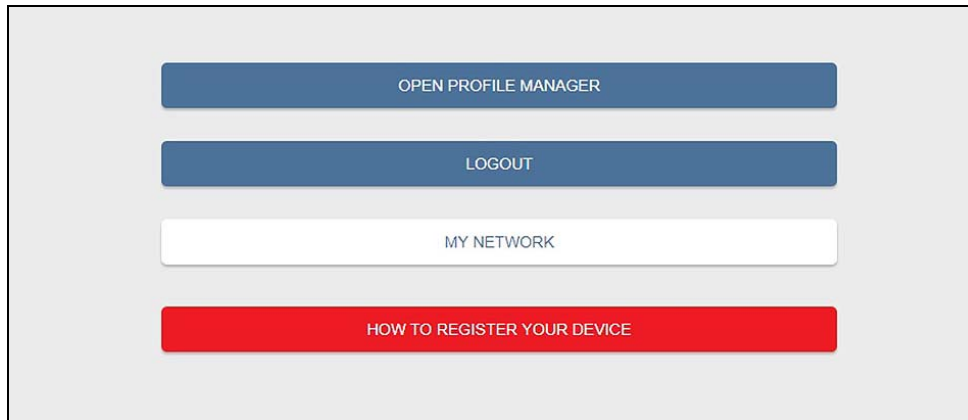


Figure 15-23

My Network

Selecting **My Network** (*Figure 15-23*) allows you to add others to your file sharing network. Enter the contacts name, phone number and/or email at the prompt. Add as many contacts as you need.

The Contact Names you enter will appear in the “Share Link” pop-up screen (*Figure 15-25*) when you select the **Link** icon (*Figure 15-24*).

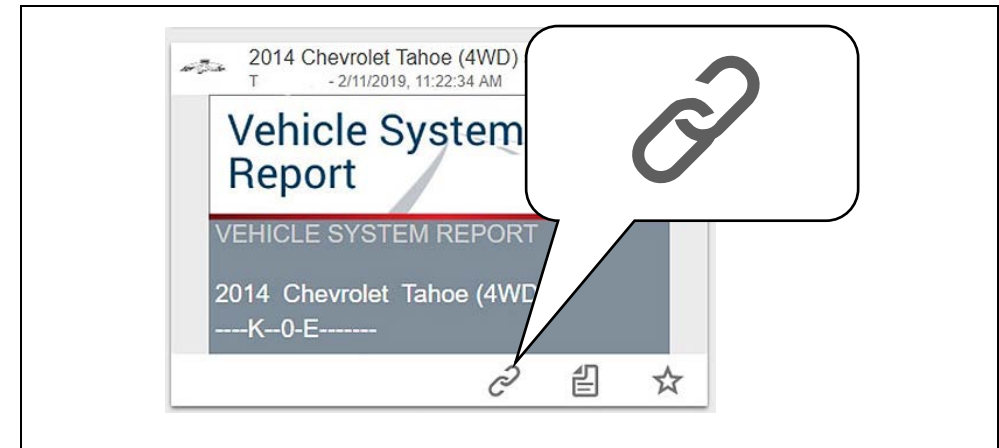


Figure 15-24

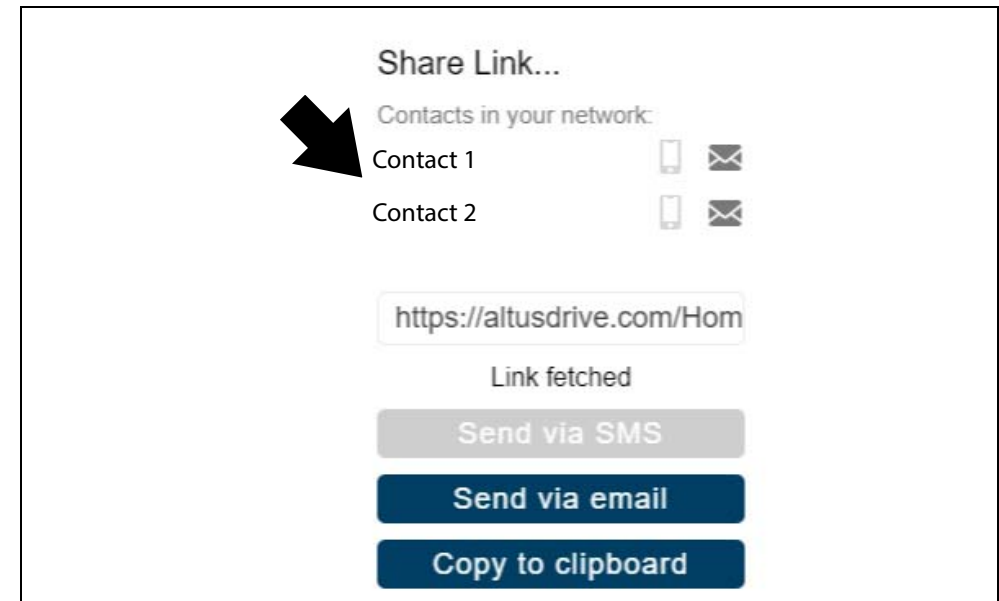


Figure 15-25



Using Profile Manager

To open the Profile Manager screen, select **Profile** from lower toolbar, then select **Open Profile Manager** (Figure 15-23).

NOTE

Profile Manager opens a new browser tab. To return to the Snap-on Cloud after logging out of Profile Manager, you must select the Snap-on Cloud Home Page browser tab.

Enter your **Username** and **Password** at the Login screen.

Profile Manager includes five tabbed categories to help you manage your account information:

- [Account](#) on page 191
- [Personal Information](#) on page 192
- [Profile Picture](#) on page 192
- [Device Management](#) on page 192

Account

This screen manages the following account information (Figure 15-26):

- Authorization Key (not required for Snap-on Cloud account registration)
- Account Expiration Date
- Shop Nickname
- Email
- Username
- Password

Figure 15-26



Personal Information

This screen manages the following personal account information ([Figure 15-27](#)):

- First Name
- Last Name
- City
- State
- Zip Code

Technician Profile Manager Logout

Your Name
New Member

Personal Information * Required field

First Name* Last Name*

City* State* ZIP

Account
Personal Information
Expertise
Profile Picture
Device Management

Cancel Save

Figure 15-27

Profile Picture

This screen allows you to personalize your profile picture, by selecting one of the provided images.

Device Management

This screen manages devices associated with your account ([Figure 15-28](#)):

Select **Add a Device** to setup and add an authorized device.

Enter the device:

- **Serial Number** - serial number of the device
- **PIN** - specific PIN associated to the device
- **Code** - authorization code specific to the device

- **Device Name** - user define name

When finished select **Save** to save and link the device to your account.

Technician Profile Manager Logout

Your Name
New Member

Device Management

You have no associated devices.

Add Device

Account
Personal Information
Expertise
Profile Picture
Device Management

Figure 15-28

Logging Out of Profile Manager

Select the **logout** icon (upper right screen) to log out of Profile Manager ([Figure 15-29](#)).

Technician Profile Manager Logout

Figure 15-29

NOTE

Profile Manager opens a new browser tab. To return to the Snap-on Cloud after logging out of Profile Manager, you must select the Snap-on Cloud Home Page browser tab.



Logging Out of the Snap-on Cloud

To log out of the Snap-on Cloud, select **Profile** from lower toolbar, then select **Logout** ([Figure 15-30](#)).

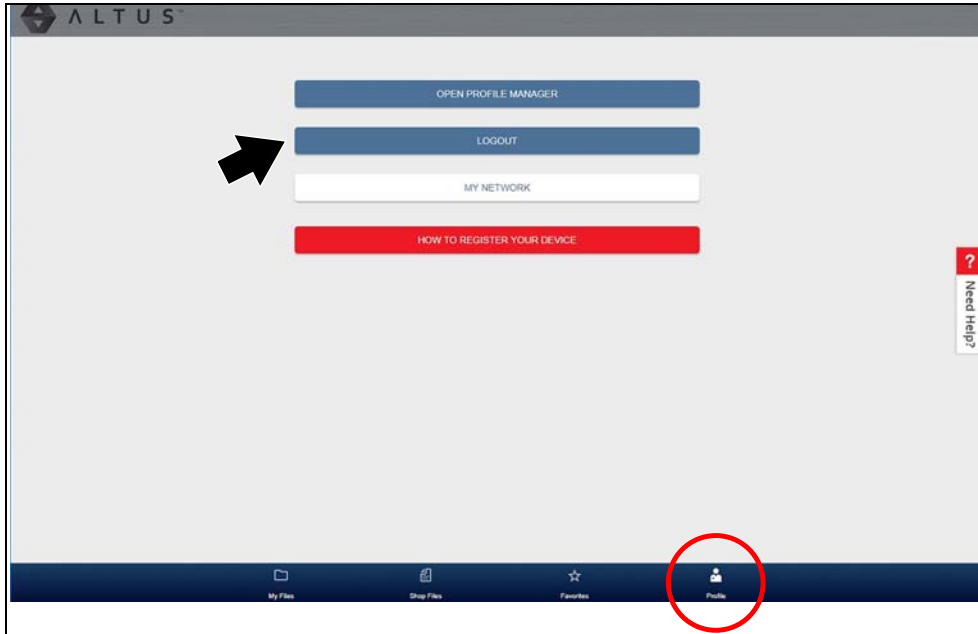


Figure 15-30



16.1.1 Saving the Report (Typical Navigation)

1. Connect the diagnostic tool to the vehicle and identify the vehicle.

NOTE

The information that is entered during vehicle identification is automatically entered onto the report form (vehicle make, model, VIN, odometer, license number, etc). The Shop Information that is associated with the diagnostic tool is also entered on the form, see [Shop Information](#) on page 171 to edit this information.

2. From the System menu, select the applicable **ADAS (Driver Assistance)** system (Lane Departure Alert, Cruise Control Radar, Front Sensing Camera, Front/Rear Camera Sensor, etc (system names vary by manufacturer)).
3. Select the applicable **functional test** or adjustment option (Recognition Camera Axis Adjust, Beam Axis Adjustment, Static Aiming, etc (test names vary by manufacturer)).
4. Follow and perform all the required setup instructions. Reference and setup values are located in the OEM service information which is available separately. If using the ADAS Recalibration System, setup values and instructions are provided with the unit.

NOTE

Take screenshots of any setup and or results screens that may be needed for reference later when filling out the form.

5. Initiate the recalibration test when prompted.
6. Once calibration is completed **Exit** the test.
7. Select the **Back Arrow** twice to return to the System menu.
8. From the upper toolbar, select **ADAS Report** ([Figure 16-2](#)). The ADAS Report form is displayed ([Figure 16-3](#)).

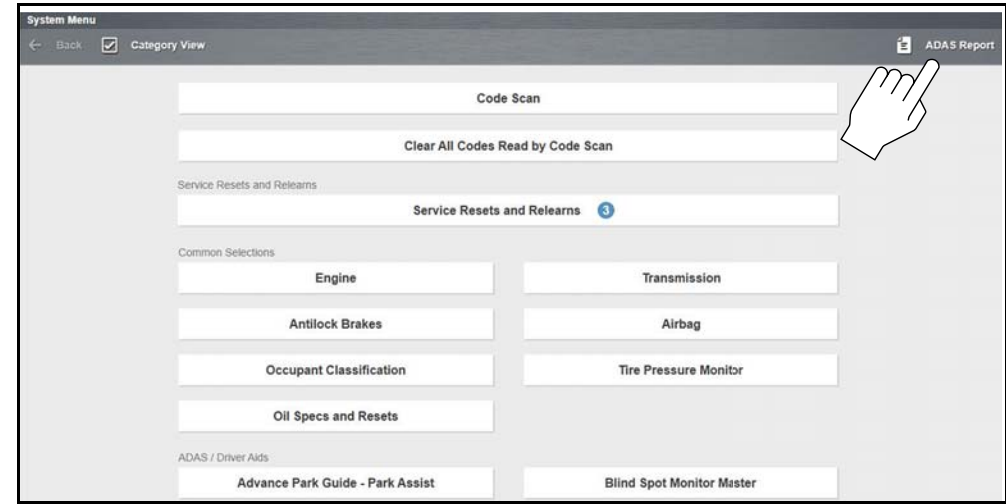


Figure 16-2

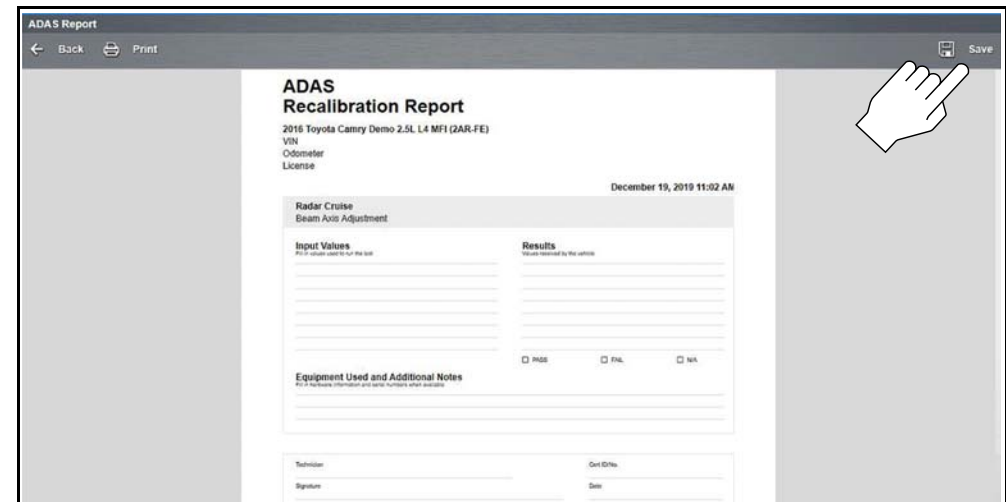


Figure 16-3

9. Select **Save** ([Figure 16-3](#)) to save the report within the diagnostic tool and automatically upload it to the Snap-on Cloud.

NOTE

Selecting Print will not save the report.



The report form is saved as a PDF file that can be accessed from the following locations:

- Vehicle Record attachment field.
- ADAS Report Data Folder (in Data Manager).
- Snap-on Cloud

As reference the file is located in the following path:

C:\Users\ShopstreamUser\Documents\ShopStream\ADAS Report Data Folder\ (date).pdf.

16.1.2 Printing the Report

Before you can print you must install a printer and have a current version of Adobe Reader installed.

To install a printer, see [Printing / Printer Setup](#) on page 19.

To check and/or install Adobe Reader, see [Checking/Installing Adobe® Reader](#) on page 22.

- The report may be directly printed by selecting the **Print** icon from the System menu toolbar.
- If the file was saved it may also be printed from either the Vehicle Record attachment, or from the ADAS Report Data Folder within Data Manager.

The following sections describe these methods.

Printing (From the System Menu Screen)

When print is selected, the file is sent directly to the default printer ([Figure 16-4](#)). The file may be displayed momentarily in the PDF viewer and then minimized (this is normal).

i NOTE

The file is not saved when Print is selected.

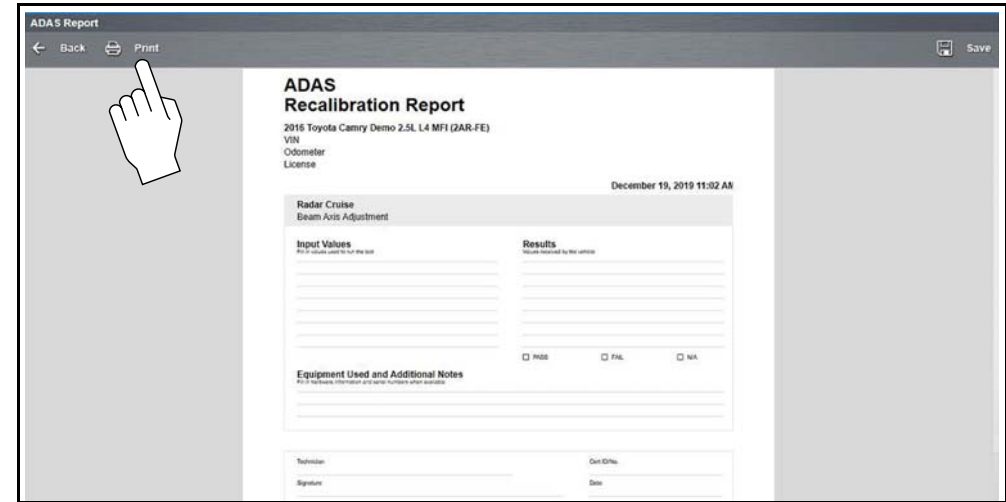


Figure 16-4

Printing (From Data Manager)

To print the file from Data Manager:

1. Select **Data Manager** from the Home Screen
2. Select and open the ADAS Report Data Folder ([Figure 16-5](#)).

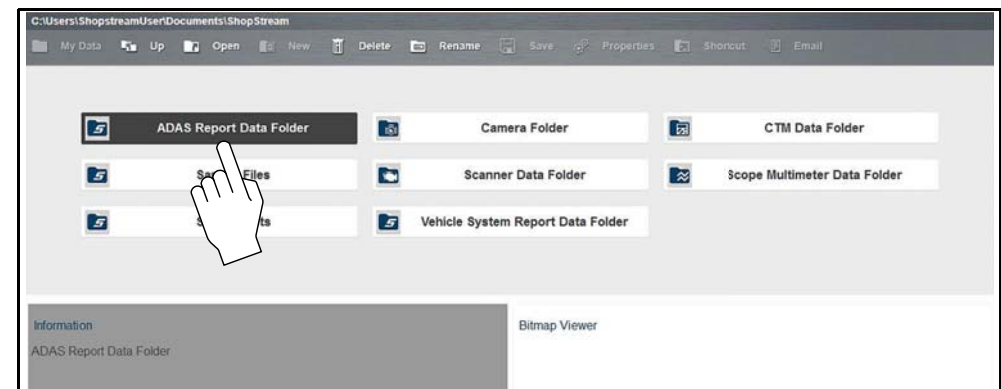


Figure 16-5

3. Select and open the ADAS Report PDF file from the list.
4. From the PDF viewer use the menu or toolbar print options to print the file ([Figure 16-6](#)).

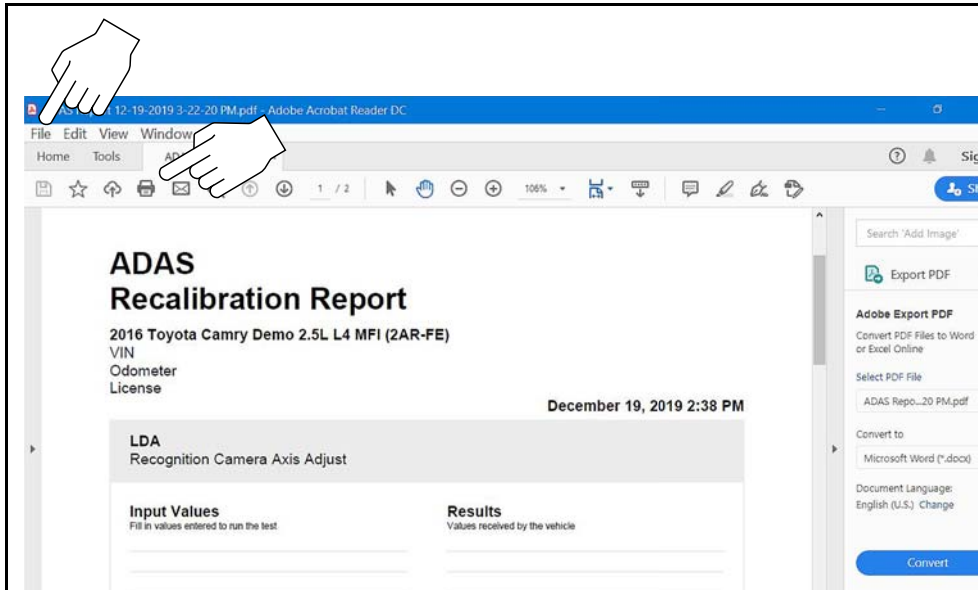


Figure 16-6

Printing (From Vehicle History Record)

To print the file from the Vehicle History Record:

1. Select **Vehicle History** from the Home Screen
2. Select and open the vehicle record from the list.
3. Select and open the ADAS Report PDF file from the attachments box (Figure 16-7).

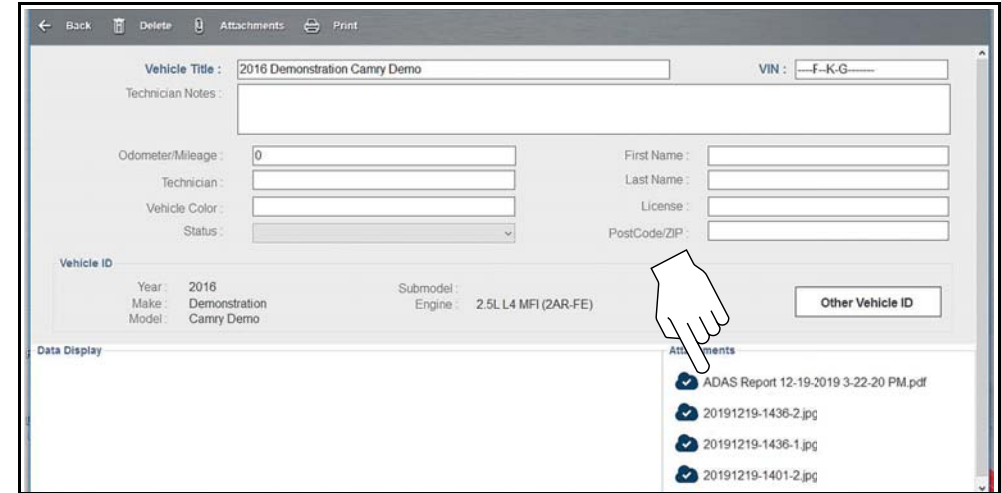


Figure 16-7

4. From the PDF viewer use the menu or toolbar print options to print the file (Figure 16-6).



Introduction

This section describes typical maintenance and care procedures for your diagnostic tool and components.

Main Topic Links

- [Cleaning the Diagnostic Tool](#) page 198
- [Cleaning the Touch Screen](#) page 198
- [Cleaning the Compact Scan Module \(CSM\)](#) page 198
- [Battery Pack Replacement](#) page 200
- [Battery Pack Disposal](#) page 200
- [Screen Protector Installation](#) page 201
- [Stylus Tip Replacement \(Touch Screen\)](#) page 202

17.2 Cleaning

17.2.1 Cleaning the Diagnostic Tool

Periodically perform the following tasks to keep your diagnostic tool in proper working order:

- Check the housing, cables and connectors for dirt and damage before and after each use.
- At the end of each work day, wipe the diagnostic tool housing, cables and connectors clean with a damp cloth.

IMPORTANT

Do not use any abrasive cleansers or automotive chemicals on the diagnostic tool.

17.2.2 Cleaning the Touch Screen

The touch screen can be cleaned with a soft cloth and a mild window cleaner.

IMPORTANT

Do not use any abrasive cleansers or automotive chemicals on the touch screen.

17.2.3 Cleaning the Compact Scan Module (CSM)

When using the CSM, always:

- Check the housing, wiring, and connectors for dirt and damage before and after each use.
- At the end of each work day, wipe the housing, wiring, and connectors clean with a slightly damp cloth.

**IMPORTANT**

Do not use any abrasive cleansers or automotive chemicals on the CSM.

17.3 Battery Pack

17.3.1 Safety

Follow all safety guidelines when handling the battery pack.



WARNING

Risk of electric shock.

- **Prior to recycling the battery pack, protect exposed terminals with heavy insulating tape to prevent shorting.**
- **Disconnect all test leads and turn diagnostic tools off before removing the battery pack.**
- **Do not attempt to disassemble the battery or remove any component projecting from or protecting the battery terminals.**
- **Do not expose the diagnostic tool or battery pack to rain, snow, or wet conditions.**
- **Do not short circuit the battery terminals.**

Electric shock can cause injury.



WARNING

Risk of explosion.

- **The Lithium battery is factory replaceable only, incorrect replacement or tampering with the battery pack may cause an explosion.**

Explosion can cause death or serious injury.

IMPORTANT

The battery pack contains no user serviceable components. Tampering with the battery pack terminals or housing will void the product warranty.

Keep the following in mind when using and handling the battery pack:

- Do not short circuit battery pack terminals.
- Do not immerse the diagnostic tool or battery pack in water, or allow water to enter the diagnostic tool or battery pack.
- Do not crush, disassemble, or tamper with the battery pack.
- Do not heat the battery pack to over 100°C (212°F), or dispose of it in a fire.
- Do not expose the battery pack to excessive physical shock or vibration.
- Keep the battery pack out of reach of children.
- Do not use a battery pack that appears to have suffered abuse or damage.
- Charge the battery pack in the appropriate charger only.
- Do not use a battery charger that has been modified or damaged.
- Use the battery pack for the specified product only.
- Store the battery pack in a cool, dry, well ventilated area.

NOTE

The battery pack should be used within a short period of time (about 30 days) after charging to prevent loss of capacity due to self-discharging.

If long-term storage of the battery pack is necessary, it should be stored in a cool, dry, well ventilated place with a 30 to 75 percent state of charge to prevent loss of characteristics.

To prolong the life of your battery, turn off the diagnostic tool when not in use. The diagnostic tool has a built in charger that recharges the battery on demand whenever it is connected to a power source.

17.3.2 Battery Pack Replacement

If the battery pack no longer holds a charge, contact your sales representative to order a new one.

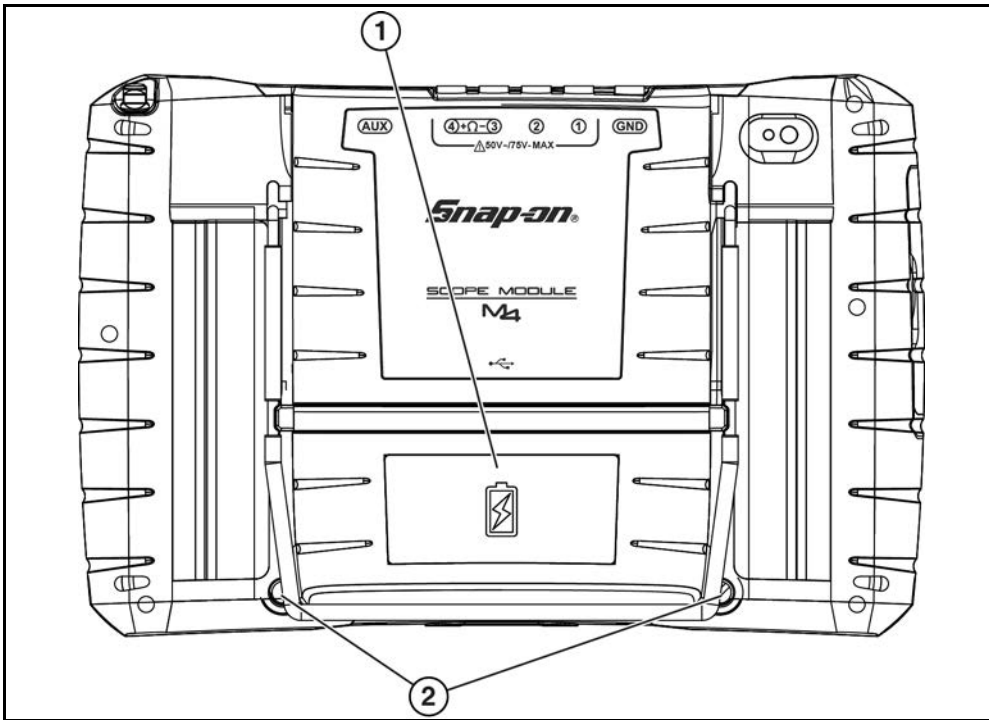
IMPORTANT

Replace the battery pack with a Snap-on replacement battery pack only.



To replace the battery pack:

1. Loosen the two battery pack screws.
2. Carefully tilt the battery pack up from the bottom, and then remove it.



1. Battery Pack
2. Battery Pack Screws (2)

Figure 17-1 Battery pack location

3. In the opposite manner of removal; insert the new battery pack into position, then tilt it down into place making sure it is fully seated.

NOTE

Do not overtighten the battery pack screws.

4. Tighten the two battery pack screws.

17.3.3 Battery Pack Disposal

Always dispose of a lithium-ion battery pack according to local regulations, which vary for different countries and regions. The battery pack, while non-hazardous waste, does contain recyclable materials. If shipping is required, ship the battery pack to a recycling facility in accordance with local, national, and international regulations. For additional information contact:

- **United Kingdom**—Electrical Waste Recycling Company at <http://www.electricalwaste.com>

Products bearing the WEEE logo (Figure 17-2) are subject to European Union regulations.

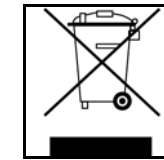


Figure 17-2 sample WEEE logo

NOTE

Always dispose of materials according to local regulations.

Contact your sales representative for details.



17.4 Screen Protector Installation

Touch screen protectors are available as optional equipment (contact your sales representative to order). The following procedure describes typical installation procedures.

Items recommended for installation:

- Microfiber type cloth (lint-free)
- Flexible straight edged tool (e.g. small squeegee, plastic card)
- Cellophane tape



To install a screen protector:

i NOTE

Cleanliness is the most important factor during the installation of the screen protector. The following tips are provided to assist in the installation:

- Clean your hands thoroughly.
- Clean the touch screen thoroughly using a microfiber type cloth, removing all dirt, dust, grease, fingerprints etc. See [Cleaning the Touch Screen](#) on page 198 for additional information.
- Work in a well lit area.
- Minimize dust; work in an area with minimal air movement, turn off fans or air conditioning etc.
 1. Thoroughly clean and dry the touch screen. See [Cleaning the Diagnostic Tool](#) on page 198 for additional information.
 2. Remove the rear mask ([Figure 17-3](#)) from the screen protector.

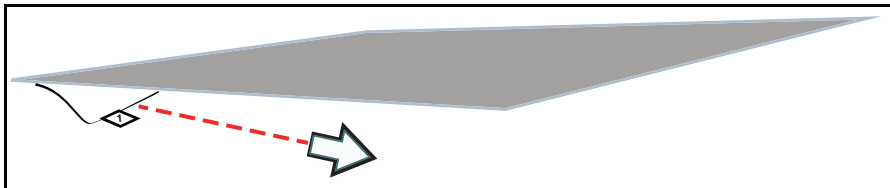


Figure 17-3 Removing rear mask

3. Carefully align the edge of the protector with the edge of the screen, and slowly allow the screen protector to lie flat on the screen ([Figure 17-4](#)).

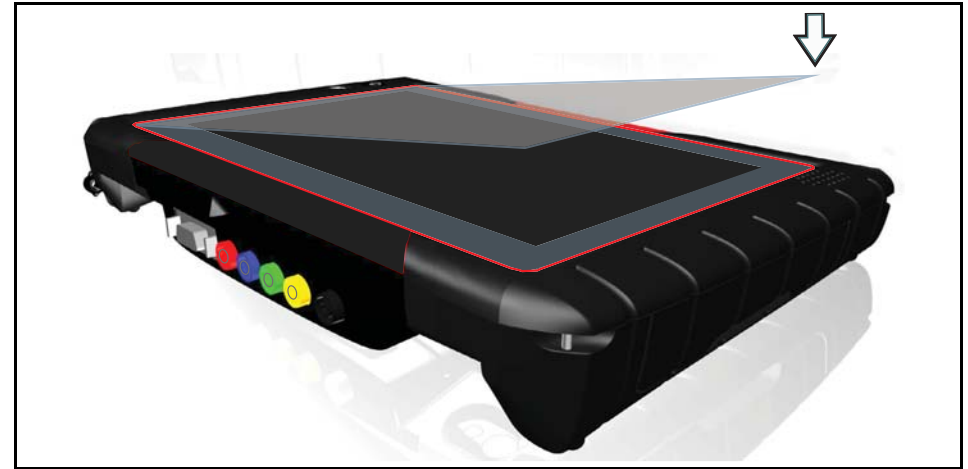


Figure 17-4

i NOTES

To remove air bubbles, slowly work from the inside towards the edges. If large air bubbles are trapped, it may be easier to carefully peel back the protector and re-apply.

If air bubbles are persistent, it is an indication that the screen and/or protector are not clean.

If visible dust is trapped under the protector, peel back the protector and use the adhesive side of a small piece of cellophane tape to remove the dust.



17.5 Stylus Tip Replacement (Touch Screen)

Periodically the capacitive stylus tip may need to be replaced. There are two styles of removable stylus tips.

Style "A" (*Figure 17-5*) - To remove, unthread the tip counterclockwise. To install a new stylus tip, thread it on clockwise until seated.

Style "B" (*Figure 17-6*) - To remove, unthread the collar counterclockwise. To install a new stylus tip, remove the old tip from the shaft and install a new tip, then thread the collar on clockwise until seated.

Stylus tips are available as optional equipment (contact your sales representative to order).

IMPORTANT

Do not overtighten the stylus tip.

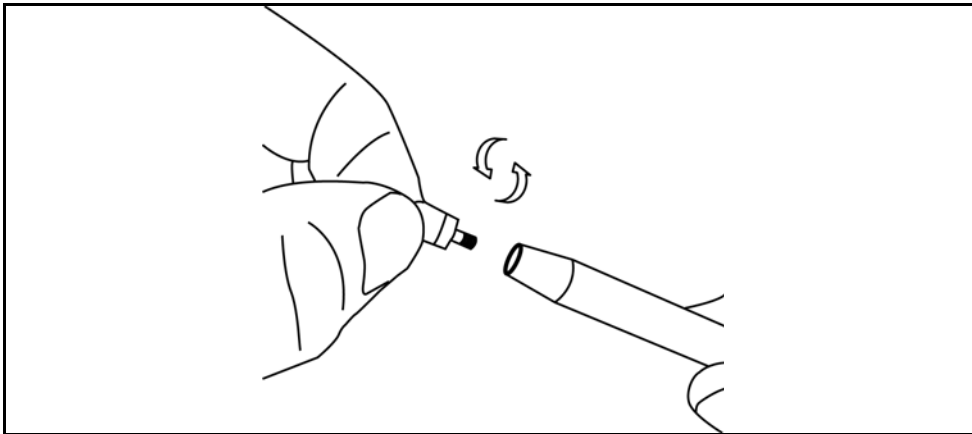


Figure 17-5 Replacing stylus tip - (Style A)

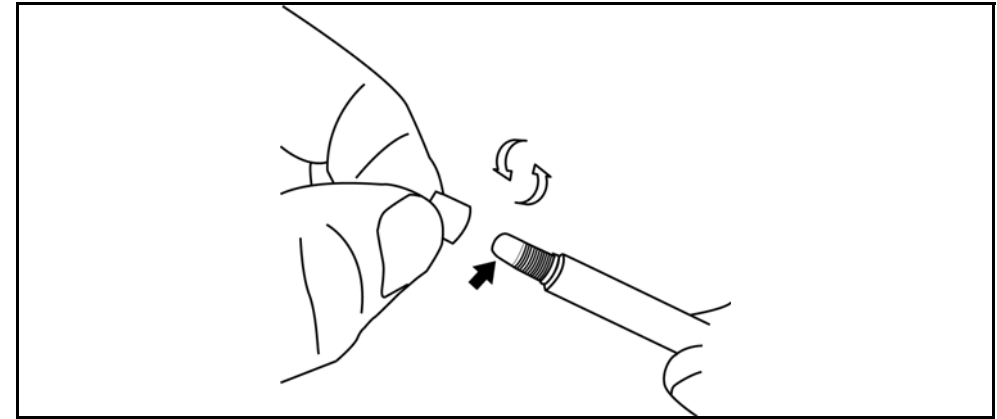


Figure 17-6 Replacing stylus tip - (Style B)



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Use of Software is governed by the terms and conditions of the End User License Agreement. The diagnostic tool should not be initially operated until the End User License Agreement is read. Use of the device acknowledges your acceptance of the End User License Agreement. The Snap-on Incorporated Software End User License Agreement may be provided with the diagnostic tool, and is available at: <https://eula.snapon.com/diagnostics>

Patent Information

For a listing of Snap-on products that are protected by patents in the United States and elsewhere, visit: <https://patents.snapon.com>

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- Modifies or alters in any way the standard terms and conditions of the purchase, lease, or rental agreement under the terms of which the equipment to which this manual relates was acquired.
- Increases in any way the liability to the customer or to third parties.

Snap-on® reserves the right to make changes at any time without notice.

IMPORTANT

Before operating or maintaining this unit, please read this manual carefully paying extra attention to the safety warnings and precautions.

Manuals / Technical Documentation - The information in this manual is periodically revised to ensure the latest information is included. Download the latest version of this manual and other related technical documentation from the Snap-on Diagnostics website.

IMPORTANT INFORMATION

Operating System (OS)

Your ZEUS™ delivers exclusive coverage, more capabilities, superior performance and runs on a special version of the Microsoft® Windows® 10 operating system.

DO NOT install another operating system on this diagnostic tool. The modification or installation of a different OS or OS version will damage the diagnostic tool and void its warranty.