VERUS® Edge

User Manual

ZEEMS330A Rev. A

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IMPORTANT:
Before operating or maintaining this unit, please read this manual carefully paying extra attention to the safety warnings and precautions.

Contact Information (North America)

Websites:

Snap-on Diagnostics and Information

- http://diagnostics.snapon.com

Software Subscription - Learn how to always have the latest diagnostic software on your Diagnostic Tool.

- http://diagnostics.snapon.com/theprogram

Training and Support (by platform) - Find product support information, and watch free instructional product videos.

- http://diagnostics.snapon.com/FAQ.htm

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 at :

- http://diagnostics.snapon.com/usermanuals

Forums and Training - Watch free instructional product videos. Connect with and share your Diagnostic Tool questions, ideas and success stories :

- http://diagnostics.snapon.com/ForumsandTraining.htm

Phone / E-mail - Technical Assistance

1-800-424-7226 / diagnostics_support@snapon.com

For technical assistance in all other markets, contact your selling agent.

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 it's 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 unexpected vehicle movement.

- **Block drive wheels before performing a test with engine running.**

A moving vehicle can cause injury.

Important Safety Instructions

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

SAVE THESE INSTRUCTIONS

Contents

Safety Information ..... **iii**

Contents ..... **i**

Chapter 1: Using This Manual **1**
Conventions 1
Bold Text 1
Symbols 1
Terminology 1
Notes and Important Messages 2
Procedures 2
Hyperlinks 2
Tool Help 2

Chapter 2: Introduction **3**
Features and Specifications 3
Diagnostic Tool 3
Scope Module 7
Scan Module (Wireless) 9

Chapter 3: Basic Operation and Navigation **11**
Turning On/Off, Sleep Mode and Emergency Shutdown 11
Turning On 11
Turning Off 11
Sleep Mode 12
Emergency Shutdown 12
Shortcut (S) Button 13
Configure Shortcut (S) Button 14
Advanced (menu selection) 14
LED Indicator 15
Basic Navigation 15
Touch Screen and Stylus 15
Starting the ShopStream Diagnostic Suite Program 17
Home Screen Layout 17
Function Icons 18
Toolbar 19
Windows Taskbar 21
Virtual Keyboard 21
Camera Operation 23
Operating the Camera 23
Viewing Pictures 24
Wi-Fi Setup 24

Chapter 4: Scanner Function **25**
Demonstration Program 25
Basic Operation and Navigation 26

Screen Messages 26
Making Selections 26
Scanner Screen Layout 27
Menu Options 36
Scanner Operation 39
Vehicle Identification 39
Connecting the Scan Module 40
Vehicle System and Test Selection 41
Stopping Communication and Exiting the Scanner 52

Chapter 5: Scan Module Operation 54
Overview 54
Pairing The Scan Module 55
Checking Scan Module Paired Status 56
Data Cable Connection 57
Troubleshooting 58
No Communication Message 58
Signal Loss / Out of Range Alarm 58
Checking Hardware Status 58
Recovery Procedure 60
Updating Scan Module Firmware 62

Chapter 6: OBD Direct Operations 65
OBD Health Check 66
Global OBD II Code Check 66
Global OBD II Clear Codes 67
Readiness Monitors 67
MIL Status 68
OBD Diagnose 68
Start Communication 68
Connector Information 72
Manual Protocol Selection 72

Chapter 7: Guided Component Test Operations 73
Vehicle Identification 73
Menu Options, Guided Component Test 74
Creating a Favorites List 76
Identifying a Test Vehicle 77
Operations 79
Component Information 79
Tests 80

Chapter 8: Scope and Multimeter Operations 84
Using the Scope Module Remotely 84
Getting Started 86
Capabilities 86
Leads, Probes and Adapters 87
Menu Options, Scope Multimeter 90
Navigation 91
Screen Layout 91
Making Selections 96

Operations 97
Starting the Scope and Multimeter 97
Measurement Out of Range 99
Scope and Multimeter Setup 99

Chapter 9: Repair Information Operations 113

Chapter 10: Technical Service Bulletins 114

Chapter 11: Vehicle History Operations 116
Screen Layout 116
Vehicle History Main Body 117
Vehicle History Toolbar 117

Chapter 12: Data Manager Operations 121
Screen Layout 121
Navigation 122
Operations 122
My Data 122
Up 122
Open 123
New 124
Delete 125
Rename 126
Properties 127
More 127
Saved File Structure 128
Scanner DataViewer Operation 129
Menu Bar 130
Display Toolbar 133
Navigation Tools 134
Customizing the Display 136
Customizing the Parameter List 137
Saving Files 138
ShopStream Connect™ 138

Chapter 13: Help Operations 139
Using the Help Toolbar 139

Chapter 14: System Settings Operations 140
Paired Devices 140
Scan Module Pairing 141
Paring the M2 Scope/Meter 141
Shop Information 145

Chapter 15: SureTrack 147
SureTrack Authorization and Registration 147
SureTrack Authorization Code 148
SureTrack Account Registration 148
SureTrack Log In 149
Using SureTrack in Scanner Mode 151

Common Replaced Parts Graph 151
Dashboard Feature Information 152
Starting SureTrack from the Home Screen 154
Using the SureTrack Website 155
SureTrack Home Page 155
My SureTrack 158
Dashboard 159
Ask the Experts 161
Enter a Tip 163
Add Waveform/PID Graph 163
My Profile 163
Support 163

Chapter 16: ShopStream Update Tool (SST) 164
Basic Operation 164
Manual Download 166
Installing Software Updates 168
Installing Software Upgrades 169

Chapter 17: Maintenance 171
Diagnostic Tool 171
Cleaning 171
Cleaning the Touch Screen 171
Battery Service 171
Calibrating the Touch Screen 174
Screen Protector Installation 176
Stylus Tip Replacement 178
Operating System Restore 178
Scan Module 179
Cleaning and Inspecting the Scan Module 179
Replacing the Protective Handgrip 179

Index 180

Chapter 1 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.

1.1 Conventions

1.1.1 Bold Text

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

Example:

- Select **Functions**.

1.1.2 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.

1.1.3 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.

1.1.4 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.

1.1.5 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.

1.1.6 Hyperlinks

Hyperlinks, or links, that take you to other related articles, procedures, and illustrations are available in electronic documents. Blue colored text indicates a selectable hyperlink.

Example:

IMPORTANT:
Read all applicable Safety Information before using this tool!

1.1.7 Tool Help

To display help topics for this tool, select a help option from the Help menu.

Chapter 2 Introduction

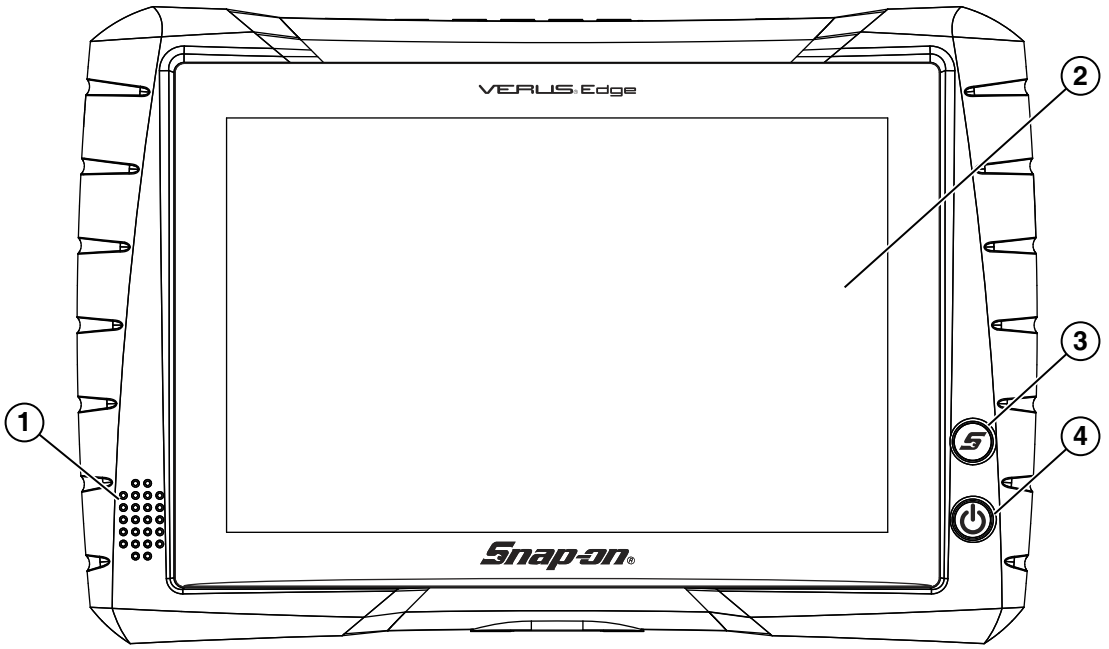
This chapter introduces the basic features of the Diagnostic Tool, including the control buttons, data ports, battery pack, and power sources. Your Diagnostic Tool is a specialized personal automotive diagnostic solution that combines information with test instrumentation to help you diagnose symptoms, codes, and complaints quickly and efficiently. There are three main components to the system:

- **Diagnostic Tool**—central processor and monitor for the system
- **Scope Module**—device for sampling circuits and signals
- **Scan Module**—wireless device for accessing vehicle data

This manual describes the operation of these three devices and how they work together to deliver diagnostic solutions.

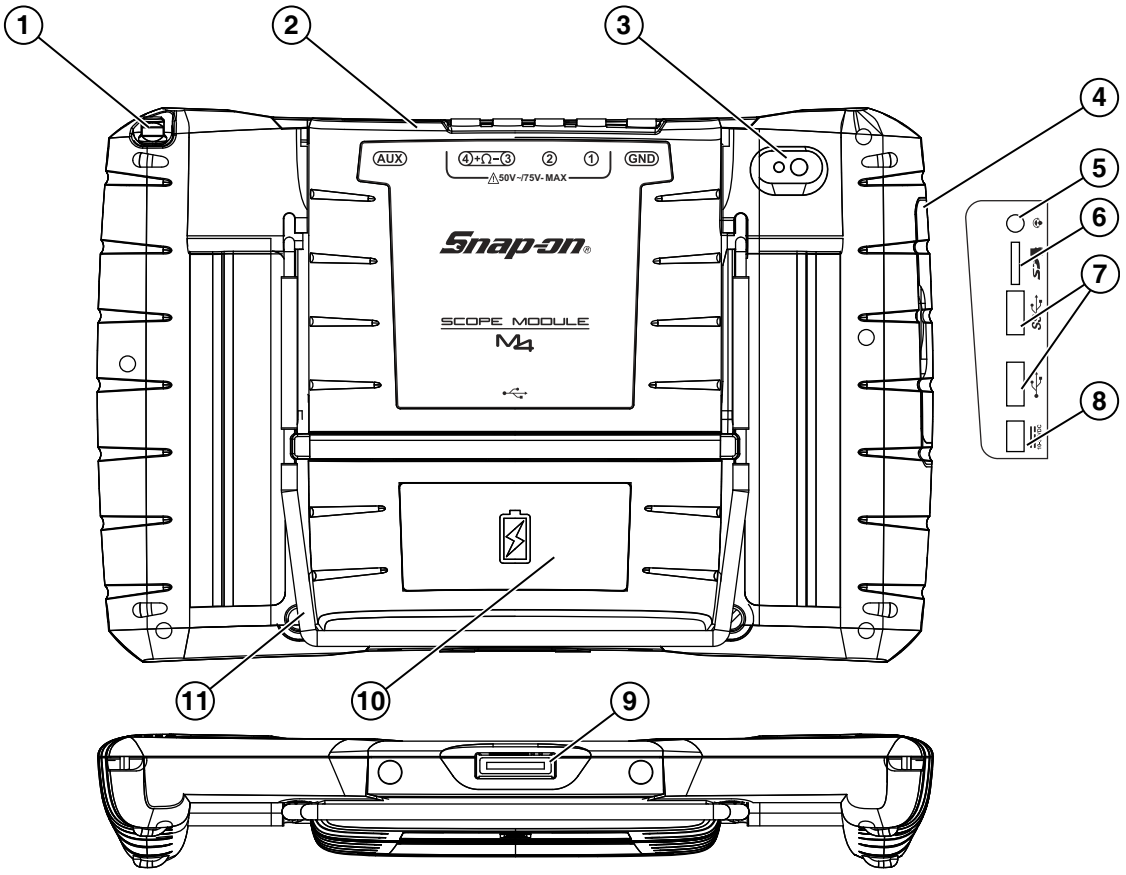
2.1 Features and Specifications

2.1.1 Diagnostic Tool



1— Audio Speaker
2— Capacitive Touch Screen
3— Shortcut (S) Button (special functions)
4— Power Button (with backlit LED functions)

Figure 2-1 *Front view*



1— Stylus Storage
2— Scope Module M4 (removable)
3— Camera Lens
4— Communication and Power Jacks Cover
5— Head Phone Jack
6— Micro uSD Card Slot
7— USB (universal serial bus) Jacks (2)
8— DC Power Supply Input Jack
9— Docking Station Connector
10—Battery Pack
11—Collapsible Stand

Figure 2-2

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
Operating System	Microsoft® Windows® Embedded 7
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)
Environmental Conditions	This product is intended for indoor use only
	This product is rated for Pollution Degree 2 (normal conditions)

Built-in Stand

The built-in stand extends from the back of the Diagnostic Tool to allow hands-free viewing. The stand clips into the Diagnostic Tool for storage and pivots out so the display is at a 45 degree angle when in use.

Power Sources

Your Diagnostic Tool can receive power from any of the following sources:

- Internal Battery Pack
- AC/DC Power Supply
- Vehicle Power
- Docking Station (Optional)

Internal Battery Pack

The Diagnostic Tool can be powered from the internal rechargeable battery pack. A fully charged standard battery pack provides sufficient power for about 5 hours of continuous operation. The LED backlit power button indicates the battery status.

AC/DC Power Supply

The Diagnostic Tool can be powered from a standard AC outlet using the AC/DC power supply. When connected to the Diagnostic Tool, the AC/DC power supply also recharges the internal rechargeable battery pack.

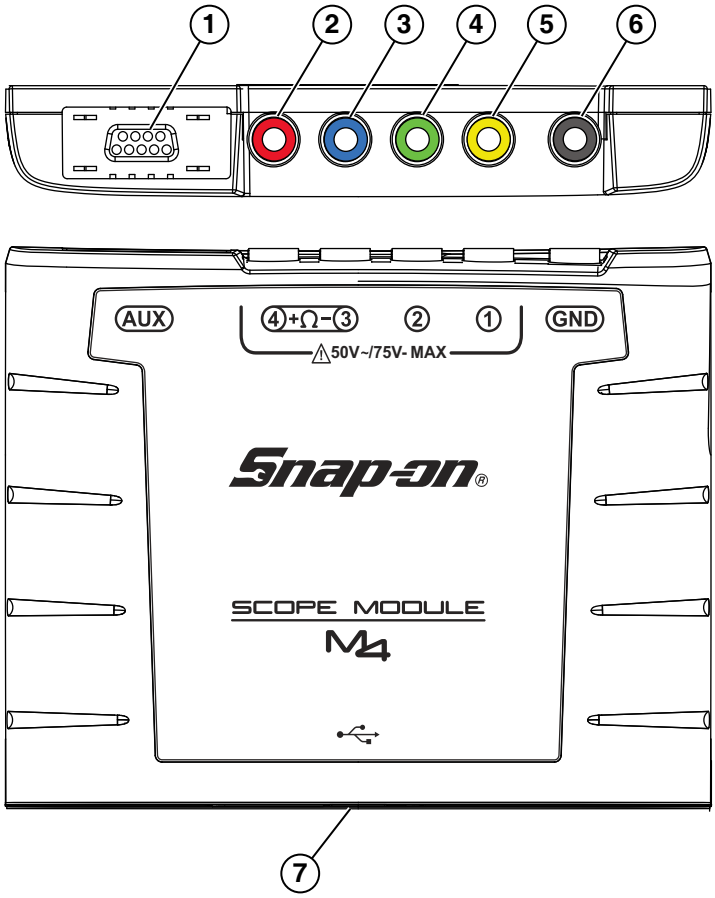
Vehicle Power

The Diagnostic Tool can be powered from a standard 12VDC vehicle power port using the Diagnostic Tool DC power port adapter. The DC power port adapter connects to the DC power supply jack on the left side of the Diagnostic Tool.

Docking Station (Optional)

The Diagnostic Tool can be powered (when connected) by the optional docking station. When connected to the docking station, the internal rechargeable battery pack is recharged. Contact your sales representative for additional details.

2.1.2 Scope Module



1— Auxiliary (DB9) Connector
2— Channel 4 Jack
3— Channel 3 Jack
4— Channel 2 Jack
5— Channel 1 Jack
6— Common (Ground) Jack
7— USB Jack (not shown - used for remote operation)

Figure 2-3 *Scope Module, removed from Diagnostic Tool*

Remote Operation

If needed, the Scope Module (M4) 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. For additional information see, Using the Scope Module Remotely on page 84.

Technical Specifications

Item	Description / Specification
USB Power	5V @ 500mA
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)
Environmental Conditions	This product is intended for indoor use only
	This product is rated for Pollution Degree 2 (normal conditions)

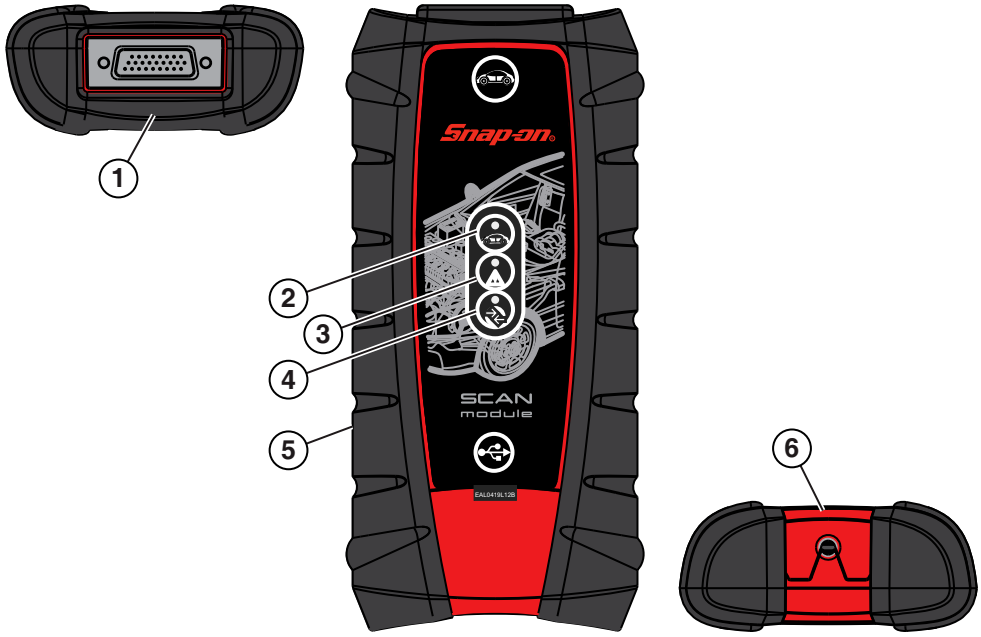
Power Sources

The Scope Module operates on USB power (5V @ 500mA) supplied by the Diagnostic Tool. Power is provided either through direct connection to the Diagnostic Tool, or through a USB cable when the Scope Module is removed from the Diagnostic Tool.

Auxiliary Connector

The auxiliary connector is used for connection of the optional RPM inductive pickup and the pressure traducer split lead adapter. For additional information contact your sales representative and see, Using the Scope Module Remotely on page 84.

2.1.3 Scan Module (Wireless)



1— Data Cable Connector
2— Vehicle Power LED (green)
3— Communication Issue LED (red)
4— Bluetooth LED (green)
5— Memory Card Port (remove protective hand grip for access)
6— Universal Serial Bus (USB) Jack (remove protective hand grip for access)

Figure 2-4 *Scan Module*

Wireless Communication

The Scan Module is a wireless communications device that transmits vehicle data to the Diagnostic Tool without a physical connection. A signal lost due to moving out of range automatically restores itself when the Diagnostic Tool is brought closer to the Scan Module. The Scanner sounds a tone when the signal is lost.

Technical Specifications

Item	Description / Specification
Communications	Wireless *Bluetooth*® 2.1 Technology
USB Power	5V @ 500mA
Data Cable Connector Power	8V to 32V, Maximum 12 Watts
Width	8.04 in. (204.3 mm)
Height	3.82 in. (97 mm)
Depth	1.66 in. (42.1 mm)
Weight	0.9 lb (0.408 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)
Environmental Conditions	This product is intended for indoor use only
	This product is rated for Pollution Degree 2 (normal conditions)

Power Sources

The Scan Module operates on 12V or 24V vehicle power, which it receives through the data cable connector. The Scan Module powers on whenever it is connected to an OBD-II/EOBD compliant data link connector (DLC). For non OBD-II/EOBD compliant vehicles, the Scan Module can be powered from a suitable power port on the test vehicle using the auxiliary power cable supplied with your kit.

Chapter 3 Basic Operation and Navigation

This chapter describes the basic operation, and navigation of the Diagnostic Tool.

3.1 Turning On/Off, Sleep Mode and Emergency Shutdown

The following sections describe how to turn the Diagnostic Tool on and off, use Sleep Mode and perform an emergency shutdown.

Before using the Diagnostic Tool, make sure the battery is fully charged or is connected to an AC/DC power supply. see Power Sources on page 6.

3.1.1 Turning On

Press and release the **Power** button (Figure 2-1) to switch the Diagnostic Tool on. The system boots up, then opens the Home screen (Figure 3-4).

Table 3-1 *Power button*

Name	Button	Description
Power Button / LED Indicator		Turns the Diagnostic Tool on and off. See LED Indicator on page 15 for LED indicator information.

3.1.2 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 Data Cable 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.

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 **Turn Off Computer**.
5. Select **Turn Off** in the dialog box.
   The open programs close and the power turns off.

3.1.3 Sleep Mode

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 from the same screen it was on previous to going to sleep.

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

To enter Sleep Mode:

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

  The display screen will turn off and the LED backlit power button will light up red, blinking on and off at two second intervals.

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.

3.1.4 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 If the Diagnostic Tool does not respond to navigation or control buttons or exhibits erratic operation. To force an emergency shutdown, press and hold the **Power** button for five seconds until the Diagnostic Tool turns off.

3.2 Shortcut (S) Button

The shortcut (S) button (Figure 3-1) located on the front of the diagnostic tool, and is a customizable button that can be set to perform various routine functions.

Figure 3-1

NOTE:
You can open the Shortcut menu at anytime by pressing and holding the Shortcut (S) button for 3 seconds.

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

Table 3-2

Name	Icon	Description
Screen Capture		Saves a bitmap image (screenshot) of the visible screen. For file retrieval and management information, see Data Manager Operations on page 121.
Camera		Opens the camera application. See Camera Operation on page 23 for additional information.
Keyboard		Opens the virtual keyboard. See Virtual Keyboard on page 21 for additional information.
Brightness		Pressing and releasing the **Brightness** icon changes the display brightness setting. Use multiple taps to toggle though the settings.
Settings		Opens the Shortcut (S) button configuration menu.

3.2.1 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 button to perform when pressed (Figure 3-2). The current/active setting is indicated by a yellow highlight box.

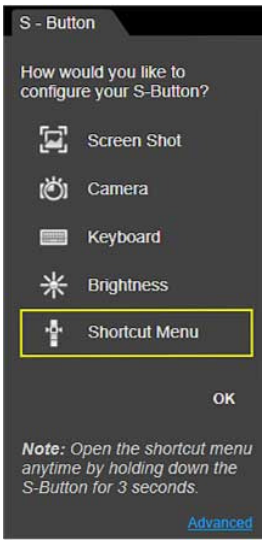


Figure 3-2 *Shortcut (S) button configuration menu*

4. Select **OK**.

3.2.2 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 state information and functions are ONLY used during system troubleshooting, when requested by Snap-on customer service.

3.3 LED Indicator

The power button is backlit by an light emitting diode (LED) (see Figure 2-1 on page 3 for location). The LED is used to indicate battery/power status and sleep mode activation.

Table 3-3

Name	Button
Power Button / LED Indicator	

- Battery Status Indicator LED—three colors are used to show the battery and power status:
  - **Green** indicates either a battery with a full or nearly full charge, or the Diagnostic Tool is being powered by the AC/DC Power Supply.
  - **Orange** indicates a battery that is charging.
  - **Red** indicates a low battery (15% of capacity or less).
- Sleep Mode:
  - A **Red** LED that blinks on and off at two second intervals indicates the Diagnostic Tool is in Sleep Mode. See Sleep Mode on page 12 for additional information.

3.4 Basic Navigation

3.4.1 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 chapters 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 174

Touch screen maintenance - see Cleaning on page 171

Stylus tip replacement - see Stylus Tip Replacement on page 178

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.

Table 3-4

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.

3.4.2 Starting the ShopStream Diagnostic Suite Program

The ShopStream Diagnostic Suite program is the main program which is used for all diagnostic functions. The ShopStream Diagnostic Suite program is automatically started when the Diagnostic Tool is turned on through the Windows “start up” folder function. After the program has started, the ShopStream Diagnostic Suite Home Screen displays, see Home Screen Layout on page 17. The application runs as a normal Windows program and it’s window can be minimized, resized and closed like any other Windows program. To access the Windows desktop, minimize the program window.

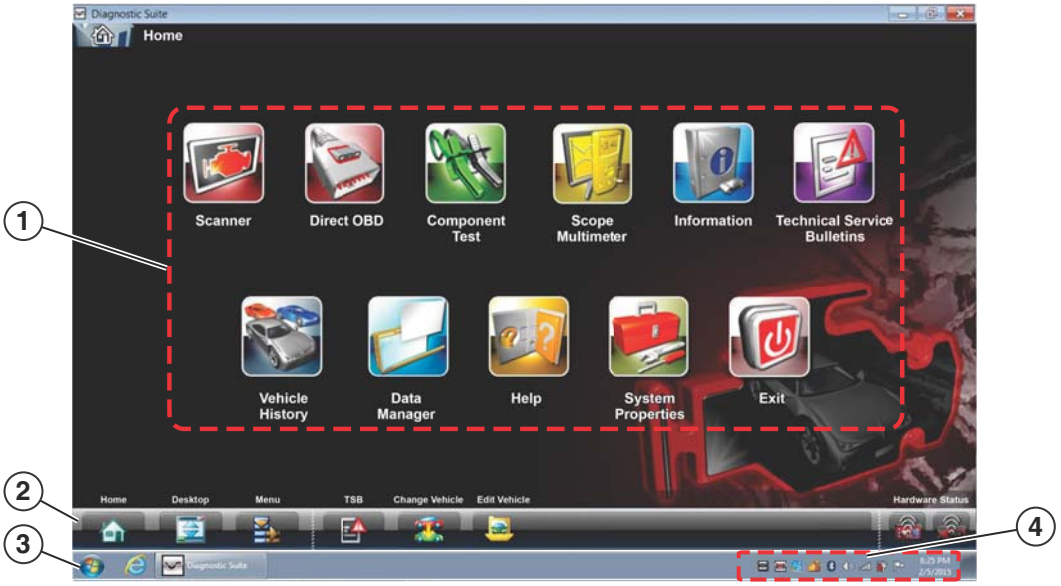
If the program is exited or closed, select the ShopStream Diagnostic Suite icon from the Windows desktop to start the program.

Figure 3-3 *ShopStream Diagnostic Suite desktop icon*

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

3.4.3 Home Screen Layout

The Home screen includes the diagnostic suite toolbar and the Windows taskbar. The Home screen includes function icons, one for each of the primary Diagnostic Tool functions.



1. **Function Icons**
2. **Toolbar**
3. **Windows Taskbar**
4. **Windows Taskbar Notification Area**

Figure 3-4 *Home screen*

3.4.4 Function Icons

The Function Icons configure the Diagnostic Tool for the type of test to be performed. Table 3-5 on page 18 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.

Table 3-5 *(table 1 of 2)*

Name	Icon	Description
Scanner		Configures the Diagnostic Tool to operate as a scan tool. See Scanner Function on page 25.
OBD Direct		Allows you to perform generic OBD-II or EOBD system tests without identifying the specific vehicle. See OBD Direct Operations on page 65.
Guided Component Test		Opens a diagnostic database of specific tests for the identified vehicle. See Guided Component Test Operations on page 73.
Scope Multimeter		Configures the Diagnostic Tool to operate as a lab scope, graphing multimeter, or digital multimeter. See Scope and Multimeter Operations on page 84.
SureTrack®		Opens the SureTrack website. See SureTrack on page 147.
Repair Information		Provides the information needed to make repairs once you have made your diagnosis. The linked program varies by region. See Repair Information Operations on page 113.
Technical Service Bulletins		Provides Technical Service Bulletin information (if available) for the identified vehicle. See Technical Service Bulletins on page 114.
Vehicle History		Identifies the test vehicle and organizes and manages work in progress and service records. See Vehicle History Operations on page 116.
Data Manager		Opens the organization system for saved data files. See Data Manager Operations on page 121.

Table 3-5 *(table 2 of 2)*

Name	Icon	Description
Help		Opens the on-line help for the system. See Help Operations on page 139.
System Settings		Establishes and manages connections to peripheral devices, such as the Scan Module. See System Settings Operations on page 140.
Exit		Closes the Diagnostic Tool software and returns the display to the Windows desktop. See Turning Off on page 11.

3.4.5 Toolbar

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

Table 3-6

Name	Icon	Description
Home		Selecting this icon returns you to the Home screen from any test.
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.
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.
Hardware Status		Indicates the connectivity status of the Scan Module. Icon changes depending on status.
		Indicates the connectivity status of the Scope Multimeter. Icon changes depending on status.

Menu Options

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 supporting documentation, selecting opens a submenu.

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.

Help

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

- User Manual
- Version Info
- Activation Status

User Manual

This option opens this document, which provides overall navigation and operation information for the Diagnostic Tool.

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.

3.4.6 Windows Taskbar

The standard Windows taskbar displays program icons that are currently running or that you have pinned to the taskbar for quick access. Refer to Microsoft Windows 7 user documentation for additional information.

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). Refer to Windows 7 user documentation for additional information for Windows applications. For additional information on the ShopStream Update Tool and Virtual Keyboard, see:

ShopStream Update Tool - ShopStream Update Tool (SST) on page 164

Virtual Keyboard - Virtual Keyboard on page 21

3.5 Virtual Keyboard

The 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 **Keyboard** icon from the Shortcut (S) button menu
- **Windows notification area** - choose the Virtual Keyboard icon in the Windows notification area

  Menu options include:

  - **Hide Virtual Keyboard** - minimizes the keyboard
  - **Close Virtual Keyboard** - closes the Virtual Keyboard program
  - **Show Virtual Keyboard** - displays the keyboard
  - **Settings** - opens the Virtual Keyboard settings window (Figure 3-7)
  - **About** - displays the Virtual Keyboard program software version number

- **Windows “All Programs” or “Startup” menus** - choosing the Virtual Keyboard application from the Windows menus, opens the Virtual Keyboard and adds the Virtual Keyboard icon to the notification area

NOTE:
As an alternative, you can connect a USB keyboard to the Diagnostic Tool and use it to key in information.

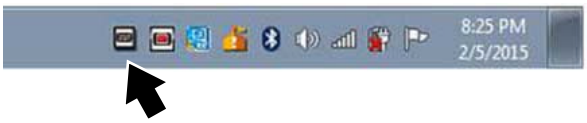


Figure 3-5 *Virtual Keyboard notification area icon*

1. **Settings icon -** opens the Virtual Keyboard settings window (**Figure 3-7**)
2. **Expand icon -** expands the Virtual Keyboard to full display (press again to return to standard display)
3. **Top -** moves the keyboard to top of screen
4. **Close -** closes the keyboard
5. **Bottom -** moves the keyboard to bottom of screen

Figure 3-6 *Virtual Keyboard (shown expanded)*

NOTE:
The Virtual Keyboard can be set to open automatically, when a data field or form is selected in certain applications. See the Settings window (Figure 3-7) for selection options.

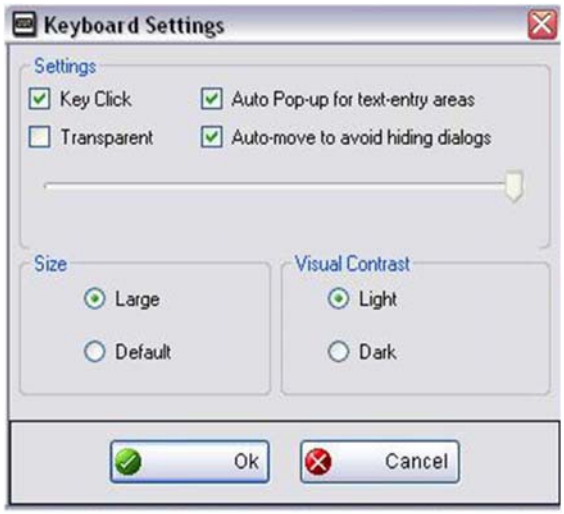


Figure 3-7 *Virtual Keyboard settings window*

3.6 Camera Operation

3.6.1 Operating 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:

Table 3-7 *Camera icons*

Name	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.

3.6.2 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 **My Documents** > **ShopStream** > **Camera Folder**.

3.7 Wi-Fi Setup

Certain applications in the ShopStream Diagnostic Suite require wireless Internet connection. The wireless network connection status icon is typically available from the Windows taskbar notification area and can be used to access the wireless network connection setup. Refer to Windows user documentation for wireless network setup instructions.

Chapter 4 Scanner Function

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 view live data parameters from various vehicle systems such as the engine, transmission, antilock brake system (ABS) and more.

4.1 Demonstration Program

A Scanner demonstration program is provided to help you to become familiar with Scanner operations, without connecting to a vehicle. Sample data and test results are provided to help you learn the menus and basic operations.

IMPORTANT:
Do not connect the Scan Module to a vehicle while using the Demonstration mode.

Using the demonstration program:

1. From the Home screen, select the **Scanner** icon to open the manufacturer menu.

   The manufacturer menu includes all makes for which Scanner information is available. There is also a Demonstration icon included in the list.

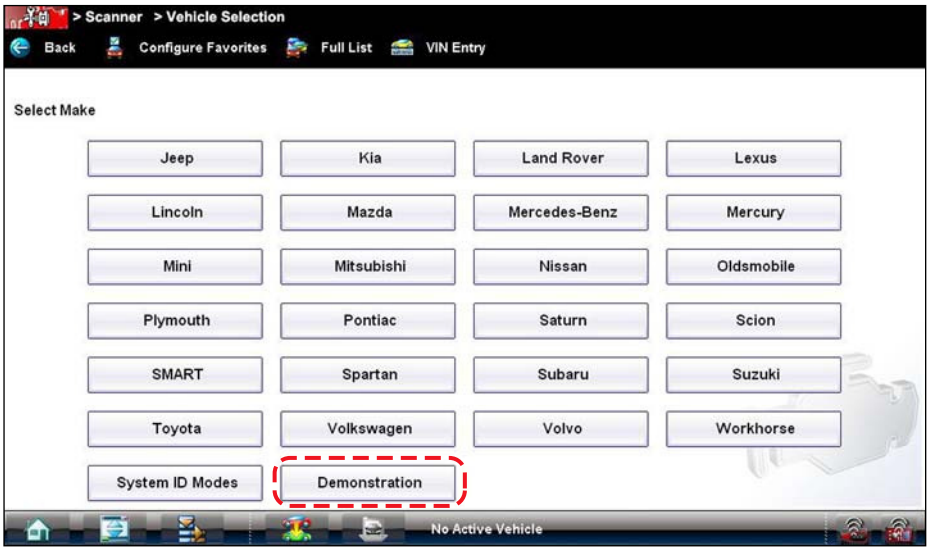


Figure 4-1 *Sample demonstration selection*

2. Select the **Demonstration** icon.

   A menu of demonstration choices now displays:

   – US Domestic—contains actual data captured while driving a 2001 Chevrolet Tahoe. Look for the throttle position (TP) sensor dropout while analyzing the data in Graphing mode.

   – OBD Training Mode—provides simulated data for an OBD-II/EOBD vehicle that allows you to access any of the standard functions.

3. Select either option and a confirmation message displays.
4. Select **OK** to load the selected database.
5. Follow the on-screen instructions and select as needed until the Systems menu displays.
6. Select from any of the systems listed, then select from the submenus.

4.2 Basic Operation and Navigation

This section describes the basic menus, controls and navigation of the Scanner function and select scanner tests.

4.2.1 Screen Messages

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

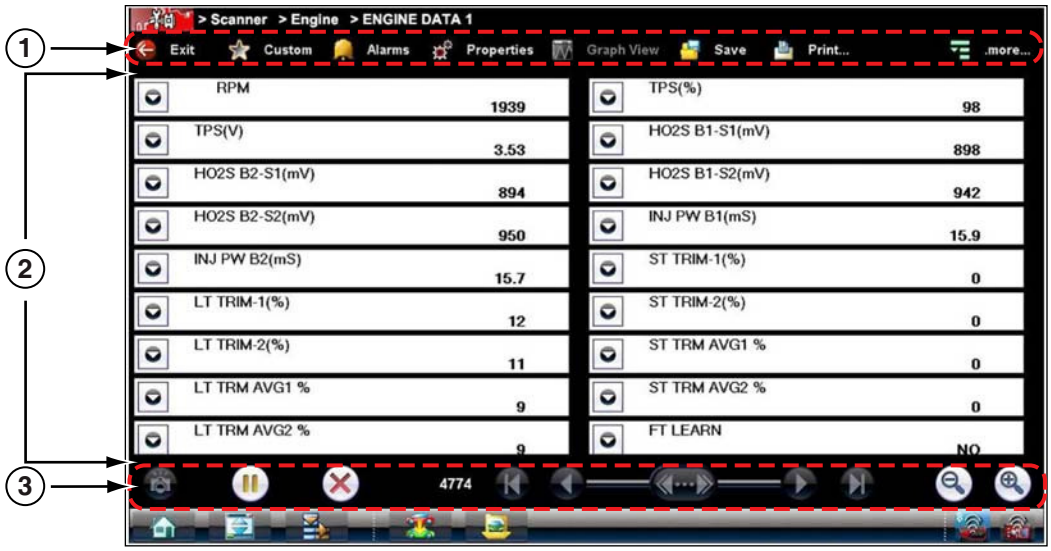
- **Confirmation Messages** - Confirmation messages inform you when you are about to perform an action that cannot be reversed or when an action has been initiated and your confirmation is needed to continue. When a user-response is not required to continue, the message displays briefly before automatically 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.

4.2.2 Making Selections

The Scanner interface is a menu driven program that presents a series of choices one at a time. As you select from a menu, the next menu in the series displays. Each selection narrows the focus and leads to the desired test. Use your fingertip or the stylus to make menu selections.

4.2.3 Scanner Screen Layout

The Scanner screens typically include three sections (Figure 4-2):



1— Scanner Toolbar
2— Main Body
3— Lower Toolbar

Figure 4-2 *Scanner screen layout*

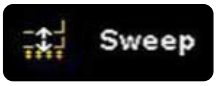
Scanner Toolbar

The Scanner toolbar contains a number of icons that allow you to configure the displayed data and to exit. The table below provides a brief explanation of the Scanner toolbar icon operations:

Table 4-1 *Scanner toolbar icons (sheet 1 of 2)*

Name	Icon	Description
Exit	Exit	Closes the current test and returns you to the menu.
Back	Back	When available, returns to the previously viewed screen.
Custom	Custom	Allows you to select which parameters are displayed on the screen.
Alarms	Alarms	Allows you to set an alarm on certain data parameters when the signal goes above or below the alarm setting.
Properties	Properties	Allows you to adjust the display characteristics for all of the data screens.
Graph View	Graph View	Allows you to simultaneously view up to 16 data graphs at a time.

Table 4-1 *Scanner toolbar icons (sheet 2 of 2)*

Name	Icon	Description
Save		Saves a copy of the current frame of data that can be viewed using Data Manager.
Print		Opens a standard Windows Print dialog box for saving a print copy of the current frame of data.
More		Opens a dropdown menu of the additional options shown below.
Scale		Switches the scale values, displayed along the left-hand side of the graphs, on and off.
Sweep		Switches the sweep values, displayed at the base of the graphs, on and off.

The Scanner toolbar is used to configure certain aspects of the displayed data and to exit. The following sections explain how to use the toolbar.

Custom

The **Custom** icon on the Scanner Toolbar is used to determine which specific parameters display. Minimizing the number of parameters on the data list allows you to focus on any suspicious or symptom-specific data parameters. You can add or remove most parameters from the list. Any parameter that has a lock icon next to it cannot be removed from the list.

IMPORTANT:
Limiting the number of parameters that display allows for a faster refresh rate of the data. A smaller data lists also reduces the amount of memory used for saved files.

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 4-3).
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 4-3 *Sample custom configuration screen*

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 31 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, 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 opens.
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 4-4).

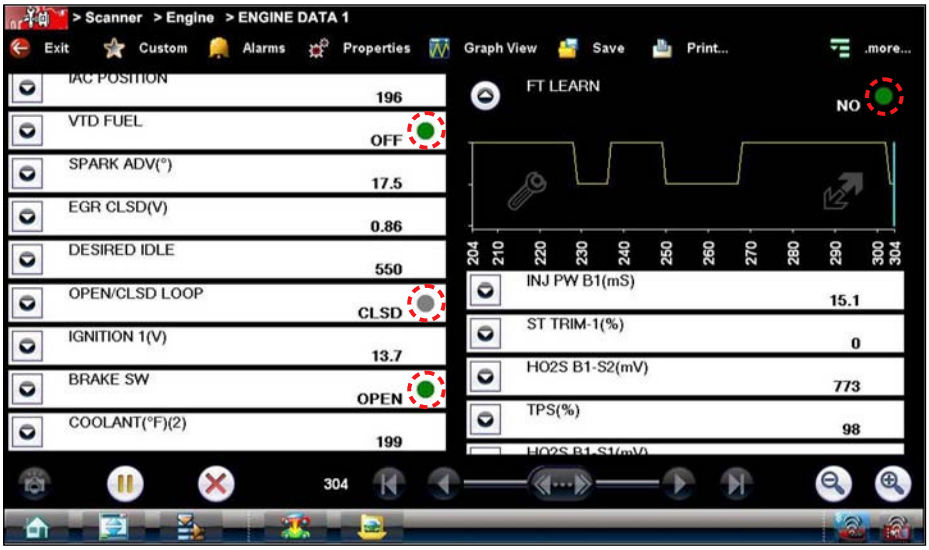


Figure 4-4 *Sample alarm indicators*

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

The **Properties** icon on the Scanner Toolbar is used to configure certain characteristics of the parameter graph display. Selecting opens a Properties dialog box that allows you to adjust colors, settings, and sweep (Figure 4-5).

Figure 4-5 *Sample properties dialog box*

Selecting either color option, **Edit Plot Color** or **Edit Background Color** opens a standard color selection dialog box. Select a color, then select **OK** to close the dialog box.

The Show Grid icon is used to switch a background grid pattern on the data graphs on and off:

- To switch the grid on; select to highlight **Show Grid**, then select **Accept**.
- To switch the grid off; select **Show Grid** twice so it is not highlighted, then select **Accept**.

The Samples After Trigger setting determines how many data samples are recorded following a triggering event. The highlighted samples icon indicates the number of frames that are included in the recording after a triggering event.

The sweep options let you choose the amount of data that displays across the graph. Values are in sample points, or 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 simultaneously display up to 16 parameter graphs (Figure 4-6). The graphs must first be opened in the data list in order to be included when **Graph View** is selected 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.

A toolbar in Graph View allows you switch scale and sweep values on and off, and to return to the List View. The Data Buffer toolbar at the base of the screen remains active.

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

Figure 4-6 *Sample Graph View screen*

Graph View mode can also be engaged from the custom data list configuration screen. Refer to Custom on page 28 for details.

Save

The **Save** icon is used to record movies of vehicle datastream values. Saved files can be helpful when trying to isolate an intermittent problem or to verify a repair during a road test.

To save a movie:

- Select **Save**.

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

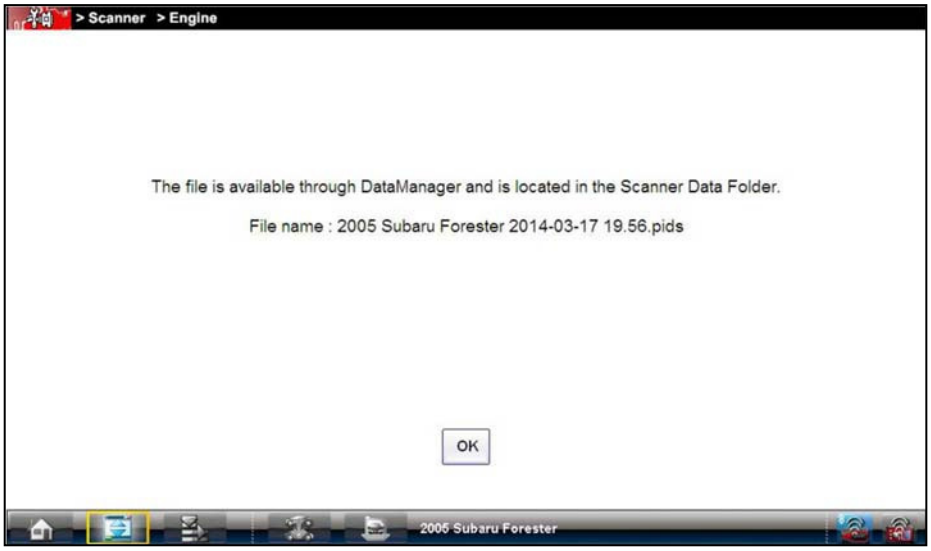


Figure 4-7 *Sample save dialog box*

To open saved Scanner data files, from the Home screen select **Data Manager > Scanner Data Folder**, see Scanner DataViewer Operation on page 129.

Print

Selecting **Print** from the toolbar opens a standard Windows Print dialog box. Select from the options as needed to print the current frame of data.

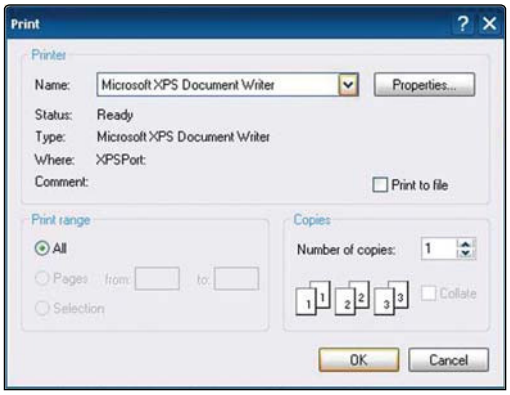


Figure 4-8 *Sample print dialog box*

If the Diagnostic Tool is connected to a printer, the current frame of data is printed. If the Diagnostic Tool is not connected to a printer, the frame of data is saved as an “XPS” file. A dialog box opens so that you can name the print file and specify the location that it is saved to, follow the on-screen instructions.

Saved files can be printed at a later date, or opened and reviewed.

NOTE:
Saved print files cannot be viewed using the Data Manager, they can only be opened into an internet browser.

To open a saved print file:

1. Minimize the Diagnostic Suite to view the desktop.
2. From the desktop select **My Documents** > **ShopStream** > **Scanner Data Folder**.
3. Locate the file you wish to view.
4. Double select the file to open it.
   The internet browser and file open.

More

Whenever the More icon appears on the toolbar it indicates that there are additional options available. Selecting the **More** icon from the Scanner toolbar opens a dropdown menu that offers two choices that only apply to data graphs:

- Scale
- Sweep

Scale

The **Scale** option switches the scale values, displayed along the left-hand side of the data graphs, on and off (Figure 4-9). The dropdown menu closes once a selection is made.

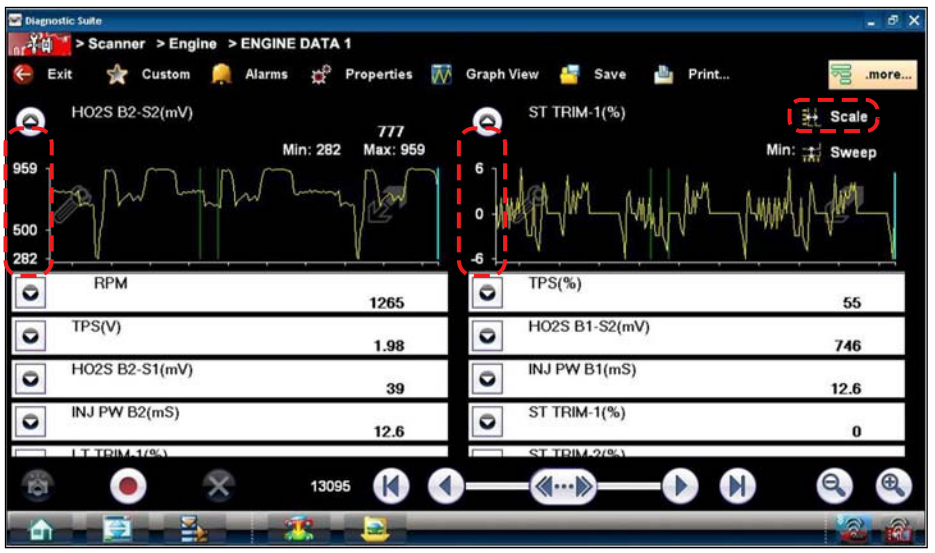


Figure 4-9 *Sample data graph scales*

Sweep

The Sweep option switches the sweep values, displayed below the data graphs, on and off (Figure 4-10). The dropdown menu closes once a selection is made.

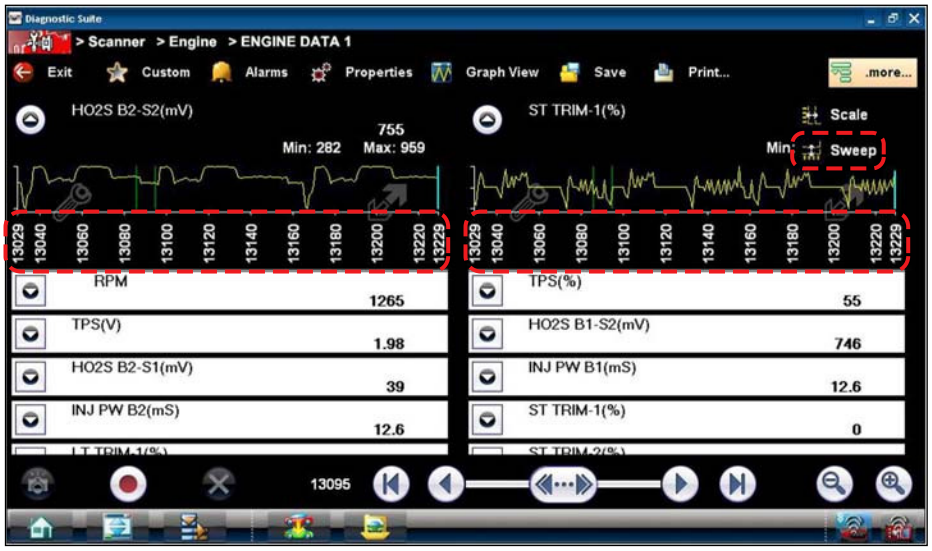


Figure 4-10 *Sample data graph sweep*

Main Body

The main body of the screen varies depending on the stage of operation. The main body can show vehicle identification selections, the main menu, test data, instructions, troubleshooting information, controls, and other diagnostic information.

Lower Toolbar

Whenever communication is established with a vehicle, the Scanner continuously records data transmitted by the ECM in the data buffer. The toolbar below the main body of the screen contains the icons for navigating the buffered data and other options (Table 4-2).

Table 4-2 *Data buffer toolbar icons*

Name	Icon	Description
Snapshot		Arms the software to take a snapshot of vehicle data
Go To Start		Moves to the first frame in the data buffer
Pause		Suspends data capture and changes to show the Play icon
Play		Starts or resumes data capture and changes to show the Pause icon
Go To End		Moves to the last frame in the data buffer
Clear		Erases data in the data buffer
Step Back		Moves to the previous frame in the data buffer
Frame Counter		Indicates the data buffer frame currently displayed
Step Forward		Moves to the next frame in the data buffer
Zoom In		Increases the magnification by decreasing the sweep of the graph
Zoom Out		Decreases the magnification by increasing the sweep of the graph

Use the slider in the middle of the toolbar to quickly move through paused data.

Figure 4-11 *Sample data buffer slider*

4.2.4 Menu Options

The Toolbar Menu icon at the base of the screen opens a menu near the top of the display.

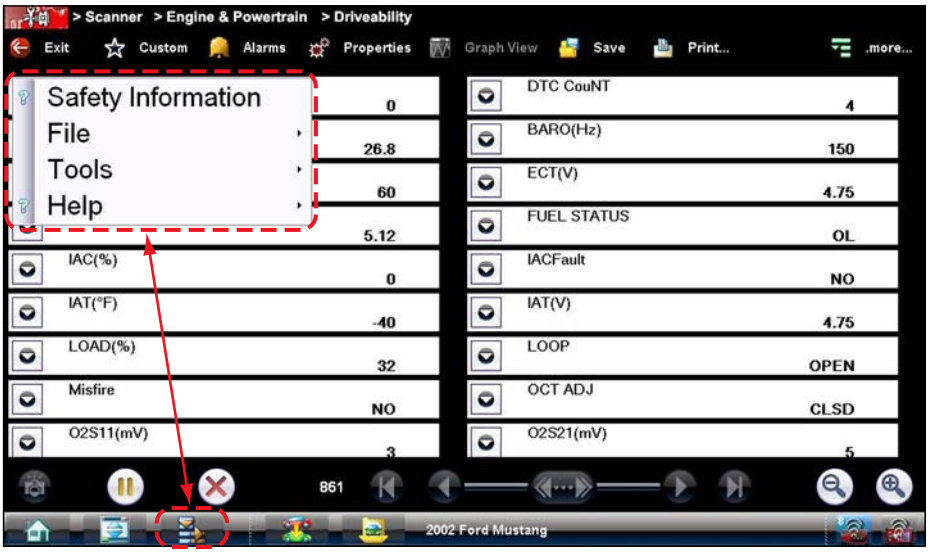


Figure 4-12 *Sample Scanner Menu icon options*

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.

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 30).
- **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.

Tools

This option 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 opens.

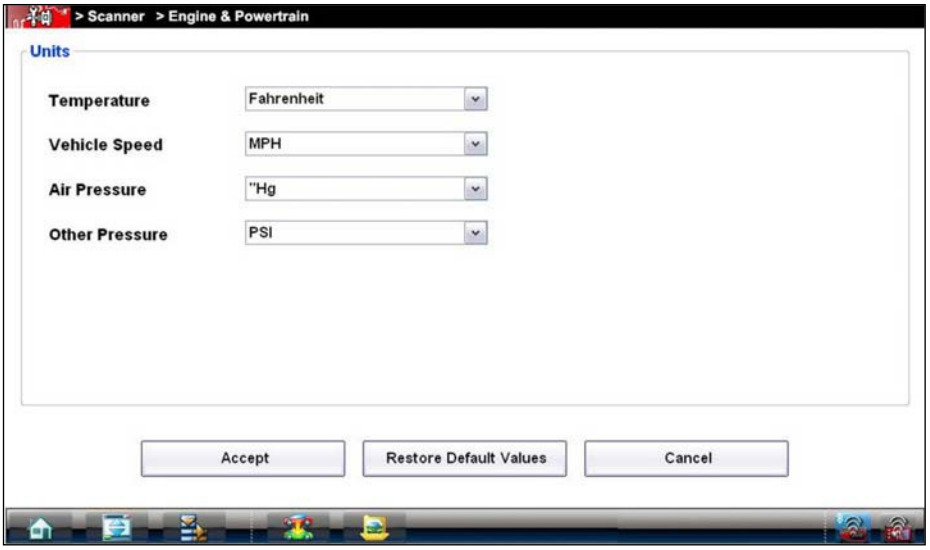


Figure 4-13 *Sample Units Setup screen*

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 opens a screen with the Balco Engine Number (BEN) of the currently identified vehicle. The BEN is used internally for data coordination, and you may be asked to provide to a Customer Care representative for troubleshooting communication problems.

Help

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

- User's Manuals
- About Scanner Hardware Version
- About Scanner

The User Manual, Version Info, and Activation Status options are the same as explained previously, see Menu Options on page 20 for details. Other options are explained below.

User's Manuals

This option opens a menu of additional support documentation, such as vehicle communication software manuals, available to assist in your diagnosis. These manuals provide connection information, detailed test procedures, and other resource material for specific vehicles.

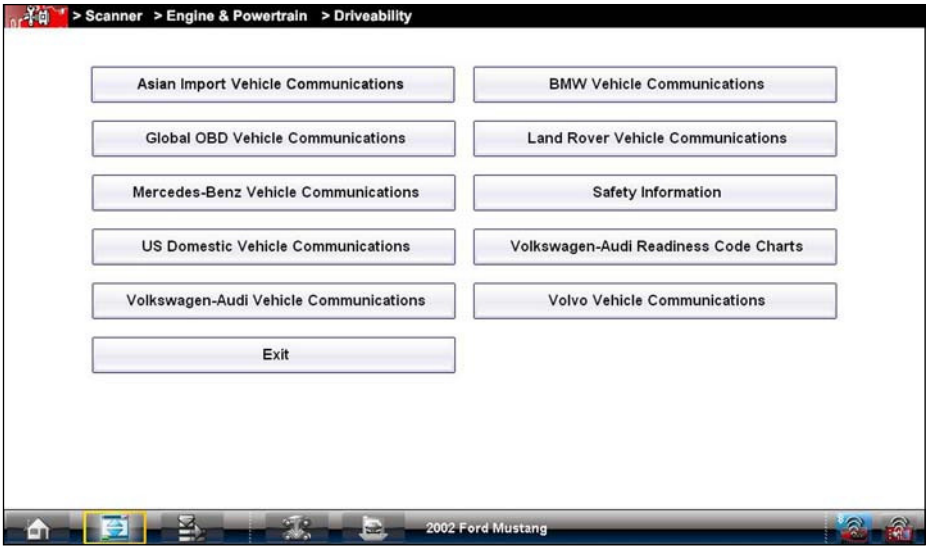


Figure 4-14 *Sample User's Manuals menu*

Select **Exit** to close the Help module and return to the Scanner.

About Scanner Hardware Version

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

4.3 Scanner Operation

The Scanner function has two main operation features:

- Scanner—allows communication with the vehicle ECMs to review DTCs, view parameter data, and perform functional tests.
- Fast-Track Troubleshooter—provides access to troubleshooting information from a database of experienced based information developed by master technicians.

Basic Scanner Operation Steps

1. **Open Scanner**—Select Scanner on the Home screen.
2. **Identify the vehicle**—Identify the test vehicle by selecting from the menu options.
3. **Connect the data cable to the vehicle**—Follow the on-screen connection instructions to connect the Scan Module to the test vehicle.
4. **Select a system**—Select the system to be tested from the systems menu.
5. **Select a test** —Select the desired test.

4.3.1 Vehicle Identification

The Scanner communicates with the ECMs of the test vehicle and provides vehicle specific data and test results. 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 for later use to save time when testing the same vehicle.

The vehicle identification sequence is menu driven, each selection advances to the next screen. A Back icon in the upper left corner of the screen returns to the previous screen. Menus items and procedures may vary by vehicle.

Identifying a vehicle:

1. Select the **Scanner** Function icon from the Home screen.
   A list of manufacturers displays (Figure 4-15).

Figure 4-15 *Sample manufacturer list*

2. Select the manufacturer of the test vehicle from the list.

   A model year menu displays.

NOTE:
You can limit the number of manufacturers that appear on the list by selecting **Configure Favorites** from the toolbar. See Creating a Favorites List on page 76 for details.

3. Select the year of the test vehicle from the menu.

   A list of vehicle types or models displays. 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 displays once all the required data has been entered. Review the information to make sure it is correct.

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 Operations on page 65 for additional information.

Technical Service Bulletins

The Technical Service Bulletins icons (Figure 4-16) become active, after a vehicle has been identified, for additional information, see Technical Service Bulletins on page 114.

Figure 4-16 *Home Screen - TSB/Recall/Campaign Icon*

4.3.2 Connecting the Scan Module

The Scan Module is a wireless device that is connected (using the vehicle data cable) to the vehicle and transmits vehicle data to the Diagnostic Tool. To use the Scanner function the Scan Module must be paired with the Diagnostic Tool. If the Scanner tries to communicate with the vehicle and the Scan Module is not connected to the vehicle, a Connect Data Cable confirmation screen will display. For Scan Module connection and operation information, see Pairing The Scan Module on page 55.

4.3.3 Vehicle System and Test Selection

Selecting a vehicle system:

1. After the vehicle has been identified, a list of available systems for testing displays (Figure 4-17). Select a system to continue.

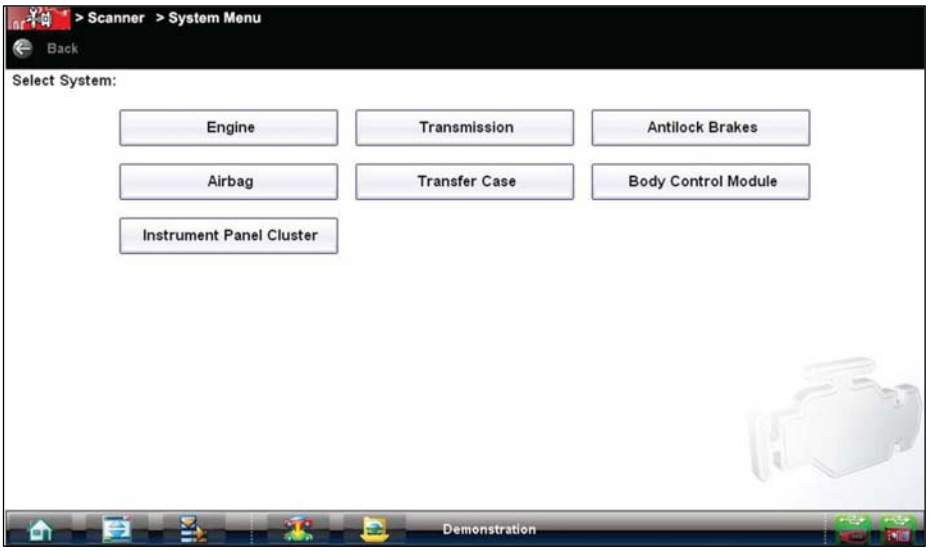


Figure 4-17 *Systems menu*

2. After a system is selected and the Scanner establishes communication with the vehicle, the Scanner Main menu displays available tests. Select a menu item to continue.

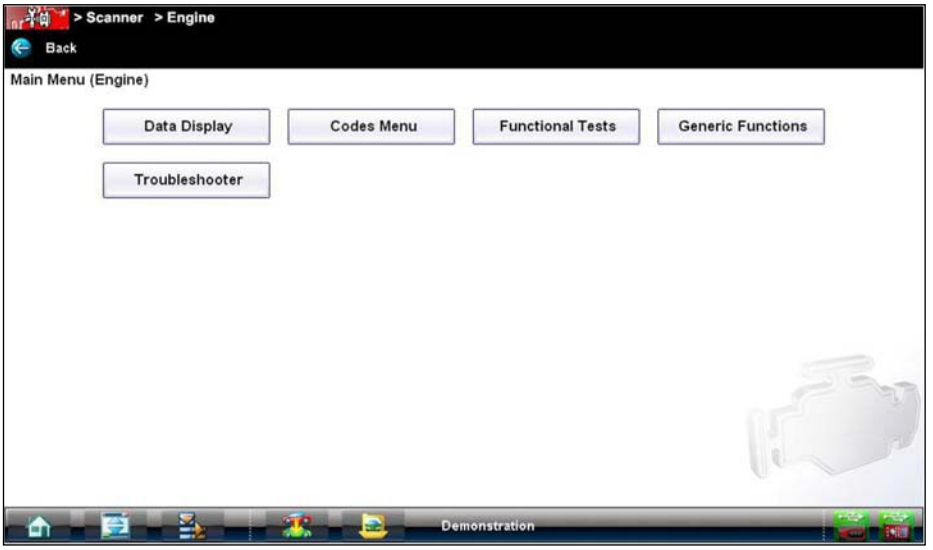


Figure 4-18 *Scanner Main menu*

Main menu options vary slightly by year, make, and model. The main menu may include:

- **Data Display**— displays data parameter information from the vehicle electronic control module (ECM). Selecting may open a submenu of viewing options.
- **Codes Menu**—displays diagnostic trouble code (DTC) records from the vehicle electronic control module. Selecting may open a submenu of viewing options.
- **Clear Codes**—erases DTC records and other data from the ECM. This selection is found on a Codes submenu for some models.
- **Functional Tests**—provides specific subsystem and Guided Component Tests. The tests vary depending on the manufacturer and model.
- **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.
- **Generic Functions**—lets you access certain available Generic OBD II functions from a proprietary menu (1996 and newer vehicles only).
- **Troubleshooter**—provides step-by-step procedures, integrating parameter data and retrieving trouble codes when appropriate, for specific symptoms of the identified vehicle.

Codes Menu

This selection may appear as Codes, Codes Menu, Codes Only, Codes (No Data), or something similar on the menu. Selecting opens a list of data parameter viewing options that may include:

Display Codes

Selecting opens either a list of diagnostic trouble codes (DTCs) stored in the selected electronic control module (ECM), or a submenu of DTC viewing options. Submenu options may include:

- **Trouble Code Information**—opens a list of codes in ECM memory.
- **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.

If SureTrack® (optional) is active and data is available for a selected DTC, additional troubleshooting information from SureTrack (e.g. Common Replaced Parts data (Figure 4-19), Real Fix and Related Fixes) will also be available. For additional information about using SureTrack, see SureTrack on page 147.

A code list includes the DTC, a brief description, and a SureTrack **Fix It!** icon that opens a submenu allowing you additional information about the DTC (Figure 4-19).

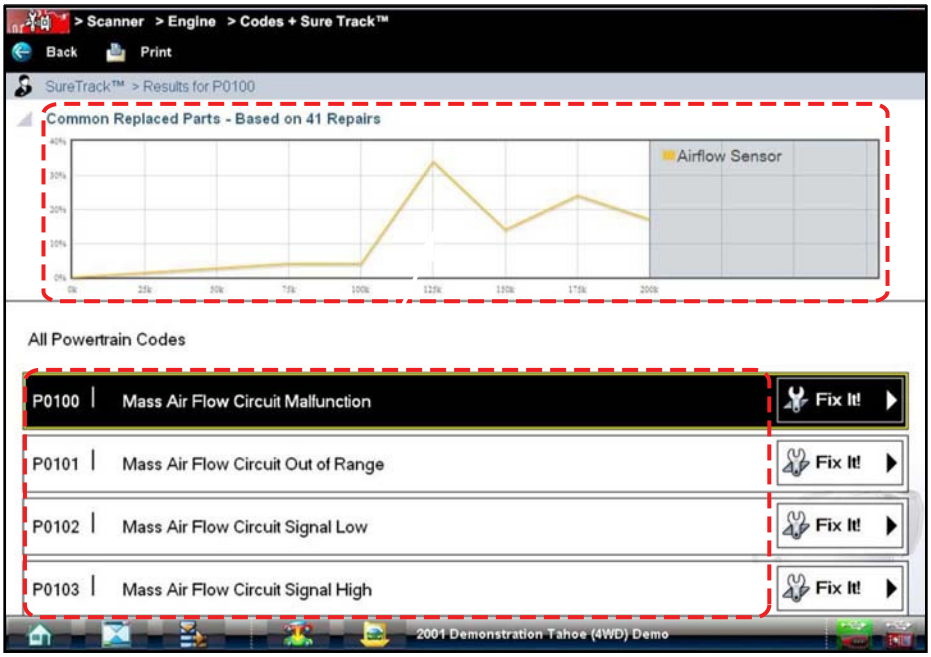


Figure 4-19 *Sample code list and SureTrack information*

Clear Codes

The Scanner clears trouble codes from the ECM memory on some vehicles. If this function is not available on the test vehicle, Clear Codes does not appear as a menu option.

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 displays once the operation is complete.
3. Select **Continue** to return to the Codes Menu.

Freeze Frame/Failure Records

This selection displays the DTC that was set, along with corresponding data, when the ECM commanded the malfunction indicator lamp (MIL) to turn on.

DTC Status

This selection allows you to view the records of a particular DTC.

To check DTC status

1. Select **DTC Status** from the Codes Menu.
   The DTC Status entry field displays and the virtual keyboard opens (Figure 4-20).
2. Use the virtual keyboard to enter the characters of the DTC.
3. Select the virtual keyboard **Backspace** icon if needed to erase a character.

4. Select the virtual keyboard **Return** key once all the code characters are entered.

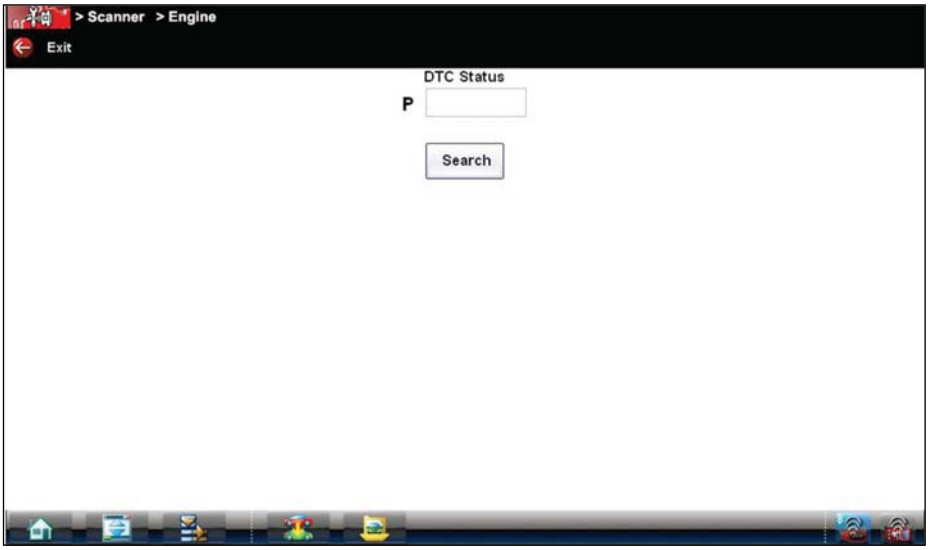


Figure 4-20 *Sample DTC Status entry field*

The DTC status report displays (Figure 4-21).

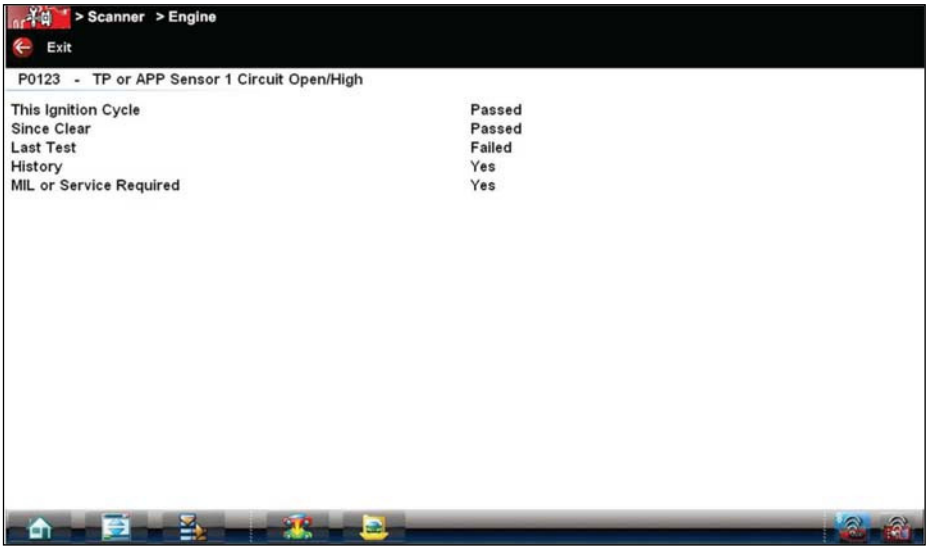


Figure 4-21 *Sample DTC status report*

5. Select **Exit** to return to the DTC status entry screen.
6. Select **Exit** again to return to the Codes menu.

Data Display

Depending upon the test vehicle, this selection may appear as Data, Data Display, Data Only, Data (No Codes), or something similar. All are similar. Selecting has one of the following results:

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

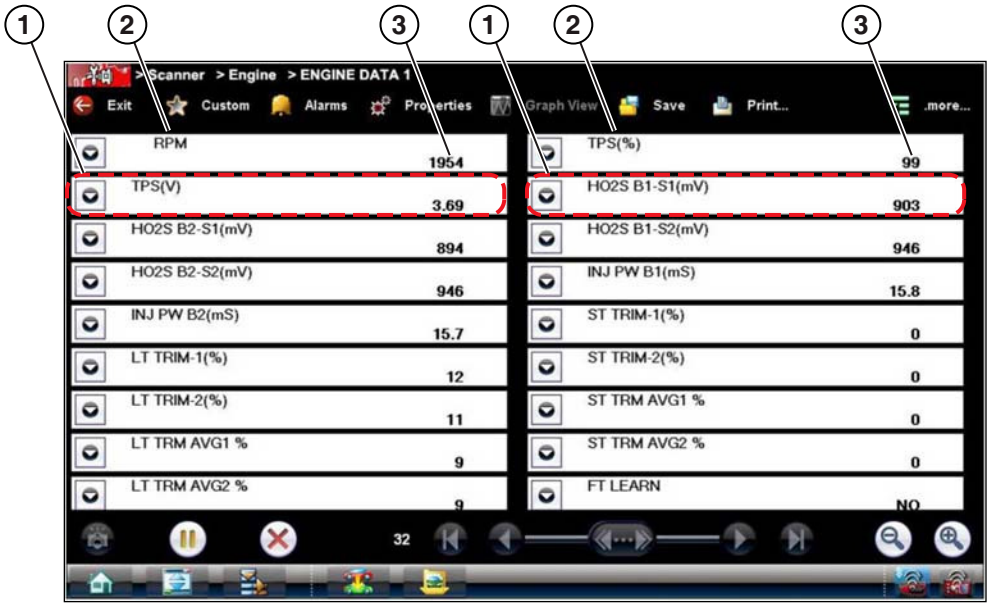
A submenu displays when more than one data viewing mode is available on the identified vehicle. On some models, the engine must be started or cranked before data can be displayed. For these models, a “Waiting to Communicate” message displays if the engine was not cranked or started.

Data Screens

When a Data selection is made, the screen displays the data list for the selected module.The items available for any electronic control module vary from one vehicle to another.

Data is presented in a 2-column format. An abbreviated parameter name is at the left of each column and its value is at the right edge of the column. Parameters display in the order that they are transmitted by the ECM, so expect variation between vehicles.

Gesture scrolling allows you to quickly move through the data list. Simply touch the screen and drag your finger up or down to reposition the parameters being displayed. Position bars momentarily appear to the right of each column to indicate the position of the current screen in relation to the entire list as you scroll. Each column of parameters scrolls independently of the other column. Figure 4-22 shows a typical data screen.



1— Graph icon

2— Parameter name

3— Parameter value

Figure 4-22 *Sample data screen*

Data Graphs

Select the **Graph** icon to open a data graph for that parameter (Figure 4-23). Selecting a parameter for graph view moves it to the top of the list. Select the **Graph** icon again to close the graph for that parameter and return to a data list view.

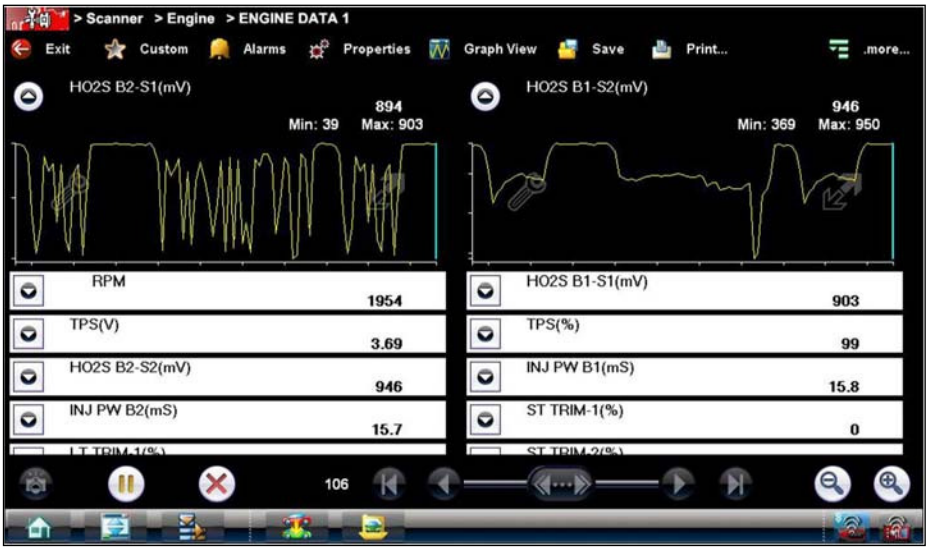


Figure 4-23 *Sample graph view*

The icons that display on each data graph allow you configure settings for the selected graph only:

Table 4-3 *Data graph icon operations*

Name	Icon	Description
Expand/Collapse		Select to expand the graph to fill the entire screen, select again to collapse the graph to the standard view.
Graph Properties		Select to open the Graph Properties dialog box, which allows you to set triggers for recording a snapshot and to adjust the scale.

Triggers

Triggers establish threshold values, an upper limit and a lower limit, for recording a data snapshot. A snapshot allows you to closely evaluate conditions that caused the triggering event.

When a snapshot is taken, the Scanner captures additional data after the trigger point is detected, data collection pauses, and the buffered information is automatically saved as a movie. This gives you a complete picture of what was happening before the fact, what occurred at the trigger point, and what happened after the fact.

Data collection is paused following a trigger event. Select the **Play** icon to resume viewing live data. A vertical line now appears on each of the data graphs to indicate the triggering point. The trigger line on the parameter that triggered the snapshot is a different color than those on the other graphs. This makes it easy to determine which parameter caused the trigger when triggers are set for multiple parameters.

To adjust the amount of data collected after a trigger:

1. Select the **Properties** icon on the Scanner toolbar to open the dialog box.
2. Highlight one of the **Samples After Trigger** options:
3. Select the Accept icon to close the dialog box.

NOTE:
You can also adjust the amount of data collected after a triggering event using the Properties icon on the Scanner toolbar. See Properties on page 30 for additional information.

To set triggers and record a snapshot:

1. Select the Graph Properties icon on the parameter graph you wish to set triggers on.
   The Graph Properties dialog box opens.
2. From the Graph Properties dialog box, select **Triggers On**.
   A check mark appears in the box and the Min and Max fields activate (Figure 4-24).
3. Select either **Max:** (maximum) or **Min:** (minimum) to activate that field and open the keyboard.
4. Type the desired trigger value into the field.
5. Select the other field and enter a trigger value, then close the virtual keyboard.
6. Select **Save** to close the dialog box.
   Trigger lines (blue for upper and red for lower) display on the selected parameter graph.
   The area between the upper and lower trigger lines establishes the triggering condition. Any data points that register outside of the set trigger conditions initiates a snapshot.

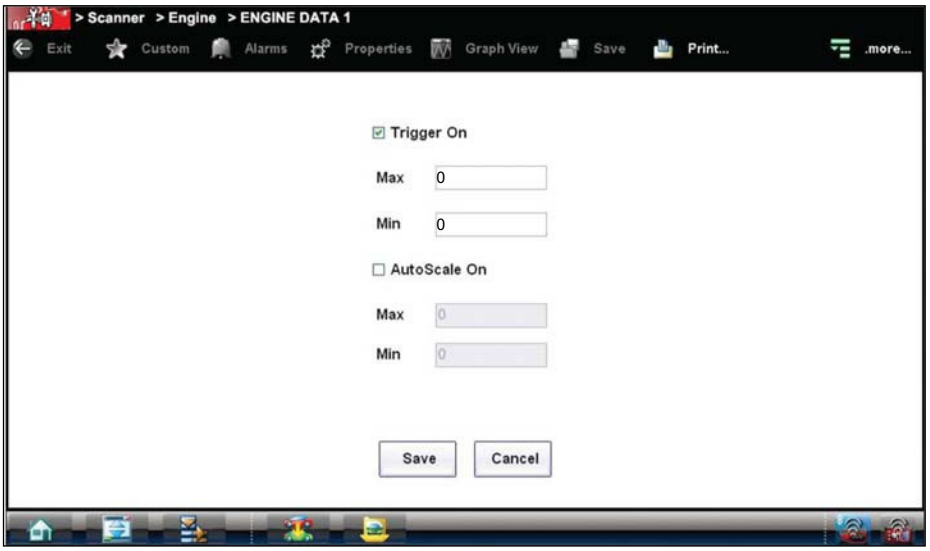


Figure 4-24 *Sample Graph Properties dialog box*

7. Select **Snapshot** on the Data Buffer Toolbar to arm the snapshot.
   The Snapshot icon changes color to indicate it has been armed (Figure 4-25).

Figure 4-25 *Sample armed Snapshot icon*

Once all of the data is compiled, data collection pauses and the information is saved as a movie. A confirmation screen displays to let you know the name automatically assigned to the saved file and where to locate it.

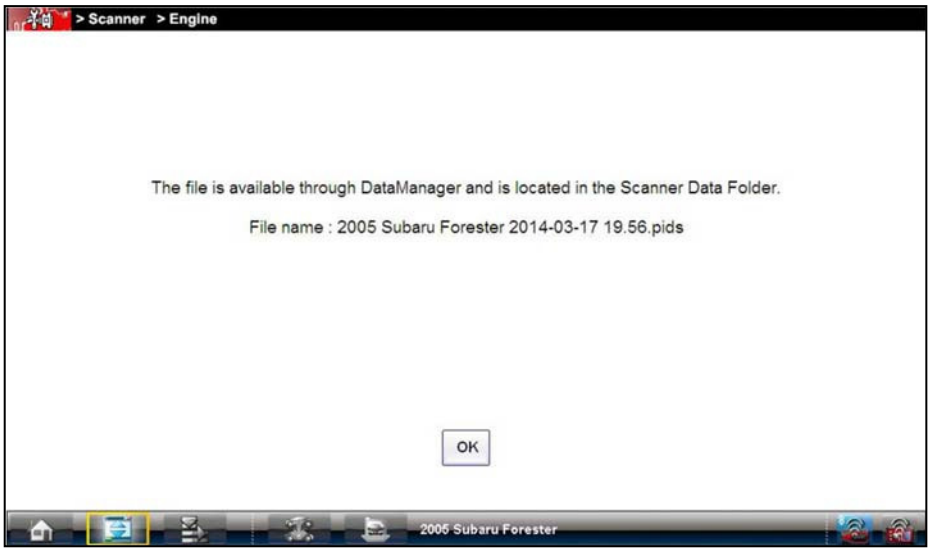


Figure 4-26 *Sample saved movie confirmation screen*

8. Select **OK** to close the confirmation screen.
9. Select the **Play** icon on the toolbar to resume viewing live data.

NOTE:
Selecting an armed Snapshot icon disarms it.

Scale

Scale adjusts the upper and lower values displayed on the vertical axis of a data graph. Two scale modes are available; auto scale and manual scale. Auto scale, which is the default setting, automatically adjusts the graph scale based upon the minimum and maximum values transmitted by the ECM. Manual scale allows you to set the minimum and maximum values.

To manually set the scale on a graph:

1. Select the Graph Properties icon to open the dialog box for the graph you wish to scale.
2. From the Graph Properties dialog box (Figure 4-27), select **Auto Scale On**.
   The check mark is cleared from the box and the minimum and maximum fields activate.
3. Select either **Max:** (maximum) or **Min:** (minimum) to activate that field and open the keyboard.
4. Type the desired scale value into the field.
5. Select the other field and enter a value, then close the virtual keyboard.
6. Select **Save** to close the dialog box.

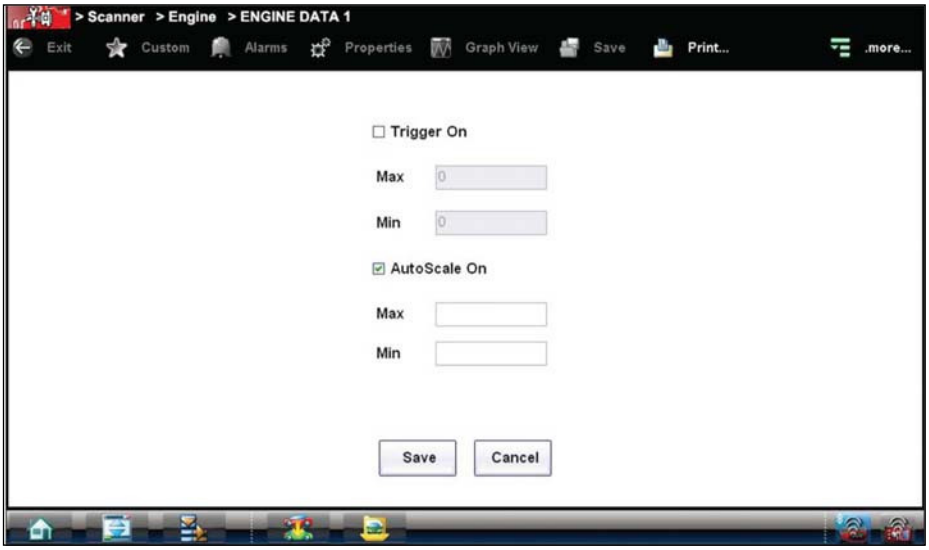


Figure 4-27 *Sample manual scale selection*

The dialog box closes and the parameter scale is now at the set values.

Using Zoom

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.

Functional Tests

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

There are four general types of functional test operations:

- **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.

Selecting **Functional Tests** opens a menu of test options that varies by make and model. Selecting a menu option either activates the test or opens a submenu of additional choices. Follow all screen instructions while performing tests. How and what information is presented on the screen varies according to the type of test being performed.

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.

Some toggle and variable control tests display functional test controls at the top of the screen with data stream information below (Figure 4-28).

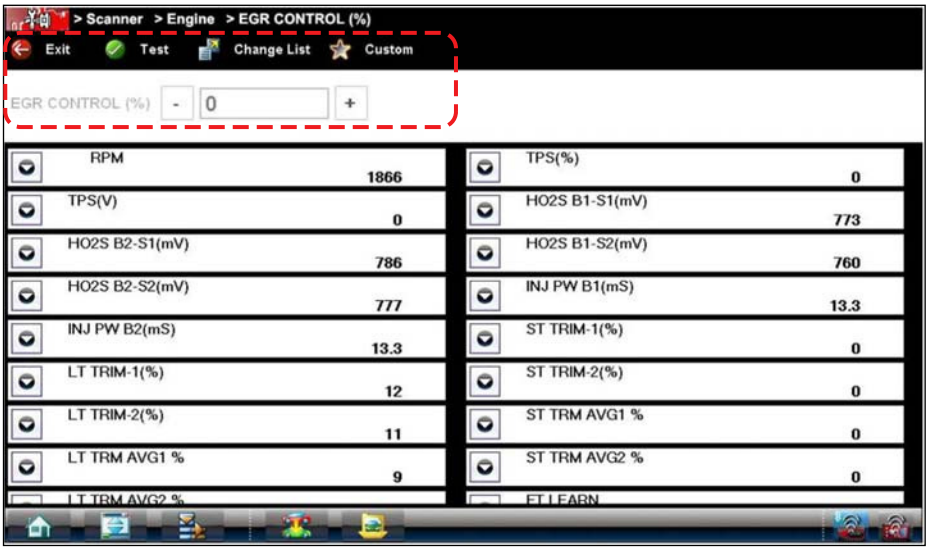


Figure 4-28 *Sample functional test controls*

Functional test controls allow you manipulate the test signal as shown in Table 4-4.

Table 4-4 *Functional test control icons*

Name	Icon	Description
Test	Test	Activates the test.
Return	Return	Moves focus back to the data list.
Change List	Change List	Allows you to switch data lists.
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.

Generic Functions

The **Generic Functions** selection opens a menu of available OBD-II/EOBD functions on 1996 and newer vehicles. For additional information on generic functions refer to the *Global OBD Vehicle Communications Software Manual*. Menu options typically include:

- MIL Status - displays the ID and status of the Malfunction Indicator Lamp (MIL)
- Fast Track® 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

Troubleshooter

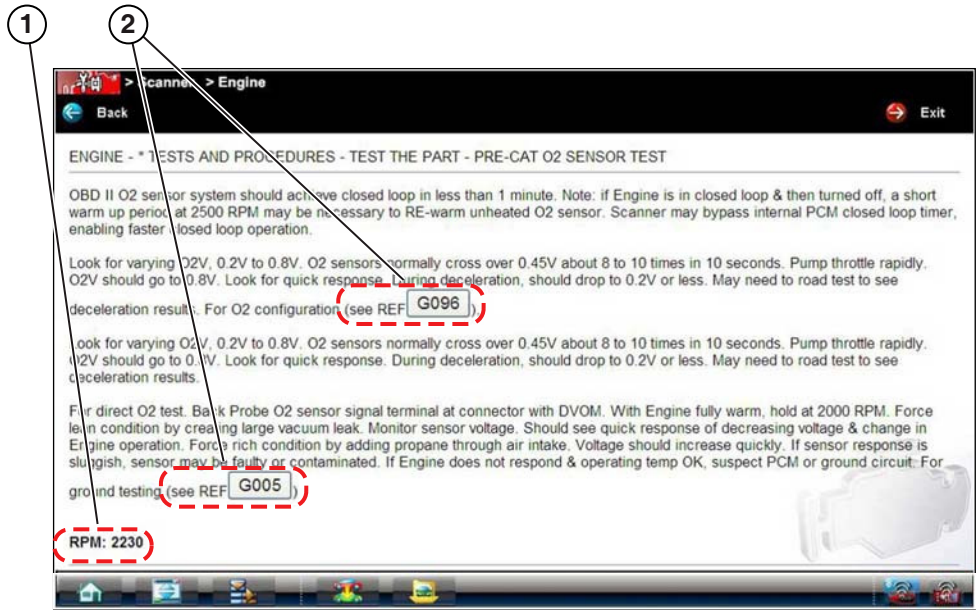
Fast-Track® Troubleshooter is a database of experience-based information of validated real-world repair strategies that have been compiled by top-notch technicians. Troubleshooter simplifies the diagnosis process, as it contains information on virtually all common diagnostic trouble code (DTC) problems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

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. Selecting opens a menu that may include:

- **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.
- **Common Problems**—provides advice and remedies for certain “pattern failures” that have been experienced on vehicles of the same model.
- **Tests and Procedures**—explains how to perform certain tests on the specific test vehicle. Some tips provide specifications and installation information as well.
- **Fast-Track Data Scan (Normal Values)**—contains information and guidelines on how to validate data readings for certain sensors and actuators, live data values are provided.

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

Certain live data parameter values display directly within the tip when performing Troubleshooter tests and procedures. A tip may also contain a hyperlink to a Troubleshooter Reference, another test or procedure, or a supplemental operation, such as Clear Codes. Hyperlinks are shown in blue, and selecting them opens the link. Troubleshooter References open in a separate window. (Figure 4-29).



1— Live data values

2— Hyperlink

Figure 4-29 *Sample data values within a Troubleshooter tip*

4.4 Stopping Communication and Exiting the Scanner

The Scanner remains open as long as there is an active communication link with the vehicle. You must first stop communication with the vehicle in order to exit from the Scanner function. A warning message displays if you attempt to exit from the Scanner while it is communicating with the vehicle ECM.

NOTE:
Damage to the vehicle electronic control module (ECM) may occur if communication is disrupted. Make sure the data cable and the USB cable are properly connected at all times during testing. Exit all tests before disconnecting the test cable or turning off the tool.

To exit Scanner and disconnect from a vehicle:

When disconnecting the Diagnostic Tool from the vehicle, make sure the Scanner software is not communicating with the vehicle.

1. From a codes or data display screen, select the **Exit** icon on the upper toolbar.

Figure 4-30 *Exit icon*

The screen goes to the codes or data menu.

2. Select the **Back** icon on the upper toolbar.

Figure 4-31 *Back icon*

The screen goes to the system menu.

3. Select the **Back** icon on the upper toolbar.

A “stopping communication” message briefly displays followed by the systems menu.

4. Select the **Change Vehicle** icon on the Toolbar.

Figure 4-32 *Change Vehicle icon*

The vehicle description on the toolbar should now read “No Active Vehicle”.

5. Select the **Home** icon on the Toolbar.

Figure 4-33 *Home icon*

The Home screen displays.

6. Disconnect the data cable from the vehicle diagnostic connector.

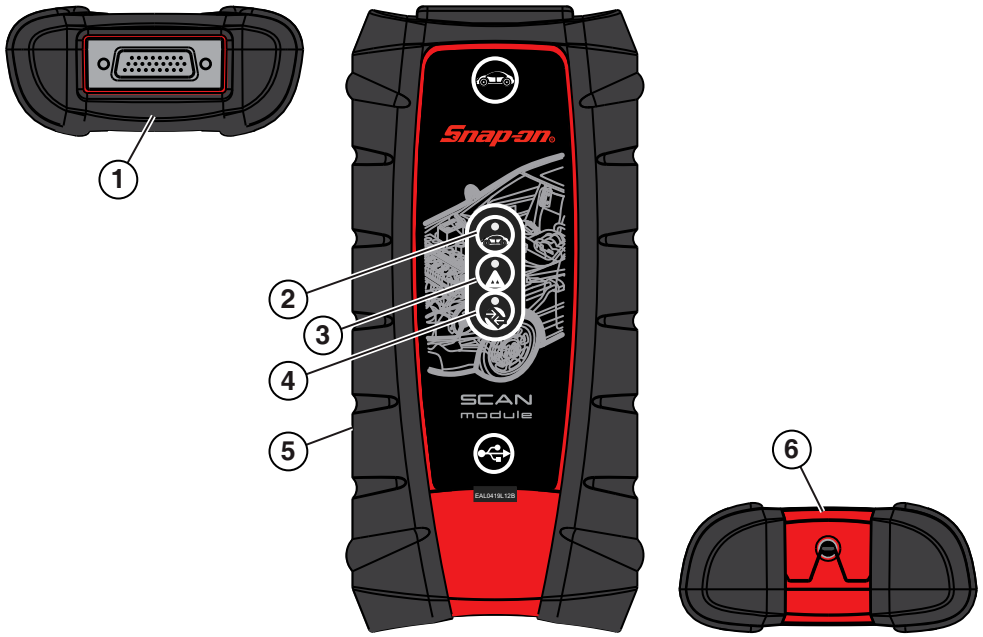
Chapter 5 Scan Module Operation

This chapter describes the connection, operation, troubleshooting and updating of the Scan Module.

5.1 Overview

The Scan Module is a wireless device that is connected to the vehicle and transmits vehicle data to the Diagnostic Tool.

The Scan Module operates on 12 or 24VDC vehicle power, supplied through the vehicle's data link connector (DLC).



1— Data Cable Connector
2— Vehicle Power LED (green)
3— Communication Issue LED (red)
4— Bluetooth LED (green)
5— Memory Card Port (remove protective hand grip for access)
6— Universal Serial Bus (USB) Jack (remove protective hand grip for access)

Figure 5-1 *Scan Module*

5.2 Pairing The Scan Module

To use the Scan Module with the Scanner or OBD-II/EOBD functions, it must first be paired with the Diagnostic Tool.

Pairing is the wireless connection (identification) process used to connect the Scan Module to your Diagnostic Tool.

The Scan Module only needs to be paired once before it's 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 Scan Module with the Diagnostic Tool:

1. Turn on the Diagnostic Tool.

IMPORTANT:
The Scan Module needs to be powered on during the pairing process. Connect the Scan Module to a vehicle or to the Diagnostic Tool using the USB cable. Make sure the Diagnostic Tool has a charged battery or is connected to the AC/DC power supply.

2. Connect the 26-pin end of the data cable to the Scan Module data cable connector.
3. Connect the 16-pin end of the data cable to a vehicle data link connector (DLC).

   The green LED on the Scan Module is illuminated when power is being supplied to the Scan Module. For additional information on the Data Cable, see Data Cable Connection on page 57.
4. From the Diagnostic Tool select **System Settings** > **Paired Devices**.
5. Select **Add** from the toolbar, then **OK** when prompted.

   The Diagnostic Tool searches for compatible wireless devices, then displays the results. (Figure 5-2).

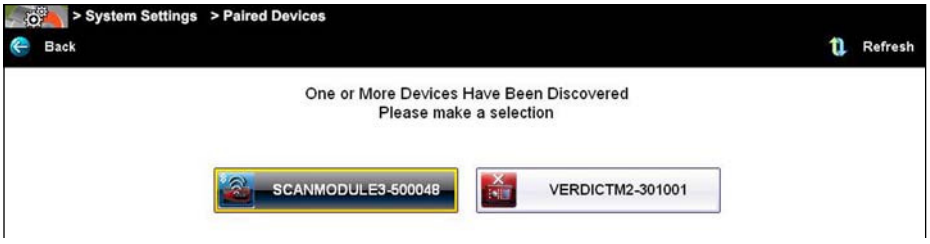


Figure 5-2 *Sample Scan Module selection*

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 Scan Module before continuing.

6. Select the Scan Module you wish to connect from the results list.

A search in progress message displays during the pairing procedure (Figure 5-3), the Paired Devices screen (Figure 5-4) displays once the procedure completes.

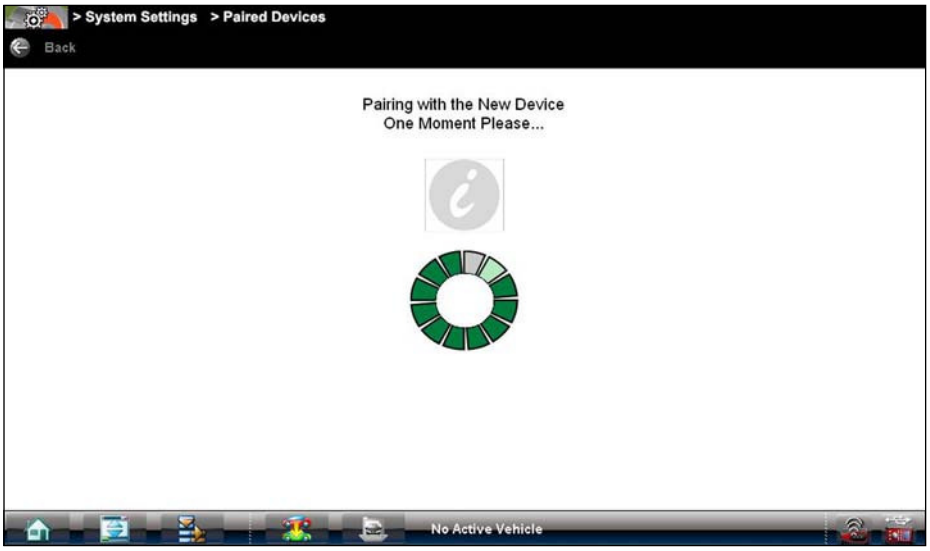


Figure 5-3 *Sample pairing in progress message*

7. Select the **Home** icon on the Toolbar.
8. Disconnect the data cable from the vehicle.

The Scan Module and Diagnostic Tool are now paired for wireless communication and should automatically recognize each other when both are powered up.

5.3 Checking Scan Module Paired Status

To check if the Scan Module is paired to your Diagnostic Tool:

1. Select **System Settings > Paired Devices**.
   The paired devices screen opens (Figure 5-4).

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 5-4 *Typical Paired Devices screen*

2. Verify the Scan Module is in the list of paired devices.

5.4 Data Cable Connection

To use the Scan Module for Scanner and OBD-II/EOBD testing, it must first be connected to the vehicle's data link connector (DLC).

Depending on the vehicle, the supplied DA-4 data cable may be used alone or may require optional adapters.

- **All OBD-II/EOBD compliant vehicles** - Use the supplied DA-4 data cable. The 26-pin end of the cable attaches to the data cable connector on the Scan Module. The16-pin end connects to the vehicle DLC. The cable connectors are secured with captive screws.
- **All non-OBD-II/EOBD (OBD-I) compliant vehicles** - Use the supplied DA-4 data cable with the optional DA-5 adapter and a manufacturer specific adapter. The 26-pin end of the cable attaches to the data cable connector on the Scan Module. The16-pin end connects to the DA-5 adapter, the DA-5 adapter connects to the manufacturer specific adapter and then connects to the vehicle DLC. The cable connectors are secured with captive screws.

While using the Scanner and OBD-II/EOBD functions, on-screen cable and adapter connection instructions are provided. The instructions may also include the location of the vehicle DLC (Figure 5-5). If required, additional connection information can be found in the appropriate vehicle communication software manual for the vehicle. Vehicle communication software manuals are available online, see the website information at the front of this manual.

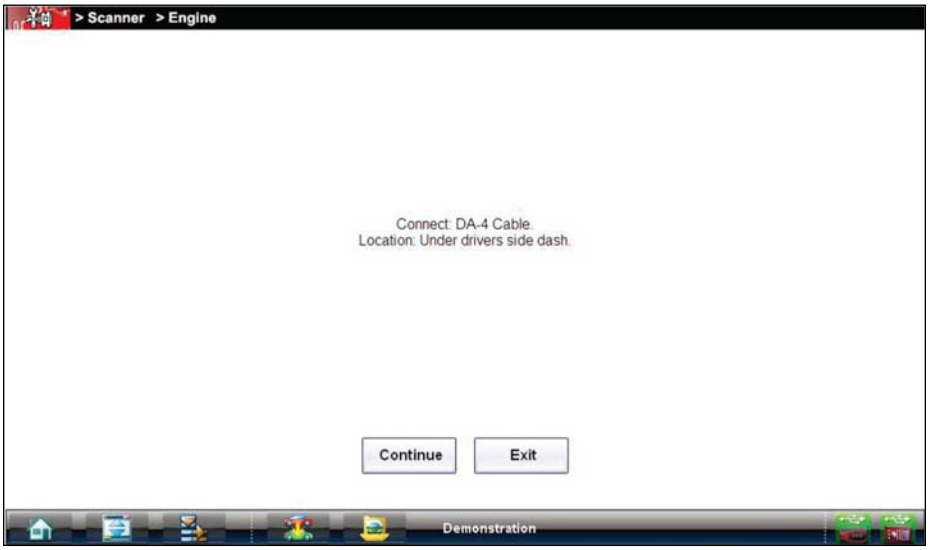


Figure 5-5 *Vehicle connection data cable message*

For data cable vehicle power connection information, see Power Sources on page 10.

To connect the data cable to the vehicle:

1. While using the Scanner or OBD-II/EOBD function, follow the on-screen instructions for connecting the cable and/or any adapters required to the vehicle (Figure 5-5).
2. Select **Continue** once the data cable is connected to the vehicle.

5.5 Troubleshooting

The Scan Module is a wireless communications device that uses Bluetooth technology to transmit vehicle data to the Diagnostic Tool without a physical connection. The working range of the transmitter is about 30 feet (9.14 m). Scan Module 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 Scan Module response accompanied by “Error 101” message.
- Slow Scan Module response accompanied by “Error 404” message.
- “Error Occurred” Message when trying to use the Scan Module.
- “Error Occurred” Message after 20 or more minutes sitting idle, particularly if the devices have been stationary.

5.5.1 No Communication Message

If the Scan Module is paired to the Diagnostic Tool and tries to communicate with the vehicle and the Scan Module is not connected to the vehicle, a “Connect Data Cable” or “no communication” message displays.

A signal lost due to moving out of range automatically restores itself when the Diagnostic Tool is brought closer to the Scan Module. The Scanner sounds a tone when the signal is lost.

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 data cable or adapter.
- There is a circuit fault in the data cable, Personality Key, or adapter.
- Incorrect vehicle identification was entered.

Refer to the Vehicle Communication Software manuals for manufacturer-specific troubleshooting information.

5.5.2 Signal Loss / Out of Range Alarm

A signal lost due to moving the Diagnostic Tool out of range of the Scan Module will automatically restore itself when the Diagnostic Tool is brought closer to the Scan Module. The Scan Module will sound an audible tone when the signal is lost.

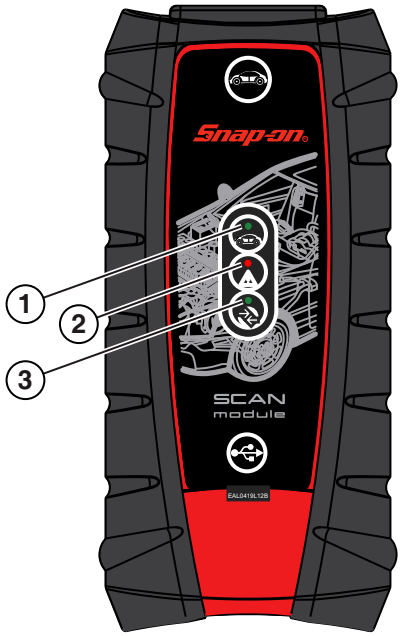
5.5.3 Checking Hardware Status

Verifying the Hardware Status is always the first step in troubleshooting a wireless connection issue.

The Hardware Status indicators in the lower-right corner of the Home screen provide a quick reference to wireless operations. The background color of the status indicator icon represents the condition of the wireless connectivity to that device. Icon status is shown in the table below:

Hardware Icon	Background Color	Condition	Action
	Red	Not Paired	Pair the Scan Module to the Diagnostic Tool. See Scan Module Pairing on page 141 for instructions.
	Grey	Paired, but Not Communicating	You may have moved out of range. Move the Diagnostic Tool closer to the Scan Module to reestablish communications. If connectivity is not restored, perform the Recovery Procedure on page 60.
	Blue	Paired and Communicating	Hardware status is good and Bluetooth should be functional. Verify that the green Bluetooth LED on the front of the Scan Module is flashing. If there is no connectivity, perform the Recovery Procedure on page 60.

The three light emitting diodes (LEDs) on the faceplate of the Scan Module let you know at a glance whether or not there is an active connection between the two modules. The two green LEDs (Vehicle Power and Bluetooth) both flash on and off when the Scan Module and Diagnostic Tool are actively communicating through a wireless connection. The red Communication LED flashes on and off when the Scan Module is performing an internal self test, and is illuminated continuously if a failure is detected (Figure 5-6).



1— Vehicle Power—green LED, flashes during wireless communications

2— Communication—red LED, illuminates if there is a communications failure

3— Bluetooth—green LED, flashes during wireless communications

Figure 5-6 *Scan Module LEDs*

Each LED can be in one of three states; off, lit solid, or flashing. Interpret as follows:

- Vehicle Power
  - Off, vehicle power is not being supplied to the Scan Module through the data cable
  - On Solid, the Scan Module is being powered by the vehicle, but not communicating with the Diagnostic Tool.
  - Flashing, the Scan Module is being powered by the vehicle and is communicating with the Diagnostic Tool.
- Communication
  - Off, normal state, no errors detected.
  - On Solid, communications error detected.
  - Flashing, internal self-test in process, will go out once the test completes.
- Bluetooth
  - Off, there is no connection between the Scan Module and Diagnostic Tool.
  - On Solid, the Scan Module and Diagnostic Tool are communicating through a solid (USB cable) connection.
  - Flashing, the Scan Module and Diagnostic Tool are communicating through a wireless connection.

5.5.4 Recovery Procedure

This is a quick and easy method that reestablishes connectivity between the Diagnostic Tool and the Scan Module in most instances. If bluetooth connectivity remains unavailable following recovery, use one of the alternate procedures to restart the system.

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 communication cables and follow screen prompts.

To recover wireless connectivity:

1. Disconnect the Scan Module 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 Scan Module to the vehicle.
5. Select the **ShopStream Diagnostic Suite** icon on the desktop.

Figure 5-7 *Sample ShopStream Diagnostic Suite desktop icon*

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

Alternate Recovery Procedures

Use these methods as an option 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 modules.

To create a USB connection:

1. Carefully slip the ends of the handgrip off of the sides of the Scan Module housing.
2. Lift open the hinged cover on the base of the Scan Module.

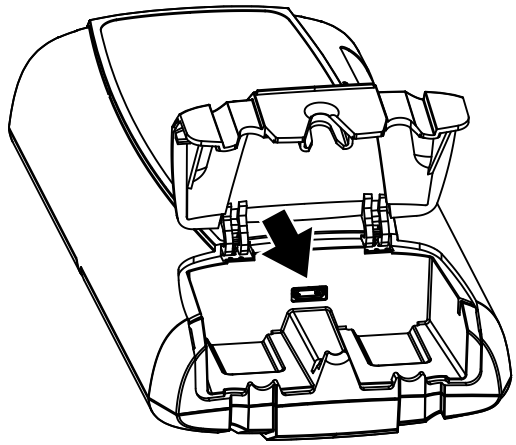


Figure 5-8 *Scan Module USB jack, handgrip removed*

3. Plug the small end of the USB cable into the USB jack on the Scan Module.
4. 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 Scan Module are both fully functional, so you can complete your testing with the USB connection intact.

ShopStream Diagnostic Suite 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 Scan Module 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 Scan Module 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 Scan Module to the vehicle once the ShopStream Diagnostic Suite opens.

5.6 Updating Scan Module Firmware

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

Scan Module 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 5-9).

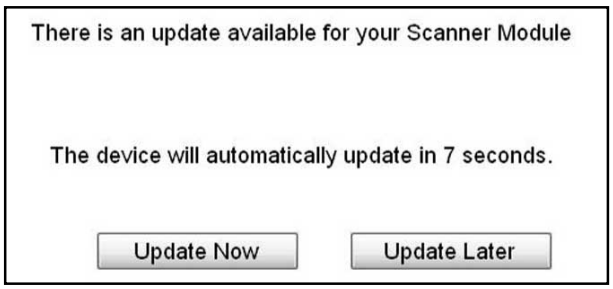


Figure 5-9 *Scan Module update available message*

The firmware update process, as explained in the following procedure, begins automatically after ten seconds 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.

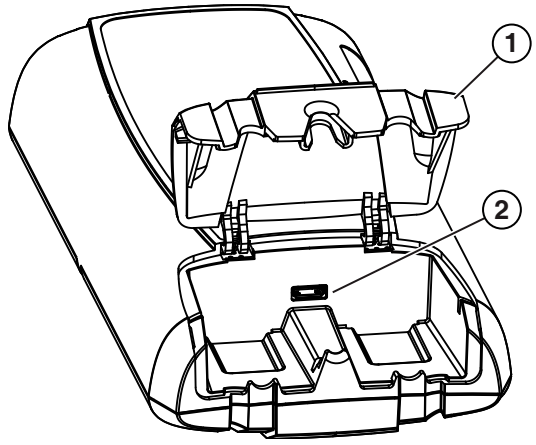
Updating Scan Module firmware:

IMPORTANT:
The Diagnostic Tool must be connected and powered by the AC/DC power supply during the Scan Module firmware update process. Damage can occur to the Scan Module if the Diagnostic Tool power is turned off or the power supply is disconnected during the firmware update process.

1. Connect the AC/DC power supply to the Diagnostic Tool.
2. Turn on the Diagnostic Tool.
3. Connect the Scan Module to the Diagnostic Tool as follows (Figure 5-10):

NOTE:
The Scan Module and Diagnostic Tool must be connected with the USB cable during the update process. The Scan Module DLC must be disconnected from a vehicle during the update process.

   a. From the bottom of the Scan Module, gently lift up and out on the sides of the handgrip to free it from housing.
   b. Open the hinged cover on the base of the Scan Module to expose the USB jack.
   c. Plug the small end of the USB cable into the USB jack on the Scan Module.
   d. Plug the large end of the USB cable into one of the USB jacks on the side of the Diagnostic Tool.



1— Hinged cover
2— USB jack

Figure 5-10 *Scan Module USB jack*

4. Select **Scanner** from the Diagnostic Tool Home screen.
5. Select **OK** when the update available message displays (Figure 5-9).

The update begins and installation progress is tracked on the screen (Figure 5-11).

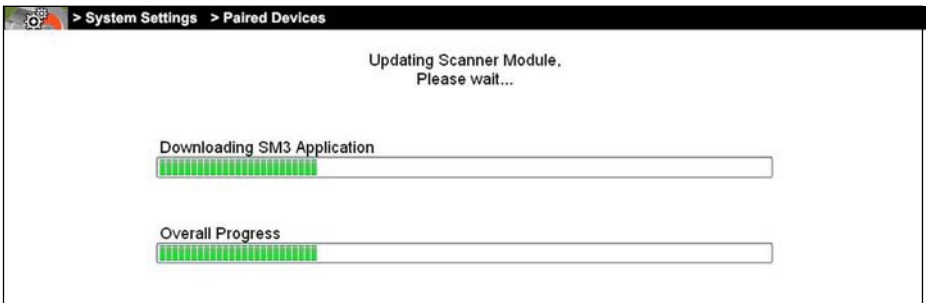


Figure 5-11 *Sample update in progress screen*

A “successfully updated” message displays once the installation process is complete (Figure 5-12).

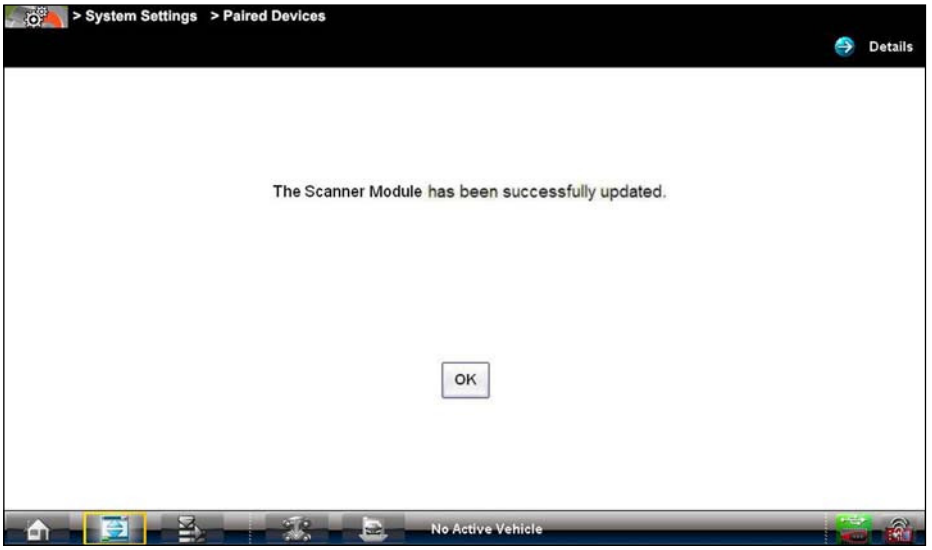


Figure 5-12 *Sample firmware update complete message*

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

Chapter 6 OBD Direct Operations

This Home screen option allows you to access Generic OBD-II/EOBD Scanner tests without completing a vehicle identification. OBD Direct presents a quick way to check for diagnostic trouble codes (DTCs), isolate the cause of an illuminated malfunction indicator lamp (MIL), check monitor status prior to emissions certification testing, verify repairs, and perform a number of other services that are emissions-related. This mode is also used for testing OBD-II/EOBD compliant vehicles that are not included in the Scanner databases.

OBD Direct is a Scanner function, and the Scan Module must be connected to the test vehicle and communicating with the Diagnostic Tool. This function only provides generic OBD-II/EOBD information. To access enhanced OBD-II/EOBD functions, select Scanner from the Home screen.

Options for the Menu icon on the Toolbar at the base of the screen are the same as those available for the Scanner module. Refer to Menu Options on page 36 for details.

Selecting OBD Direct on the Home screen opens a menu with two options (Figure 6-1):

Figure 6-1 *Sample OBD Direct main menu*

6.1 OBD Health Check

The OBD Health Check offers a way to quickly check for and clear generic diagnostic trouble codes (DTCs) and to check readiness monitors. Selecting OBD Health Check opens a submenu of options (Figure 6-2).

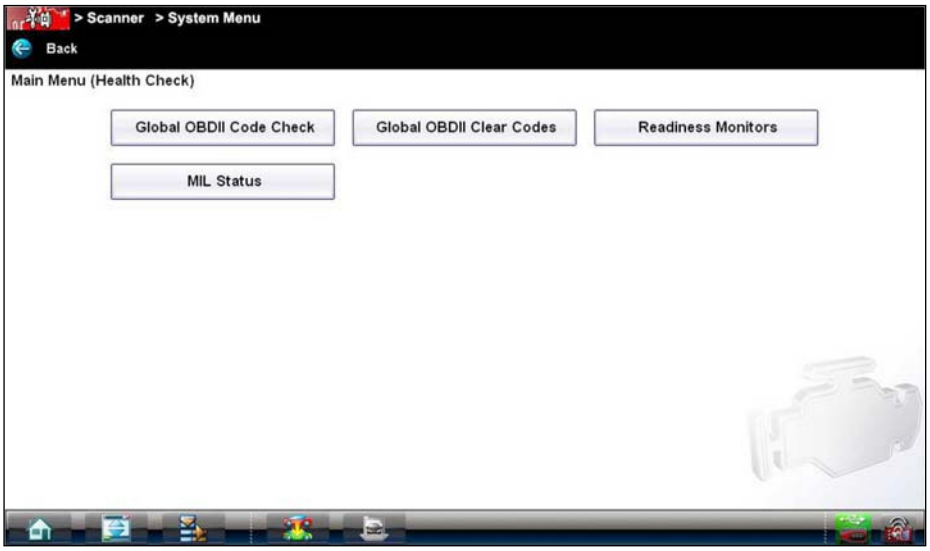


Figure 6-2 *Sample OBD Health Check menu*

6.1.1 Global OBD II Code Check

This option displays any stored emission related generic DTCs reported by the ECM. Selecting opens a submenu with two choices: Codes and Pending Codes.

Select an option to display the code list. Refer to Codes Menu on page 42 and the *Global OBD Vehicle Communication Software Manual* for additional information.

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

The purpose of this service is to enable 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 the service technician after a 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.

6.1.2 Global OBD II Clear Codes

This option is used to clear 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. Refer to Codes Menu on page 42 and the *Global OBD Vehicle Communication Software Manual* for additional information.

6.1.3 Readiness Monitors

Use this menu option to check the readiness of the monitoring system. An OBD-II/EOBD system checks the status of emission-related subsystems by running continuous or periodic tests. Test results are shown in the data viewer (Figure 6-3).

Figure 6-3 *Sample readiness monitor test report*

Gesture sweep to view the entire list of Readiness Monitors to ensure that all tests are complete. It is possible to print the readiness test status or save it as part of a Vehicle history.

6.1.4 MIL Status

This item is used to check the current condition of the malfunction indicator lamp (MIL). Additional information, such as which ECM commanded the MIL on and the distance driven while the MIL is on (if supported), can also be displayed. It is also possible to print the MIL Status.

6.2 OBD Diagnose

Selecting OBD Diagnose opens a menu with the following options:

- Start Communication—begins the test session
- Connector Information—provides data link connector (DLC) location details for most models
- Manual Protocol Selection—allows you to select which protocol to use

6.2.1 Start Communication

Use the following procedure to conduct an OBD Direct test session:

To perform an OBD Direct Test:

1. Select **Start Communications** from the OBD Direct menu.

   A generic connection message will display (Figure 6-4), connect the Scan Module to the test vehicle as instructed.

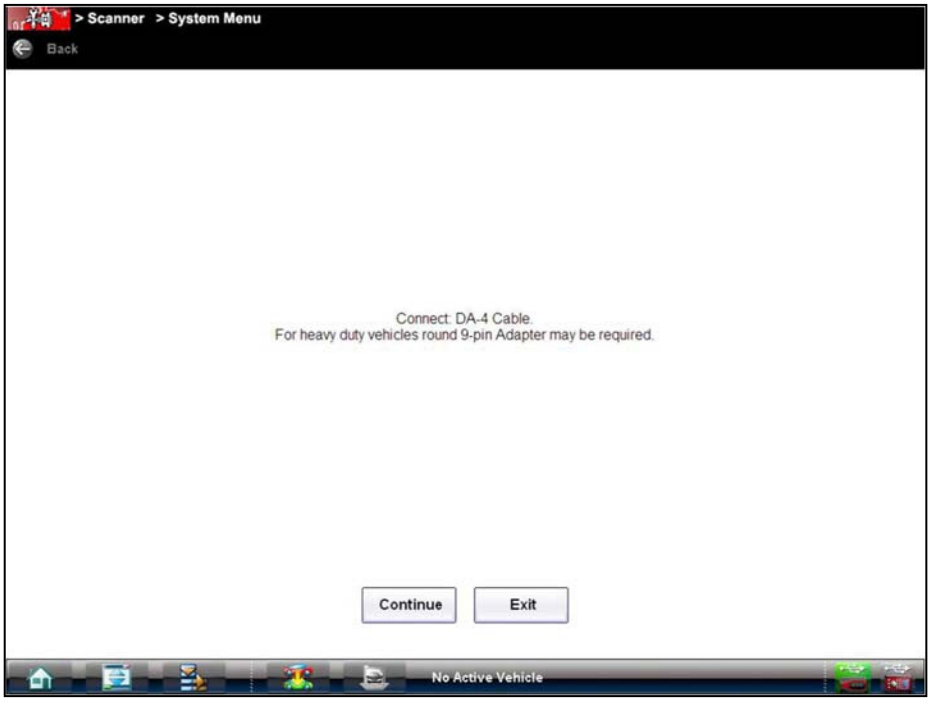


Figure 6-4 *Sample generic connection message*

2. Select **Continue**.

   A communications message that shows how many ECMs were detected, which ECM is communicating, and which communication protocol is being used displays (Figure 6-5).

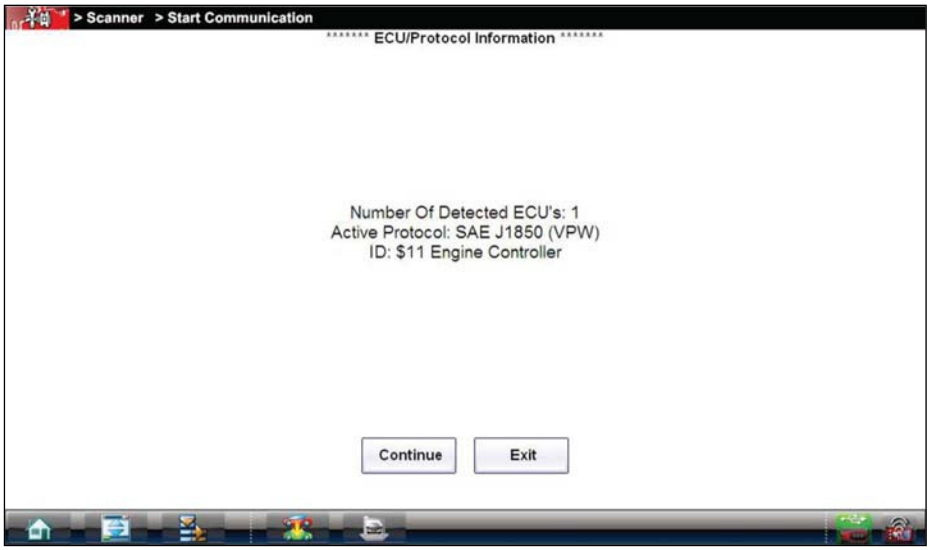


Figure 6-5 *Sample communication message*

3. Select **Continue** and a menu of available tests displays (Figure 6-6).

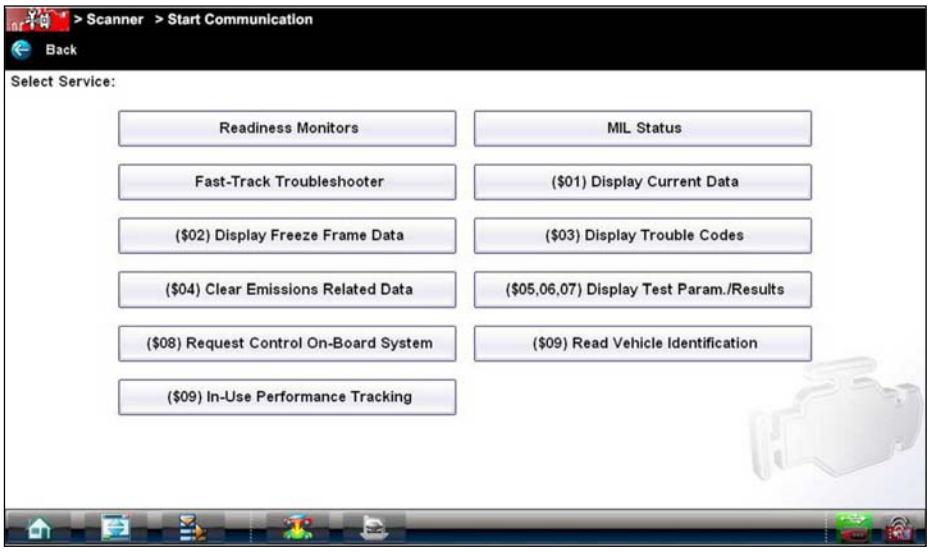


Figure 6-6 *Sample Start Communication menu*

4. Select a test to continue.

Readiness Monitors

Use this menu item to check the status of the monitored system. If a monitored system is not supported, it is not displayed. Scroll, if needed, to view the entire list of monitors. Selecting Readiness Monitors opens a submenu with two choices:

- **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.

MIL Status

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

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.

($01) Display Current Data

Use this item to display the current emission related data 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. OBD Direct data displays similar to Scanner data, refer to Data Display on page 45 for details.

($02) Display Freeze Frame Data

This item is used to display freeze fame 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

This option displays any stored emission related DTCs reported by the various ECMs. The OBD Direct code report is similar to a Scanner module code report, and includes the Fix It icon with hyperlinks to SureTrack and Repair Information details. See Display Codes on page 42 for additional information.

($04) Clear Emissions Related Data

This item is used to clear 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

This option 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:

- Oxygen Sensor Monitoring ($05)
- On-Board Monitored Systems ($06)
- DTCs Detected During Last Drive ($07)

($08) Request Control of On-board System

This service enables bidirectional control of the ECM so that the Scanner is able to transmit control commands to operate the vehicle system. This function is useful in determining how well the ECM responds to a command.

Available options vary by make, model, and year of the test vehicle. Select a test and follow the on-screen instructions.

($09) Read Vehicle Identification

This selection displays the vehicle identification number (VIN), the calibration identification, and the calibration verification number (CVN) of the test vehicle.

($09) In-use Performance Tracking

This selection displays the “In-use Performance Tracking” of monitored data. It is basically a record of the number of times each of the monitor tests have been completed.

($0A) Emission Related DTC with Permanent Status

This service 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.

6.2.2 Connector Information

This option opens a database of vehicle diagnostic connector locations that includes most makes and models.

To locate a vehicle diagnostic connector:

1. Select **Connector Information** from the System menu.
2. Select a manufacturer from the list presented.
3. Select a model from the list presented.
   Instructions for which, if any, cable adapter or pin to use displays.
4. Select **Continue**.
   Information on where to locate the vehicle diagnostic connector displays.
5. Select **Continue** to return to the System menu.

6.2.3 Manual Protocol Selection

A communication protocol is a standardized way of data communication between an ECM and a scan tool. Global OBD may use several different communication protocols. The scan tool automatically connects to an available protocol, which displays on the connection message (Figure 6-5). Some vehicles communicate on more than one protocol. Use the Manual Protocol Selection option to switch to a different protocol.

Select **Manual Protocol Selection** and message displays advising you to make sure you know the correct protocol for the test vehicle. An incorrect selection may activate warning lamps and set CAN related faults on the vehicle. Select **OK** and a menu of options displays (Figure 6-7).

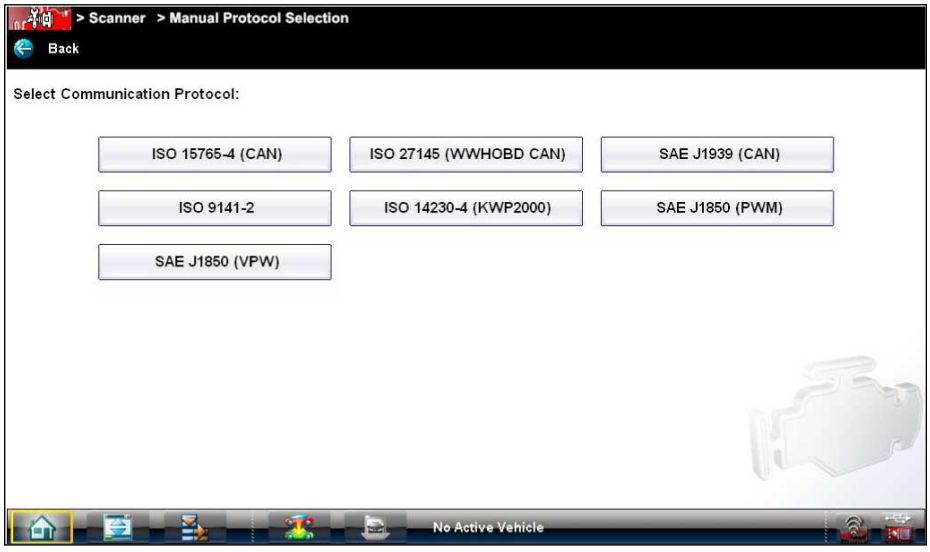


Figure 6-7 *Sample communication protocol menu*

Chapter 7

Guided Component Test Operations

The Guided Component Test software is a component-testing powerhouse, providing you with a robust diagnostic database for use with scopes and meters. It is like having access to a complete library of shop manuals for testing engine-management components, transmission sensors and components, and ABS systems.

Guided Component Test helps you with everything from selecting the appropriate test for a specific component to showing the hook-up location and correct pin configuration. This software thoroughly guides and instructs you on proper testing procedures and offers tips from the internal troubleshooter database. The Guided Component Test procedures, tips, and meter settings reduce your overall set-up and diagnostic testing time. Vehicle-specific Guided Component Tests are provided for engine, transmission, ABS, charging, transfer case and suspension systems.

⚠ 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, or circuit damage.

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

7.1 Vehicle Identification

The Guided Component Test information presented is specific to the vehicle being tested. Therefore, certain attributes of the test vehicle must be entered into the Diagnostic Tool so that the correct data can be retrieved. Vehicle identification information is carried over if you enter the Guided Component Test module either from the Scanner function or from one of the records stored in the Vehicle History module. However, you may need to enter additional attributes in some instances.

The vehicle identification sequence is menu driven, you simply follow the screen prompts and make a series of choices. Each selection you make advances you to the next screen.

7.1.1 Menu Options, Guided Component Test

Selecting the Toolbar Menu icon at the base of the screen offers the following options:

- Safety Information—opens the *Important Safety Instructions* document. See Safety Information on page iii for additional information.
- File—allows you to print, save and set page settings of the data being viewed.
- Top Level Menus—allows you to access supplemental information and training programs.
- Help—allows you to view supporting documentation. See Help Operations on page 139 for additional information.

File

Selecting **File** opens a menu of print options:

- **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.

Top Level Menus

Selecting **Top Level Menus** opens a list of the following options:

- Features Benefits
- How To
- Power User Tests
- Snap-on Automotive Theory

Features Benefits

Selecting **Features Benefits** opens a menu page that includes:

- **5-Minute Walk Thru With Demo Board**—explains how to use the optional demonstration board to generate sample signals.
- **Features & Benefits**—provides descriptions and a brief overview of meter functions.
- **Accessories**—opens a menu of optional equipment available.
- **Product Description**—provides descriptions and a brief overview of meter operations.

The demonstration board not only helps you learn how to use the Guided Component Test software, it allows you to hone your skills and diagnostic technique without an actual test vehicle.

Power User Tests

The **Power User Tests** option gives you quick access to a pre-configured meter for conducting a number of control system tests. Tests are available with or without on-screen help. Help typically provides a description of the test along with expected results and a link to the pre-set meter.

How To

The **How To** option provides a list of available on-screen instructions for performing tasks. Scroll to view the entire list. Typical topics include:

- **10-Minute Electronic Classes**—provides brief instruction in basic electronics and circuit connections.
- **15-Minute Ignition Classes**—provides an introduction to basic ignition testing.
- **Illustrated Terms & Definitions**—provides definitions of terms, drawings and tips associated with Guided Component Testing.
- **No-start Basics**—provides a guideline for diagnosing a no-start condition.
- **O2 Sensor & Feedback System Analysis**—displays the Guided Component Test meter in the “live” graphing mode with O2S test tips to help you understand the fundamental concepts of O2S diagnostics.
- **Test Tips**—gives on-screen instructions for performing specific Guided Component Tests along with drawings and tips.
- **20-Minute Current Ramp Classes**—provides an introduction to current ramp testing.
- **Minute Current Ramp Classes**—provides an introduction to current ramp testing.
- **Theory And Operation**—provides basic theory and operation information for related components**.**

Snap-on Automotive Theory

Selecting the **Snap-on Automotive Theory** option provides you basic operation, theory and testing information on various systems such as:

- Air Conditioning
- Diesel Particulate Filters
- High-Intensity Discharge Headlights
- Supplemental Restraint Systems
- Diagnosing Battery Draws
- Electronic Parking Assistance Class
- LIN-Bus
- Tire Pressure Monitoring

7.1.2 Creating a 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.

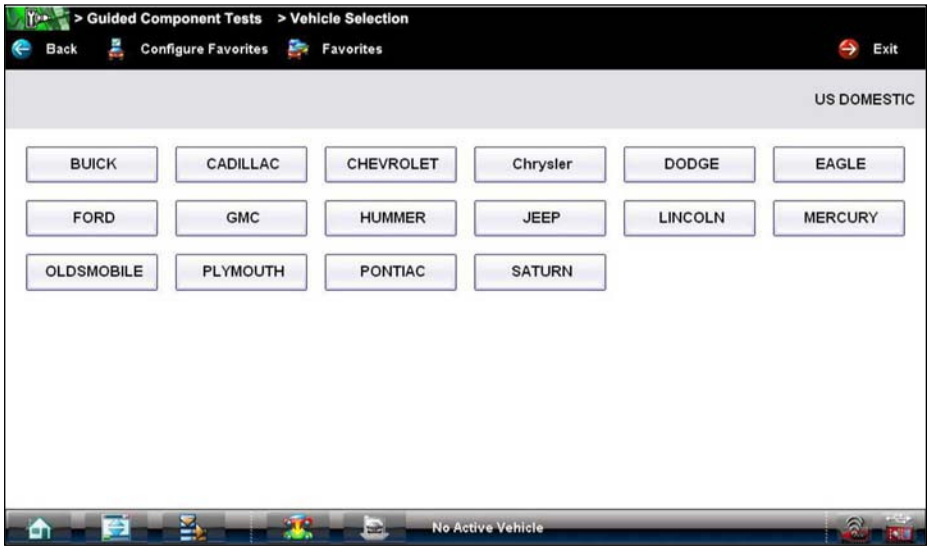


Figure 7-1 *Sample manufacturer list*

To configure a favorites list:

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

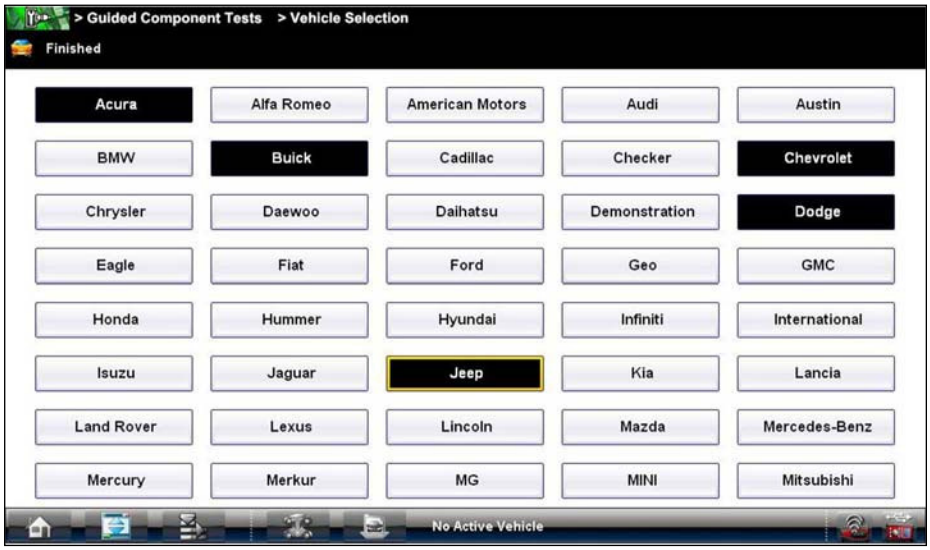


Figure 7-2 *Sample Configure Favorites screen*

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.

7.1.3 Identifying a Test Vehicle

Exact procedures to identify the test vehicle may vary somewhat by vehicle and market. The following procedure, which identifies a 2008 Ford Focus for testing the fuel injection system, is typical of what to expect.

To identify a vehicle for Guided Component Test:

1. Select the **Guided Component Test** Function icon from the Home screen.
2. Select which database to load for the test vehicle if requested (optional).

   After the database loads, a list of manufacturers displays.
3. Select **FORD** and a model year menu displays.
4. Select **2008** from the year menu and a list of available models displays.
5. Select **FOCUS** from the model list and a list of available engines displays.
6. Select **2.0L** from the engine list and a confirmation dialog box displays (Figure 7-3).

Figure 7-3 *Sample confirmation dialog box*

7. From the confirmation dialog box, select **OK** to continue, or **Cancel** to return to the engine list.

A list of tests available for the identified vehicle displays (Figure 7-4).

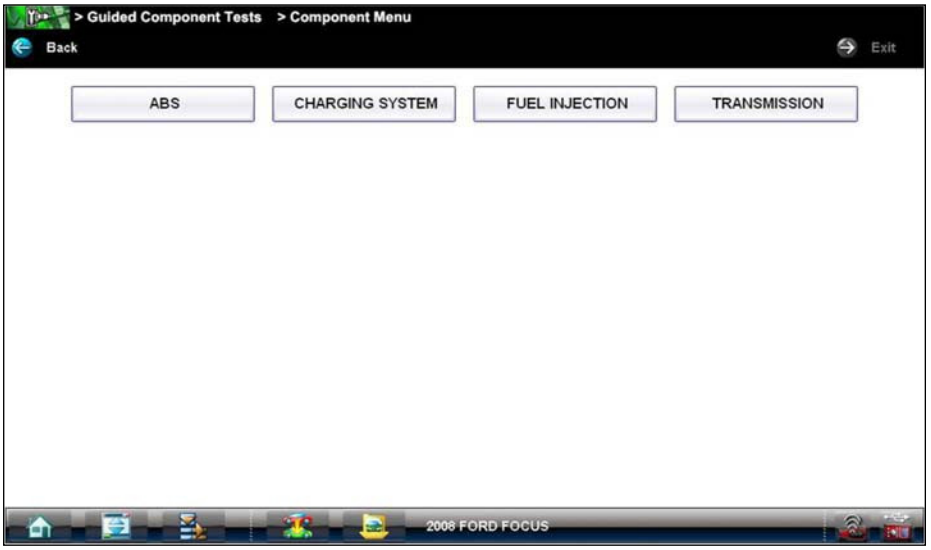


Figure 7-4 *Sample available tests list*

8. Select **FUEL INJECTION** and a fuel injection component test menu displays (Figure 7-5).

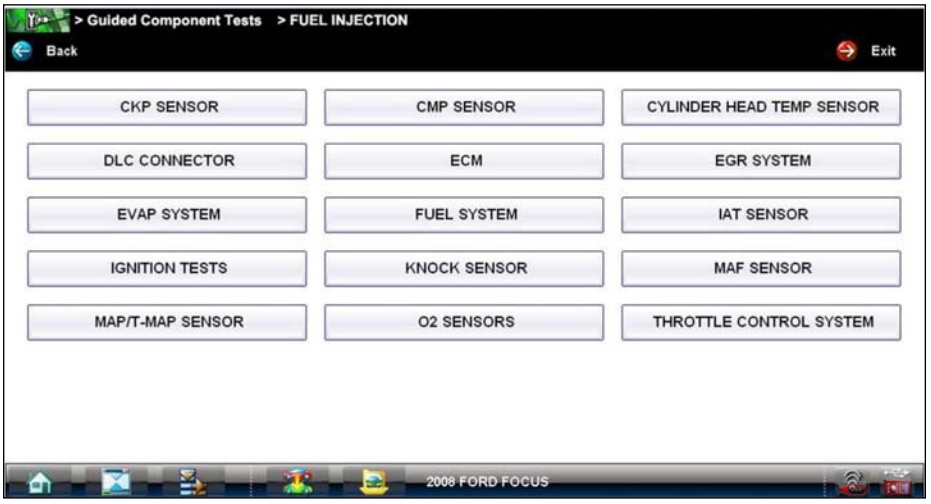


Figure 7-5 *Sample available component tests list*

9. Select a test to continue.

The identification sequence is now complete, refer to the Operations section that follows for details on how to navigate through the Guided Component Test information and perform tests.

NOTE:
If you return to the Home screen and select **Scanner** or **Vehicle History** the vehicle identification entered here is carried over. However, additional information may be needed by some modules.

7.2 Operations

The Guided Component Test software provides vehicle specific Guided Component Test procedures and information that aid in setting up scopes and meters. Once a test vehicle is identified, you can select a Guided Component Test from the list of available tests. For most selections two main choices are available on the component menu:

1. **COMPONENT INFORMATION**—provides information on the selected component and connector pin details that assists you in understanding the components prior to diagnosis.
2. **TESTS**—provides a pre-configured list of tests, guides you through performing the tests, and offers tips and resources to reduce setup and testing time.

7.2.1 Component Information

Component Information provides details on specific vehicle components to provide a better understanding of the components prior to diagnosis.

The Component Information screens contain information to assist you with testing. The screens are divided in sections to help quickly guide you to the correct information (Figure 7-6):

- **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.

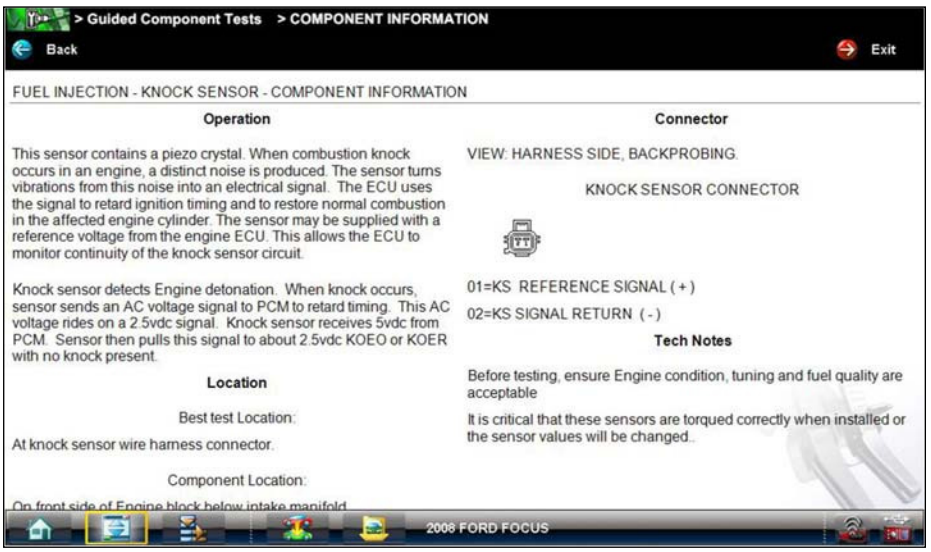


Figure 7-6 *Sample Component Information screen*

To view component information:

1. Select a component from the tests list.
2. Select **COMPONENT INFORMATION** from the component menu.

NOTE:
An additional selection, such as front or rear for an oxygen sensor (O2S), may be required before advancing to the component information screen.

The component information screen displays (Figure 7-6).

3. Always Gesture sweep to view any additional information below what is visible.
4. Select **Back** at any time to return to the previous screen.

7.2.2 Tests

The Tests section guides you through the process of performing tests on a specific component. It also provides specifications, tips on how and where to connect the test meter leads, and also automatically configures the multimeter or lab scope to perform the selected test.

Once a test vehicle is identified, you can select a component from the available tests list.

To select a test:

1. Select a component from the list.
2. Select **TEST** to open the list.

NOTE:
More than one selection is available in some instances. For example, select Ignition Tests and a menu offering Primary Tests and Secondary Tests displays.

The list shows all of the tests available for the selected component, choices vary by make, model, and year.

Selecting opens an additional submenu similar to the one shown in Figure 7-7 when more than one option is available.

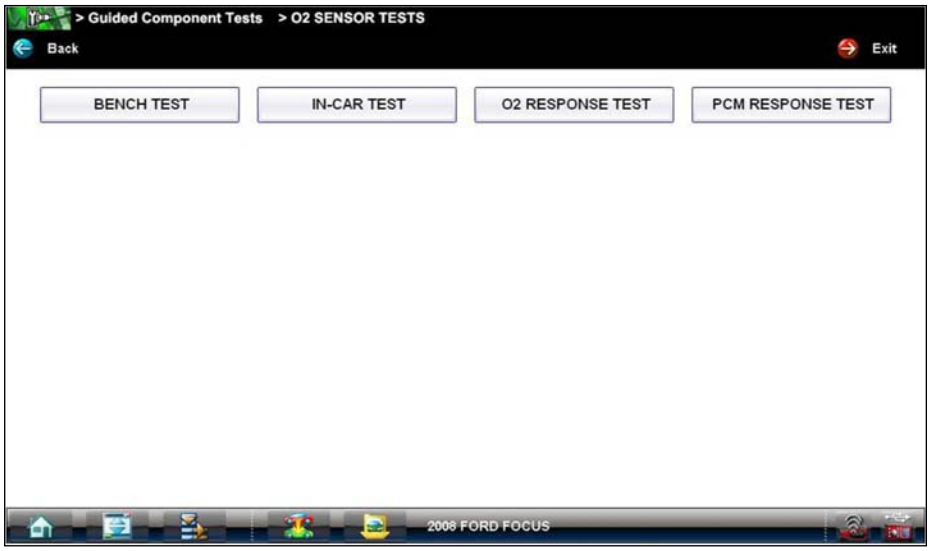


Figure 7-7 *Sample O2S voltage test submenu*

3. Select a test option and the test screen displays (Figure 7-8).

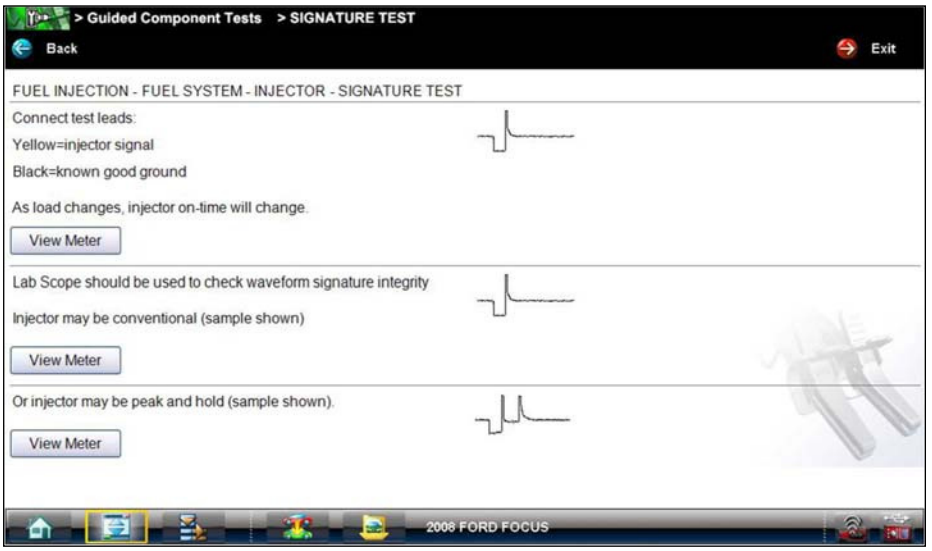


Figure 7-8 *Sample Test screen*

4. Gesture sweep to view any additional information.
5. Select **Back** at any time to return to the previous screen, or select **Exit** to return to the main component menu.

Hyperlinks

Guided component test screens contain hyperlinks that can either take you to another page containing additional information or open an additional window on top of the current screen. Hyperlinks display as icons. Common hyperlinks are:

- **View Meter**—opens a live meter set up to perform the test in the lower portion of the screen (Figure 7-9). 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 Multimeter Toolbar on page 93 for details.
- **Show More Information**—advances to a new screen with more detailed information about a particular test, select **Back** to return to the test screen.

View Meter

A Meter icon, which is only available in the Guided Component Test view meter mode, appears on the upper toolbar (Figure 7-9).

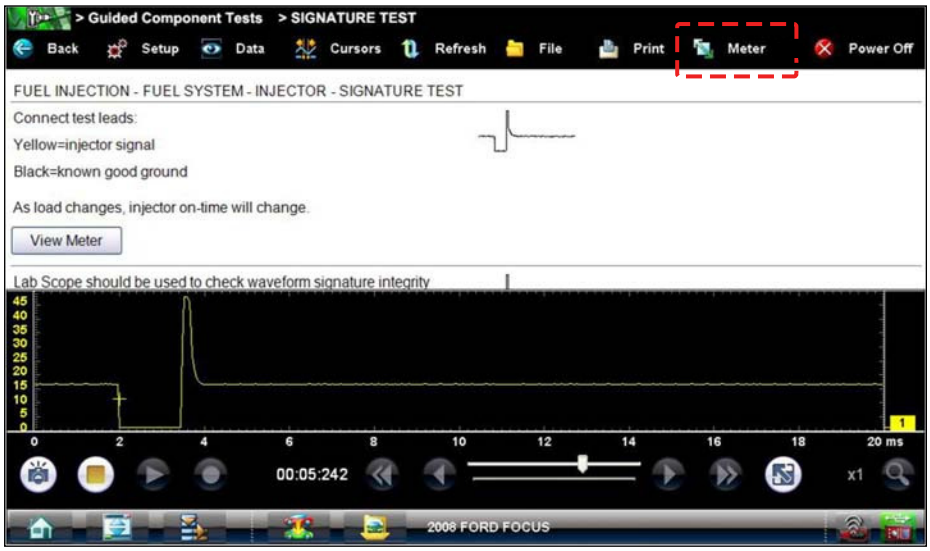


Figure 7-9 *Sample view meter window*

Three view meter options are available:

1. With View Meter active (Figure 7-9), 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 open as a separate window (Figure 7-10). This window can remain open if you switch to the Scanner function and can be accessed from the Windows taskbar at the bottom of the screen. You can also resize and reposition the meter window on the screen.

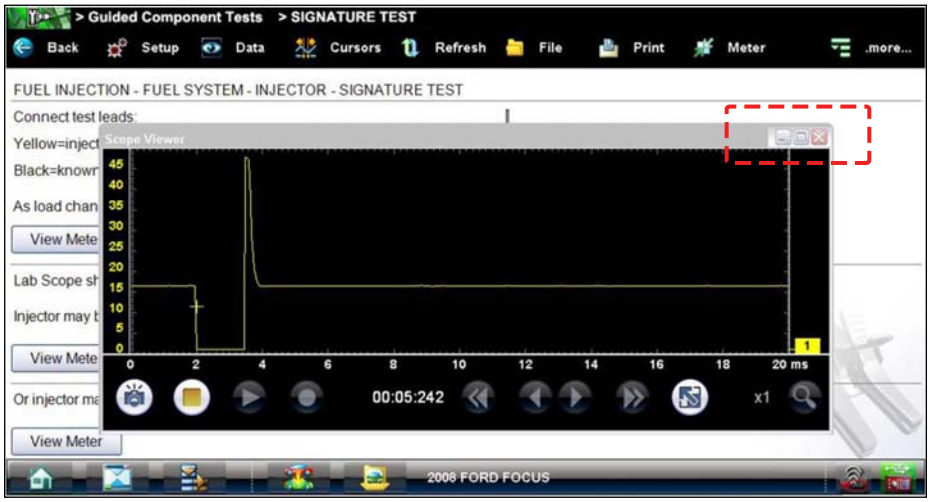


Figure 7-10 *Sample meter view in a separate window*

Selecting the **Close** icon (red box with an X) 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 7-9.

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

Connecting to a Test Vehicle

Before performing a test, you must connect the meter test leads to the vehicle. Certain Guided Component Tests require the use of specific leads. Information on specific leads and other connecting information displays on the initial test screen. Follow the on-screen connection instructions in the test procedure to connect the test leads.

Performing a Test

Once you connect the test leads to the vehicle, you can proceed with testing.

To perform Guided Component Tests:

1. Follow the instructions displayed in the test procedure section.
2. Gesture sweep to view all of the instructions and follow the on-screen procedures.
3. Select the View Meter hyperlink to display test results.
4. Refer to the on-screen information to verify test results.

IMPORTANT:
Refer to Scope and Multimeter Operations on page 84 for additional information on working with the View Meter window.

Chapter 8 Scope and Multimeter Operations

The Scope Multimeter function provides all the tools needed for performing electrical and electronic circuit tests and for monitoring signals and circuit activity. 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.

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.

⚠ 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, or circuit damage.

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

8.1 Using the Scope Module Remotely

The Scope Module (M4) module can be undocked from the Diagnostic Tool, and used remotely to increase the range of mobility while monitoring signals on a test vehicle. An A/B type USB cable (supplied) is used to connect the Scope Module to the Diagnostic Tool when used remotely.

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. Settings are not saved if Back is selected.

NOTE:
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.

NOTE:
When the Scope Module is connected to it's docking station or is connected to the Diagnostic Tool with a USB cable remotely, the Scope Module USB connection status indicator (lower right of screen) is displayed. When the Scope Module is removed from the docking station, and is not connected by a USB cable the status indicator is not 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 8-1).

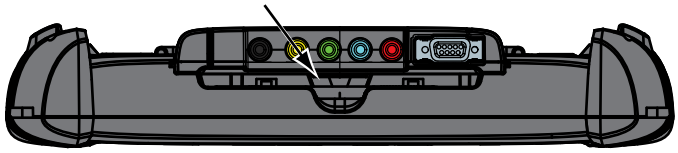


Figure 8-1 *Scope Module release tab*

2. Slide the Scope Module off of the Diagnostic Tool.
3. Locate the USB jack on the bottom of the Scope Module (Figure 8-2).

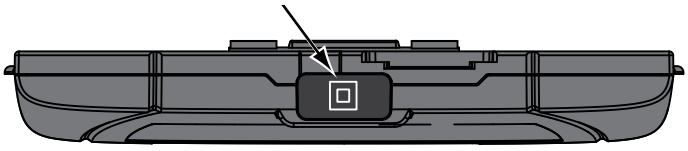


Figure 8-2 *Scope Module USB jack location*

4. Connect the square end of the USB cable to the jack on the Scope Module.
5. Connect the rectangular end of the USB cable to either of the two ports on the Diagnostic Tool.
   The Scope Module is now ready for remote use.

8.2 Getting Started

The Scope and Multimeter module enables the following functions:

- Lab Scope
- Ignition Scope
- Graphing Multimeter
- Digital Multimeter

8.2.1 Capabilities

The following tables detail the software and hardware capabilities.

Table 8-1 *Scope*

Function	Range	Accuracy/Comments
Signal Measurement	Ch. 1—yellow banana jack Ch. 2—green banana jack Ch. 3—blue banana jack Ch. 4—red banana jack	Each channel input is referenced to common ground input (GND—black banana jack)
Sample Rate	For 50uS sweep 6MSPS For 100uS sweep 3MSPS For all other sweeps 1.5 MSPS	Continuous sampling, MSPS = mega samples per second
Bandwidth	DC–3 MHz	3 db point @ 3 MHz
Input Impedance	10 MOhm @ DC 4 kOhm @ 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 banana jack) and (–) to GND input (black banana jack). See NOTE below.

Table 8-2 *Graphing Multimeter (part 1 of 2)*

Function	Range	Accuracy/Comments
Signal Measurement	Ch. 1—yellow banana jack Ch. 2—green banana jack Ch. 3—blue banana jack Ch. 4—red banana jack	Each channel input is referenced to common ground input (GND—black banana 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 MOhm @ DC 4 kOhm @ 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 banana jack Ch. 4—red banana jack	-

Table 8-2 *Graphing Multimeter (part 2 of 2)*

Function	Range	Accuracy/Comments
Ohms	40 Ohm–4 MOhm	Fixed scales
Low Amp Probe	20A scale (100mV/Amp) 40A scale (10mV/Amp) 60A scale (10mV/Amp)	Connect Low amp Probe (+) to Ch. 1 (yellow banana jack) and (–) to GND input (black banana jack). See NOTE below.

Table 8-3 *Digital Multimeter*

Function	Range	Accuracy/Comments
Signal Measurement	Ch. 1—yellow banana jack	Channel 1 input is referenced to common ground (GND—black banana 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 MOhm	-
Ohm Measurement Diode Test Continuity Test	Ch. 3—blue banana jack Ch. 4—red banana jack	-
Ohms	40 Ohm–4 MOhm	Fixed scales or Auto Ranging
Glitch capture	Approximately 50 uS	-
Diode Test	2 V Scale	-

NOTE:
200V to 400V scales are not to be used to measure signals greater than 50VAC (rms) or 75VDC.

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

8.2.2 Leads, Probes and Adapters

The Scope Module uses standard safety banana plugs that are compatible with many accessories. The various leads, probes, clips, and adapters that are supplied with, or available as optional equipment, are explained in this section.

IMPORTANT:
When removing leads from their sockets, do not pull on the wire because it can damage the leads. Pull on the plug.

Channel 1 Lead

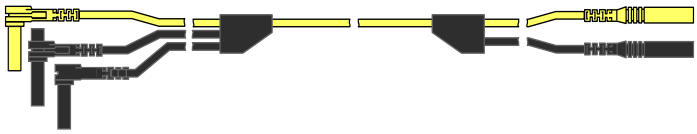


Figure 8-3 *Yellow Channel 1 Lead*

The shielded yellow lead is used for Channel 1 (Figure 8-3) and other channel connections that need additional grounding. The lead color matches the color of socket 1 on the Scope Module and the color of trace 1 on the test screens.

This yellow lead includes a black, right-angle, common ground plug and a black, stackable, common ground plug. The non-stackable ground plug always connects to the ground (GND) jack on top of the Diagnostic Tool. The stackable ground plug is used for connecting additional leads, such as the Channel 2 Lead or the Secondary Coil Adapter Lead, that require grounding. The stackable lead grounds through the non-stackable lead and does not need to be connected to the jack on the Diagnostic Tool.

Channel 2 Lead

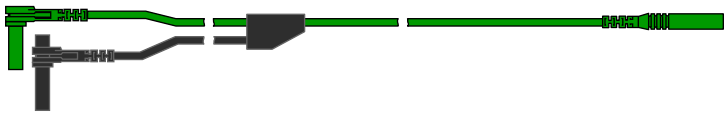


Figure 8-4 *Green Channel 2 lead*

The shielded green lead (Figure 8-4) is used for Channel 2. The lead color matches the color of socket 2 on the Scope Module and the color of trace 2 on the test screens. This green lead includes a stackable, black, right-angle ground plug.

Channel 3 Lead

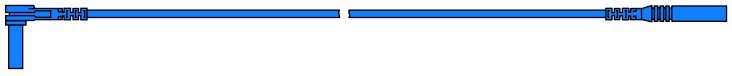


Figure 8-5 *Blue Channel 3 lead*

The non-shielded blue lead (Figure 8-5) 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.

Channel 4 Lead

Figure 8-6 *Red Channel 4 lead*

The non-shielded red lead (Figure 8-6) 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.

Alligator Clips

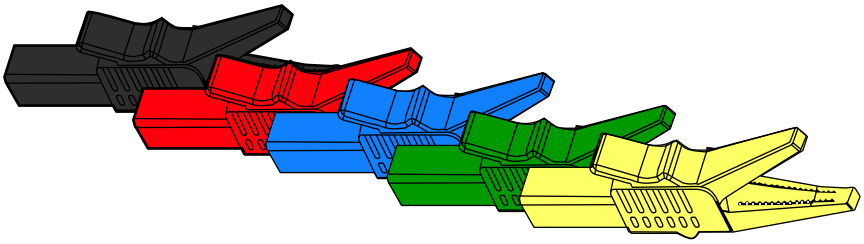


Figure 8-7 *Alligator clip*

Insulated alligator clips, colored to match each test lead, are included. A black clip for the common ground lead is also supplied (Figure 8-7). Each clip plugs into the straight end of a channel lead.

Test Probes

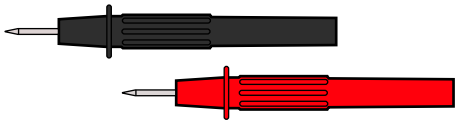


Figure 8-8 *Test probe*

Two test probes are included, one black and one red (Figure 8-8). The test probes plug into the straight end of the test leads.

Secondary Coil Adapter Lead (optional)

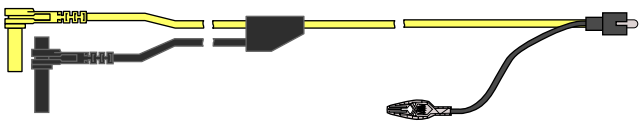


Figure 8-9 *Secondary Coil Adapter lead*

The optional Secondary Coil Adapter lead (Figure 8-9) connects to the clip-on secondary wire adapter, coil-in-cap adapter or coil-on-plug adapter to display secondary waveforms.

Secondary Ignition Clip-on Wire Adapter (optional)

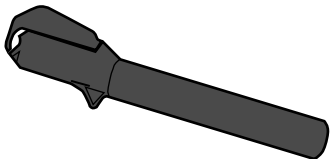


Figure 8-10 *Secondary Ignition Clip-on Wire Adapter*

The optional Secondary Ignition Clip-on Wire Adapter (Figure 8-10) connects the Secondary Coil Adapter lead to a secondary ignition lead on the vehicle to display ignition patterns.

Inductive RPM Pickup Adapter (optional)

Figure 8-11 *Inductive RPM Pickup adapter*

The optional Inductive RPM Pickup adapter (Figure 8-11) 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.

Low Amp Current Probe (optional)

The optional Low Amp Current Probe provides accurate and reliable non-intrusive testing of ignition coils, fuel injectors, fuel pumps, relays, electric motors, and parasitic draw. The optional Low Amp Current Probe measures current from 10 mA to 60 Amps.

Figure 8-12 *Low Amp Current Probe*

8.2.3 Menu Options, Scope Multimeter

The Menu icon on the Toolbar at the base of the screen opens a menu with the following options:

- Safety Information—opens the *Important Safety Instructions* document.
- File—allows you to print or save the data or meter setup being viewed.
- Setup—allows you to adjust certain tool settings once a test has been selected.
- Help—allows you to view supporting documentation.

File

Use to print or save a copy of the data currently being viewed. Selecting opens a submenu:

- **Save Multimeter**—opens an additional submenu with these options:
  - **Save Configuration**—saves the current screen setup as a preset for quick access.
  - **Save Single Frame**—saves a recording of the current screen.
  - **Save All Frames**—saves a recording of the current screen plus all the data in the buffer.
- **Print**—opens a standard Windows Print dialog box for printing the current screen.

Setup

This option allows you to adjust tool settings to your personal preferences. Selecting opens a menu of the following:

- Unit Setup—opens the Unit Setup dialog box to adjust trace and display settings
- Snapshot—opens the Snapshot dialog box for selecting how triggered data is saved.
- Ignition—opens the Ignition dialog box for setting up to display secondary ignition patterns.

Help

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

- User Manual
- Version Info
- Activation Status
- Scope About

The User Manual, Version Info, and Activation Status options are the same as explained previously, see Menu Options on page 20 for details.

Scope About

This option opens a dialog box that contains the software version and other specific details about the Scope module.

8.3 Navigation

The following section describes how to navigate the screen interface.

8.3.1 Screen Layout

The screens typically include the following sections (Figure 8-13):

- **Scope Multimeter Toolbar—**allows you to configure the tool for the type of test and to adjust the settings for each channel, or trace.
- **Main Body of the screen—**displays test results. Options on the toolbar let you select how tests display on the screen.
- **Trace Details**—displays trace settings, which can be adjusted or switched through the touch screen.
- **Record/Playback Control Toolbar**—allows you to record and navigate through paused data.

1— Scope Multimeter Toolbar
2— Main body
3— Trace Details
4— Record/Playback Control Toolbar

Figure 8-13 *Scope Multimeter screen layout*

Scope Multimeter Toolbar

The Scope Multimeter toolbar is used to set up the tool for testing and to configure the settings for each trace. Table 8-4 on page 93 gives brief descriptions of the control icons on the toolbar:

Table 8-4 *Scope Multimeter toolbar icons*

Name	Icon	Description
Back		Returns to the previously viewed screen.
Setup		Opens a dialog box that allows you to select personal preferences for viewing and saving data.
Data		Switches the trace information displayed at the base of the screen between three available states.
Cursors		Opens a dialog box that allows you to switch cursors on and off, and to reposition them on the screen.
Refresh		Clears the Min/Max and Current values on the trace details section of the screen.
File		Opens a dialog box that allows you to select options for saving data.
Print		Opens a dialog box that allows you to configure and print data.
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 switch the meter back on.

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.

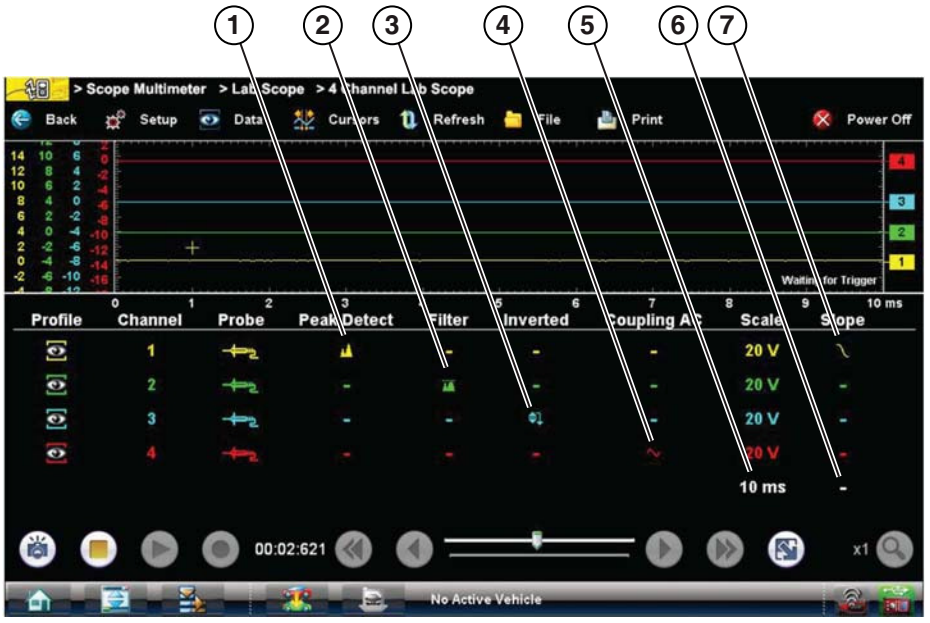
When using transducers, the pressure being sensed by the transducer is converted into a voltage signal. However, the values are shown as pressure on the display screen rather than voltage.

Trace Details

The Trace Details section displayed at the base of the screen can be used to quickly adjust settings for capturing the trace. The Trace details are accessed using either the **Data** icon on the upper toolbar or the **Touch and Grow** icon on the Playback toolbar. Both icons function the same and cycle the Trace Details selection through three states:

- **Displayed**—trace settings are displayed in this mode.
- **Expanded**—trace settings are displayed in a larger format in this mode.
- **Off**—trace settings are not displayed in this mode.

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 (Figure 8-14).



1— Peak Detect on
2— Filter on
3— Inverted trace
4— Coupling AC on
5— Sweep setting
6— Trigger setup
7— Trigger set on the rising slope

Figure 8-14 *Sample data detail display*

The following trace adjustments and settings are available:

- **Profile**—switches the trace for the selected channel on and off.
- **Channel**—opens a dialog box that allows you to configure the trace setup (see Trace Controls on page 99 for details).
- **Probe**—opens a dialog box that allows you to select the type of test probe being used.
- **Peak Detect**—maximizes the signal sampling rate in order to capture fast events, such as spikes, glitches and other anomalies, that may normally be undetected.
- **Filter**—smooths out the trace when the signal is disrupted by noise or other interference.
- **Inverted**—switches the polarity of the displayed signal.
- **Coupling AC**—subtracts the average value of the waveform by blocking the DC portion of an input signal to amplify the AC portion. This makes small variations in the trace visible.
- **Scale**—opens a dialog box that allows you to select the scale, which is the total value displayed on the vertical axis of the display.
- **Sweep**—the current sweep setting is shown in white at the end of the scale list, selecting opens a dialog box that adjusts the sweep (see Sweep Controls on page 101 for details).
- **Slope**—only active when a trigger is set, indicates whether the trigger is set to activate on the rising or falling slope of the trace. Selecting the slope icon switches the slope. The white dash at the bottom of the slope column is used to set the trigger, selecting it opens the trigger setup dialog box (see Trigger Controls on page 102 for details).

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. A position counter in the toolbar displays a numerical value of where the current screen is in relation to the entire recorded file.

Use the slider in the middle of the toolbar to quickly move through paused data.

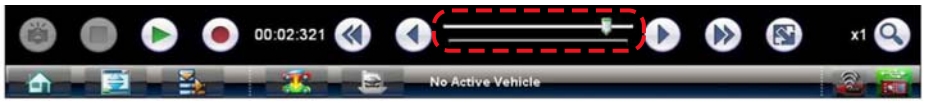


Figure 8-15 *Sample data buffer slider*

Use the toolbar icons (Table 8-5) to more precisely navigate the data.

Table 8-5 *Data buffer toolbar icons (part 1 of 2)*

Name	Icon	Description
Snapshot		Arms the software to take a snapshot of the sampled data
Step Back		Moves to the previous point in the recorded data
Back 1 Frame		Moves to the previous frame in the recorded buffer

Table 8-5 *Data buffer toolbar icons (part 2 of 2)*

Name	Icon	Description
Stop		Stops recording data
Record		Begins recording data
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
Position Indicator		In record mode, indicates how much data is collected. In playback mode; shows the position of the buffered data currently displayed as minutes:seconds:milliseconds of elapsed time
Touch and Grow		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

8.3.2 Making Selections

Most selections for setting up and operating the scope are made using the stylus and the scope toolbar. The cursor lines, the trace zero line, and the trigger point indicator (+) can be repositioned by selecting and dragging them in the main body of the screen.

There are two basic types of controls on the toolbar:

- Switches
- Dialog boxes

A Switch changes states when selected. Changes happen immediately as the selection is made.

A dialog box opens as a separate window on the screen and typically includes a number of choices. Changes happen immediately, however, the dialog box must be closed to return to the main window and continue. Make a selection to close the dialog box.