VERDICT®

User Manual

EAZ0063L34C Rev. A

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Snap-on reserves the right to make changes at any time without notice.

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

Contact Information

Visit our websites at:

(United Kingdom) http://diagnostics.snapon.co.uk

(Australia and New Zealand) snapontools.com.au

ShopStream Connect

(United Kingdom) http://www1.snapon.com/diagnostics/UK/Diagnostics/ShopStreamConnect.htm

(Australia and New Zealand) http://snapontools.com.au/diagnostics/downloads/shopstream_connect_software

For Technical Assistance

Phone / E-mail:

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

(Australia) 1-800-810-581 / sota.diagnostics@snapon.com

(New Zealand) 1-800-441-762 / sota.diagnostics@snapon.com

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

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Safety Information

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

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

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 automotive technician's responsibility 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 equipment only as described in this manual.

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

Safety Signal Words

Safety messages are provided to help prevent personal injury and equipment damage. All safety messages are introduced by a signal word indicating the hazard level.

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. All safety messages are introduced by a signal word indicating the hazard level.

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.

Example:

WARNING

Risk of unexpected vehicle movement.

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

A moving vehicle can cause injury.

Important Safety Instructions

For a complete list of safety messages, refer to the accompanying safety information.

SAVE THESE INSTRUCTIONS

Contents

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 manual is intended for multiple international markets and may include information and procedures that are not applicable to your Diagnostic Tool.

The VERDICT® 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 VERDICT system:

- D7 Diagnostic Tool—the central processor and monitor for the system
- Scan Module—the device for accessing vehicle data
- M2 Data Acquisition Device—the device for performing meter and lab scope tests

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

2.1 D7 Diagnostic Tool

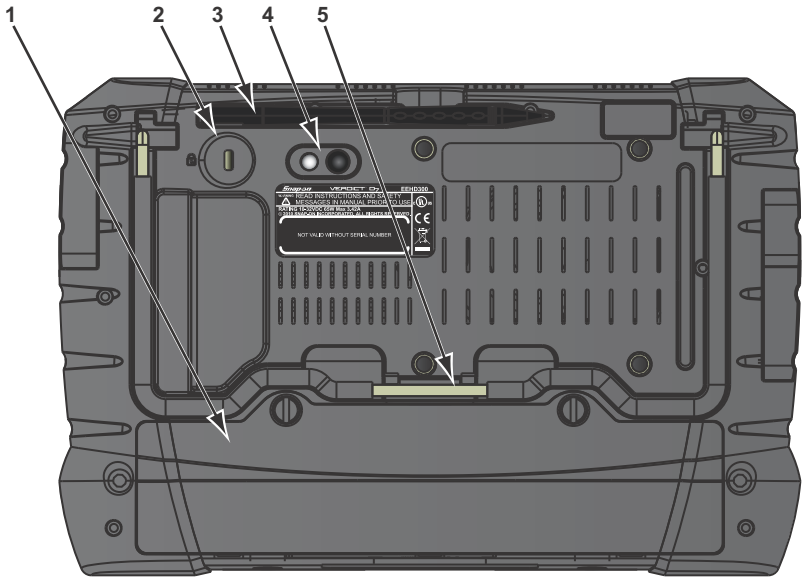
2.1.1 Features

1— Audio Speaker
2— Battery Status Indicator LED (light emitting diode)
3— Microphone
4— Hard Drive Activity LED
5— Directional Buttons; left (◀), right (▶), up (▲), down (▼)
6— Stylus lanyard anchor post
7— S (Shortcut) Button (special functions)
8— Enter Button
9— Camera (shutter) Button
10—Virtual Keyboard Button
11—Brightness Button
12—Power Button

Figure 2-1 *Model D7 front view*

1— USB (universal serial bus) Ports (2)
2— Head Phone Jack
3— Microphone Jack
4— DC Power Supply Input Port
5— SD (secure digital) Card Port
6— Mini USB Client Port

Figure 2-2 *Model D7 side views*



1— Battery Compartment Cover
2— Kensington Lock (standard security device connection, device not included)
3— Stylus
4— Camera Lens
5— Collapsible Stand (closed)

Figure 2-3 *Model D7 back view*

2.1.2 Technical Specifications

Processor:
Intel Atom

Operating System
Microsoft Windows Embedded Standard SP3

Touch Screen
Resistive Touch Panel

Display:
7 inch diagonal, LCD TFT
1024 x 600 resolution SWVGA
16 bit color

Battery:
Lithium Ion Smart Battery Pack
Approximately 3.5 hour run time
Approximately 3 hour charge time, unit not operating
Approximately 4 hour charge time, unit operating

DC Jack Operating Voltage
10V to 32V DC

Communications:
802.11 b/g/n Wireless
Bluetooth 2.0 Class 1

Dimensions:
Width:
9.9 inches
252 mm
Height:
6.8 inches
173 mm
Depth:
1.8 inches
46 mm

Weight (including battery):
2.9 lbs.
1.32 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 Supply:

Supply Rating; 19 VDC. 3.42A

2.1.3 Power Sources

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

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

Internal Battery Pack

The display unit can be powered from the internal rechargeable battery. A fully charged standard battery provides sufficient power for about 3.5 hours of continuous operation. An optional high-capacity battery that provides 6 hours of operation is available. A LED on the front of the unit indicates the battery state of charge.

AC/DC Power Supply

The display unit can be powered from a wall socket using the AC/DC power supply and power cord. The AC/DC power supply also powers the internal battery pack charging process.

Vehicle Power

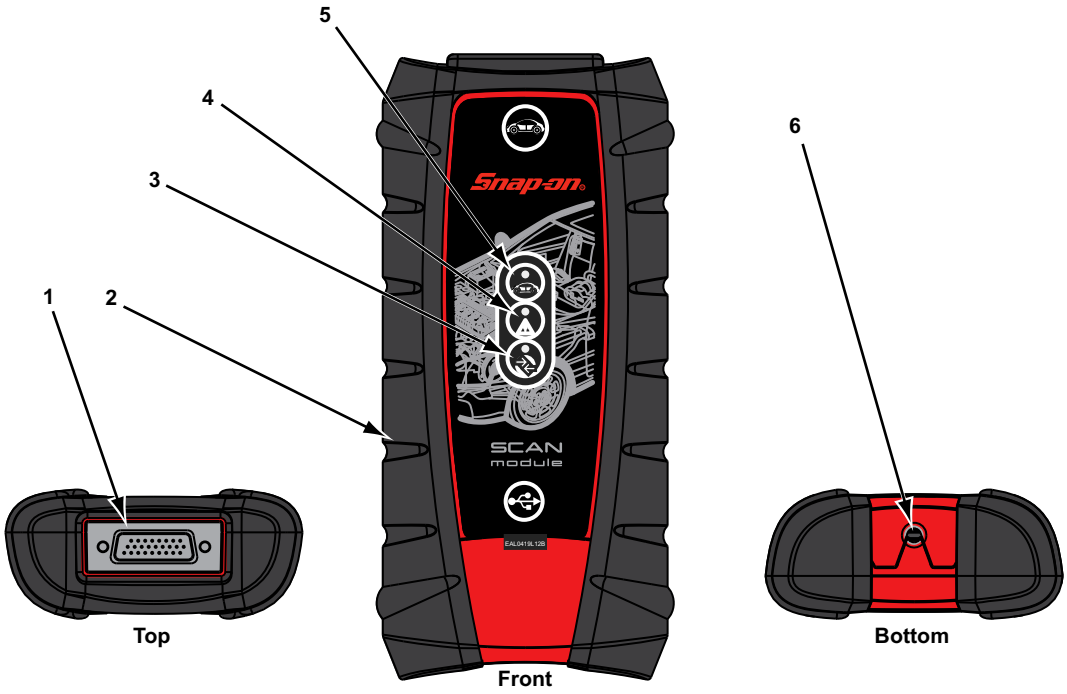
The display unit can be powered from a cigarette lighter or other suitable power port on the test vehicle through a direct cable connection. The vehicle power cable connects to the DC power supply port on the left side of the display unit.

Docking Cradle (Optional)

The display unit can be powered and operated when installed on the optional docking cradle. The docking cradle also powers the internal battery pack charging process and allows USB connectivity for attaching peripherals. Contact your sale representative for additional details.

2.2 Scan Module

2.2.1 Features



1— Data cable connector
2— Memory card port (remove protective hand grip for access)
3— Bluetooth LED (green)
4— Communication issue LED (red)
5— Vehicle power LED (green)
6— Universal serial bus (USB) port (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 VERDICT Diagnostic Tool without a physical connection. The working range of the transmitter is about 30 feet (9.14 m). A signal lost due to moving out of range automatically restores itself when the display unit is brought closer to the Scan Module. The Scanner sounds a tone and the Diagnostic Tool shows a warning message when the signal is lost.

2.2.2 Technical Specifications

Dimensions:

Length:

8.04 inches

204.3 mm

Height:

3.82 inches

97 mm

Depth:

1.66 inches

42.1 mm

Weight (including protective hand grip):

0.9 lbs.

0.408 kg

Communications:

Bluetooth 2.0 Class 1

USB Power:

5V @ 500mA

Data Cable Connector Power:

8V to 32V, Maximum 12 Watts

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).

2.2.3 Power Sources

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

2.3 M2 Data Acquisition Device

2.3.1 Features

1— DC Power Supply Input Port
2— Color Graphic Display Screen
3— Soft Keys for Selecting Additional Functions
4— Rotary Switch for Selecting Primary Functions
5— Common (Ground) Lead Input Port
6— Channel 1 (Red) Lead Input Port
7— Channel 2 (Green) Lead Input Port

Figure 2-5 *Model M2 Data Acquisition Module*

Wireless Communication

The VERDICT M2 is a digital graphing multimeter and wireless communications device. The unit can be used as a stand-alone meter, or configured to transmit vehicle data to the D7 Diagnostic Tool without a physical connection. The working range of the transmitter is about 30 feet (9.14 m). A signal lost due to moving out of range automatically restores itself when the display unit is brought closer to the M2 meter. The VERDICT M2 sounds a tone and the Diagnostic Tool shows a warning message when the signal is lost.

2.3.2 Technical Specifications

Display:

Color graphical display

Battery Pack:

4 1.2V Ni-Mh (nickel-metal hydride)

Dimensions:

Height:

9.125 inches

231.8 mm

Width:

4.25 inches

107.9 mm

Depth:

2.00 inches

50.8 mm

Weight (including battery):

1.9 lbs.

0.86 kg

Agency Approvals:

IEC 61010-1 Over Voltage

CAT III—1000 VAC/DC

CAT IV—600 VAC/DC

Pollution Degree 2

UL Listed 61010-1:

CAT II 750 VAC, 1000 VDC

CAT III 600 VAC/DC

2.3.3 Power Sources

The Data Acquisition Device comes with a rechargeable battery pack, which is already installed in the unit. Simply turn on the unit and observe the battery icon on the display to determine the battery pack state of charge. The AC/DC Power Supply (included) provides power from a wall socket to recharge the battery pack, or to power the unit if the battery pack charge is low.

Internal Battery Pack

The data acquisition unit is powered from the internal rechargeable battery. An icon in the upper right-hand corner of the display screen indicates the battery state of charge.

AC/DC Power Supply

An AC/DC Wall Adapter for charging the internal battery of the M2 Data Acquisition Device is also provided. The jack that connects the adapter to the M2 unit is longer than the jack that is used for the Diagnostic Tool.

Chapter 3 Getting Started

Make sure the VERDICT® Diagnostic Tool has a charged battery or is connected to an AC power supply (see Power Sources on page 8). 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.

3.1 Turning On

Press the **Power** button to turn the Diagnostic Tool on. The system boots up, then opens the VERDICT Home screen (Figure 3-1).

1. **Function Icons**
2. **VERDICT Toolbar**
3. **Windows Toolbar**

Figure 3-1 *Sample VERDICT Home screen*

3.1.1 Function Icons

The Function icons configure the VERDICT for the type of test to be performed. Table 3-1 on page 12 gives brief descriptions of the available Function icons, which operations are available depends upon the individual configuration of your VERDICT system.

Use the stylus or your finger tip to select from the Function icons.

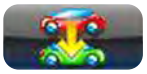
Table 3-1

Name	Icon	Description
Scanner		Configures the Diagnostic Tool to operate as a scan tool. See Scanner Operations on page 20.
OBD Direct		Allows you to perform generic OBD-II or EOBD system tests without identifying the specific vehicle. See OBD Direct Operations on page 55.
Guided Component Test		Opens a diagnostic database of specific tests for the identified vehicle. See Guided Component Test Operations on page 63.
Scope Multimeter		Configures the Diagnostic Tool to operate as a lab scope, graphing multimeter, or digital multimeter. See Scope Multimeter Operations on page 94.
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.
Help		Opens the on-line help for the system. See Help Operations on page 129.
System Settings		Establishes and manages wireless connections to peripheral devices, such as the Scan Module and the Data Acquisition Device. See System Settings Operations on page 131.
Exit		Closes the VERDICT Diagnostic Tool software and returns the display to the Windows desktop.

3.1.2 VERDICT Toolbar

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

Table 3-2

Name	Icon	Description
Home		Touching this icon returns you to the VERDICT Home screen from any test.
Windows Toolbar		Touching this icon opens and closes the standard Windows toolbars at the top and bottom of the screen.
Menu		Touching this icon opens a menu that provides information on the screen being viewed.
Change Vehicle		The currently identified vehicle is shown to the right of the icons, touching allows you to change the identified test vehicle.
View Record		Touching the icon opens an editable worksheet of vehicle records.
Hardware Status		Indicates the connectivity status of the Scan Module.
		Indicates the connectivity status of the Scope/Multimeter.

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 Operations—allows you to view supporting documentation, selecting opens a submenu.

Safety Information is available for all of the modules, and Help, as explained below, displays in the SureTrack, Vehicle History, Data Manager, Help, and System Settings modules. Additional menu options are available for the Scanner, OBD Direct, Guided Component Test, and Scope Multimeter modules. These additional menu options are detailed in their respective module chapters.

Safety Information

Selecting Safety Information opens an electronic version of the printed *Important Safety Instructions* that were included with 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. Tap **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.

3.1.3 Windows Toolbar

This is the standard Windows toolbar. Your VERDICT Diagnostic Tool is a fully functional personal computer based on the Windows Embedded Standard operating system. Refer to Microsoft documentation for additional information.

3.2 Turning Off

All vehicle communication must be terminated before shutting down the VERDICT Diagnostic Tool. A warning message displays if you attempt to shut down while the Scanner is communicating with the vehicle. Forcing a shut down while communicating may lead to ECM problems on some vehicles. Exit the Scan Module before turning off.

To turn off the VERDICT Diagnostic Tool:

1. Navigate to the VERDICT 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 switches off.

3.2.1 Emergency Shutdown

In case of emergency, press and hold the **Power** button for five seconds to force a shutdown.

Chapter 4 Navigation

This chapter discusses how to use the hardware controls and features for the VERDICT® Diagnostic Tool and Data Acquisition Module. There are no external controls on the Scan Module, it can only be operated by a separate device.

4.1 Diagnostic Tool Controls, and Features

The external controls on the Diagnostic Tool are simple because most operations are controlled through the touch screen. Touch screen navigation is 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 modules.

The following sections describe the external controls and features of the Diagnostic Tool.

4.1.1 Control Buttons

Name and location of control buttons:

Table 4-1 *Diagnostic Tool control buttons*

Name	Button	Description
S (Shortcut) Button		A function button that provides a shortcut for capturing a screen image.
Directional Buttons		Moves the cursor or highlight on the display screen up, down, right, or left.
Enter Button		Selects a highlighted item or returns the display to the previous screen.
Camera Button		Operates the built-in camera. Press once to open the application, The button then acts as the shutter to take a photograph of what is visible on the screen.
Keyboard Button		Opens or closes the virtual keyboard.
Brightness Button		Increases the screen backlighting in seven incremental steps.
Power Button		Turns the Diagnostic Tool on and off.

All other tool operations are controlled through the touch screen.

To use the camera:

1. Press the **Camera** button.

   The camera screen opens and the button now becomes the shutter.
2. Focus the image to be captured in the view finder.
3. Press the **Camera** button.

   The view finder now shows the captured picture.
4. Select **OK** to save the image, or **Delete** to delete it.

   The view finder is live and the Camera button is the shutter, repeat steps 2, 3, and 4 to take additional pictures.
5. Select **Exit** from the live view to close the camera application.

4.1.2 LEDs

There are two light-emitting diodes (LEDs) on the front face of the Diagnostic Tool:

- Battery Status Indicator LED—this device uses three colors 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. An orange LED that fades on and off at three second intervals indicates the Diagnostic Tool is in Standby mode.
  - Red indicates a low battery (15% of capacity or less).
- Hard Drive Activity LED—illuminates when the central processing unit (CPU) is reading or writing to the hard disk drive (HDD).

4.1.3 The 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 35 degree angle when in use.

4.2 M2 Data Acquisition Device Controls and Features

There are two sets of controls for the M2 Data Acquisition Device:

- Rotary Selector Switch—establishes the primary operation of the unit
- Soft Keys—select additional functions, which vary depending upon the position of the Rotary Selector Switch

The following sections describe the external controls and features of the M2 unit.

4.2.1 Rotary Selector Switch

Turning the Rotary Selector Switch determines the primary function of the M2 unit.

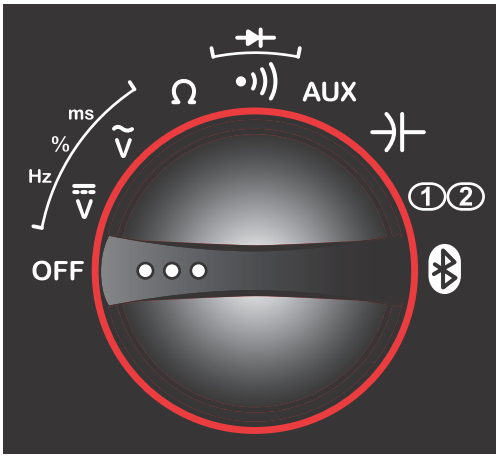


Figure 4-1 *Sample Rotary Selector Switch*

The available functions are represented by graphic icons on the face of the tool. Descriptions of the functions are given in the following table:

Table 4-2 *Data Acquisition Device rotary switch settings (part 1 of 2)*

Function	Icon	Description
Off	OFF	Switches power to the M2 unit off. The switch should be in this position whenever the tool is not being used to prevent battery drain.
Volts DC	V	Measures direct current (DC) voltages within a range of zero to 600 volts. This setting is also used to measure frequency (hertz), duty cycle (%), and time period (cycle, ms).
Volts AC	V	Measures alternating current (AC) voltages within a range of zero to 1000 volts. This setting is also used to measure frequency (hertz), duty cycle (%), and time period (cycle, ms).
Resistance	Ω	Measures the DC resistance to current in Ohms in a range of zero to open circuit (infinite).
Continuity/ Diode Check		Performs dual tests; circuit continuity and diode test (forward drop). The “S” (special function) soft key switches between the two tests.
Auxiliary	AUX	Performs three auxiliary tests; current (amperes), pressure, and temperature. The “S” (special functions) soft key switches between the three tests. Pre-approved sensors must be used in order to take valid measurements.

Table 4-2 *Data Acquisition Device rotary switch settings (part 2 of 2)*

Function	Icon	Description
Capacitance		Measures capacitance in nanofarad (nF), millifarad (mF), and microfarad (µF).
Oscilloscope (Waveform Viewer)		Configures the M2 unit to perform as one or two channel oscilloscope, or waveform viewer.
Remote Functions		Configures the M2 unit to be operated through the Diagnostic Tool. Readings are also shown on the Diagnostic Tool screen. All of the controls on the from panel of the M2 unit become inoperative when the rotary switch is in this position.

4.2.2 Soft Keys

The eight soft keys located above the rotary dial on the M2 unit are used to initiate a variety of additional functions while performing meter tests. The functionality of the soft keys varies according to what type of tests are being performed, as determined by the position of the rotary switch. Some of the soft keys do not function for certain test modes. Refer to M2 Data Acquisition Device, on page 72 for additional information.

In general, a short or momentary push of a soft key activates the assigned function, a long push returns to the normal display.

4.3 Camera Operation

A single press of the Camera button on the front of the Diagnostic Tool activates the camera. With the camera active, 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 what camera function is active:

Table 4-3 *Camera icons (part 1 of 2)*

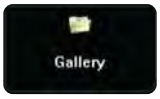
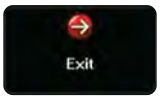
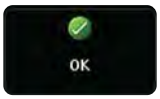
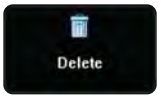
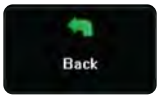
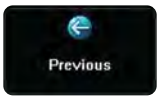
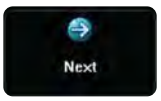
Name	Icon	Description
Photo		Acts as a shutter to take a photograph of what is visible in the view finder, which is the left-hand portion of the screen.
Gallery		Opens a thumbnail gallery of recently taken pictures.
Exit		Closes the camera application and returns to the previous screen.
OK		Displays after a picture is taken. Selecting saves the photograph and returns to the view finder.

Table 4-3 *Camera icons (part 2 of 2)*

Name	Icon	Description
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.

To use the camera:

1. Press the **Camera** button.

   The camera screen opens and the **Camera** button now controls the shutter.
2. Focus the image to be captured in the view finder.
3. Press the **Camera** button, or tap the **Photo** icon.

   The view finder now shows the captured picture.
4. Select **OK** to save the image, or **Delete** to delete it.

   The view finder is live and the Camera button is the shutter, repeat steps 2, 3, and 4 to take additional pictures.
5. Select **Exit** from the live view to close the camera application.

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

1. From the Diagnostic Suite; select **Data Manager** from the Home screen, then open the **Camera Folder**.
2. From the desktop; select **My Documents** > **ShopStream** > **Camera Folder**.

Chapter 5 Scanner Operations

The Scanner allows you to establish a data link to the electronic control systems of the vehicle being serviced to retrieve diagnostic trouble codes (DTCs), view live data parameters, and perform tests. The Scanner can access the electronic control module (ECM) for various vehicle control systems such as engine, transmission, antilock brake system (ABS) and more.

Scanner testing requires connecting the VERDICT® Diagnostic Tool to the test vehicle using the data cable and test adapters. On screen instructions tell you how to connect the Scanner, additional connection information can be found in the appropriate vehicle communication software manual for the test vehicle, which is available through the Help menu.

5.1 Getting Started

Before initial use the Scan Module must be paired with the Diagnostic Tool to establish a wireless communication link. Refer to Pairing the Scan Module on page 132 for details.

A demonstration program allows you to become familiar with Scanner operations and testing without being connected to an actual vehicle.

5.1.1 The Demonstration Program

The Scan Module demonstration program allows you to become familiar with many of the test capabilities without connecting to a vehicle. Sample data and mock test results help you learn the menus and basic operations.

To start the demonstration program:

1. From the VERDICT Home screen, tap the **Scanner** icon.

   The manufacturer menu displays. This menu lists includes all makes for which Scanner information is available. There is a Demonstration icon that starts the program is also included in the list.

2. Tap the **Demonstration** icon.

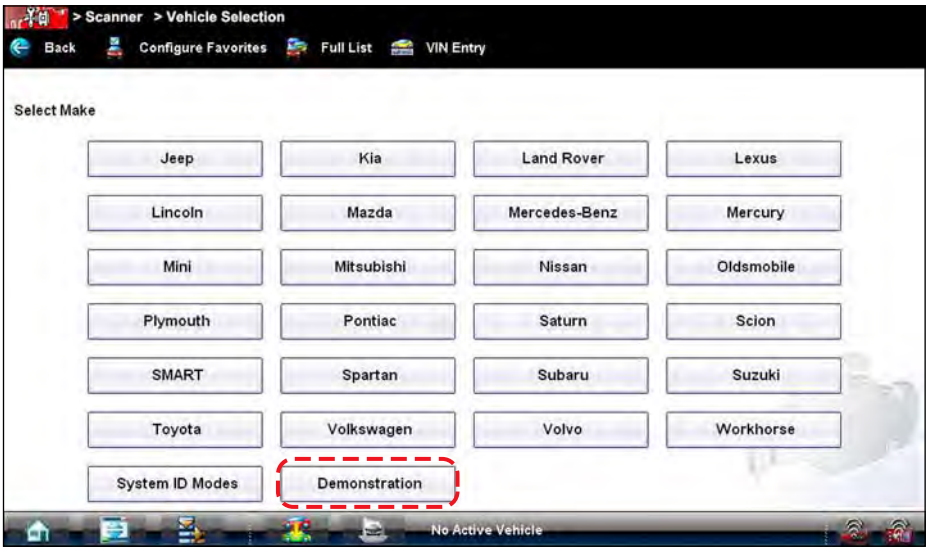


Figure 5-1 *Sample demonstration selection*

A screen with multiple choices now displays:

- - 2010 Commodore VE Demo (Australia Markets)
- - 2001 Commodore VX Demo (Australia Markets)
- - 2009 Peugeot 407 Demo (Australia and United Kingdom Markets)
- 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.

IMPORTANT:
Do not connect a vehicle to the VERDICT Diagnostic Tool while in the Demonstration mode.

5.1.2 Disconnecting the VERDICT Diagnostic Tool From a Vehicle

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

To exit Scanner and disconnect the VERDICT Diagnostic Tool from a vehicle:

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

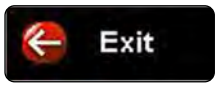


Figure 5-2 *Sample upper toolbar Exit icon*

2. Tap the **Back** icon on the upper toolbar from the codes or data menu.

Figure 5-3 *Sample upper toolbar Back icon*

The screen goes to the system menu.

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

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

4. Tap the **Change Vehicle** icon on the VERDICT toolbar.

Figure 5-4 *Sample VERDICT toolbar Change Vehicle icon*

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

5. Tap the **Home** icon on the VERDICT toolbar.

Figure 5-5 *Sample VERDICT toolbar Home icon*

The Home screen displays.

6. Disconnect the test adapter from the vehicle connector.

NOTE:
Damage to the electronic control module (ECM) of the vehicle can occur if communication is disrupted. Ensure that the vehicle communication cable is properly connected at all times during testing. Exit testing before removing the test cable or turning off.

5.1.3 Menu Options, Scanner

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

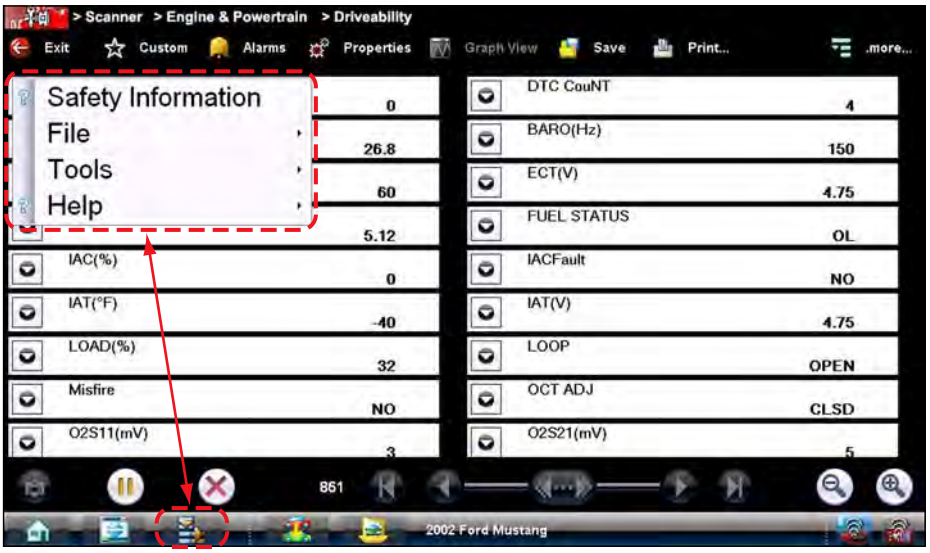


Figure 5-6 *Sample Scanner Menu icon options*

The following Menu icon options are available:

- Safety Information—opens the *Important Safety Instructions* explained previously.
- 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 47).
- **Print**—opens a submenu with these options:
  - **Screenshots**—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.

NOTE:
All measurement units return to their default values when different software is selected.

To change the units setup:

1. Select **Tools** > **Units Setup**.
   The Measurement Units Setup dialog box opens.

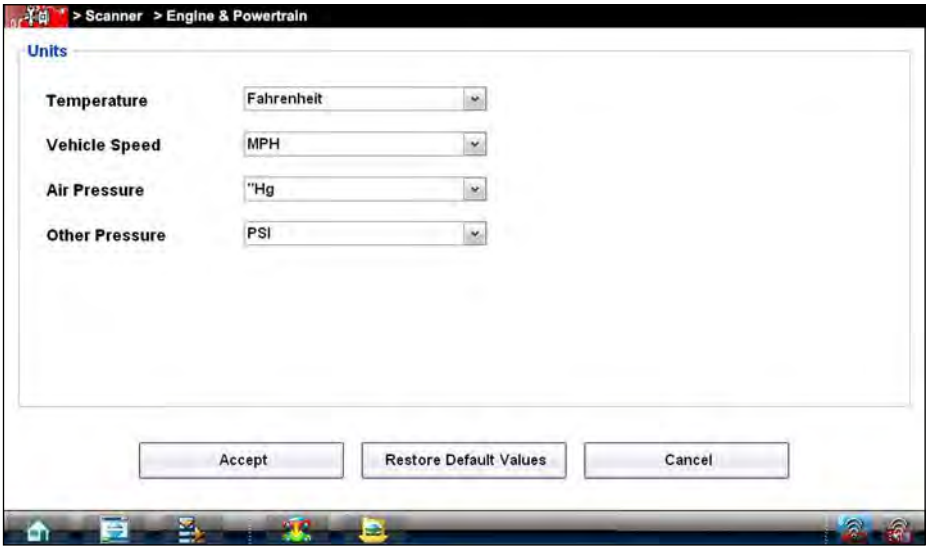


Figure 5-7 *Sample Units Setup screen*

2. Use the dropdown menus to select the desired value for each item.
3. Tap **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 this number to a Customer Care representative for troubleshooting communication problems.

Help

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

- User Manual
- Version Info
- Activation Status
- 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 13 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.

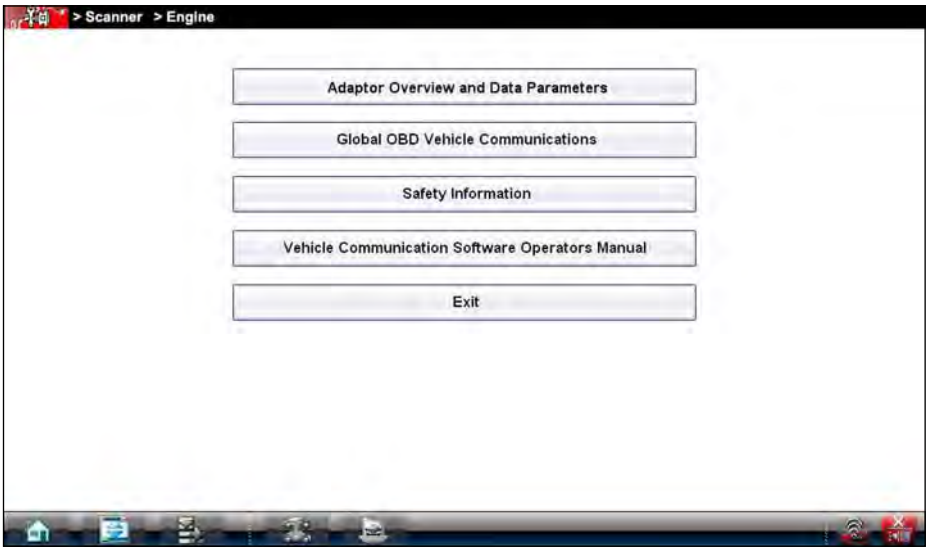


Figure 5-8 *Sample User's Manuals menu*

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 details about the Scanner module. A **Copy to Clipboard** icon allows you to paste the Scanner information to a document or e-mail.

5.2 Vehicle Identification

The Scanner information presented is provided by a direct link to the ECM of the vehicle being tested. Therefore, certain attributes of the test vehicle must be entered into the VERDICT Diagnostic Tool so that the data displays correctly. Vehicle identification information is carried over if you enter the Scan Module either from the Guided Component Test module 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. A Back icon in the upper left corner of the screen returns you to the previous screen. Exact procedures may vary somewhat by vehicle.

To identify a vehicle for Scanner testing:

1. Tap the **Scanner** Function Icon from the Home screen.
   A list of manufacturers displays (Figure 5-9).

Figure 5-9 *Sample manufacturer list*

2. Select the manufacturer of the test vehicle from the list.
   A model year menu displays.
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 dialog box displays once all the required data has been entered (Figure 5-10).

Figure 5-10 *Sample confirmation dialog box*

4. From the Confirm vehicle details dialog box, select:
   a. **OK** to continue.
   b. **Cancel** to return to the engine list.
5. Select **OK** and a list of systems available for testing on the vehicle displays (Figure 5-11).

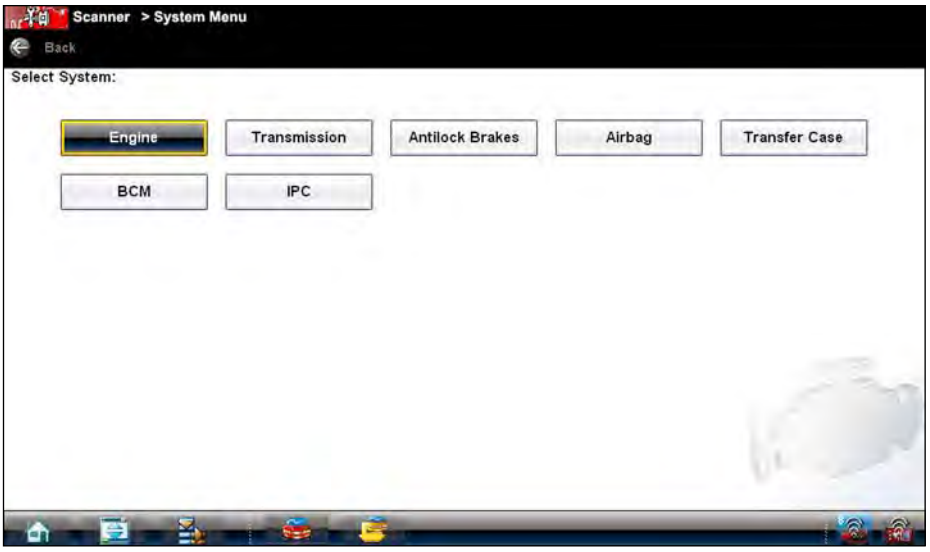


Figure 5-11 *Sample available tests list*

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

NOTE:
If you return to the Home screen and select **Guided Component Test, Information**, or another module the vehicle identification entered here is carried over. However, additional information may be needed in some instances.

5.2.1 Alternative Vehicle Identification

Occasionally, you may identify a test vehicle that the Scanner does not recognize, the database does not support, or has some unique characteristics that prevent it from communicating with the Scanner through the normal channels. In these instances, there is an alternative selection available that will work on any 1996 or newer vehicle.

- OBDII/EOBD—allows you to perform generic OBD-II or EOBD tests, see OBD Direct Operations on page 55 for additional information.

5.3 Connecting to a Vehicle

5.3.1 Data Cable Connection

Connection of the data cable to the Diagnostic Tool and vehicle DLC is required for Scanner and OBD-II/EOBD testing.

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 top of the Diagnostic Tool. 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 top of the Diagnostic Tool. 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.

On-screen cable and adapter connection instructions are provided while using the Scanner and OBD-II/EOBD functions. The instructions may also include the location of the vehicle DLC (Figure 5-12). 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

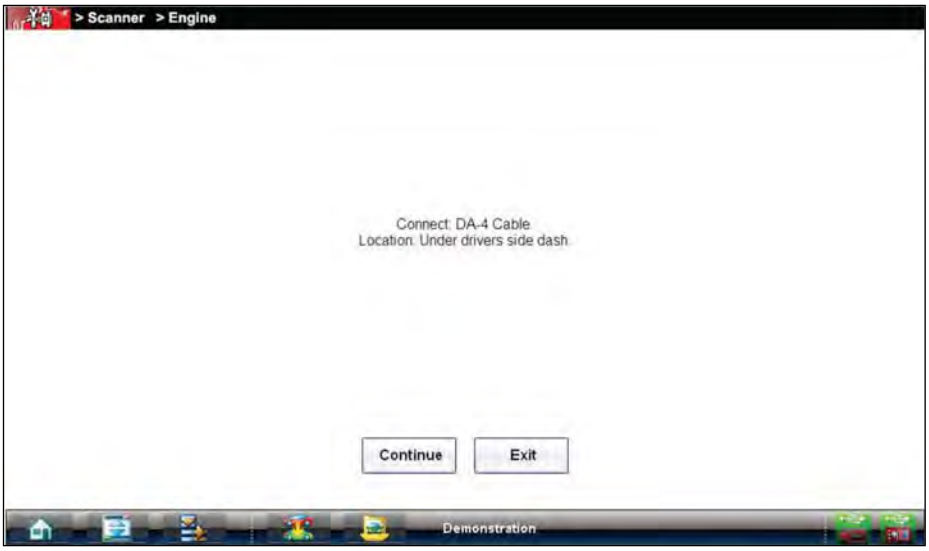


Figure 5-12 *Vehicle connection data cable message*

For data cable vehicle power connection information, see Vehicle Power on page 6.

To connect the data cable to the vehicle:

1. Follow the on-screen instructions for connecting to the vehicle (Figure 5-12).
2. Select **Continue** once the data cable is connected.

   The Diagnostic Tool establishes communication then displays a list of available tests. If the Diagnostic Tool is unable to establish a communications link, a “no communications” message displays.
3. Select from the available tests to open a submenu of test options.

Make a selection from the systems available for testing list and instructions for connecting the Scanner to the vehicle with the data cable display on the screen (Figure 5-12).

5.3.2 No Communication Message

If the Scanner is unable to establish a communication link, a “no communication” message displays. A “no communication” message means the VERDICT Diagnostic Tool and the vehicle electronic control module cannot communicate with each other for some reason.

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.

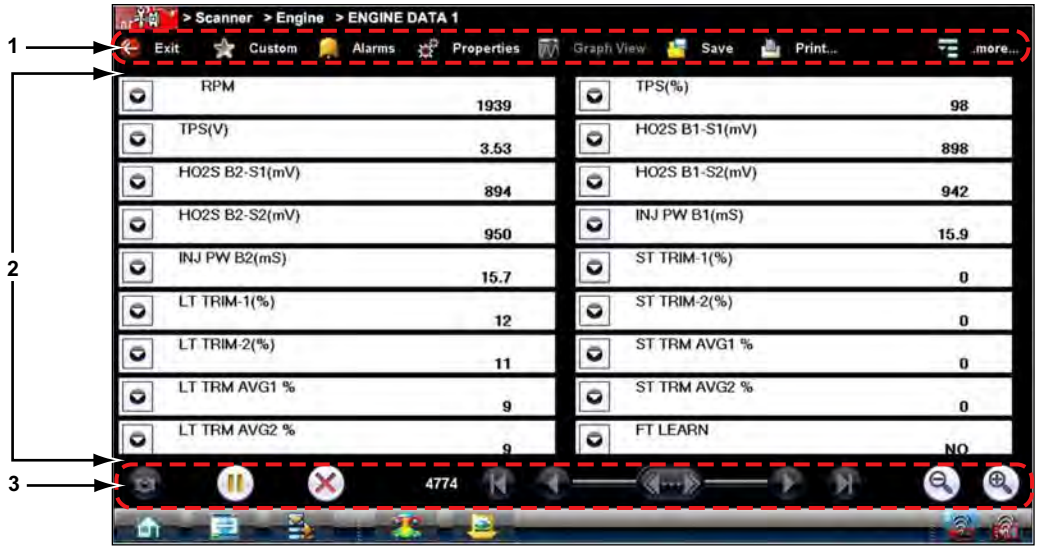
Refer to the Vehicle Communication Software manuals for manufacturer-specific problems.

5.4 Navigation

This section describes how to navigate the Scanner interface and select scanner tests.

5.4.1 Scanner Screen Layout

The Scanner screens typically include three sections (Figure 5-13):



1— Scanner Toolbar

2— Main Body

3— Data Buffer Toolbar

Figure 5-13 *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 5-1 *Scanner toolbar icons (sheet 1 of 2)*

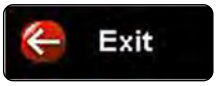
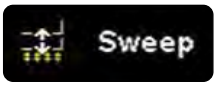
Name	Icon	Description
Exit		Closes the current test and returns you to the menu.
Back		Returns to the previously viewed screen.
Custom		Allows you to select which parameters are displayed on the screen.

Table 5-1 *Scanner toolbar icons (sheet 2 of 2)*

Name	Icon	Description
Alarms		Allows you to set an alarm on certain data parameters when the signal goes above or below the alarm setting.
Properties		Allows you to adjust the display characteristics for all of the data screens.
Graph View		Allows you to simultaneously view up to 16 data graphs at a time.
Save		Saves a copy of the current frame of data that can be viewed on the tool or in ShopStream Connect.
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.

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.

Data Buffer 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 this buffered data (Table 5-2).

Table 5-2 *Data buffer toolbar icons*

Name	Icon	Description
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
Snapshot		Arms the VERDICT software to take a snapshot of vehicle data
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 5-14 *Sample data buffer slider*

5.4.2 Screen Messages

Screen messages appear when additional input is needed before proceeding. There are three types of on-screen messages; confirmation, warning, and error.

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.

5.4.3 Making Selections

The Scanner software 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.

5.5 Operations

The Scanner allows you to establish a data link to the electronic control systems of the vehicle being serviced in order to view live data parameters and perform tests. You can use selected functional tests, get troubleshooting tips, and get vehicle-specific trouble codes for various vehicle control systems such as engine, transmission, antilock brake system (ABS) and more.

The Scanner has two main functions:

1. Scanner—provides access to Vehicle Communication Software functions such as reading codes, viewing data, and performing functional tests.
2. Fast-Track Troubleshooter—provides the diagnostic power of Fast-Track Troubleshooter, a database of experience based information developed by master technicians.

After a system is selected and the Scanner establishes communication with the vehicle, a Scanner Main menu, which lists available tests, displays.

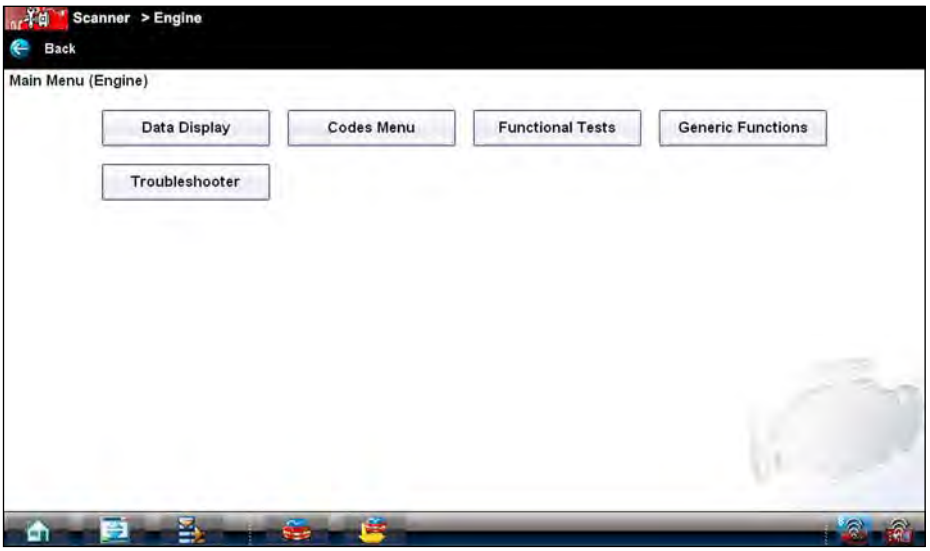


Figure 5-15 *Sample Scanner Main menu*

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. 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. These are 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.

To perform a Scanner test

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

5.5.1 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 the same, selecting displays vehicle data.

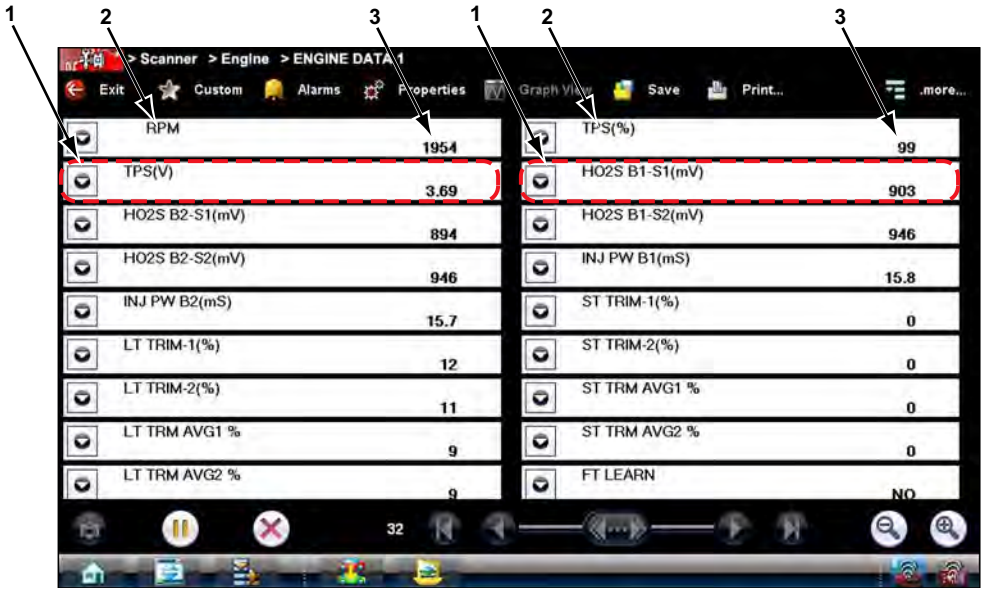
A submenu displays when more than one data viewing mode is available on the identified vehicle. On some models, the engine must be started or cranked before data can be displayed. For these models, a “Waiting to Communicate” message displays if the engine was not cranked or started.

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 that momentarily appear to the right of each column indicate the position of the current screen in relation to the entire list. Each column of parameters scrolls independently of the other column. Figure 5-16 shows a typical data screen.



1— Graph icon

2— Parameter name

3— Parameter value

Figure 5-16 *Sample data screen*

Data Graphs

Tap the **Graph** icon to open a data graph for that parameter (Figure 5-17). Selecting a parameter for graph view moves it to the top of the list. Tap the **Graph** icon again to close the graph.

Figure 5-17 *Sample graph view*

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

Table 5-3 *Data graph icon operations*

Name	Icon	Description
Expand/Collapse		Tap to expand the graph to fill the entire screen, tap again to collapse the graph to the standard view.
Graph Properties		Tap 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. Tap the **Properties** icon on the Scanner toolbar to open the dialog box.
2. Highlight one of the **Samples After Trigger** options:
3. Tap 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 47 for additional information.

To set triggers and record a snapshot:

1. Tap 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, tap **Triggers On**.
   A check mark appears in the box and the minimum and maximum fields activate (Figure 5-18).

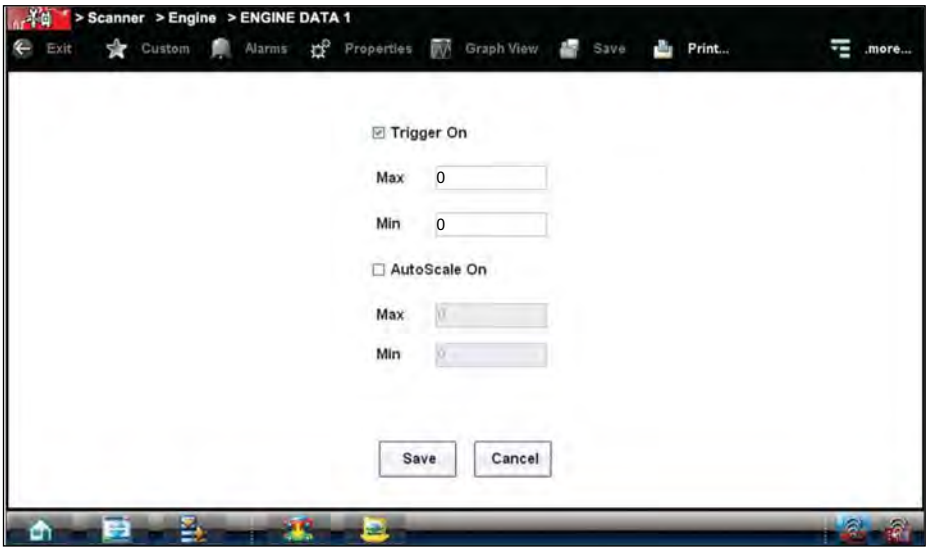


Figure 5-18 *Sample Graph Properties dialog box*

3. Tap either **Max:** (maximum) or **Min:** (minimum) to activate that field and open the keyboard.
4. Type the desired trigger value into the field.
5. Tap the other field and enter a trigger value, then close the virtual keyboard.
6. Tap **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. Once the snapshot is armed, any data points that register outside of the set trigger conditions initiates a snapshot. The Scanner continues to record the preset amount of data after the trigger and includes it in the snapshot.

7. Tap **Snapshot** on the Data Buffer Toolbar to arm the snapshot.
   The Snapshot icon changes color to indicate it has been armed (Figure 5-19).

Figure 5-19 *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.

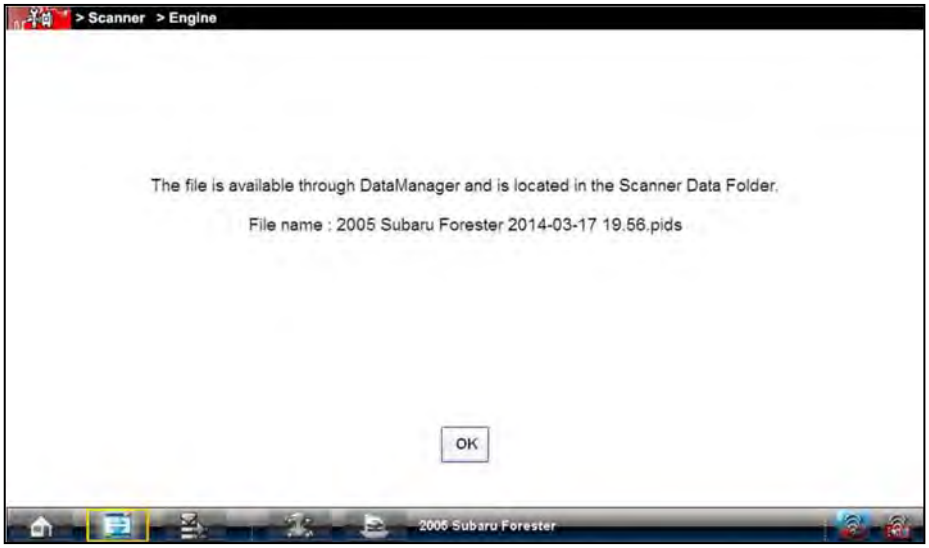


Figure 5-20 *Sample saved movie confirmation screen*

8. Select **OK** to close the confirmation screen.
9. Tap 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. Tap the Graph Properties icon on the graph you wish to scale to open the dialog box (Figure 5-21).
2. From the Graph Properties dialog box, tap **Auto Scale On**.
   The check mark is cleared from the box and the minimum and maximum fields activate
3. Tap either **Max:** (maximum) or **Min:** (minimum) to activate that field and open the keyboard.
4. Type the desired trigger value into the field.
5. Tap the other field and enter a trigger value, then close the virtual keyboard.
6. Tap **Save** to close the dialog box.
   The dialog box closes and the parameter scale is now at the set values.

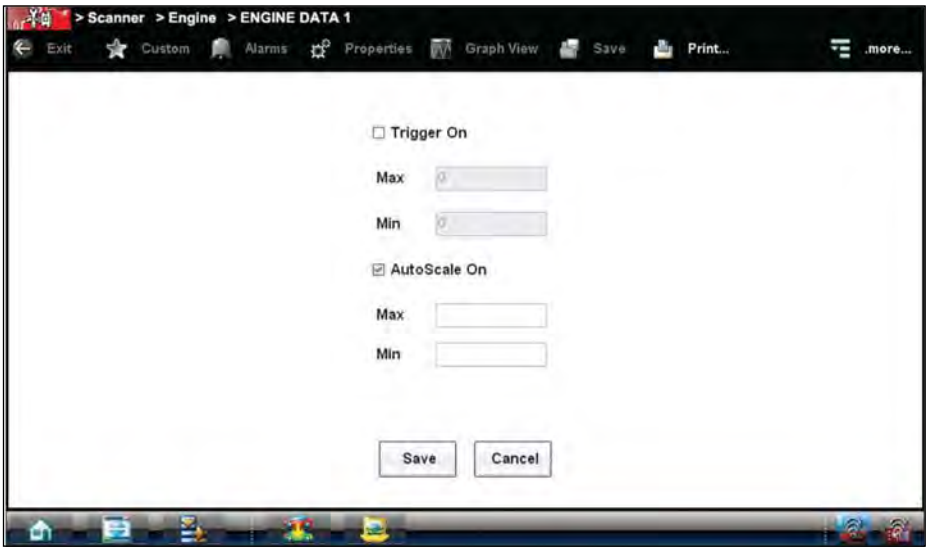


Figure 5-21 *Sample manual scale selection*

Using Zoom

The zoom options on the Data Buffer toolbar allow you to change the level of magnification of the sweep when viewing graph data. Use the Zoom In (+) icon to increase magnification, and the Zoom Out (–) icon to decrease magnification.

5.5.2 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 include:

- Display Codes
- Clear Codes
- Freeze Frame/Failure Records
- DTC Status

Display Codes

Selecting this opens 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.

A code list includes the DTC and a brief description of the code (Figure 5-22).

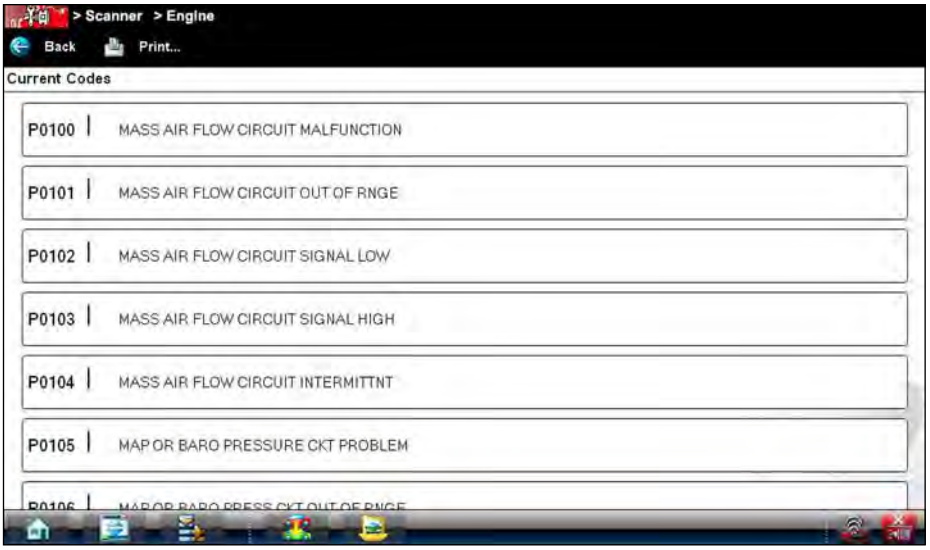


Figure 5-22 *Sample code list*

Clear Codes

The Scanner clears trouble codes from the electronic control module 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 5-23).

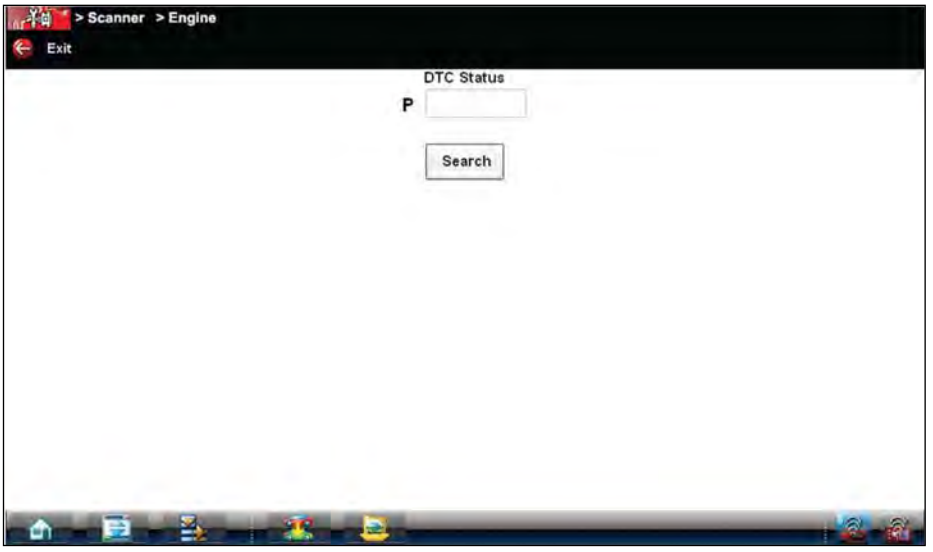


Figure 5-23 *Sample DTC Status entry field*

2. Use the virtual keyboard to enter the characters of the DTC.
3. Tap the virtual keyboard **Backspace** icon if needed to erase a character.

4. Tap the virtual keyboard **Return** key once all the code characters are entered. The DTC status report displays (Figure 5-24).

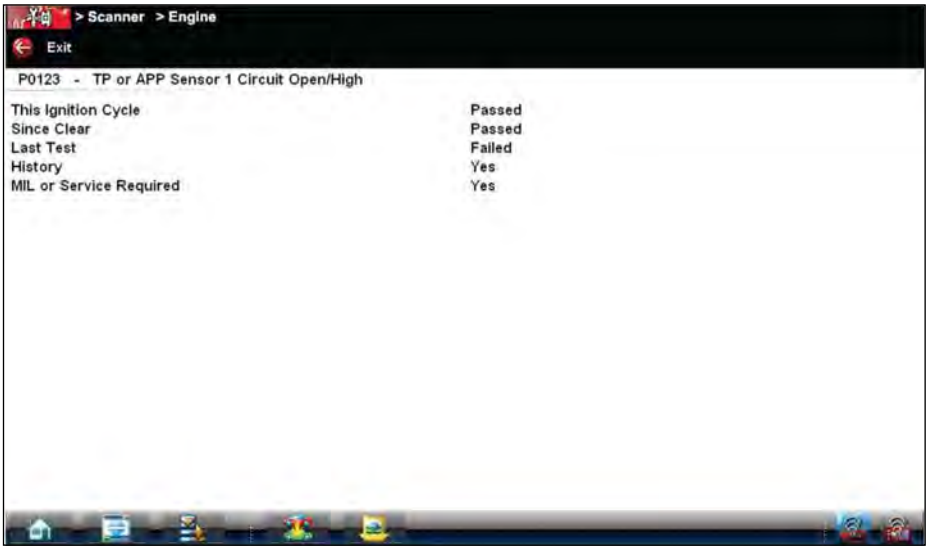


Figure 5-24 *Sample DTC status report*

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

5.5.3 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**—applies a certain output value to 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.

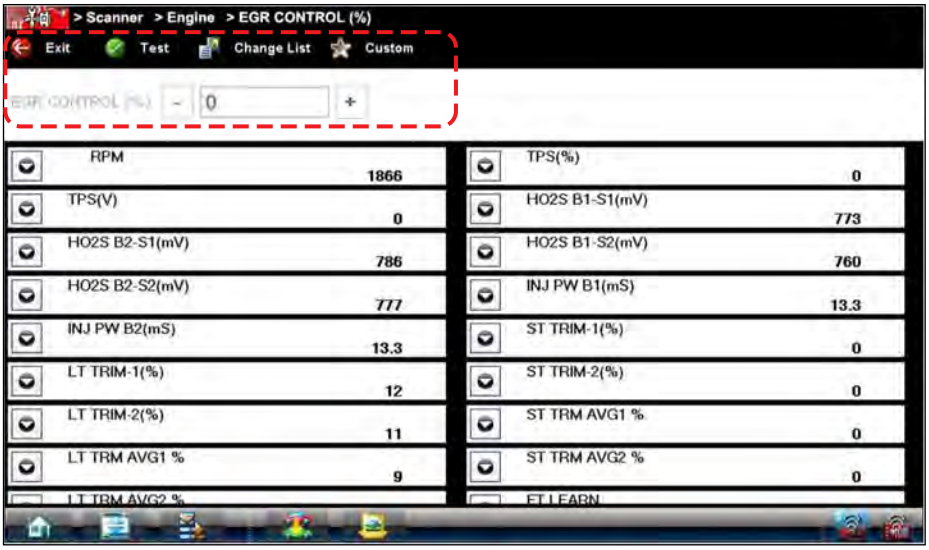


Figure 5-25 *Sample functional test controls*

Some toggle and variable control tests display functional test controls at the top of the screen with data stream information below (Figure 5-25).

Functional test controls allow you manipulate the test signal as shown in Table 5-4.

Table 5-4 *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 off or low, or incrementally reduces a variable signal.
Plus	+	Switches an item high or on, or incrementally increases a variable signal.

5.5.4 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:

- Readiness Monitors—displays the status of the OBD-II/EOBD required monitors
- 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
- ($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) Non-Continuous Monitors—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

Refer to the *Global OBD Vehicle Communications Software Manual* for additional information.

5.5.5 Troubleshooter

Troubleshooter is a database of experience-based information of validated real-world repair strategies designed to simplify the diagnosis process. Troubleshooter contains information on virtually all common diagnostic trouble code (DTC) problems for most vehicles covered by the vehicle communication software. Troubleshooter only appears on a menu if tips are available for the system selected on the identified vehicle.

5.5.6 Scanner Toolbar Operations

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 to display only those that apply to a particular situation 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 5-26).
2. Tap the **Deselect All** icon to clear the highlights from the screen.

Figure 5-26 *Sample custom configuration screen*

3. Create a custom data list by tapping the parameters to be included. Highlighting indicates a parameter that displays, parameters that are not highlighted do not display.
   Keep the following in mind when configuring a custom data list:
   - If the list of parameters is longer than what is shown on the screen, touch and drag the screen to bring the additional parameters into view.
   - 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.
   - Tap individual parameters to highlight and include them in the list.
   - Tap 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 format.

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 does not switch to the data list when the Graph View icon is selected.

Alarms

Alarms are visual indicators next to a parameter in the data display list that change color to show the status of the signal. A red alarm indicates on, a gray alarm indicates off. Only parameters with a range of two states can have alarms. Parameters with continuous ranges, such as variable voltage and pressure values, cannot have alarms.

The **Alarms** selection is used to configure visual indicators on certain digital data parameters. If a vehicle does not provide signals for these functions, the alarm indicators are unused.

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.

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.

2. Check the parameters that you want to show alarms.
3. Select **Save List**.
   Alarm indicators now appear next to the selected parameters in the Data List. The indicators are green when the value is high, and gray when the value is low (Figure 5-27).

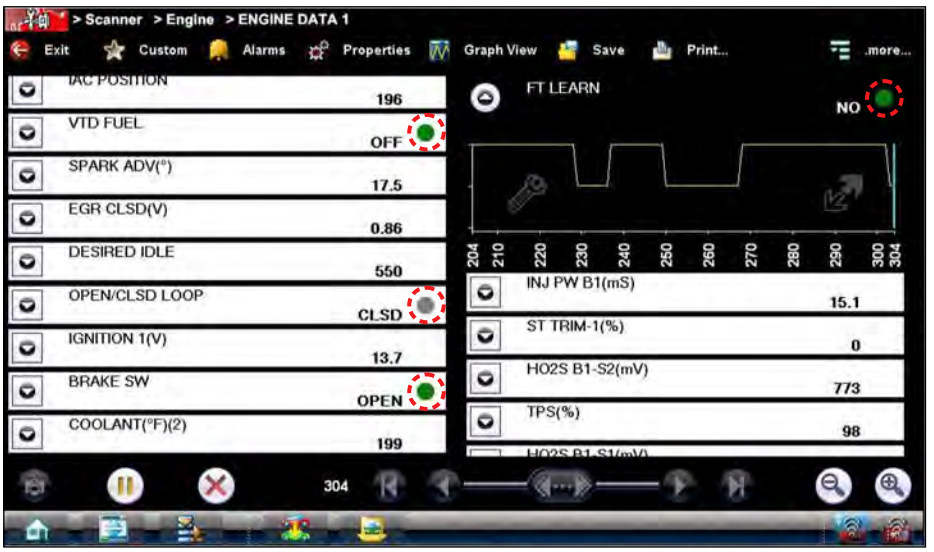


Figure 5-27 *Sample alarm indicators*

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 5-28).

Figure 5-28 *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 tap **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; tap to highlight **Show Grid**, then tap **Accept**.
- To switch the grid off; tap **Show Grid** twice so it is not highlighted, then tap **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 5-29). 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.

Figure 5-29 *Sample Graph View screen*

A simple 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.

Graph View mode can also be engaged from the custom data list configuration screen. Refer to Custom on page 44 for details.

Save

The **Save** icon is used to record movies of vehicle datastream values. Saved files and 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.

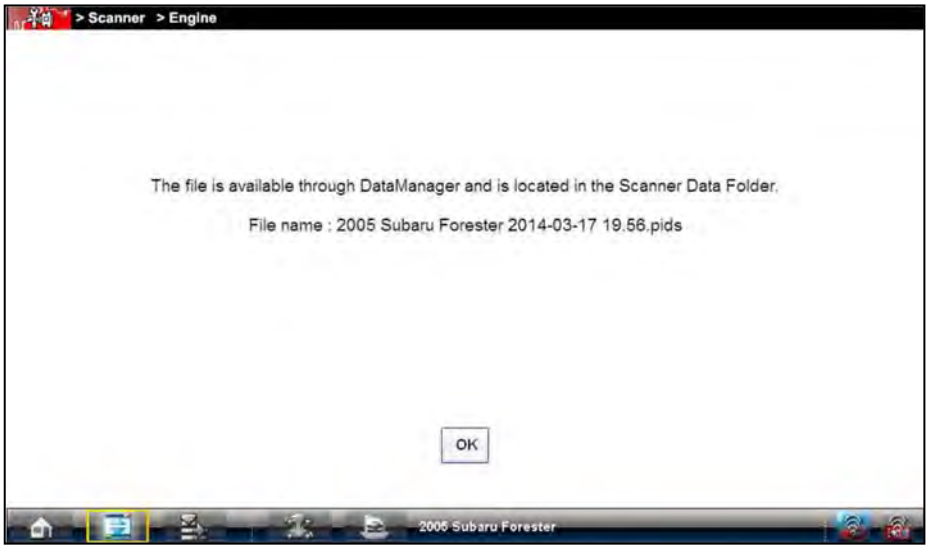


Figure 5-30 *Sample save dialog box*

Saved files can later be viewed by selecting Data Manager on the home screen. From the Data Manger open the Scanner Data Folder, then locate and select the saved file to be viewed.

Print

Selecting Print from the toolbar opens a standard Windows Print dialog box. Select from the options as needed to print the current screen.

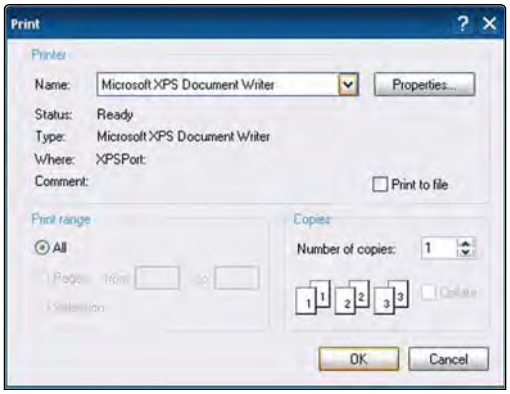


Figure 5-31 *Sample print dialog box*

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, 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 tap 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 5-32). The dropdown menu closes once a selection is made.

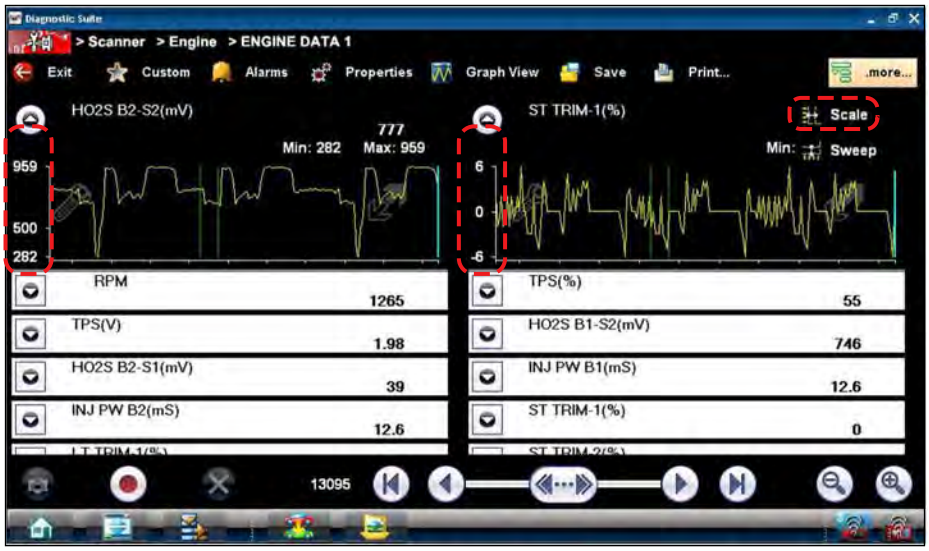


Figure 5-32 *Sample data graph scales*

Sweep

The **Sweep** option switches the sweep values, displayed below the data graphs, on and off (Figure 5-33). The dropdown menu closes once a selection is made.

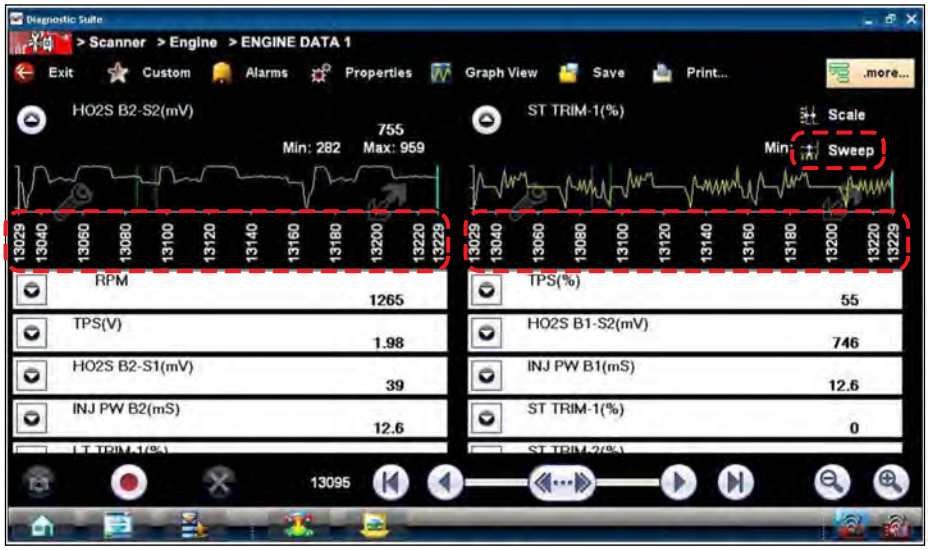


Figure 5-33 *Sample data graph sweep*

5.6 Exiting the Scanner

The Scanner remains open as long as there is an active communication link with the vehicle. You must disconnect this communication link in order to exit from Scanner tests and close the VERDICT Diagnostic Tool software. A warning message displays if you attempt to shut down with the Scanner communicating.

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 the Scanner:

1. From an active screen, select **Exit** from the Scanner Toolbar to return to the Systems Menu.
2. From the Systems Menu, select **Back** from the Scanner data menu.

   A “stopping communications” message briefly displays followed by the Scanner main menu.

Now, the Scanner is no longer communicating with the vehicle and it is safe to return to the Home screen and exit the VERDICT Diagnostic Tool.

5.7 Downloading Firmware

The internal programming of the Scan Module, known as the firmware, can be updated using the VERDICT Diagnostic Tool. Firmware updates increase the Scan Module diagnostic capabilities, typically by adding support for new tests, new models, or enhanced applications to the databases.

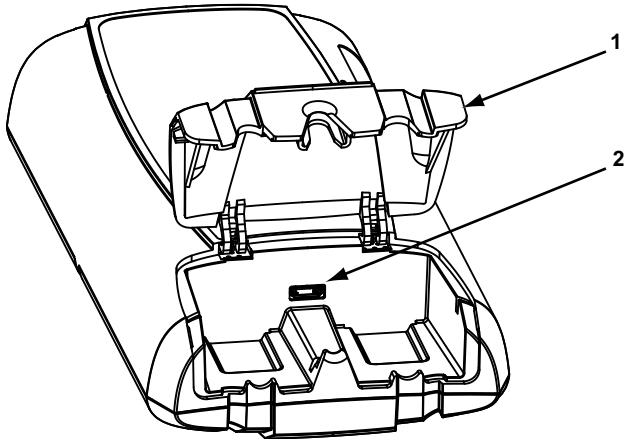
The Diagnostic Tool automatically searches for available updates for all of the VERDICT components when it is connected to the internet. Any updates that are found are downloaded and stored on the Diagnostic Tool. However, the update must be installed in order to complete the process. This section describes installing an update to the Scan Module firmware. A notification message displays if an update is available when Scanner is selected from the VERDICT Home screen (Figure 5-34).

Figure 5-34 *Update available message*

The firmware update process, as explained in the following procedure, begins automatically after ten seconds unless the Update Now or Update Later icon is selected. Selecting **Update Now** begins the process immediately. **Update Later** defers the operation, closes the message, and starts the Scan Module. Not updating does not impact operations, the Scan Module remains functional but may 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.

To update the firmware:

1. Turn on the VERDICT D7 Diagnostic Tool.
2. Connect the Scan Module to the D7 Diagnostic Tool as follows (Figure 5-35):
   a. From the bottom of the Scanner, gently lift up and out on the sides of the handgrip to free it from Scanner housing.
   b. Open the hinged cover on the base of the Scanner to expose the service ports.
   c. Plug the small end of the USB cable into the USB port on the Scanner.
   d. Plug the large end of the USB cable into one of the ports on the side of the Diagnostic Tool.



1— Hinged cover

2— USB port

Figure 5-35 *Scanner service port*

NOTE:
The Scanner and Diagnostic Tool must be connected with the USB cable to update the firmware. The USB cable also provides powers to the Scanner so there is no need to connect to a vehicle.

3. Select **Scanner** from the VERDICT D7 Diagnostic Tool Home screen.
4. Select **OK** when the update available message displays (Figure 5-34).
   The update begins and installation progress is tracked on the screen (Figure 5-36).

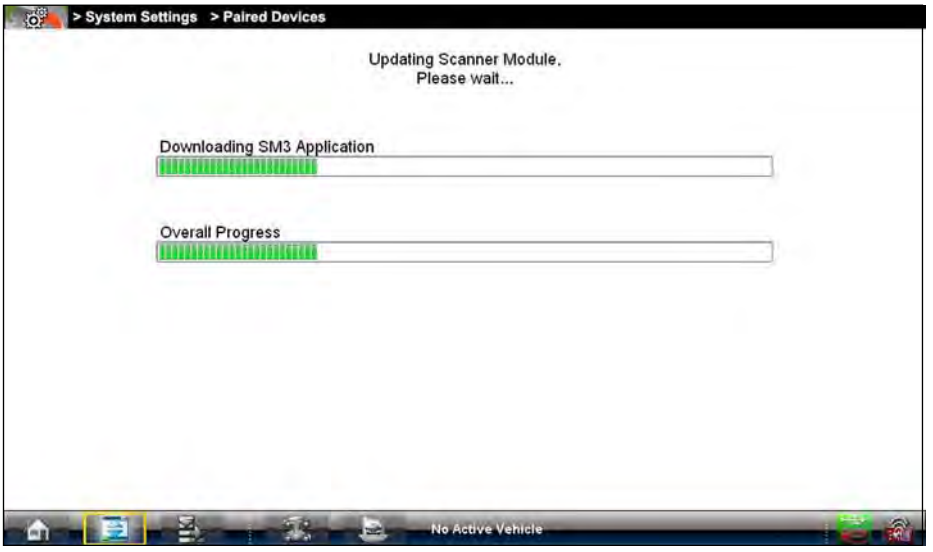


Figure 5-36 *Sample update in progress screen*

A “successfully updated” message displays once the installation process is complete (Figure 5-37).

Figure 5-37 *Sample firmware update complete message*

5. Select **OK** to close the message and return to Scanner operations.
   The Scan Module, with the latest firmware update, is now 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. This option 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. OBD Direct 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. Keep in mind, this function only provides generic OBD-II/EOBD information. To access enhanced OBD-II/EOBD functions, select **Scanner** from the VERDICT® 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 13 for details.

Selecting OBD Direct on the VERDICT 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 will first direct you to connect the correct cable and adapter. Selecting **Continue** opens a submenu of options (Figure 6-2).

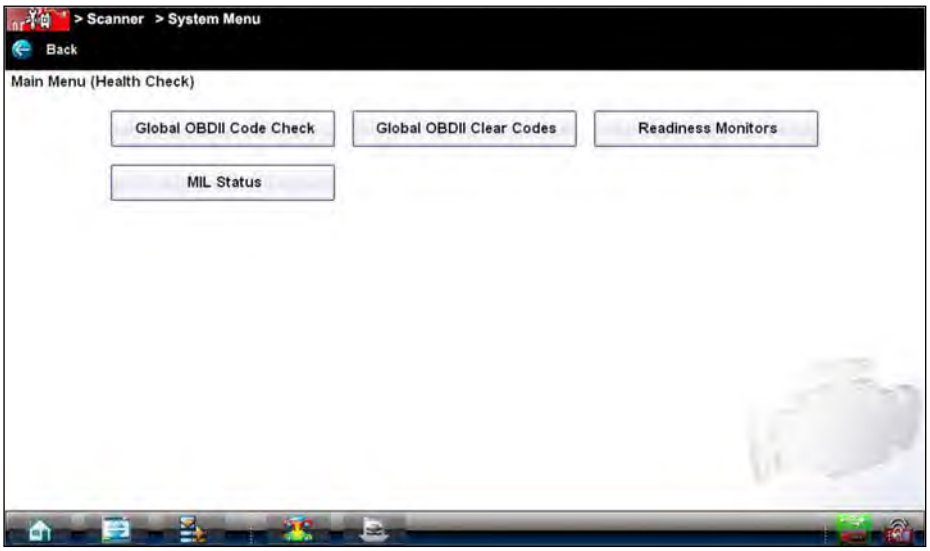


Figure 6-2 *Sample OBD Health Check menu*

6.1.1 Global OBD II Code Check

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

Select an option to display the code list. Refer to Codes Menu on page 40 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, DTCs, freeze frame data, and test results from the memory of the selected ECM. 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 40 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 Connector Information

This option opens a database of vehicle diagnostic connector locations that includes most makes and models. The menu driven interface leads you quickly to the difficult to find test connector.

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.
4. Select **Continue**.
   Information on where to locate the vehicle diagnostic connector display.
5. Select **Continue** to return to the System menu.

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 (Figure 6-5).

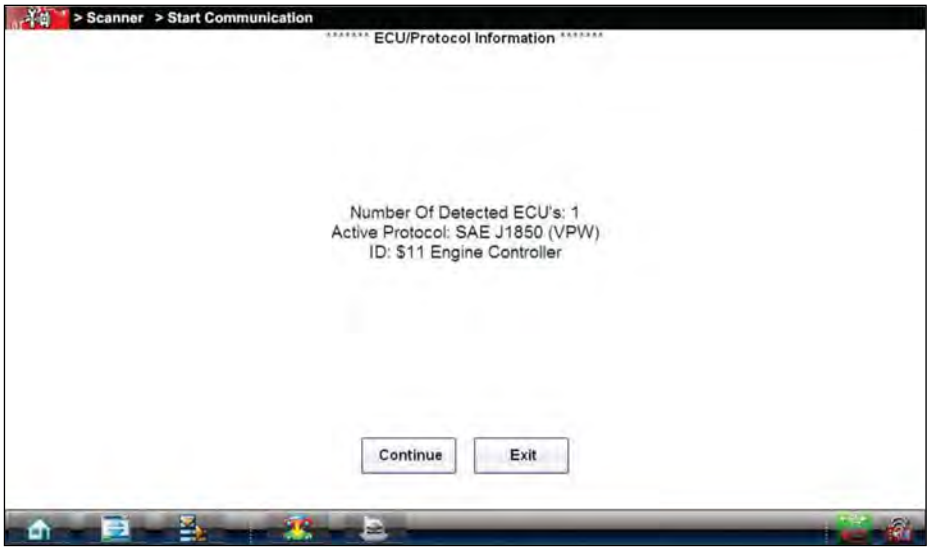


Figure 6-5 *Sample communication message*

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

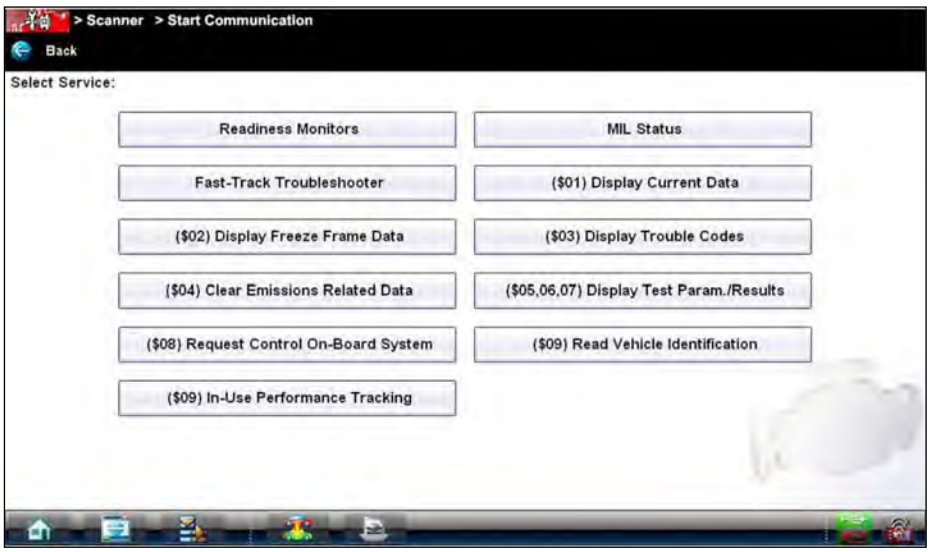


Figure 6-6 *Sample Start Communication menu*

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 the distance driven while the MIL is on (if supported), can also be displayed. It is also possible to print the MIL Status.

($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.

($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 is used to display any stored emission related DTCs reported by the various ECMs.

($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 selection opens a submenu of test parameters and test results from various sensors, such as the oxygen sensor (O2S), 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 systems. 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 the same database of vehicle diagnostic connector locations as discussed for OBD Health Check testing. Refer to Connector Information on page 58.

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).

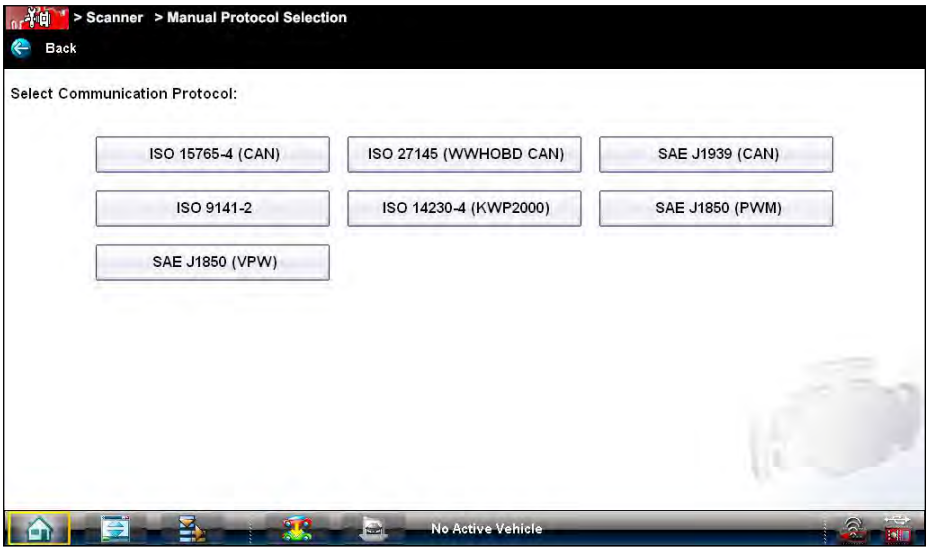


Figure 6-7 *Sample communication protocol menu*

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.**

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 VERDICT® 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 Scan Module 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.
- File—allows you to print or save the data being viewed.
- Top Level Menus—allows you to access supplemental information and training programs.
- Help—allows you to view supporting documentation.

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:

- Power User Tests
- How To
- Features and Benefits
- Index

Features and Benefits

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

- **Features and 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.

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. Typical topics may include:

- **10-Minute Electronic Class**—provides brief instruction in basic electronics and circuit connections.
- **15-Minute Ignition Class**—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.

7.1.2 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. Tap 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 **1.6L SIGMA B** from the engine list and a confirmation dialog box displays (Figure 7-1).

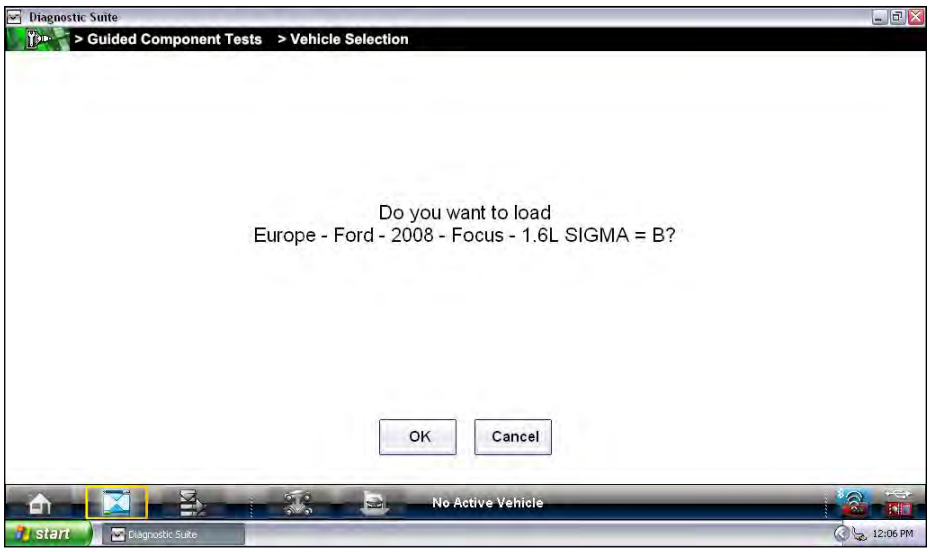


Figure 7-1 *Sample confirmation dialog box*

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 7-2).

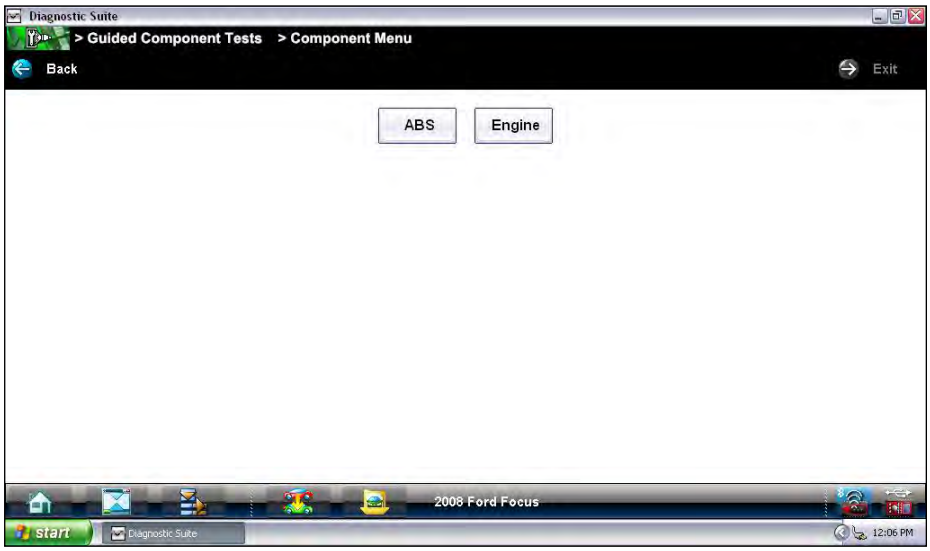


Figure 7-2 *Sample available tests list*

8. Select **ENGINE** and a component test menu displays (Figure 7-3).

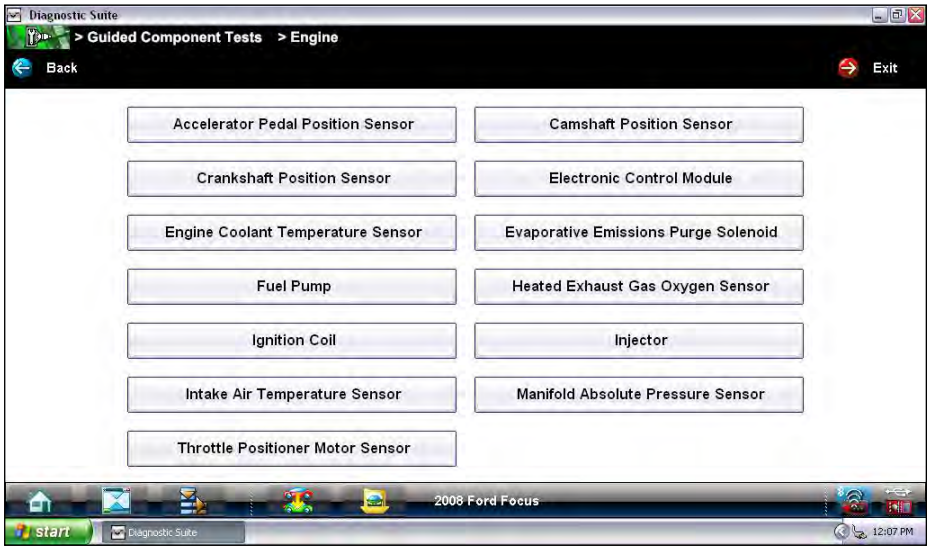


Figure 7-3 *Sample available component tests list*

9. Select a test to continue.

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 7-4):

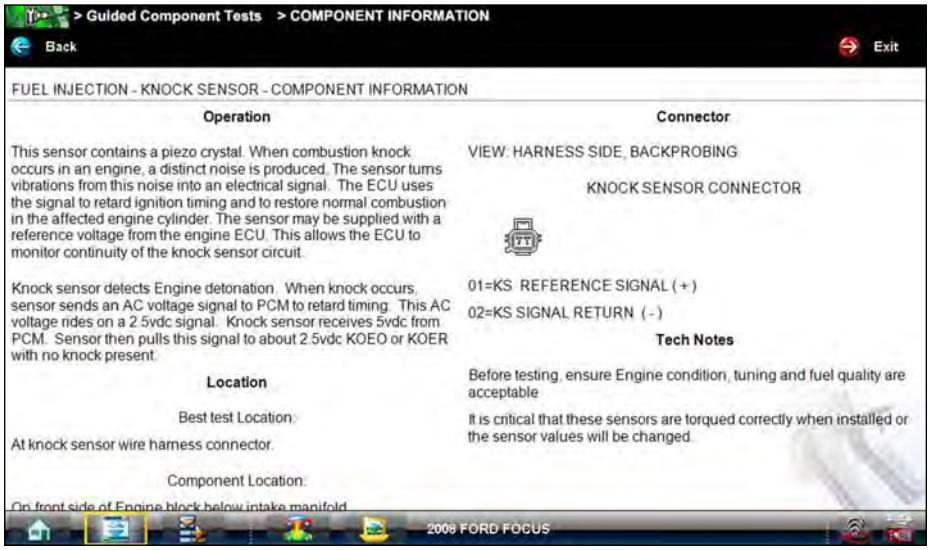


Figure 7-4 *Sample Component Information screen*

- **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.

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 7-4). A scroll indicator along the right edge of the screen appears if there is additional information below what is on the screen.

3. Gesture sweep to view any additional information.
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 test on a specific component. It also provides specifications, tips on how and where to connect the test meter leads, and also 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, a primary and a secondary tests selection display when ignition tests is selected.

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

Selecting some tests open an additional submenu similar to the one shown in Figure 7-5 when more than one option is available.

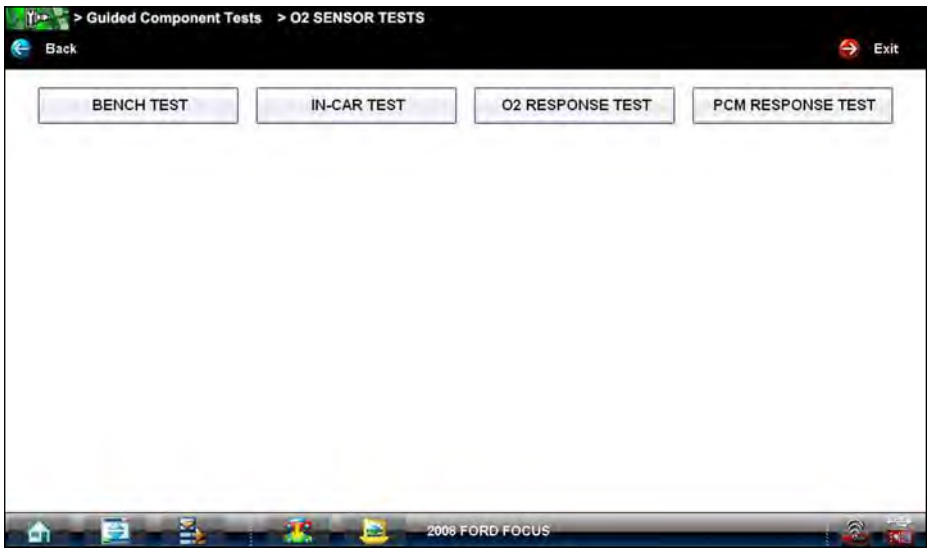


Figure 7-5 *Sample O2S voltage test submenu*

3. Select a test option and the test screen displays (Figure 7-6).

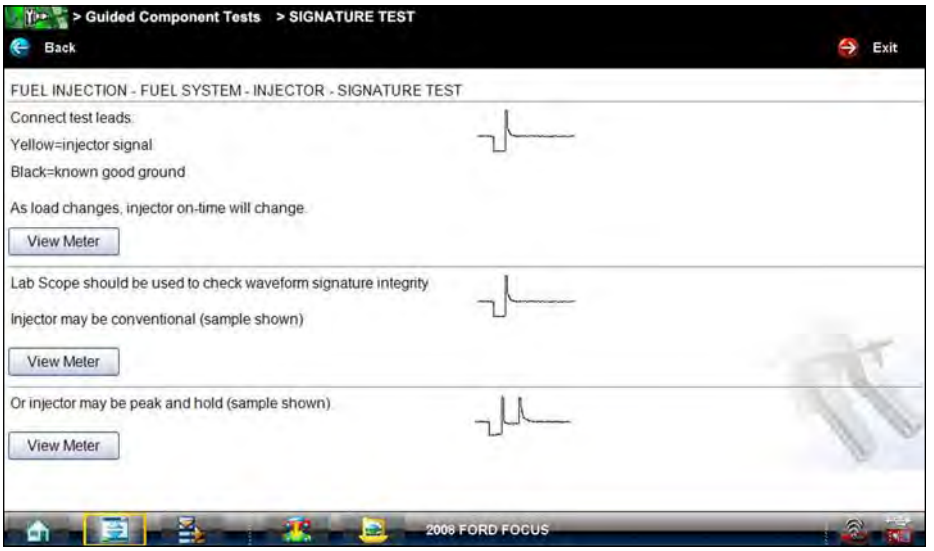


Figure 7-6 *Sample Test screen*

A scroll indicator displays momentarily along the right edge of the screen if there is additional information below what is on the 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 either take you to another page that contains 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 7-7). Once the meter view is open, the Guided Component Test toolbar at the top of the screen is replaced by the Scope Multimeter toolbar, which allows you to make adjustments to the settings. See Scope Multimeter Toolbar on page 101 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 7-7).

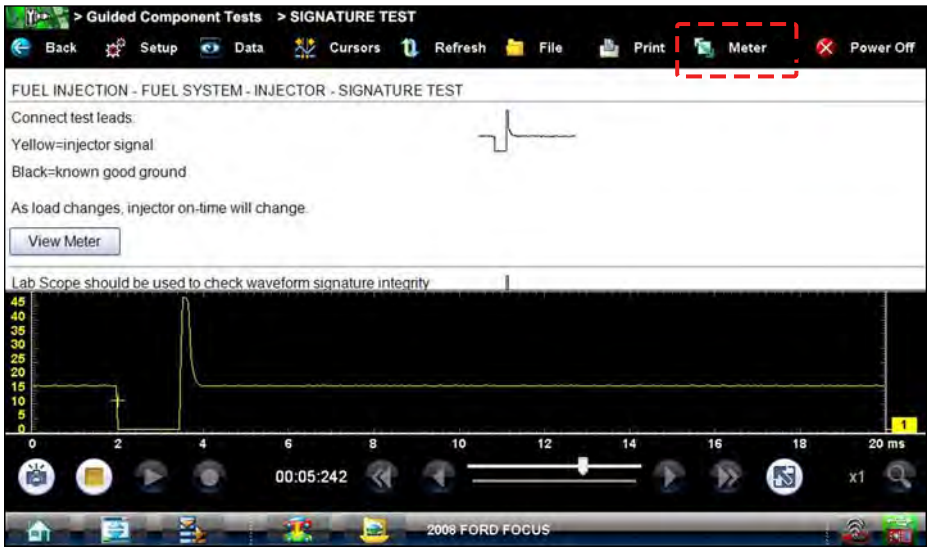


Figure 7-7 *Sample view meter window*

Three view meter options are available:

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

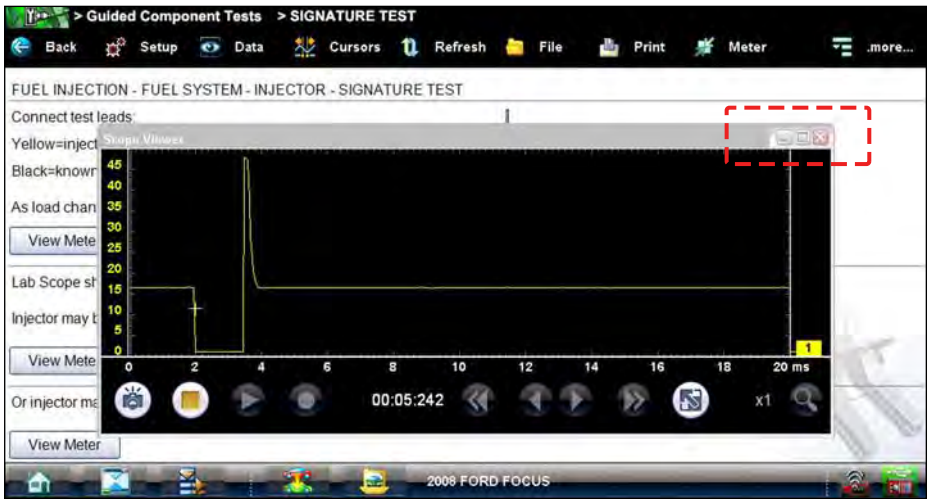


Figure 7-8 *Sample meter view in a separate window*

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

   Select **Exit** from the toolbar to close meter view and return to the Guided Component Test screen.
4. There are two ways to close meter view and return to the Guided Component Test screen:
   - Tap the **Close** icon (red box with an X) on the Scope Viewer toolbar.
   - Select **More** > **Exit** from the Guided Component Test toolbar.

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 in the initial test screen. Follow the on-screen connection instructions in the test procedure and support sections 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 display 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 Multimeter Operations on page 94 for additional information on working with the View Meter window.

Chapter 8 M2 Data Acquisition Device

This chapter discusses how to use the hardware controls and features of the VERDICT® M2 Data Acquisition Module.

8.1 Controls, and Features

There are two sets of controls for the M2 Data Acquisition Device:

1— Soft Keys—select test functions, which vary depending upon the Rotary Switch position

2— Rotary Switch—establishes the primary operation of the unit

Figure 8-1 *VERDICT M2 controls*

The following sections describe the external controls and features of the M2 unit.

8.1.1 Rotary Selector Switch

The VERDICT M2 is a combination digital-multimeter (DMM) and waveform viewer, capable of reading volts (AC and DC), resistance (Ohms), capacitance (farads), continuity, diode forward voltages, and external auxiliary probes, as well as viewing dynamic voltage graphs (waveforms). The Rotary Selector Switch on the front panel determines which measurements are taken.

The available functions are represented by graphic icons on the face of the tool. Descriptions of the functions are given in the following table:

Table 8-1 *Data Acquisition Device rotary switch settings*

Function	Icon	Description
Off	OFF	Switches power to the M2 unit off. The switch should be in this position when the tool is not being used to prevent battery drain.
Volts DC	V⎓	Measures direct current (DC) voltages within a range of zero to 1000 volts. This setting is also used to measure frequency (hertz), duty cycle (%), and time period (cycle, ms).
Volts AC	V~	Measures alternating current (AC) voltages within a range of zero to 1000 volts. This setting is also used to measure frequency (hertz), duty cycle (%), and time period (cycle, ms).
Resistance	Ω	Measures the DC resistance to current in Ohms in a range of zero to open circuit (infinite).
Continuity/ Diode Check		Performs dual tests; circuit continuity and diode test (forward drop). The “S” (special function) soft key switches between the two tests.
Auxiliary	AUX	Performs three auxiliary tests; current (amperes), pressure, and temperature. The “S” (special functions) soft key switches between the three tests. Pre-approved sensors must be used in order to take valid measurements.
Capacitance		Measures capacitance in nanofarad (nF), millifarad (mF), and microfarad (µF).
Oscilloscope (Waveform Viewer)	①②	Configures the M2 unit to perform as one or two channel oscilloscope, or waveform viewer.
Remote Functions		Configures the M2 unit to be operated through the Diagnostic Tool. Readings are also shown on the Diagnostic Tool screen. All of the controls on the from panel of the M2 unit become inoperative when the rotary switch is in this position.

8.1.2 Soft Keys

The eight soft keys located above the rotary dial on the M2 unit are used to initiate a variety of additional functions while performing meter tests. The functionality of the soft keys varies according to what type of tests are being performed, as determined by the position of the rotary switch. Some of the soft keys do not function for certain test modes.

The table below gives a brief general description of soft key operations, the “Mode” column lists the tests during which the key is active. More detailed information is found in the categorical sections that follow.

Table 8-2 *Data Acquisition Device Soft Key functions*

Name	Key	Description	Mode
F1		Switches the displayed value between a “normal” and relative reading.	Volts DC, Volts AC, Resistance, Auxiliary
F2		Freezes, or pauses, the data being displayed. A second push returns the display to live data.	All except Continuity and Diode Check
F3		Changes the measurement range when operating in the Volts DC, Volts AC, Resistance, Auxiliary, or capacitance range. Changes the time base when operating in the graph mode.	Volts DC, Volts AC, Resistance, Capacitance
F4		Select special functions when operating in oscilloscope mode.	Waveform Viewer
S		The **Special Functions** key switches the displayed value between frequency, duty cycle, and pulse width, and selects a continuity or diode test. Also selects submenus when operating in oscilloscope mode.	Volts DC, Volts AC, Waveform Viewer
Min/Max		The **Min/Max** key displays the minimum and maximum sampled signal values along with the current value.	All except Continuity and Diode Check, Capacitance
Range		The **Range** key switches between the precision of the displayed value between the four available ranges.	All
Graph		The Graph key switches the display from a digital readout to a histogram, or graph.	Volts DC, Volts AC, Auxiliary

In general, a short or momentary push of a soft key activates the assigned function, a long push returns to the normal display.

8.2 Digital Multimeter Operations

This section details the digital multi-meter (DMM) features available based on the Rotary Selector Switch position.

8.2.1 Volts DC

The Volts DC setting is used for measuring direct current (DC) voltages within a range of zero to 1000 volts, frequency, duty cycle, and pulse width.

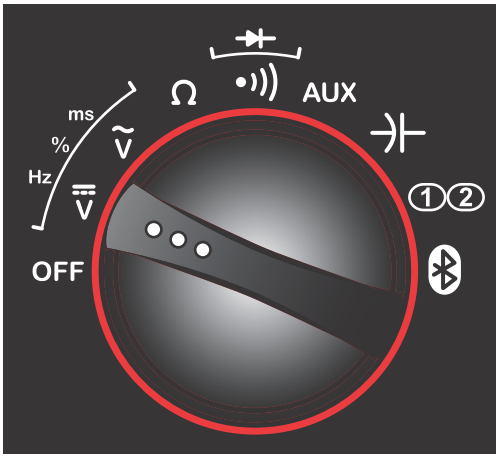


Figure 8-2 *Volts DC selected*

A typical Volts DC screen with Min/Max active is shown in Figure 8-3. Note the functions of the F1, F2, and F3 soft keys are shown at the bottom of the display screen. The F4 soft key is not operational in the Volts DC mode, although the beeper does sound if the key is pressed.

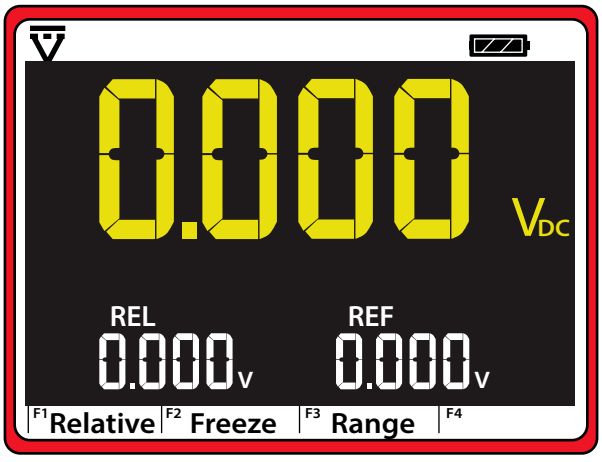


Figure 8-3 *Sample Volts DC screen*

F1 Key, Relative

The lower numbers shown in Figure 8-3 do not display when you first select the **Volts DC** function. The DMM takes a “snapshot” of the current reading and holds it on the display when the F1 key is momentarily pressed. A “relative” value, which is continuously updated and shows the relationship between the initial reading and the most current reading, now displays as well. Additional momentary presses of the F1 key record new snapshots that replace the previous base reading. Press and hold the F1 key to cancel the relative function.

Alternate F1 Menu

There is a special alternate menu that is available by pressing and holding the F1 key for several seconds while in Volts DC mode (Figure 8-4). This menu allows your to modify three settings:

- Beeper functions
- Display backlighting
- Display screen colors

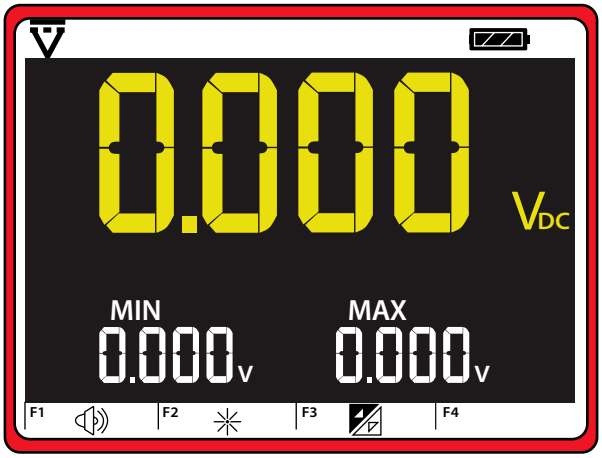


Figure 8-4 *Sample active menu select mode screen*

Each of these operations are explained below, a second long press of the F1 key returns the display to the normal mode. The F4 key is nonfunctional in the alternate menu mode.

Pressing **F1** from the alternate menu switches the internal beeper used for the continuity test and to indicate soft key pushes on and off. The beeper function remains “on” to indicate low battery conditions and other special functions like loss of contact with the remote device.

Pressing **F2** from the alternate menu changes the intensity of the LCD display backlight. Each key push advances to the next level of intensity, then returns to the lowest level once maximum brightness is reached. The backlight never turns completely off. There are five intensity levels for the backlight.

Pressing **F3** from the alternate menu switches between the two available combinations of screen background and character colors. One is light characters on a dark background and the other is dark on light.

F2 Key, Freeze

A press of the F2 key freezes, or so that the displayed value remains static. A second press of the F2 key returns to unit to normal operation. This function is available in normal and relative modes.

F3 Key and Range Key

Pressing the F3 and Range keys changes the measuring range. Measuring ranges vary by which function (Volts DC, Volts AC, Resistance, Auxiliary) is selected. A long press of the F3 or Range key returns to unit to auto-range operation. This function is available in normal and relative modes.

Min/Max Key

Press the Min/Max key and the display shows both the instantaneous voltage reading and the minimum and maximum voltages that occurred since the last time the key was pressed. See Sample active menu select mode screen on page 76.

The displayed values continue to update until the Min/Max key is pressed again, then:

- A short press of the Min/Max key resets the readings
- A long press of the Min/Max key returns to normal Volts DC mode.

S Key, Special Functions

The S key is used to activate special time measurement functions available when sampling voltage. Each press of the S key advances to the next function in the following order:

1. The screen changes to show the frequency, period, and duty cycle of the test signal.
2. The screen changes to show the frequency, period, and pulse width of the test signal.

When displaying frequency, the period (abbreviated PRD on the screen) represents the percentage of the duty cycle, or the “on time” of the signal. Readings are displayed in milliseconds. The Freeze (F2) and Range (F3) soft keys remain active in this mode. Figure 8-5 shows a typical frequency display following a single press of the S Key. Press the S Key a second time and the duty cycle (DTY) reading changes to show the pulse-width (PWD) of the signal in milliseconds.

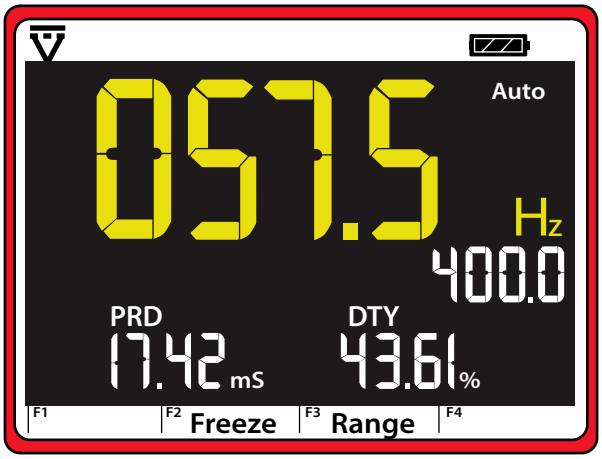


Figure 8-5 *Sample Frequency display*

NOTE:
Press and hold the S key at any time to instantly return the display to a voltage reading.

In this special time measurement mode, the readings shown on the screen are integrated, or filtered. This means that the displayed values show average time-based measurements with great accuracy, but do not capture fast signal anomalies such as instantaneous “glitches” or timing shifts. However, these types of fast signal changes can be seen using the Graph key.

Graphing Voltage Measurement Screens

The VERDICT M2 can generate a graphical history of a voltage signal over time, which is called a histogram. Pressing the Graph button when operating in Volts DC or Volts AC range causes the display to change from a digital reading to a graphical display.

While viewing a histogram, the function keys operate as follows:

- **F1**—switches peak detection on and off
- **F2**—freezes and unfreezes the histogram (pauses and resumes data collection).
- **F3**—incrementally increases the measurement range. The **Range** key incrementally decreases the measurement range.
- **F4**—incrementally increases the timescale of the histogram. The **Graph** key incrementally decreases the timescale.

A digital value of the signal displays in the upper-right corner of the display while operating in graphing mode.

Graphing with Min/Max Function

In the Volts DC graphing function you can capture and store the minimum and maximum voltages by pressing the Min/Max soft key. The readings appear in the upper-left portion of the LCD. The VERDICT M2 device captures and reports very fast events (as fast as 50 microseconds) in this mode, which is only available in Volts DC.

Press the Min/Max key and the display shows both the instantaneous voltage reading (large characters) and the minimum and maximum voltages that occurred since the last time the key was pressed. The displayed values continue to update until the “Min/Max” key is pressed again. Then the values reset the readings on the display begin the process again. Press and hold the Min/Max key to cancel this function, and return to the normal volts DC mode.

To exit graph mode:

- Press and hold the **Graph** key for two seconds.

Graphing Time-Based Measurement Screens

To access time-based measurement graphs:

1. Press the **Graph** key.
2. Press the **S** key.
   The VERDICT M2 is now in time-based measurement mode.

In this mode, the VERDICT M2 uses a specialized strategy called “cycle-by-cycle” (C-B-C) time-based measurements to capture signal glitches. To do this, the VERDICT M2 unit examines each cycle of the signal under test, calculates its period, duty cycle and pulse width, and generates a graphical history of that signal (called a histogram). Any significant variation of the signal is visible on the histogram.

When you initially enter this mode, the system shows frequency histograms (the default setting). A press of the S key switches the display from frequency to duty cycle. A second press of the S key switches the display from duty cycle for pulse width.

There three items displayed on the LCD in the graph mode:

- A histogram of the signal being measured displays across the screen
- The averaged result of the timing measurement appears on the upper-right side of the screen
- The minimum and maximum value readings display on the upper-left side of the screen (after first pressing the Min/Max key).

Range

A press of either the Range or F3 key takes the meter out of the automatic voltage scale function and allows you to change the voltage scale or resolution. Subsequent key presses switches the display between the available ranges. Press and hold the Range key to cancel this function and return to automatic range operation.

8.2.2 Volts AC

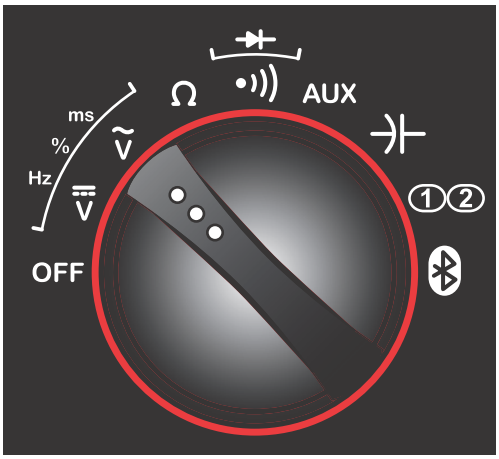


Figure 8-6 *Volts AC selected*

When sampling AC voltage the soft keys function the much the same as for DC voltage. However, there are some differences. Brief explanations are provided below, refer to Volts DC on page 75 for more detailed descriptions.

F1 Key

The F1 key switches between normal and relative readings. A short push of the key resets the reading, a long push opens the alternate menu.

F2 Key

A single press of the F2 key pauses, or freezes, the displayed voltage. A second press returns the display to normal mode.

F3 Key

Short pushes of the F3 and Range keys incrementally increase and decrease the selected measurement range respectively. These keys are active in both the standard Volts AC and histogram modes.

F4 Key

The F4 key is nonfunctional in this mode.

S Key

Pressing the S key activates the time management functions to display frequency, duty cycle, and pulse width. A long press of the key returns to the normal display mode.

Min/Max Key

Pressing the Min/Max key causes minimum and maximum readings to display along with the current value. A long press of the key returns to the normal display mode.

Range Key

A press of the F3 or Range keys changes the voltage scale or resolution of the display. Each key press incrementally advances through the available settings. A long press of the Range key returns to display to the automatic range.

Graph Key

Pushing the Graph key generates a histogram that graphically shows the various values of the voltage measurements taken.

The Range and F3 keys can be used to change the measurement range. When Range is pressed, the current histogram erases and a new graph starts building from zero.

Pressing the F4 and Graph keys while in Graph mode changes the sweep rate, or the time represented by the width of the screen.

A “long press” of the “Graph” key returns the unit to the normal “Volts AC” function.

8.2.3 Resistance

This setting allows you to measures the DC resistance to current in Ohms. When sampling resistance the soft keys function much the same as for DC or AC voltage. Brief explanations are provided below, refer to Volts DC on page 75 for more detailed descriptions.

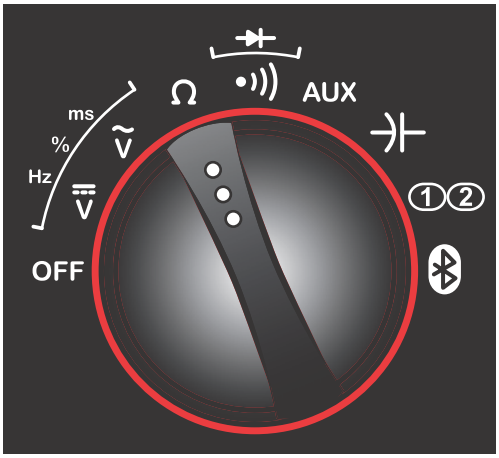


Figure 8-7 *Resistance selected*

F1 Key

The F1 key switches between normal and relative readings. A short push of the key resets the reading, a long push opens the alternate menu.

F2 Key

A single press of the F2 key pauses, or freezes, the displayed value. A second press returns the display to normal mode.

F3 Key and Range Key

A short push of the F3 or Range key changes the selected measurement range.

F4 Key and S Key

The F4 and S Keys are nonfunctional in this mode.

Min/Max Key

Pressing the Min/Max key causes minimum and maximum readings to display along with the current value. A long press of the key returns to the normal display mode.

8.2.4 Continuity and Diode Check

This setting allows you to perform circuit continuity tests, and perform a forward drop test to check the operation of a diode.

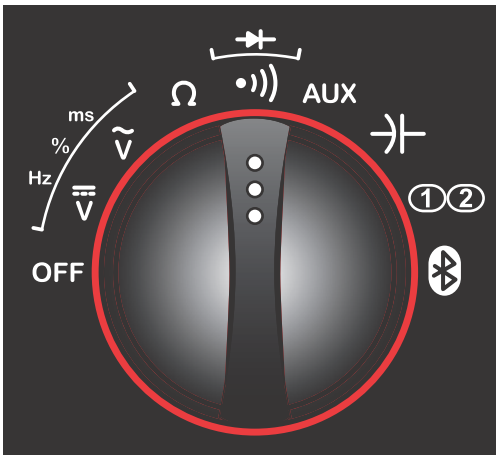


Figure 8-8 *Continuity and diode check selected*

The S key is the only soft key that is operational in continuity and diode mode. Pressing the S key switches between the continuity test and diode test settings. Continuity is the default setting.

When testing continuity, the M2 unit sounds a beep if a short circuit is detected (continuity between the two test leads).

When testing a diode, the M2 unit induces a current to the device under test and measures the resultant voltage drop across the device.

8.2.5 Auxiliary

This selection allows you to select between three auxiliary tests; current (amperes), temperature, and pressure. Approved probes, sensors, and transducers must be used in order to obtain valid measurements.

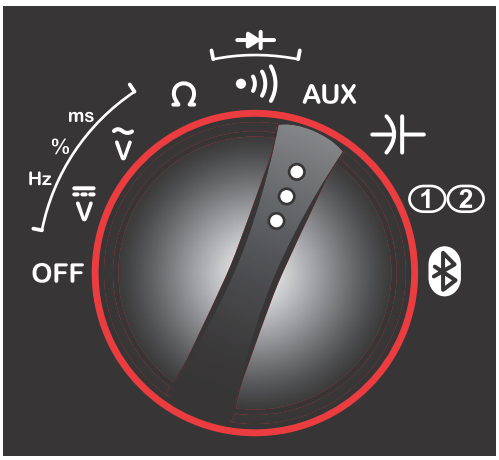


Figure 8-9 *Sample auxiliary selected*

Brief explanations of the soft key functions are provided below, refer to Volts DC on page 75 for more detailed descriptions.

F1 Key

The F1 key switches between normal and relative readings. A short push of the key resets the reading, a long push opens the alternate menu.

F2 Key

A single press of the F2 key pauses, or freezes, the displayed value. A second press returns the display to normal mode.

F3 Key and Range Key

The F3 and Range keys select the measurement range, which varies with the selected function:

- Current—switches the scale between available settings for AC Amp and DC Amp probes.
- Temperature—switches between displaying degrees Celsius and degrees Fahrenheit.
- Pressure—switches between displaying pressure as pounds-per-square-inch (PSI) and vacuum as inches-of-mercury (inHg).

F4 Key

The F4 key is nonfunctional in this mode.

S Key

The S key is used to switch between the three different test modes (amperage, temperature, and pressure) available in the auxiliary setting. Each key press advances to the next available mode.

Min/Max Key

Pressing the Min/Max key causes minimum and maximum readings to display along with the current value. A long press of the key returns to the normal display mode.

Graph Key

Pushing the Graph key generates a histogram that graphically shows the various values of the measurements taken.

The Range and F3 keys can be used to change the measurement range. When Range is pressed, the current histogram erases and a new graph starts building from zero.

Pressing the F4 and Graph keys while in Graph mode changes the sweep rate, or the time represented by the width of the screen.

A “long press” of the “Graph” key returns the unit to the normal “Auxiliary” function.

8.2.6 Capacitance

This selection is used to measure capacitance.

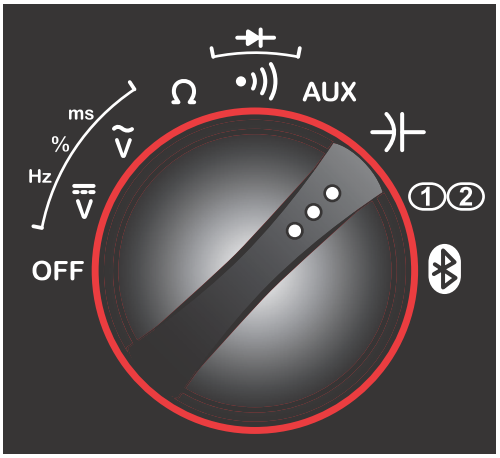


Figure 8-10 *Sample capacitance selected*

F1 Key

Relative readings are not available in this mode. A short push of the F1 key does cause a beep to sound, but the display remains unchanged. A long push of the F1 key opens the alternate menu.

F2 Key

A single press of the F2 key pauses, or freezes, the displayed value. A second press returns the display to normal mode.

F3 Key and Range Key

The F3 and Range keys select the measurement range.

F4 Key, S Key, Min/Max Key, and Graph Key

The F4, S, Min/Max, and Graph keys are nonfunctional in this mode.

8.2.7 Oscilloscope

The data acquisition device has the ability to provide a two-channel oscilloscope, or waveform viewer. The viewer becomes active when the rotary switch is turned to the “scope” position.

Figure 8-11 *Sample oscilloscope rotary switch icon*

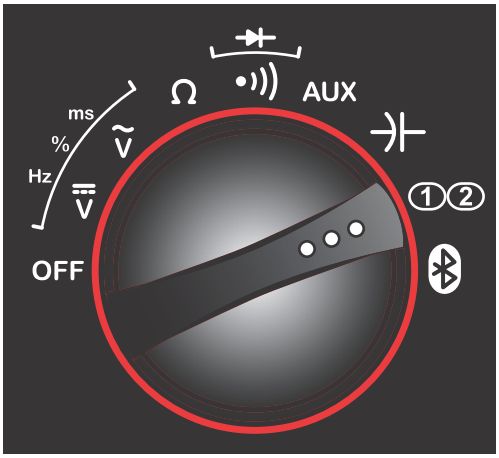


Figure 8-12 *Sample scope setting*

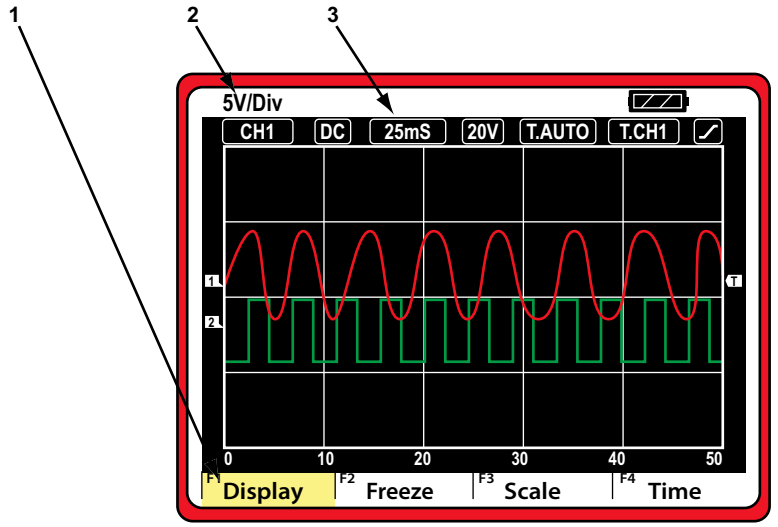
Soft key functions are unique when performing oscilloscope tests. In this mode there are seven available setting ranges for the F2, F3, and F4 keys. Pressing the F1 key scrolls up through the list of settings, and pressing the S key scrolls down through the list. The F1 area on the screen shows which of the six settings is currently active (Figure 8-13). Available scope functions are shown in the table below:

Setting	F1 Key	S Key	F2 Key	F3 Key	F4 Key
Display	Scroll up	Scroll down	Freeze	Scale	Time
Trigger			Slope	Level	Channel
Preset A			GCI&S†	LF AC†	HF AC†
Preset B			PCI&S†	LF DS†	HF DS†
Special			Peak	Invert	Coupling
Position			Move Ch1 Trace	Move Ch2 Trace	Not Used
Channel			Display Ch1	Display Ch2	Check scales
† See page 88 for acronym definitions					

Display Selections

With the scope in the display mode the soft keys perform the following functions:

- **F2**—the first press pauses data collection to allow closer examination of the waveform, the second press restores data collection.
- **F3 and Range**—each press of the F3 key advances up to the next available scale, which is the value of the voltage displayed vertically on the screen. The currently selected scale is shown at the top of the screen. The Range key moves incrementally down through the list of available scales.
- **F4 and Graph**—each press of the F4 key advances to the next timebase, or sweep rate, which is the time represented on the width of the display. The currently selected timebase is shown at the top of the screen. Use the Graph key to move incrementally down through the list of available time bases. Press and hold the F4 key to return to the default setting.

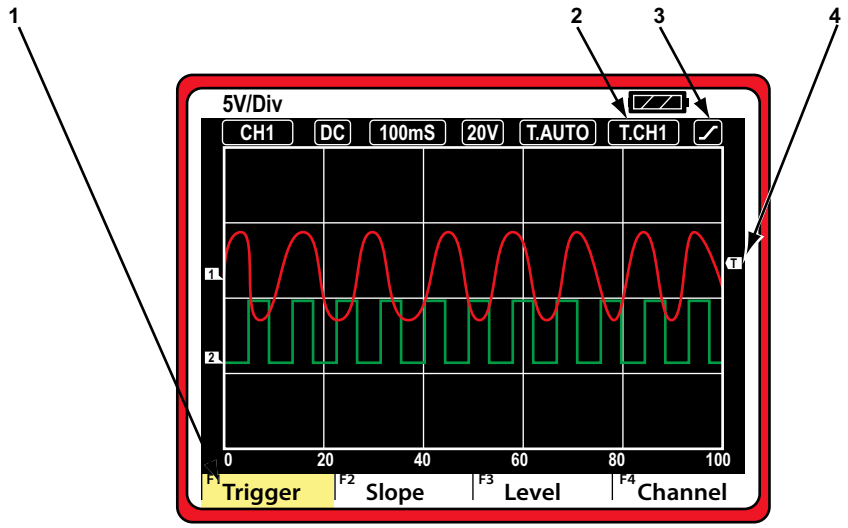


1— Mode
2— Scale
3— Timebase

Figure 8-13 *Sample display screen*

Trigger Selections

Triggering allows you to set the scope so that it begins sampling and displaying a trace once predetermined signal conditions, or triggers, are met. Triggering produces a much more stable waveform. The trace always begins at the trigger point, so the image does not appear to flicker or drift as it updates.



1— Mode
2— Trigger channel
3— Trigger slope
4— Trigger level

Figure 8-14 *Sample trigger screen*

With the scope in the trigger mode the soft keys perform the following functions:

- **F2 Slope**—pressing the F2 key switches triggering back and forth between the rising (positive) edge and trailing (negative) edge of the waveform. A graphic in the upper-right corner of the display screen shows the currently selected slope.
- **F3 Level**—short presses of the F3 key incrementally increase the trigger voltage level. An indicator to the right of the screen graph shows the current trigger voltage level. Short presses of the Range key incrementally decrease the trigger voltage level. Press and hold either key (F3 or Range) to return to the default setting.
- **F4 Channel**—a press of the F4 key switches triggering between channel 1 (CH1) and channel 2 (CH2). The channel currently selected for triggering is shown at the top of the screen.

NOTE:
Triggering is not available when the timebase setting is between 1 second and 10 seconds.

Preset Selections

These options allow you to select from already configured scope setups for commonly tested items. Six preset configurations are available; three for Preset A and three for Preset B. These preset conditions are permanent and cannot be erased or modified. However, you can construct and store additional presets within the D7 Diagnostic Tool as explained in the Scope and Multimeter chapter of this manual.

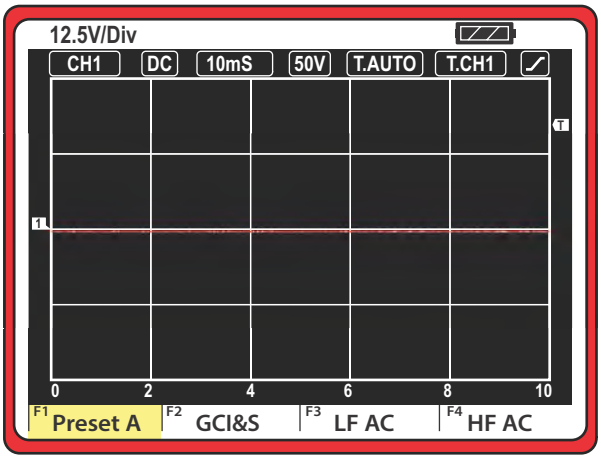


Figure 8-15 *Sample preset (Preset A, F2) screen*

To select a preset:

1. Use the **F1** or **S** key to navigate to either Preset A or Preset B.
2. Press **F2**, **F3**, or **F4** to load the desired preset.
   The selected preset loads and the meter is ready for testing.

The F2, F3, and F4 fields on the screen are acronyms for the type of test the preset is configured to perform. Interpret as follows:

- **Preset A**:
  - CGI&S—ground controlled injectors and solenoids
  - LF AC—low frequency alternating current signals
  - HF AC—high frequency alternating current signals
- **Preset B**:
  - PCI&S—power controlled injectors and solenoids
  - LF DS—low frequency digital signals
  - HF DS—high frequency digital signals

Values for the available presets are shown in the table below.

Selection	Position	Timebase	Scale	Trigger	Coupling	Slope
Preset A	F2 (CGIS)	10 mS	50 Volts	8 Volts	DC	Negative
	F3 (LF AC)	50 mS	20 Volts	0 Volt	AC	Positive
	F4 (HF AC)	10 mS	20 Volts	0 Volt	AC	Positive

Selection	Position	Timebase	Scale	Trigger	Coupling	Slope
Preset B	F2 (PCI&S)	10 mS	50 Volts	8 Volt	DC	Positive
	F3 (LF DS)	50 mS	20 Volts	3 Volt	DC	Positive
	F4 (HFDS)	10 mS	20 Volts	3 Volt	DC	Positive

Special Selections

The Special settings allow you to alter the way the trace is displayed in order to readily spot signal anomalies and to compare signals. A short push of the F2, F3, or F4 key activates the indicated special mode, a long push of the key cancels the special mode.

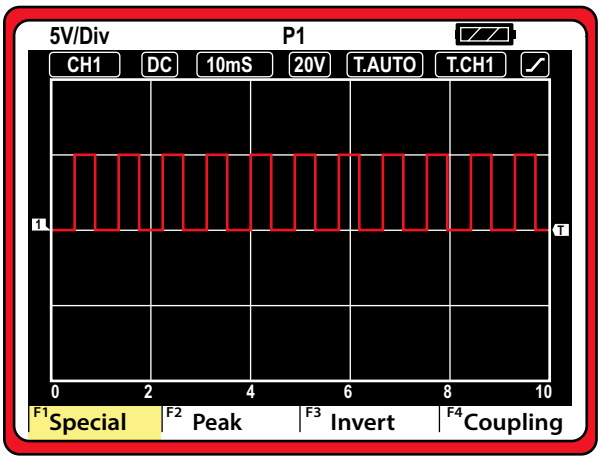


Figure 8-16 *Sample special selections screen with peak capture on*

Peak

Pressing the F2 key switches on the peak capture function, which allows you to see very fast signal transitions or glitches. When peak capture is active, “P1” displays at the top of the screen. During normal operation, the scope collects just enough data samples to plot a waveform across the screen. When peak is active the scope samples data at the maximum highest rate, which collects more data than what is needed to simply construct a waveform across the screen. Therefore, any signal glitches or fast events are captured.

Invert

Pressing the F3 key inverts, or switches, the polarity of the signal trace so that it appears upsidedown on the screen. This is typically used to sample amperage or high-voltage signals.

Coupling

Pressing the F4 key switches the input to the meter from DC coupling (default) to AC coupling. In this mode the average value of the waveform is subtracted so that small signal variations become apparent. AC coupling blocks the DC portions of an input signal in order to amplify the AC portions without driving them off of the screen. Use for viewing alternator ripple or fuel pump amperage.

Position Selections

The Position selections allow you to reposition the baselines of the channel 1 and channel 2 traces vertically on the screen.

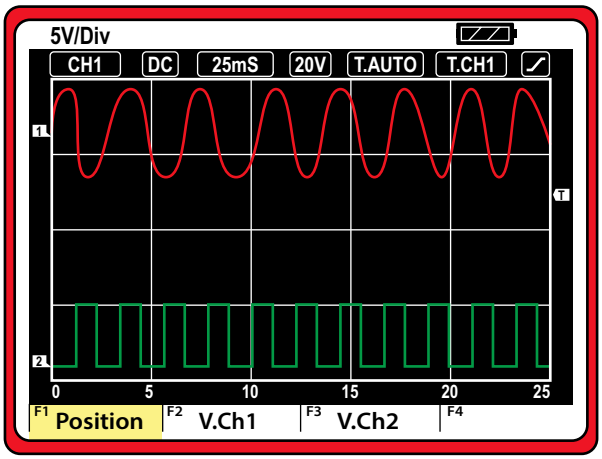


Figure 8-17 *Sample screen with both traces repositioned*

Channel 1 Trace

Use the F2 and Min/Max keys to reposition the channel 1 trace as follows:

- Short pushes of the **F2** key moves the trace incrementally up.
- A long push of the **F2** key places the trace at the midpoint of the scale.
- Short pushes of the **Min/Max** key moves the trace incrementally down.
- A long push of the **Min/Max** key places the trace at 10% of the scale.

Channel 2 Trace

Use the F3 and Range keys to reposition the channel 2 trace as follows:

- Short pushes of the **F3** key moves the trace incrementally up.
- A long push of the **F3** key places the trace at the midpoint of the scale.
- Short pushes of the **Range** key moves the trace incrementally down.
- A long push of the **Range** key places the trace at 10% of the scale.

Channel Selections

The channel selection mode allows you to switch the trace on and off. The F2 key controls the channel 1 trace and the F3 key controls the channel 2 trace. Pressing the key the first time turns this channel “off” and the sweep signal is removed from the display. Pressing the key a second time puts this channel back onto the display. The previous characteristics for this channel are saved during this process. The indicator at the base of the screen appears as inverse video (white lettering on a black background) when a channel is on.

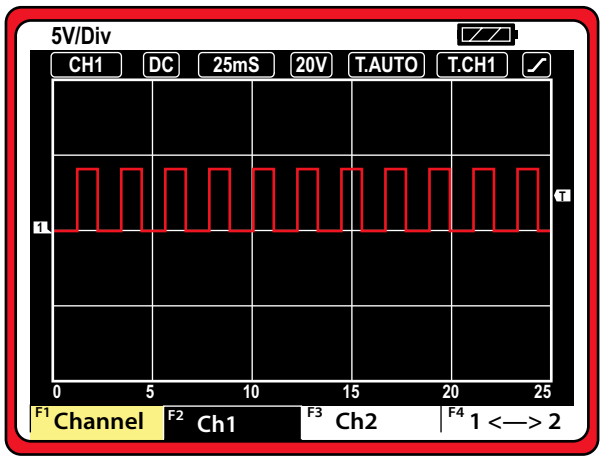


Figure 8-18 *Sample screen with channel 1 on and channel 2 off*

Bluetooth Discovery Selection

A special Bluetooth Discovery mode is available when operating in oscilloscope mode. Bluetooth Discovery allows the M2 unit to be “paired” and connected to a host computer. This function is only used when the VERDICT M2 has not been previously paired with a host, or if it becomes necessary to pair with a new host. The VERDICT M2 can only communicate with one host at a time.

When Bluetooth Discovery is enabled, the VERDICT M2 seeks a compatible host computer, such as the D7 Diagnostic Tool. If a compatible device is within range, the VERDICT M2 recognizes its presence, and can initiate pairing if so instructed by the operator. The pairing function requires active participation of an operator. Once pairing has been established, the operator must exit from the Bluetooth Discovery mode.

To pair the M2 to a D7 Diagnostic Tool:

1. Turn on the D7 Diagnostic Tool.
2. Set the VERDICT M2 Rotary Switch to the oscilloscope position.
3. Press and hold the **F1** key of the VERDICT M2 to open the alternate menu.

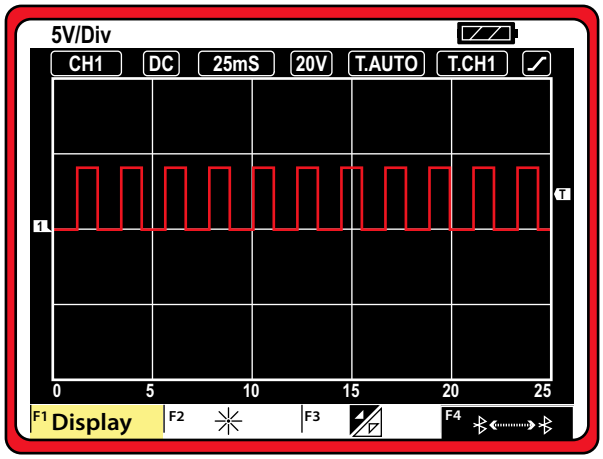


Figure 8-19 *Sample Bluetooth Discovery selected*

An alternate menu option for the F4 key is now available.

4. Press the **F4** key to activate Bluetooth Discovery.

   The F4 field on the screen switches to inverse video (white on black) when the Bluetooth Discovery mode becomes active.
5. With the Bluetooth Discovery active, turn the M2 Rotary Switch to the Remote Functions position (Figure 8-20).

   The VERDICT M2 is now ready to be paired with a Diagnostic Tool. If the radio name and the security code of the VERDICT M2 are recognized as legitimate by the Diagnostic Tool, the two devices automatically pair, bond and connect.
6. After VERDICT M2 has been successfully paired, turn the M2 Rotary Switch to the oscilloscope position.
7. Press and hold the F1 key to open the alternate menu.
8. Press the F4 key to switch off Bluetooth discovery mode.

   The F4 field on the screen switches to normal video (black on white) when the Bluetooth Discovery mode is inactive.

Once the VERDICT M2 is paired with a Diagnostic Tool, additional pairing is not necessary. Although the discovery mode has been disabled, the two-paired devices automatically seek and find each other when they are powered on. The VERDICT M2 becomes “invisible” to other Bluetooth devices whenever discovery is disabled.

8.2.8 Remote Functions

With the Rotary Switch in the Remote Functions position the VERDICT M2 attempts to communicate with a host computer. This could be either a Diagnostic Tool with which the VERDICT M2 has been paired, or one that it wants to pair to.

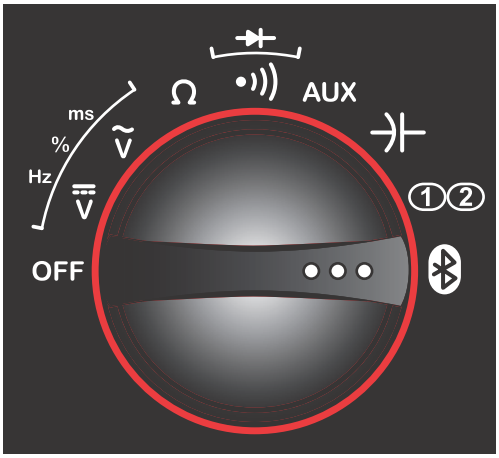


Figure 8-20 *Sample remote functions selected*

If the VERDICT M2 has been paired with a Diagnostic Tool, it automatically connects to it. Once connected to a Diagnostic Tool the front panel keys on the VERDICT M2 become inoperative. All controls of the VERDICT M2 are transferred to the host computer. Turning the Rotary Switch off of the Remote Functions position returns control to the VERDICT M2 and the front panel keys regain their functionality.

Chapter 9 Scope Multimeter Operations

When used in conjunction with the VERDICT® M2 Data Acquisition Device the Scope Multimeter module provides all the tools needed for performing electrical and electronic circuit tests and for monitoring signals and circuit activity. The Scope Multimeter works interactively with other modules. Selecting “View Meter” from a Guided Component Test or Scanner Test starts the Scope Multimeter module.

The M2 Data Acquisition Device is designed to work with the high-voltage hybrid vehicle batteries and circuits, which makes it a Measurement Category III and IV meter and raises additional safety concerns. For your safety, adhere to the safety messages posted below and those in the accompanying *Important Safety Information*.

⚠ WARNING

Risk of electrical shock.

- **This product is intended for Measurement Category III (1000V) and IV (600V).**
- **Do not exceed voltage limits between inputs as indicated on the rating label.**
- **Use extreme caution when working with circuits that have greater than 40 volts DC or 24 volts AC.**
- **Do not connect Inductive RPM Pickup, Secondary Ignition Clip-on Wire Adapter, or any other probe to a damaged or un-insulated conductors.**
- **Always wear properly rated rubber insulated gloves when required or appropriate, particularly when working with voltages exceeding 40 volts DC or 24 volts AC.**
- **Use only appropriate (Category III or IV) Snap-on components, such as test leads, scope leads and auxiliary components with meter and scope products. Do not use aftermarket “equivalents” or alternate leads of unknown origin.**
- **Use only Snap-on suggested components that are in good working order. Do not use components that show extreme wear or are visibly damaged. Make sure the components are properly rated for the task.**
- **Always examine the instrument for signs of damage before use. Do not use devices that show cracks or other defects that may allow for high voltage exposure.**

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

⚠ CAUTION

Risk of equipment or circuit damage.

- **Read the Safety Information provided for important warnings on the use of this product**
- **Disconnect test leads from any circuit being tested before changing functions. Always disconnect the live test lead before disconnecting the common test lead.**
- **Never perform resistance, diode, or polarity tests on a live circuit.**
- **Unless specifically directed by the test procedure, make sure the ignition is off before connecting or disconnecting connectors or any vehicle electrical terminals.**
- **Remove the amp probe when not in use.**
- **Do not create an electrical connection between battery terminals with a jumper wire, or your scopes and/or meters.**
- **Do not ground any electrical terminal that has or may have power.**
- **Do not allow battery gases or acid to contact tester housing.**

Improper use can cause equipment or circuit damage.

9.1 Getting Started

The Scope and Multimeter module enables the VERDICT to function as a digital multimeter (DMM), a graphing multimeter, and a 2-channel oscilloscope when the Diagnostic Tool is wirelessly linked to the Data Acquisition Device.

9.1.1 Capabilities

The following tables detail the software and hardware capabilities.

Table 9-1 *Multimeter (sheet 1 of 2)*

Function	Range	Resolution	Accuracy	Impedance/ Protection
Volts DC	40mV	0.01mV	±(1.0% of reading + 3 digits)	10M Ohm
	400mV	0.1mV		
	4V	0.001V		
	40V	0.01V		
	400V	0.1V		
	1000V	1V	±(1.5% of reading + 3 digits)	
Volts AC	400mV	0.1mV	±(1.5% of reading + 4 digits)	10M Ohm
	4V	0.001V		
	40V	0.01V		
	400V	0.1V	±(2.0% of reading + 4 digits)	
	1000V	1V		
Resistance	40 Ohm	0.01 Ohm	±(0.75% of reading + 5 digits)	600V DC or Peak AC
	400 Ohm	0.1 Ohm	±(0.5% of reading + 3 digits)	
	4k Ohm	0.001k Ohm		
	40k Ohm	0.01k Ohm		
	400k Ohm	0.1k Ohm		
	4M Ohm	0.001M Ohm	±(0.75% of reading + 5 digits)	
	40M Ohm	0.01M Ohm		
Capacitance	40nF	0.01nF	±(3.0% of reading + 15 digits)	600V DC or Peak AC
	400nF	0.1nF		
	4uF	0.001uF		
	40uF	0.01uF		
	400uF	0.1uF		
	4mF	0.001mF	±(5.0% of reading + 15 digits)	
	40mF	0.01mF		
* Test voltage.				

Table 9-1 *Multimeter (sheet 2 of 2)*

Function	Range	Resolution	Accuracy	Impedance/ Protection
Frequency	40Hz	0.01Hz	±(0.5% of reading + 2 digits)	N/A
	400Hz	0.1Hz		
	4kHz	0.001kHz		
	40kHz	0.01kHz		
	400kHz	0.1kHz		
	2MHz	0.001MHz		
Duty Cycle	0.1 — 99.9%	0.1%	N/A	N/A
Pulse Width	0.1 — 99.9%	0.1%	N/A	N/A
Diode Test	3V*	N/A	Range = 2V	N/A
Continuity	3V*	N/A	Threshold = 0.1%	N/A
* Test voltage.				

Table 9-2 *Scope*

Function	Range	Accuracy/Comments
Signal Measurement	Ch. 1—red banana jack Ch. 2—green banana jack	Each channel input is referenced to common ground input (GND—black port)
Sample Rate	20 mega samples per second	Continuous sampling, MSPS = mega samples per second
Update Rate	Real time	Real time
Sweep Rate	50 uS to 20 S	In a 5 step sequence
Band Width	2 MHz	–3 db point
Resolution	8 bit	
Coupling	AC/DC	
Input Impedance	10 MOhm	Channel 1 and 2

9.1.2 Leads and Adapters

The Scope Multimeter uses standard safety banana plugs that are compatible with many accessories. The various leads, clips, and adapters that are supplied with or available for the VERDICT M2 unit 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

The shielded red lead with an integrated probe is used for Channel 1 (Figure 9-1). The lead color matches the color of socket 1 on the Scope Multimeter and of trace 1 on the test screens.

Figure 9-1 *Red Channel 1 Lead*

Channel 2 Lead

The shielded green lead (Figure 9-2) with an integrated probe is used for Channel 2. The lead color matches the color of socket 2 on the Scope Multimeter and the color of trace 2 on the test screens.

Figure 9-2 *Green Channel 2 lead*

Common Lead

The black lead (Figure 9-3) with an integrated probe is used when a separate common, or ground, connection is needed. The lead color matches the color of the GND socket on the Scope Multimeter.

Figure 9-3 *Red Channel 4 lead*

Alligator Clips

Three insulated alligator clips that attach to the test leads are included. The insulator boots are colored to match each test lead. Alligator clips attach to the probe end of the test lead.

To install an alligator clip:

1. Remove the collar from the probe by threading it counterclockwise off of the tip (Figure 9-4). Store the collar in a safe place while not in use.

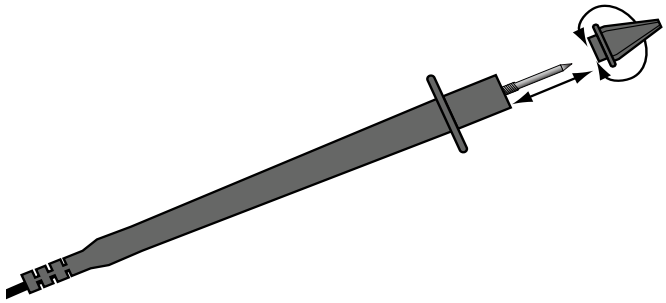


Figure 9-4 *Probe collar*

2. Fit the tip of the probe into the alligator clip and thread the clip onto the probe.

Secondary Coil Adapter Lead (optional)

The optional Secondary Coil Adapter lead (Figure 9-5) connects to the clip-on secondary wire adapter, coil-in-cap adapter or coil-on-plug adapter to display secondary waveforms.

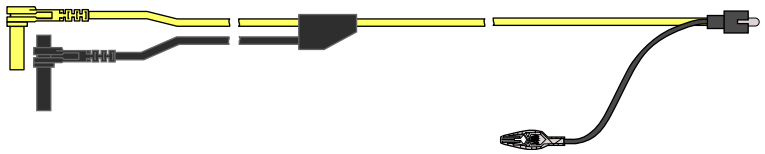


Figure 9-5 *Secondary Coil Adapter lead*

Secondary Ignition Clip-on Wire Adapter (optional)

The optional Secondary Ignition Clip-on Wire Adapter (Figure 9-6) connects the Secondary Coil Adapter lead to the vehicle Secondary wire to display ignition patterns.

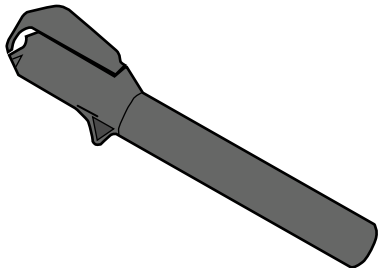


Figure 9-6 *Secondary Ignition Clip-on Wire Adapter*

Low Amp Current Probe (optional)

The optional Low Amp Current Probe (Figure 9-7) 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 9-7 *Low Amp Current Probe*

9.1.3 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.

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 13 for details.

Scope About

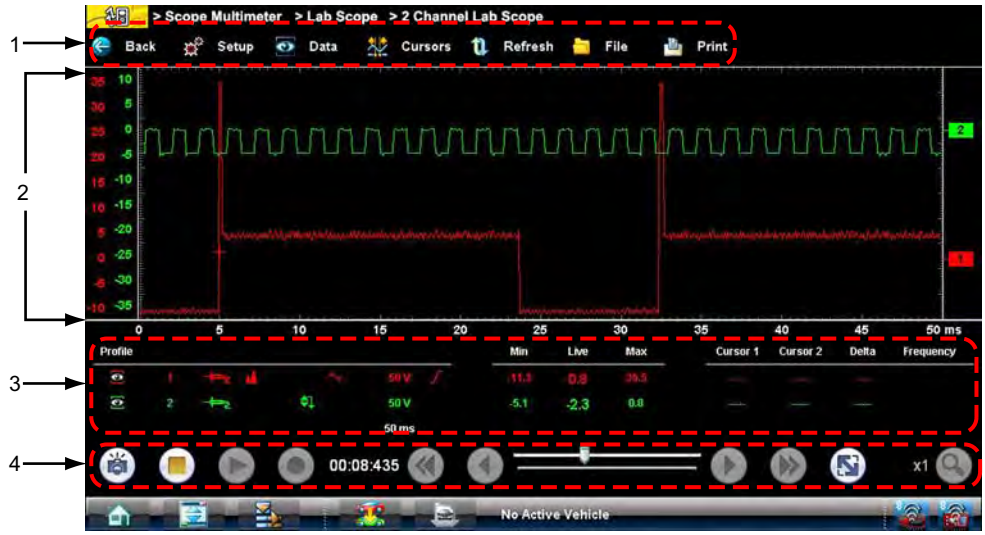
This option opens a dialog box that contains the software version and other specific details about the Scope module.

9.2 Navigation

The following section describes how to navigate the screen interface when viewing on the Diagnostic Tool. When using the Data Acquisition Device as a stand-alone test meter refer to M2 Data Acquisition Device Controls and Features on page 16 for navigation instructions.

9.2.1 Screen Layout

The scope multimeter screens typically include the following sections (Figure 9-8):



1— Scope Multimeter Toolbar—allows you to configure the tool for the type of test and to adjust the settings for each channel, or trace.

2— Main Body—displays test results. Options on the toolbar let you select how tests display on the screen.

3— Trace Details—displays trace settings, which can be adjusted or switched through the touch screen.

4— Record/Playback Control Toolbar—allows you to record and navigate paused data

Figure 9-8 *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. The table below gives brief descriptions of the control icons on the toolbar.

Table 9-3 *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 minimum and maximum digital values and updates the viewing 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.

Main Body of the Screen

The main body of the screen varies depending on what display options have been selected. Two 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.

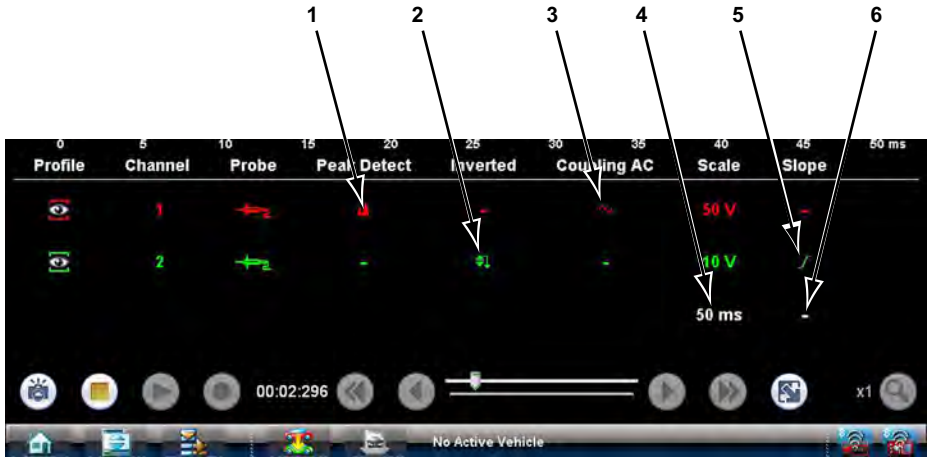
When using the pressure transducers, the pressure the transducer senses is converted into a voltage signal. However, the values are shown as pressure on the screen rather than voltage. Similarly, when using the optional Low Amp Current Probe the amperage sensed is converted to a voltage signal for processing, but displayed as amperage on the screen.

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 (fingerprint) 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 tapping the item to be changed on the touch screen. A dash (–) indicates a function that is not selected, and an icon displays to indicate an active function.



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

Figure 9-9 *Sample Touch and Grow 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 107 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.
- **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 in order 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 adjusts the sweep (see Sweep Controls on page 109 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. Tapping 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 110 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 toolbar icons (Table 9-4) to navigate the data.

Table 9-4 *Data buffer toolbar icons*

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
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 buffer
Step Forward		Moves to the next point in the recorded buffer
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		Increase or decrease the magnification of the graph

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

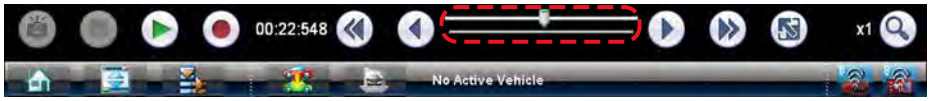


Figure 9-10 *Sample data buffer slider*

9.2.2 Making Selections

Most selections for setting up and operating the scope are made using a finger or 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 tapped with a finger or the stylus. 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.

9.3 Operations

This section describes configuring the scope or meter and performing tests.

9.3.1 Starting the Scope and Multimeter

Use the following procedure to set up the scope multimeter for performing tests.

To start the scope multimeter:

1. Select the **Scope Multimeter** icon on the VERDICT Home screen.
   The Scope Multimeter main menu, a list of setup options, displays;
   - Lab Scope
   - Graphing Multimeter
   - Digital Multimeter
   - Presets
2. Tap to select the correct main menu option for the tests to be performed.
   A submenu of scope or meter configuration displays, see below for additional information.
3. Tap to select the correct configuration for the tests to be performed.
   The Scope Multimeter displays configured for the selected test.

Lab Scope Options

The following options are available for testing:

- 2 Channel Lab Scope
- Volts DC
- Low Amps (20)
- Low Amps (40)
- Low Amps (60)
- Ignition Probe
- 100 PSI Vacuum
- 100 PSI Pressure
- 500 PSI Pressure
- 5000 PSI Pressure
- MT5030 Vacuum
- MT5030 Pressure
- EEDM506D Temperature

Graphing Multimeter Options

The following options are available for testing:

- Single Graphing Meter
- Volts DC
- Frequency
- Pulse Width
- Duty Cycle
- Low Amps (20)
- Low Amps (40)
- Low Amps (60)
- 100 PSI Vacuum
- 100 PSI Pressure
- 500 PSI Pressure
- 5000 PSI Pressure
- MT5030 Vacuum
- MT5030 Pressure
- EEDM506D Temperature

Digital Multimeter Options

The following options are available for testing:

- Volts DC
- Volts AC RMS
- Ohms
- Diode/Continuity
- Capacitance
- Low Amps (20)
- Low Amps (40)
- Low Amps (60)

Presets

Presets are factory configured meter settings for common component tests. Selecting opens a list of available setups. Selecting from the list opens the scope multimeter configured to perform the selected test. In addition to the factory presets, you can create your own custom meter configurations and save them as presets.

9.3.2 Measurement Out of Range

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

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

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

⚠ WARNING

Risk of electrical shock.

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

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

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

Correct an out-of-range condition by selecting a scale setting appropriate for the signal being sampled. See “Trace Controls” on page 107 for more information.

9.3.3 Scope and Multimeter Setup

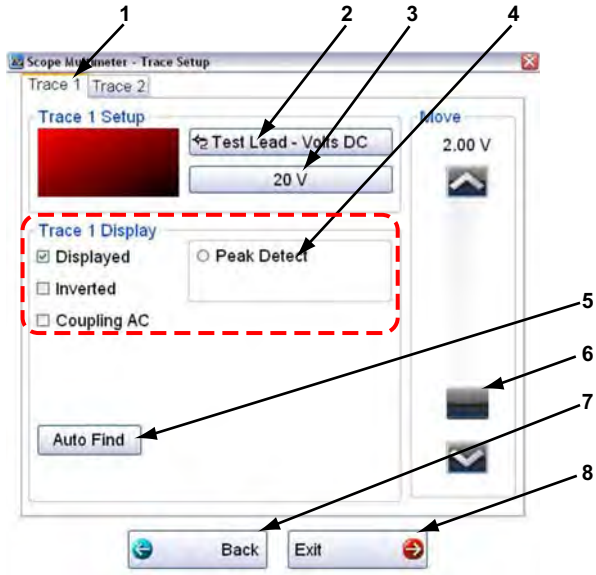
The following sections explain how to adjust the scope and multimeter for the specific type of signal being sampled. Most of these setup operations are available from the toolbar.

Trace Controls

The Traces controls are used to adjust individual characteristics of how the signal is sampled and displayed for each trace. The more commonly used trace settings can also be made from the Trace Details area of the touch screen (see Trace Details on page 102). Trace Details offers a shortcut to some of the operations described in the following sections.

To adjust trace controls:

1. Select **Setup** from the Scope Multimeter toolbar.
   The Scope Multimeter Preferences dialog box opens.
2. Double tap **Traces** to open the submenu.
3. Select the tab for the trace to be configured from the submenu
   The traces dialog box displays (Figure 9-11).



1— Trace tabs
2— Trace Probe icon
3— Trace Scale icon
4— Trace characteristics check boxes
5— Auto Find icon
6— Baseline position
7— Back icon
8— Exit icon

Figure 9-11 *Traces dialog box*

4. Select the **Trace Probe** icon to open the menu.
5. Highlight a probe on the list and tap **OK** to close the window.
6. Select the **Trace Scale** icon to adjust the vertical scale, of the display.

   A dropdown menu opens, menu options vary depending upon which test lead is selected.
7. Select a trace scale option, then close the window.
8. Select or deselect the trace characteristic items as needed:
   - **Displayed**—this trace is on screen when checked, and not visible when not checked.
   - **Inverted**—signal polarity is reversed when checked, normal when not checked.
   - **Coupling AC**—check when sampling an AC signal, do not check for DC signals.
   - **Peak Detect**—use when trying to capture a fast event or signal glitch.
9. The scope samples the signal and internally calculates the best way to display it when **Auto Find** is selected. A scale and the vertical position for the zero line of the trace that allows the whole waveform to fit on the screen is established when Auto Find is selected. If Auto Find is selected on the trigger channel, it also sets the trigger level halfway between the minimum and maximum value of the sampled signal to provide a stable waveform.
10. The baseline position is the zero line of the trace, use the slider and arrows to adjust it.
11. Select **Back** to return to the Preferences dialog box, or select **Exit** to close the dialog box and return to the scope.

Sweep Controls

Sweep is the amount of time represented by the screen, or the horizontal scale of the display.

To adjust Sweep controls:

1. Select **Setup** from the Scope Multimeter toolbar.
   The Scope Multimeter Preferences dialog box opens.
2. Tap **Sweep** to open the sweep dialog box (Figure 9-12)

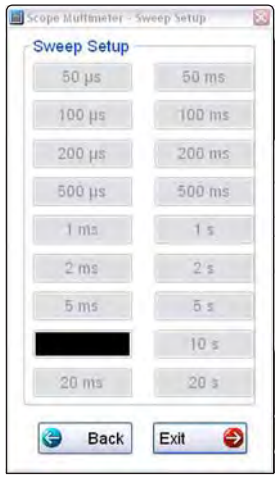


Figure 9-12 *Sample Sweep Setup dialog box*

3. Choose an option from the list.
4. Select **Back** to return to the Preferences dialog box, or select **Exit** to close the dialog box and return to the scope.

Trigger Controls

Triggering allows you to set the scope so that it begins displaying a trace once predetermined signal conditions, or triggers, are met. Triggering produces a much more stable waveform. The trace always begins at the trigger point, so the image does not appear to flicker or drift as it updates. There are three modes of triggering:

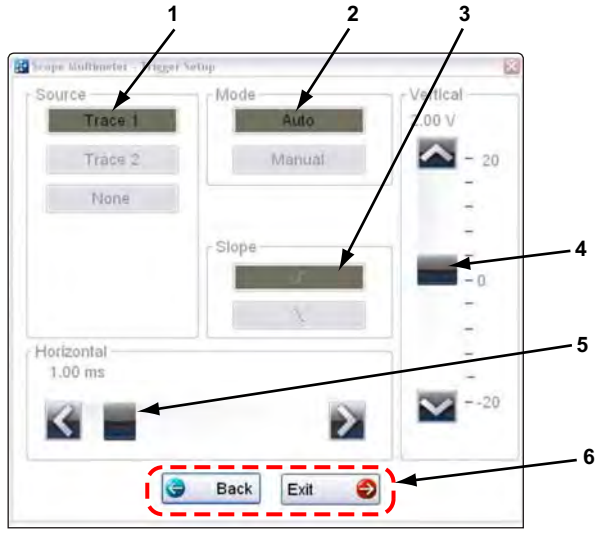
- Auto—this automatic triggering mode is the default setting that either constructs the trace independently of the trigger point or begins the trace as it crosses the trigger.
- Manual—often called normal mode, this option allows the user to set a triggering point and the trace does not begin to display until the signal reaches the trigger point.
- None—often called Histogram, this is a “no triggering” mode that is automatically engaged whenever a timebase, or sweep, between 2 seconds and 20 seconds is selected. *Triggering is prevented at slower sweep rates to eliminate screen update delays caused by the way VERDICT buffers data in order to capture rapidly occurring signal glitches.*

The trigger point is indicated by a plus sign (+) on the scope grid. The plus sign can be dragged across the grid with your finger or the stylus to roughly position it. The trigger controls allow you to precisely position the trigger.

To adjust trigger controls:

1. Select **Setup** from the Scope Multimeter toolbar.

   The Scope Multimeter Preferences dialog box opens
2. Tap **Trigger** to open the Trigger Setup dialog box (Figure 9-13).
3. Use the dialog box controls to establish the position for triggering.
4. Select **Back** to return to the Preferences dialog box, or select **Exit** to close the dialog box and return to the scope.



1— Source—selects the triggering event:

- Trace 1—sets the trigger to channel 1.
- Trace 2—sets the trigger to channel 2.
- None—switches triggering off.

2— Mode—sets the method of triggering:

- Auto (automatic)—if a trigger is found, the waveform displays. If a trigger is not found after about a half second, the waveform and a “trigger not found” message displays.

- Manual—if a trigger is found, the waveform displays. If a trigger is not found nothing displays (no waveform and no message).

3— Slope—sets triggering to the rising or falling edge of the signal.

4— Vertical position—moves the trigger position up and down on the grid.

5— Horizontal position—moves the trigger timing left and right on the grid

6— Select **Back** to return to the Preferences dialog box, or select **Exit** to close the dialog box and return to the scope.

Figure 9-13 *Trigger controls*

View Controls

Use the view controls to set display attributes.

To adjust view controls:

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

Display Settings

Selecting **Display** from the View submenu opens the Display dialog box (Figure 9-14).

Figure 9-14 *Sample Display dialog box*

NOTE:
The tabs on the view setup dialog box allow you to quickly switch between the three available settings without exiting back to the preferences menu.

The following options are available from the Display dialog box:

- **Show Grid**—switches grid lines on the screen off and on.
- **Invert Colors**—switches the screen background to white.

Layout Settings

The selected radio knob on the Layout dialog box shows which setting is active:

- **1 window**—shows all traces on the same screen.
- **2 windows**—shows two separate horizontal traces, one below the other.
- **2 windows**—shows two separate vertical traces, side-by-side.

Unit Settings

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

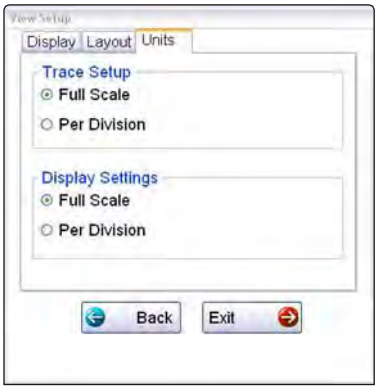


Figure 9-15 *Sample View Units dialog box*

A radio knob shows which setting is active on the Units dialog box, tap to change (Figure 9-15).

Setup Controls

Basic tool settings are adjusted here.

To adjust setup controls:

1. Select **Setup** from the Scope Multimeter toolbar.
2. When the Scope Multimeter Preferences dialog box opens, select **Setup**.
   A submenu of options displays. Selecting from the submenu opens a dialog box for that item.
3. Make dialog box selections as needed.
4. Select **Back** to return to Preferences, or select **Exit** to return to the scope.

Unit Setup

The units of measurement can be changed between US standard or metric units of measure for pressure and vacuum readings. Selecting Units opens the Setup dialog box (Figure 9-16).

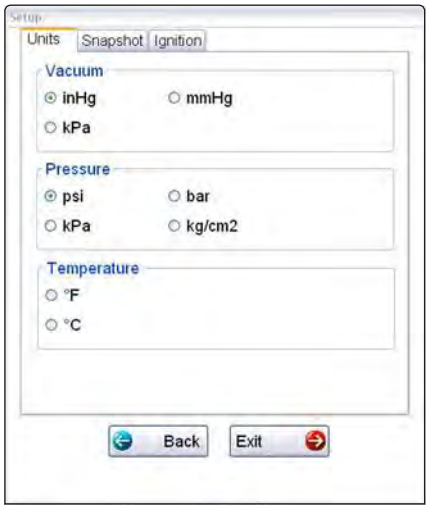


Figure 9-16 *Sample Setup Units dialog box*

Snapshot

The Snapshot tab of the Setup dialog box opens a window that allows you to select how much data is captured after a snapshot is triggered (Figure 9-17).

Selections range from ten to ninety percent in increments of ten, the current setting is highlighted. Select a icon, then select **OK** to close the dialog box.

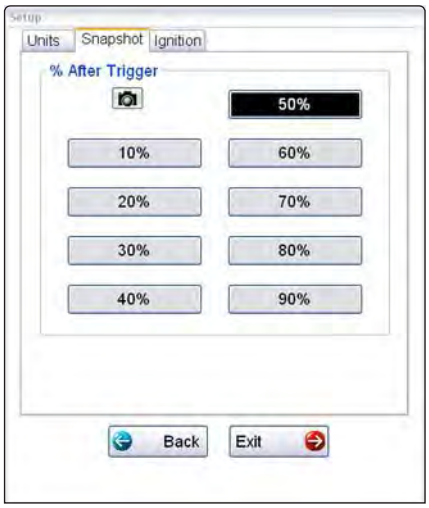
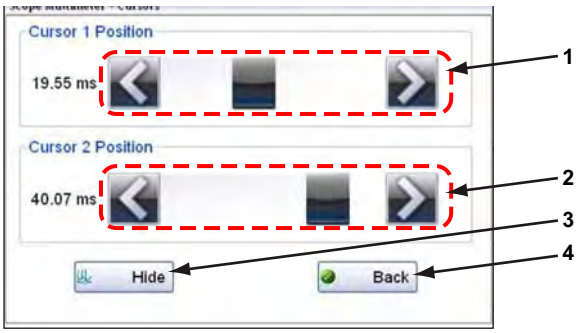


Figure 9-17 *Sample Snapshot dialog box*

Refer to Trigger Controls on page 110 for information on how to setup a trigger.

Cursor Controls

The cursor controls include a Show Cursors check box plus a slide control and arrows for moving the cursor position left or right. Select **Cursors** from the toolbar to open the Cursors dialog box (Figure 9-18).



1— Cursor 1 controls
2— Cursor 2 controls
3— Hide icon
4— Back icon

Figure 9-18 *Cursor controls*

Cursor 1, the top slider and arrows, is the left-hand cursor on the screen. Cursor 2, the lower set of controls, is the right-hand cursor on the screen. Drag the slider or tap the arrows to position the cursors. Each tap of the stylus moves the cursor incrementally in the direction of the arrow.

Select **Back** apply the changes and close the dialog box.

Select **Hide** to conceal the cursors and close the dialog box.

Refresh Controls

Selecting the **Refresh** icon from the Scope Multimeter Toolbar clears the minimum and maximum digital values and updates the viewing screen.

File Controls

Selecting **File** from the toolbar opens a window with a menu of save options:

- **Save Configuration**—saves the current setup values as a preset.
- **Save Single Frame**—saves the data currently on the screen only.
- **Save All Frames**—saves the current screen plus all the data stored in the buffer.

Selecting a menu option opens the Save As dialog box and the virtual keyboard. Follow the screen prompts to name and describe the file you are saving. Basic information from the Vehicle ID, such as year, make, and model, is saved along with the file. Select **OK** to close the dialog box.

Once a configuration is saved, it becomes available as a preset. Files are saved to the Scope Multimeter Data Folder and can be retrieved through the **Data Manager**.

Print Controls

Selecting Print from the toolbar opens a standard Windows Print dialog box set up to print the current screen. A printer must be connected and setup on the VERDICT Diagnostic Tool. If not, the “Add Printer Wizard” opens and guides you through the procedure. Select from the menus as needed.

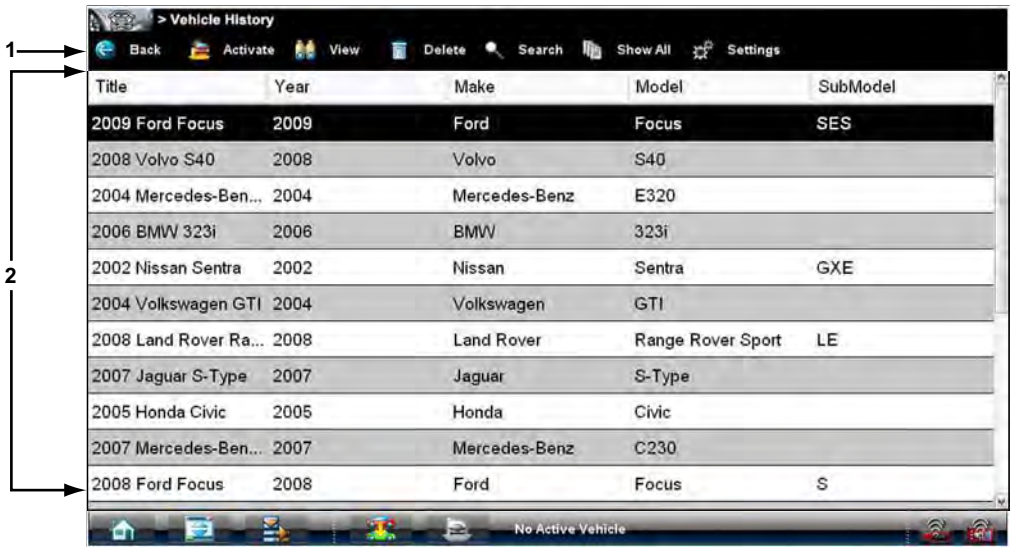
Chapter 10 Vehicle History Operations

Vehicle History refers to any work in progress, such as a repair order, estimate or invoice, that has customer, vehicle, and repair information for a vehicle in your shop. The Vehicle History is the starting point for using the VERDICT® system.

The Scanner and Guided Component Test software gets vehicle information from the Vehicle History, and can only start after a Vehicle History is opened.

10.1 Screen Layout

There are two main parts to the Vehicle History screen:



1— Vehicle History Toolbar—lets you manage the vehicle data

2— Main Body—lists all open Vehicle History records

Figure 10-1 *Sample Vehicle History screen*

10.1.1 Vehicle History Main Body

The main body of the screen lists all of the available Vehicle History items. By default, items are shown in the order in which they are entered. However, you can resort them by any of the categories shown as column headings. You can also resize the individual columns.

To sort Vehicle History items:

1. Tap a category heading.

   The listed items resort according to the selected category. A triangle appears alongside the name of the column that was used for the sort.
2. Select the triangle in the heading to reverse the sort order.

To resize a Vehicle History column:

1. Touch the line separating two columns.

   A line with arrowheads appears to show the column is ready for resizing.
2. Drag the line left or right to increase or decrease the column width.

10.1.2 Vehicle History Toolbar

The table below gives brief descriptions of the control icons on the toolbar:

Table 10-1 *Toolbar icons*

Name	Icon	Description
Back		Returns to the previously viewed screen.
Activate		Loads the highlighted vehicle history.
View		Opens the worksheet for the currently highlighted vehicle history.
Delete		Erases the currently highlighted vehicle history.
Search		Opens a window that allows you to locate a particular vehicle history.
Show All		Available only after a search, use to return to a complete Vehicle History list.
Settings		Opens a window that allows you configure which fields display on main Vehicle History screen.

Activate

Use this icon to load an existing vehicle history when servicing a vehicle that you have previously worked on. VERDICT uses the identification characteristics stored in the vehicle history to load the correct database, so you do not need to identify the vehicle to begin testing.

To activate a vehicle:

1. Locate and highlight the desired Vehicle History in the main body of the screen.
2. Tap **Activate** on the Vehicle History toolbar.

   The Activate icon is removed from the toolbar once a vehicle has been selected.
3. Tap the **Home** icon on the VERDICT toolbar.

   The VERDICT Home screen displays and with the activated vehicle shown on the toolbar.
4. Select any Function Icon on the Home screen to begin testing.

View

Use this selection to open, edit, add notes, and print the work sheet for an existing Vehicle History.

To modify an existing Vehicle History:

1. Highlight the Vehicle History be opened in the main body of the screen.
2. Tap **View** on the Vehicle History toolbar.

   The worksheet for the selected vehicle opens, and there are now Back and Save & Close icons available on the toolbar.

Figure 10-2 *Sample vehicle history worksheet*

NOTE:
The virtual keyboard automatically opens the first time you touch within one of the data fields.

3. Use the virtual keyboard to enter information in the data fields.
4. Tap **Save & Close** on the toolbar to save the changes you made and return to the Vehicle History screen.

   Use the **Back** icon on the toolbar to return to the Vehicle History screen without saving the changes you made.

Delete

Use the Delete icon to remove unwanted items from the Vehicle History list. Simply highlight the item to remove, then select **Delete**.

Search and Show All

Selecting Search opens a dialog box that allows you to search Vehicle History items by category. You can search for data in the following categories:

- Year
- Make
- Model
- Color
- Customer
- License
- State
- Technician

To search:

1. Tap **Search** on the Vehicle History toolbar to open the search window.
2. Tap within the text field of the search window to open the virtual keyboard (Figure 10-3).

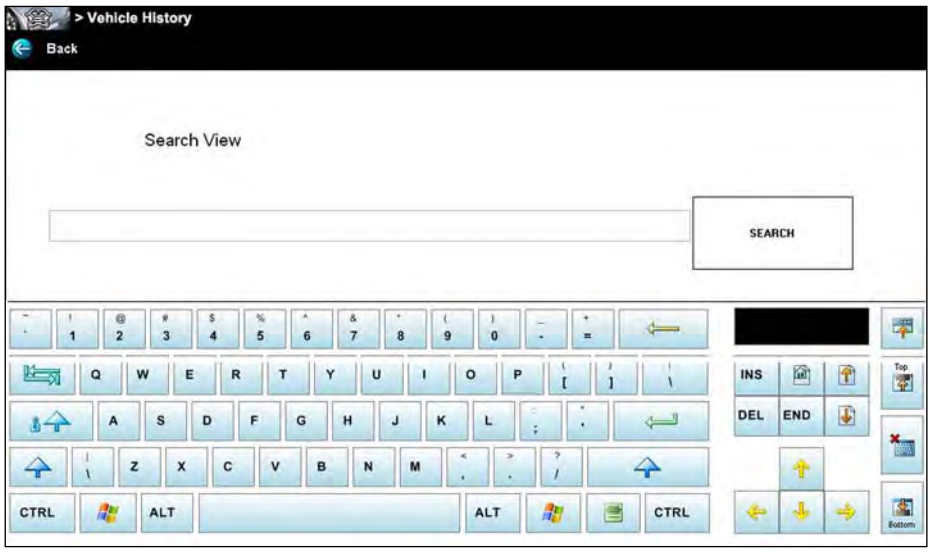


Figure 10-3 *Sample Search dialog box*

3. Enter the search criteria using the keyboard. There is no need to identify the category, just enter the search item.
4. Tap **Search** twice. The first tap closes the keyboard, the second tap starts the search.

   The display returns to the Vehicle History screen with only the records fitting the search criteria showing.
5. Tap **Show All** on the toolbar to restore the complete Vehicle History list.

Settings

Use Settings to determine which categories of information display in the main body of the Vehicle History screen. Selecting the Settings icon opens a dialog box.

To change Settings:

1. Tap **Settings** on the Vehicle History toolbar to open the dialog box.

Figure 10-4 *Sample Settings dialog box.*

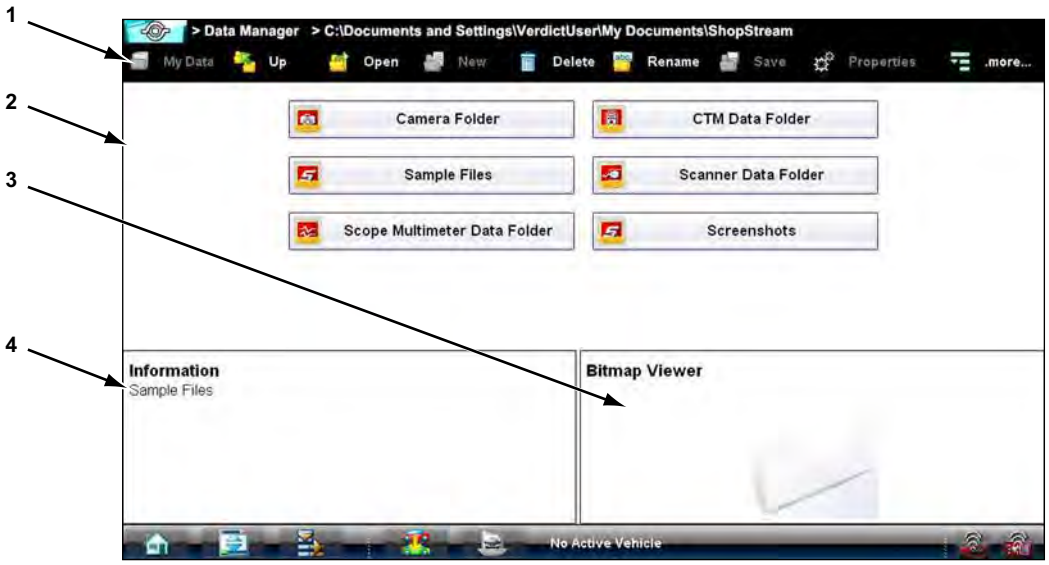
2. Tap to highlight the categories that you do not want to display on the main screen, remember:
   - Items that are highlighted do not display
   - Items that are not highlighted display
3. Select **OK** on the toolbar to implement the changes, select **Cancel** to disregard the changes. The dialog box closes and the screen updates:

Chapter 11 Data Manager Operations

The Data Manager module is used to store, sort, and review saved files. Most operations are controlled through the toolbar.

11.1 Screen Layout

Select **Data Manager** on the Module toolbar to open the file system. Use the toolbar at the top of the screen to navigate through the data. The folders panel below the toolbar displays the contents of the Windows “My Documents” folder, which is the Data Manager main screen. The information panel on the lower-left portion of the screen shows a summary of the saved file when available, and the preview panel on the lower right displays an image if the selected file is a graphic.



1— Data Manager Toolbar

2— Folders Panel

3— Preview Panel

4— Information Panel

Figure 11-1 *Sample Data Manager main screen*

The main screen includes folders for saved files from the various VERDICT® modules:

- Camera Folder—contains photographs taken with the built-in camera.
- CTM Data Folder—contains files saved while working in the Guided Component Test module.
- Sample Files—contains an assortment of example saved data files.
- Scanner Data Folder—contains files saved while working in the Scan Module.
- Scope Multimeter Data Folder—contains files saved while working with the Scope Multimeter.
- Screenshots—contains images saved by pressing the “S” button.

11.2 Navigation

Use the toolbar icons are shown in the table below to navigate through the Data Manager:

Table 11-1 *Data Manager toolbar icons*

Name	Icon	Description
My Data		Returns to the Data Manager main screen.
Up		Moves the items displayed in the folders panel up one level in the file structure.
Open		Opens the highlighted folder or file.
New		Creates a new folder.
Delete		Moves the highlighted file or folder to the recycling bin.
Rename		Opens a dialog box and virtual keyboard for renaming the selected file or folder.
Save		Saves the selected file.
Properties		Opens a dialog box and virtual keyboard for renaming the selected file or folder.
More		Opens a menu of additional options.

11.3 Operations

Data Manager operations based on toolbar selections are explained in the following sections.

11.3.1 My Data

The My Data icon is a shortcut that quickly returns you to the main Data Manager screen. Tap the icon at any time to instantly return. Note the location of the page being viewed is shown near the top of the screen just above the toolbar.

11.3.2 Up

This icon reflects the items shown in the folders panel of the screen up in the file structure one level at a time. For example; one tap of the Up icon when viewing the contents of the Scanner Data Folder returns you to the main screen. A second tap would display the contents of the “My Documents” folder.

11.3.3 Open

The Open icon is only active (displays in color) when an item in the folders panel is highlighted.

To open a folder:

1. Highlight the file to open in the folders panel.
2. Tap the **Open** icon to load the highlighted file.

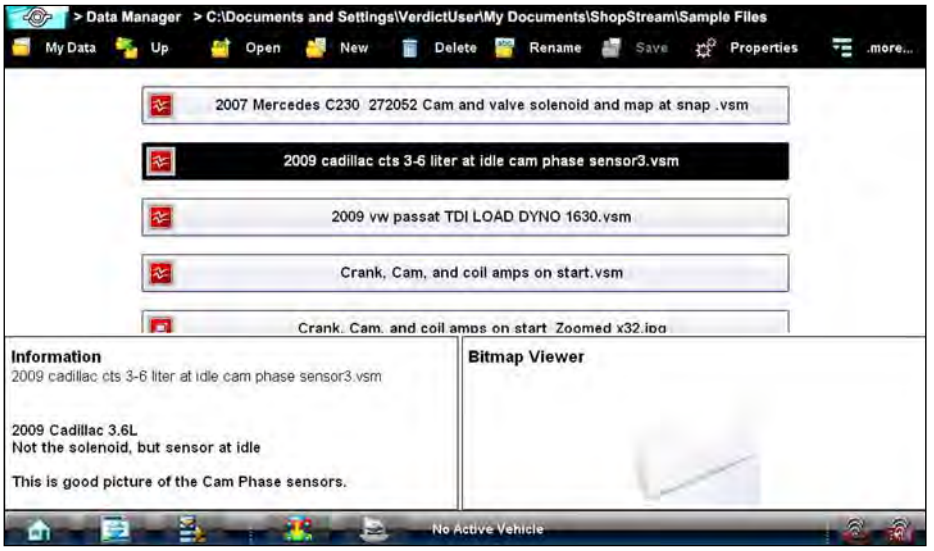


Figure 11-2 *Sample open folder showing information*

The screen advances and the contents of the open folder are shown in folders panel. Highlight an item in the folders panel and the information or preview displays if available (Figure 11-2).

3. To exit the current folder:
   - Tap **My Data** on the toolbar to return to the main Data Manager screen.
   - Tap **Up** on the toolbar to return to the previous page.

11.3.4 New

The New icon allows you to create a new folder. This option is only available when the icon displays in color.

To create a new folder:

1. Tap the **New** icon on the toolbar.
   The New Folder Name dialog box opens (Figure 11-3).
2. Touch the entry field on the dialog box to open the virtual keyboard.
3. Type a name for the new folder using the virtual keyboard.
4. Tap the **OK** icon to create the new folder and return to the previous page. The **Cancel** icon returns you to the previous page without creating a new folder.

Figure 11-3 *Sample New Folder name dialog box*

11.3.5 Delete

The Delete icon moves folders or items within folders to the Recycling bin. A confirmation displays when a file is selected for deletion. Select **Yes** to delete the file or **Cancel** to exit.

To delete an item:

1. Touch to highlight the item or folder to be deleted.
2. Tap the **Delete** icon on the toolbar.
   A confirmation message displays (Figure 11-4).

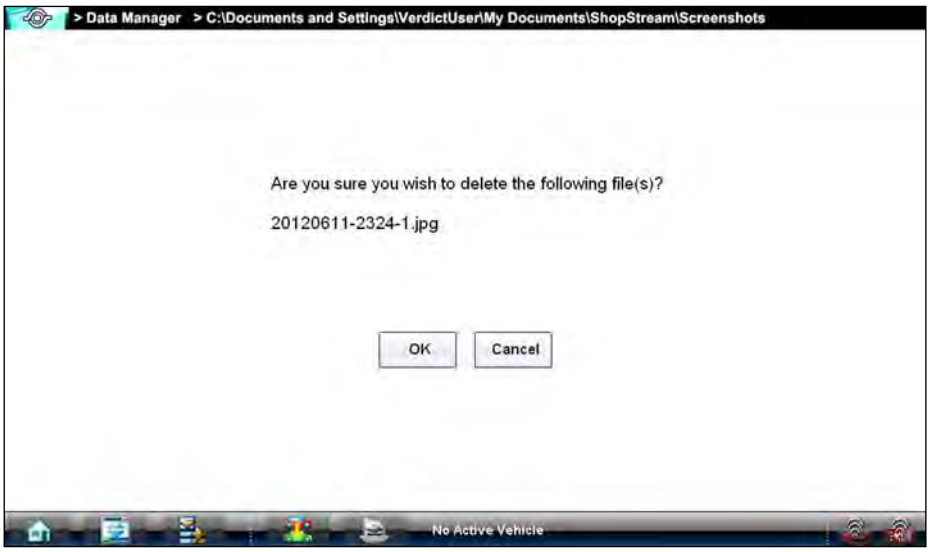


Figure 11-4 *Sample delete confirmation message*

3. Tap **OK** to delete the selected item and return to the previous page. The **Cancel** icon returns you to the previous page without deleting the selected item.

11.3.6 Rename

The Rename icon allows you to change the name of a folder or items within a folder.

To rename an item:

1. Touch to highlight the item or folder to be renamed.
2. Tap the **Rename** icon on the toolbar.
   The New Name dialog box opens (Figure 11-3).

Figure 11-5 *Sample new name dialog box*

3. Touch the entry field on the dialog box to open the virtual keyboard.
4. Type the new name into the entry field using the virtual keyboard.
5. Tap the **OK** icon to change the name and return to the previous page. The **Cancel** icon returns you to the previous page without changing the name.

11.3.7 Save

The Save icon is not implemented at this time.

11.3.8 Properties

The Properties icon function allows you to change the name and assign identifying attributes to saved Scope Multimeter files. Operation is similar to renaming a file as discussed above, except there are additional fields for entering descriptive information.

To assign properties to an item:

1. Highlight the item or folder.
2. Tap the **Properties** icon on the toolbar.
   The Properties dialog box and the virtual keyboard open (Figure 11-3).

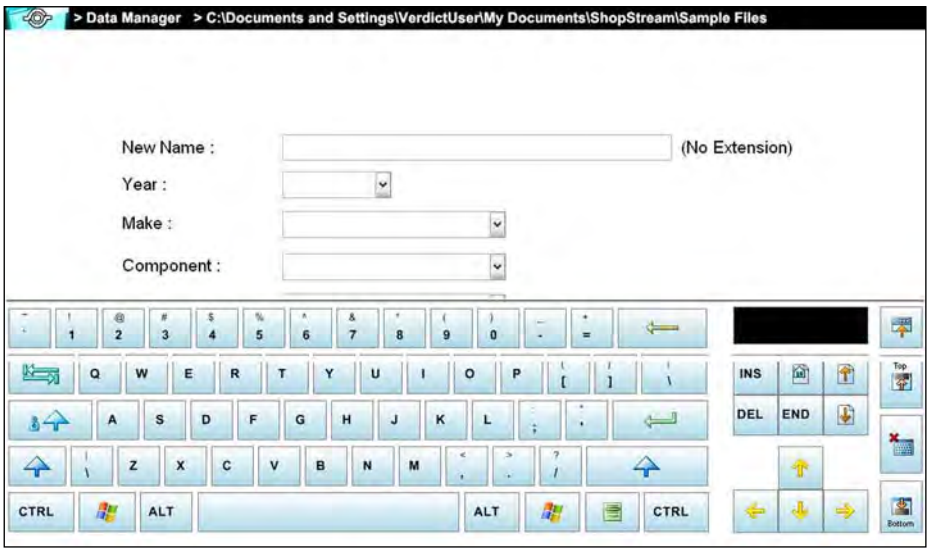


Figure 11-6 *Sample Properties dialog box*

3. Type a new name into the field using the virtual keyboard if you want to rename the file.
4. Use either the virtual keyboard or the dropdown menus to fill in the Year, Make, Component, and Condition fields.
5. Tap the **OK** icon to change the name and return to the previous page. The Cancel icon returns you to the previous page without changing the name.

11.3.9 More

Selecting the More icon opens a dropdown menu with two options:

- Shortcut—creates a shortcut to the highlighted item on the Data Manager main screen. A confirmation message displays when this option is selected.
- Email—opens a new e-mail message with the selected file attached. The Diagnostic Tool must have an active e-mail account to use this feature.

11.4 Saved File Structure

The Diagnostic Suite automatically creates folders to manage saved files. Whenever 60 files are saved into any of the Data Manager menu option folders, a new folder is created. Folders may contain files for a day, week, month, or a year. An Older folder, when available, goes to the next higher level in the files structure menu (Figure 11-7).

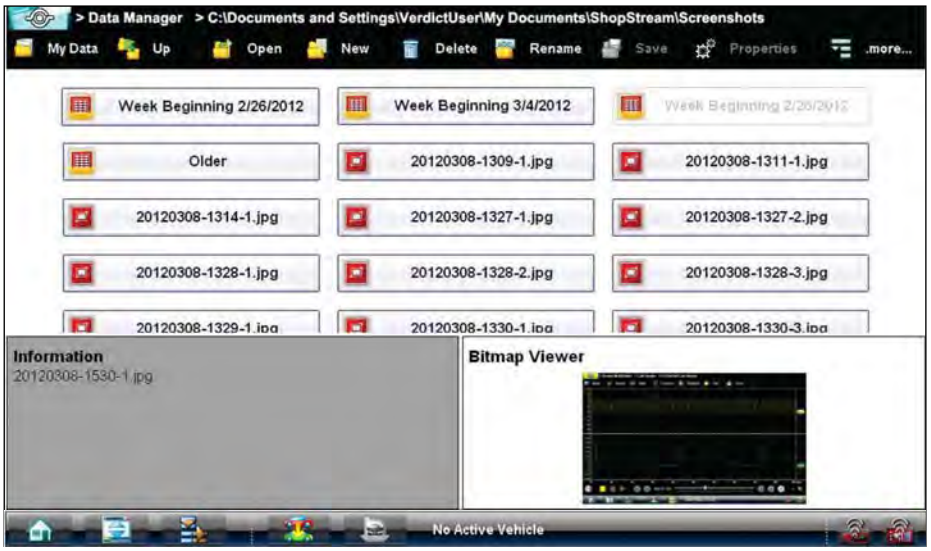


Figure 11-7 *Sample saved file folder structure*

Chapter 12 Help Operations

Selecting **Help** from the Home screen opens this manual in a dedicated screen viewer. Navigate through the file either by gesture scrolling on the touch screen, or with the scroll bar along the right edge of the viewing screen. A left-to-right scroll bar appears at the bottom of the screen when magnification is increased.

All listings in the Contents and Index are active links. Tap an entry with the stylus to go directly to that point of the document. Additional links within the text, shown in blue-colored type, also take you to the referenced section of the manual.

12.1 Using the Help Toolbar

A simple toolbar at the top of the screen is used to adjust screen magnification and to exit Help:

Table 12-1 *Help toolbar icons (sheet 1 of 2)*

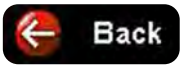
Name	Icon	Description
Back		Closes the help file and returns you to the previously viewed screen.
Zoom +		Incrementally increases the screen magnification.
Zoom –		Incrementally decreases the screen magnification.
Reset		Restores the default screen magnification.
Previous Page		Moves back one page in the document.
Page Counter		Shows the current page over the total number of pages in the document.
Next Page		Moves forward one page in the document.
More		Opens a menu of the additional options shown below.

Table 12-1 *Help toolbar icons (sheet 2 of 2)*

Name	Icon	Description
	Hide TOC	
		Closes the contents and search column so the document fills the screen.
	Show TOC	
		Opens the contents and search column if they have been hidden.
Exit		Closes the help file, and any other open modules, and returns you to the Home screen.

Chapter 13 System Settings Operations

Selecting System Settings from the Home screen opens a menu with two options:

- Paired Devices
- Shop Information

Paired Devices allows you to check the status of and to pair wireless devices, such as the Scan Module, to the Diagnostic Tool. Shop Information allows you to create and edit a personalized header that is included on printed documents.

13.1 Paired Devices

The Scan Module is connected wireless to the Diagnostic Tool so data is readily available while working anywhere on the vehicle. The M2 Data Acquisition Device is connected wireless to the Diagnostic Tool so underhood circuits can be monitored while driving. In order to do this, the modules need to be paired, or synchronized, the first time they are used together. Information about paired modules can be found by selecting System Settings from the Home screen.

To check paired module details:

1. Tap the **System Settings** icon on the Home screen.
2. Tap the **Paired Devices** option on the menu.
   The paired devices screen opens (Figure 13-1).

Figure 13-1 *Sample Paired Devices screen*

The Paired Devices screen shows the type and a partial serial number for all of the modules synchronized to the Diagnostic Tool, and whether or not there is an active communications link between the units.

The Hardware Status indicators in the lower-right corner of the Home screen provides a quick reference of which modules have been paired to the Diagnostic Tool, and whether or not they are communicating (Table 13-1):

Table 13-1 *Hardware Status indicators*

Module	Not Paired	Paired	Communicating
Scan Module			
Scope Multimeter			

13.1.1 Pairing the Scan Module

The Scan Module needs to be either connected to a vehicle or connected to a powered USB port so that it is powered up during the synchronization procedure. Make sure the VERDICT® Diagnostic Tool has a charged battery or is connected to an AC power supply.

To pair the Scanner with the Diagnostic Tool:

1. Turn on the VERDICT Diagnostic Tool.
2. Connect the 26-pin end of the data cable to the Scanner data cable port.
3. Connect the 16-pin end of the data cable to a live vehicle data link connector (DLC).
   The green vehicle power LED should be illuminated.
4. Tap the **System Settings** icon on the Home screen of the Diagnostic Tool.
5. Select **Paired Devices** from the menu.
6. From the Paired Devices screen select **Add** from the toolbar.
7. When prompted select **OK** from the toolbar.
   The Diagnostic Tool searches for compatible wireless devices, then displays the results. The Scan Module is listed as “VERDICT S3-” plus a partial serial number (Figure 13-2).

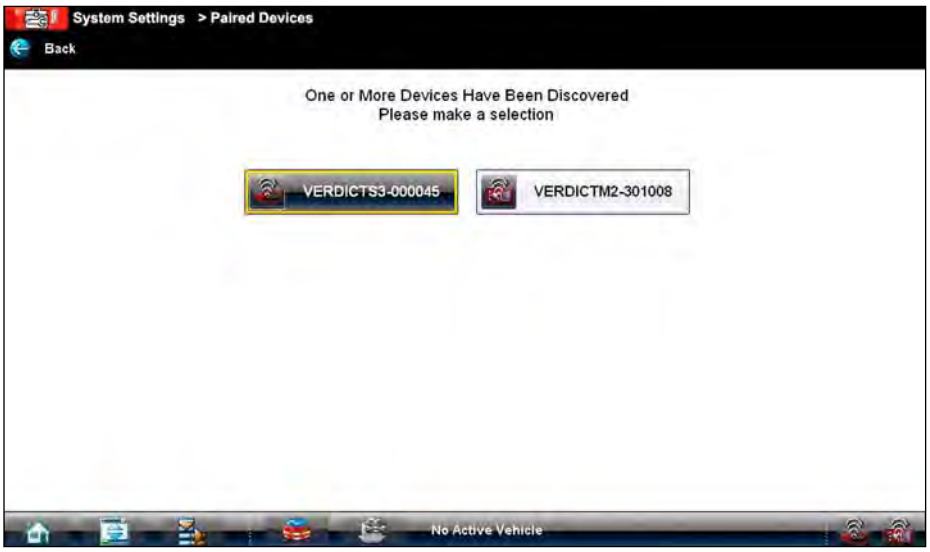


Figure 13-2 *Sample Scan Module selection*

8. Tap to select the Scan Module from the search results list.

   A search in progress message displays during the pairing procedure (Figure 13-3), the Paired Devices screen (Figure 13-1) displays once the procedure completes.

Figure 13-3 *Sample pairing in progress message*

9. Tap the **Home** icon on the VERDICT toolbar to return to the Home screen.
10. Disconnect the data cable from the vehicle.

The Scanner and Diagnostic Tools are now synchronized for wireless communication and should automatically recognize each other when both are powered up.

13.1.2 Pairing the M2 Data Acquisition Device

Make sure the M2 Data Acquisition Device and the D7 Diagnostic Tool have charged batteries, or are connected to an AC power supply.

To pair the Data Acquisition Device with the Diagnostic Tool:

1. Turn on the VERDICT Diagnostic Tool.
2. Set the M2 rotary switch to the **Remote Functions** position (Figure 13-4).

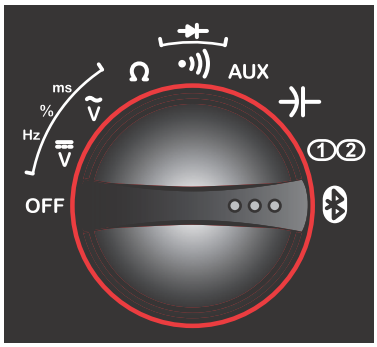


Figure 13-4 *Rotary switch Remote functions setting*

3. Tap the **System Settings** icon on the Home screen of the Diagnostic Tool.
4. Select **Paired Devices** from the menu.
5. From the Paired Devices menu select **Add** from the toolbar.
6. When prompted select **OK** from the toolbar.

   The Diagnostic Tool searches for compatible wireless devices, then displays the results. The Data Acquisition Device is listed as “VERDICT M2-” plus six digits of the unit’s serial number.
7. Tap to select the Data Acquisition Device from the search results list (Figure 13-5).

Figure 13-5 *Sample Data Acquisition Device selection*

An in progress message displays during the pairing procedure, which takes several seconds. The Paired Devices screen displays once the procedure completes (Figure 13-6).

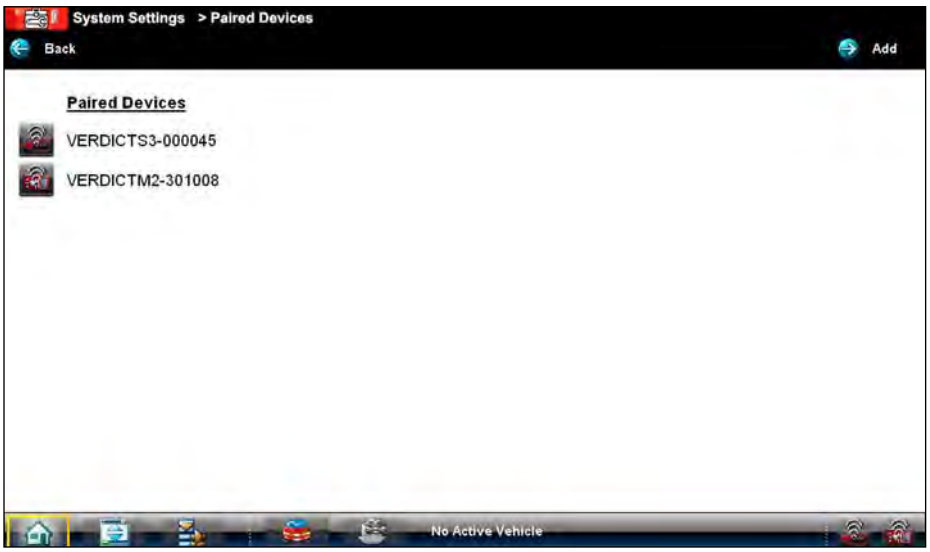


Figure 13-6 *Sample Paired Devices screen*

8. Tap the **Home** icon on the VERDICT toolbar to return to the Home screen.

13.2 Shop Information

This option allows you to add personalized shop information that can be included on printed data files. Selecting opens a form that can be filled in using the virtual keyboard. Select **OK** when the form is complete and the information is saved.

To add Shop Information:

1. From the Home screen select **System Settings**.
2. From the System Settings menu select **Shop Information**.
   The Shop Information dialog box opens (Figure 13-7).

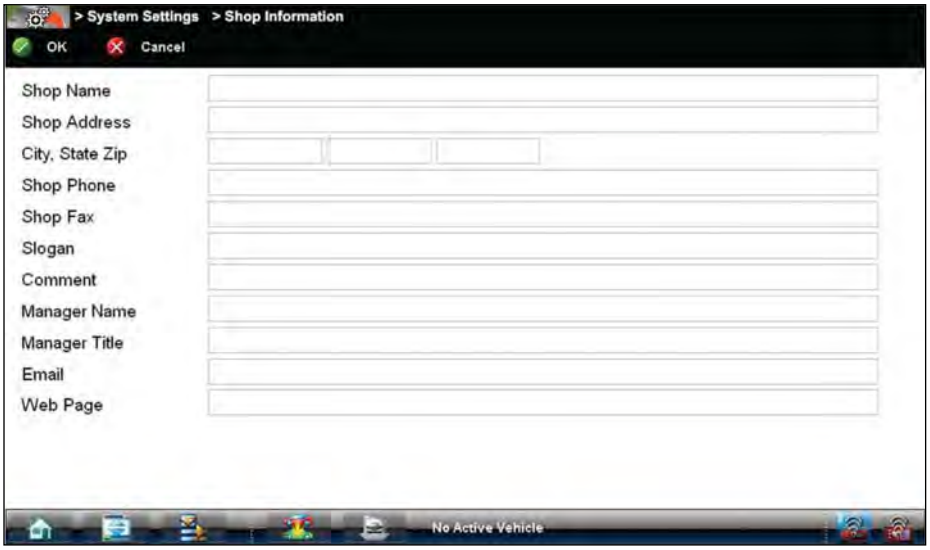


Figure 13-7 *Sample Shop Information dialog box*

3. Tap within any of the information fields and the virtual keyboard opens.
4. Use the virtual keyboard to fill in the Shop Information form.
   As an alternative, you can connect a USB keyboard to a USB port on the Diagnostic Tool and use it to enter information into the form.

NOTE:
The screen does not scroll. Use the Top and Bottom icons on the right side of the virtual keyboard relocate the keyboard on the screen so that you can complete the form (Figure 13-8).

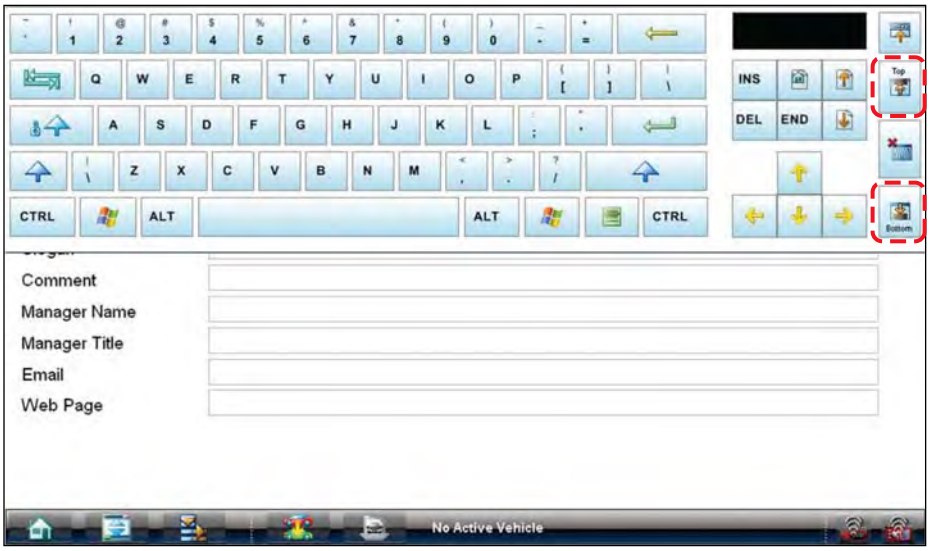


Figure 13-8 *Virtual keyboard Top and Bottom icons*

5. Close the virtual keyboard and review the information once all the fields have been filled in.
6. Select **OK** from the toolbar to save the Shop Information, or **Cancel** to close the Shop Information dialog box without saving.

   The Shop Information screen closes and the screen returns to the System Settings menu.

Chapter 14 Maintenance

This section covers how to care for your VERDICT® Diagnostic Tool components.

14.1 D7 Diagnostic Tool

This section covers how to care for your D7 Diagnostic Tool.

14.1.1 Cleaning the Touch Screen

The touch screen can be cleaned with a soft cloth and alcohol or a mild window cleaner.

IMPORTANT:
Do not use any abrasive cleansers or automotive chemicals on the touch screen.

14.1.2 Calibrating the Touch Screen

The touch screen can be calibrated for accuracy using the PenMount (PM) utility of the Diagnostic Tool.

To calibrate the touch screen:

1. From the Windows toolbar select **Start** > **PenMount Control Panel**.

Figure 14-1 *Starting the calibration program*

2. In the PM Control Panel; highlight the **PenMount 6000 RS232** and select **Configure**.
3. Select one of two calibration options:

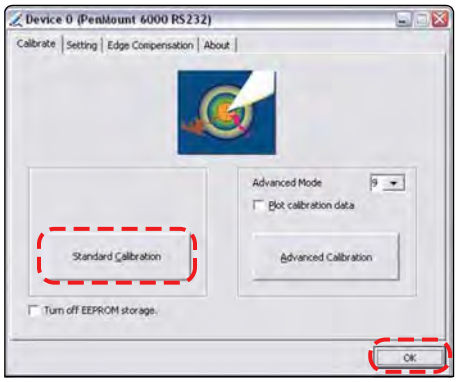


Figure 14-2 *Selecting a calibration option*

- **Automatic**—uses 5 points on the screen to quickly bring the Diagnostic Tool into calibration. You can use your finger to calibrate the screen.
- **Advanced**—uses 9, 16, or 25 points on the screen to accurately bring the Diagnostic Tool into calibration. Use the dropdown menu to select the number of points, a stylus is required to calibrate the screen.

4. Touch and hold the center of each red box that displays in sequence.

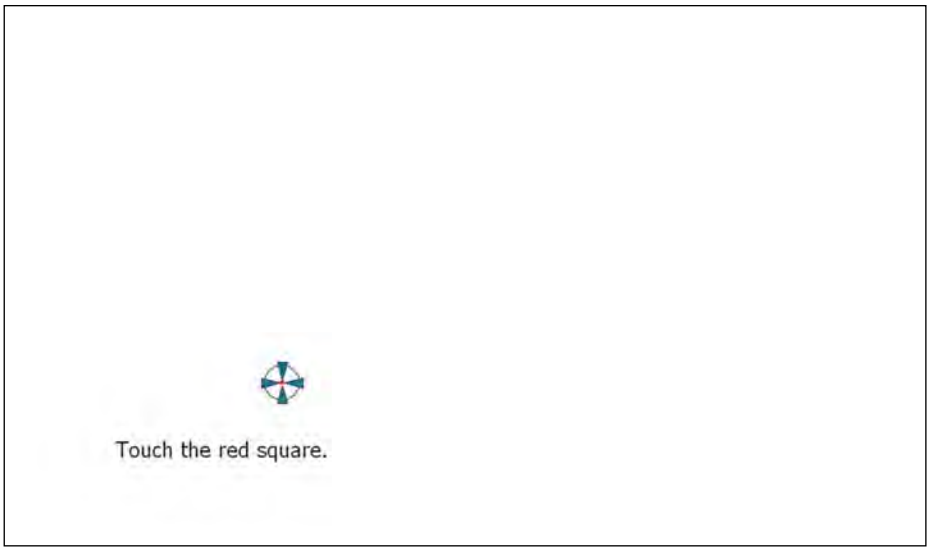


Figure 14-3 *Sample calibration target*

5. Select **OK** to close the dialog boxes once the calibration is complete.

Extended Desktop Touch Screen Calibration

Special consideration must be given to calibrating the touch screen when the Extended Desktop feature of the Diagnostic Tool is used with an external monitor and the optional docking cradle. If the standard calibration method does not restore touch screen accuracy to a unit with extended desktop, use one of the procedures that follow.

To calibrate the touch screen without the Diagnostic Tool installed in docking cradle:

1. From the Windows toolbar select **Start** > **Control Panel** > **Display**.
   The Display Properties dialog box opens.
2. From the dialog box select **Settings** > **Advanced**.
   The Default Monitor and Intel Driver dialog box opens.
3. From the dialog box select the **Display Config** tab.
4. From the Display Config tab, select LVDS (clone) CRT from the Display Configuration dropdown menu (Figure 14-4).

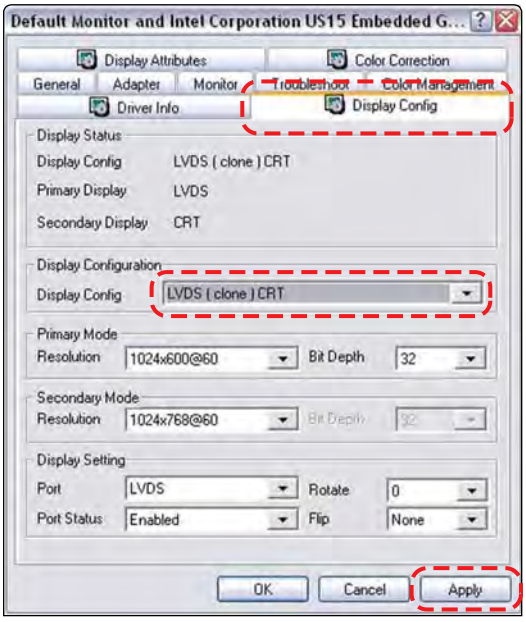


Figure 14-4 *Sample Display Config tab*

5. Select **Apply**.
6. Close the dialog boxes and the Control Panel window.
7. Calibrate the touch screen using the standard procedure.

NOTE:
This method disables the extended desktop. The same calibration issue arises if the extended desktop is used again.

To calibrate the touch screen with the Diagnostic Tool installed in docking cradle:

1. With the Diagnostic Tool installed in the docking cradle, connect a USB keyboard and an external monitor.

IMPORTANT:
The Intel Graphics Display Config should be set to "**LVDS (extended) CRT**", refer to the procedure above to verify or reset the configuration.

2. From the Windows toolbar select **Start** > **PenMount Control Panel** to open the dialog box.
3. From the dialog box, select the **Multiple Monitors** tab.
4. With the **Multiple Monitor Support** box checked, select the **Map Touch Screens** icon (Figure 14-5).

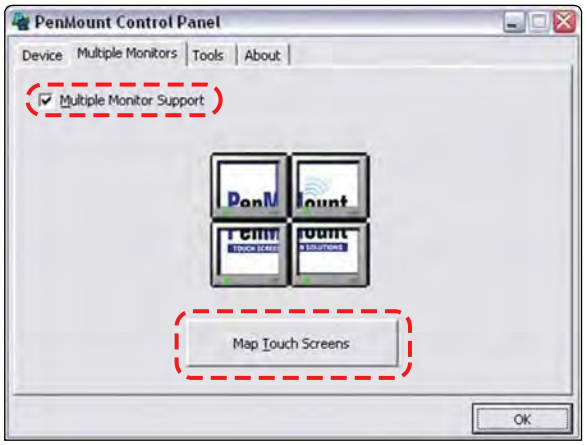


Figure 14-5 *Sample Multiple Monitors tab*

5. Follow the screen prompts and touch the screen of the D7 Diagnostic Tool as requested.
6. Type "**S**" on the USB keyboard to skip for extended display as requested.
7. Select **OK** from the Multiple Monitors tab to close the PenMount Control Panel dialog box.
8. Calibrate the touch screen using the standard procedure.

14.1.3 Cleaning and Inspecting the Diagnostic Tool

When using the VERDICT Diagnostic Tool, make sure to do the following:

- Check the housing, wiring, and connectors for dirt and damage before and after each use.
- At the end of each work day, wipe the VERDICT Diagnostic Tool housing, wiring, and connectors clean with a damp cloth.

IMPORTANT:
Do not use any abrasive cleansers or automotive chemicals on the VERDICT Diagnostic Tool.

14.1.4 Battery Service

Follow all safety guidelines when handling the battery pack.

WARNING

Risk of electric shock.

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

Electric shock can cause injury.

WARNING

Risk of explosion.

- **The Lithium battery is factory replaceable only, incorrect replacement or tampering with the battery pack may cause an explosion.**

Explosion can cause death or serious injury.

Battery Safety Guidelines

IMPORTANT:
The battery pack contains no user serviceable components. Tampering with the battery pack terminals or housing will void the product warranty.

Keep the following in mind when using and handling the VERDICT battery pack:

- Do not short circuit battery pack terminals.
- Do not immerse the VERDICT Diagnostic Tool or battery pack in water, or allow water to enter the Diagnostic Tool or battery pack.
- Do not crush, disassemble, or tamper with the battery pack.
- Do not heat the battery pack to over 100°C (212°F), or dispose of it in a fire.
- Do not expose the battery pack to excessive physical shock or vibration.
- Keep the battery pack out of reach of children.
- Do not use a battery pack that appears to have suffered abuse or damage.
- Charge the battery pack in the appropriate charger only.
- Do not use a battery charger that has been modified or damaged.
- Use the battery pack for the specified product only.
- Store the battery pack in a cool, dry, well ventilated area.

NOTE:
The battery pack should be used within a short period of time (about 30 days) after charging to prevent loss of capacity due to self-discharging.

If long-term storage of the battery pack is necessary, it should be stored in a in cool, dry, well ventilated place with a 30 to 75 percent state of charge to prevent loss of characteristics.

To prolong the life of your battery, turn off the Diagnostic Tool when not in use. The VERDICT Diagnostic Tool has a built in charger that recharges the battery on demand whenever it is connected to a power source.

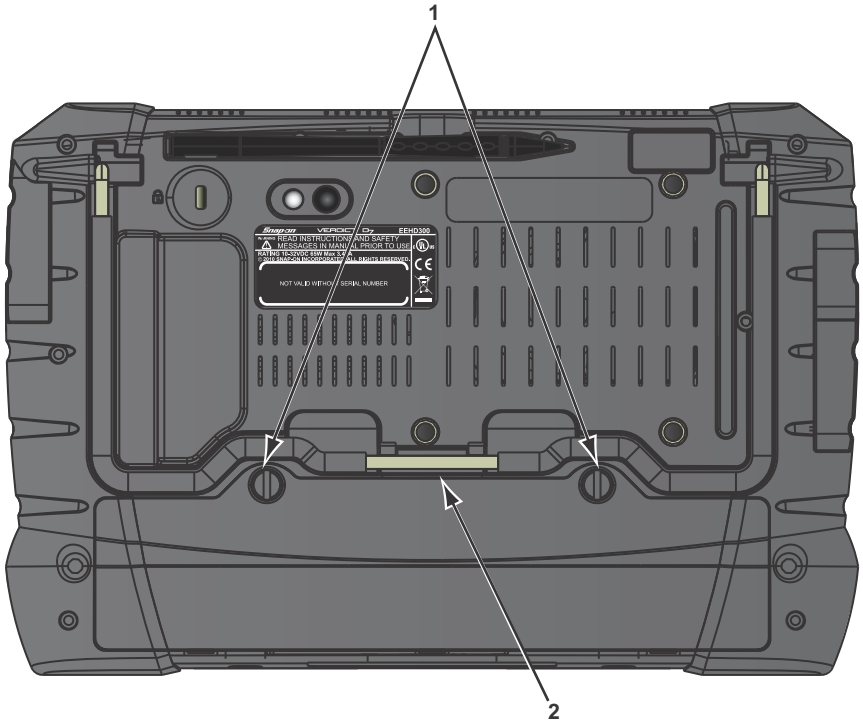
Replacing the Battery Pack

If the battery pack no longer holds a charge, contact your sales representative to order a new one.

IMPORTANT:
Replace the battery pack with original Snap-on replacement parts only.

To replace the battery pack:

1. Loosen the two captive screws that secure the battery pack to the back of the Diagnostic Tool.
2. Insert a fingernail into the recess at the mid point of the top of the battery pack, then gently raise the battery pack up to release the electrical connector.



1— Captive Screws

2— Lifting Recess

Figure 14-6 *Diagnostic Tool battery pack replacement*

3. Lift the battery pack clear of the Diagnostic Tool.
4. Fit the three tabs on the bottom of the new battery pack into the slots, then rotate the assembly into position.
5. Make sure the battery pack is fully seated.
6. Tighten the two captive screws.

Disposing of the Battery Pack

Always dispose of a lithium-ion battery pack according to local regulations, which vary for different countries and regions. The battery pack, while non-hazardous waste, does contain recyclable materials. If shipping is required, ship the battery pack to a recycling facility in accordance with local, national, and international regulations. For additional information contact:

- North America—Rechargeable Battery Recycling Corporation (RBRC) at http://www.rbrc.org or http://www.call2recycle.org, or call 1(800) 822-8837 (USA)
- United Kingdom—Electrical Waste Recycling Company at http://www.electricalwaste.com
- Australia—Australian Battery Recycling Initiative http://www.batteryrecycling.org.au
- New Zealand—Ministry for the Environment https://www.mfe.govt.nz/issues/waste/streams/batteries.html

Products bearing the WEEE logo (Figure 14-7) are subject to European Union regulations.

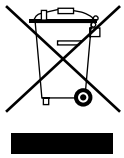


Figure 14-7 *sample WEEE logo*

NOTE:
Always dispose of materials according to local regulations.

Contact your sales representative for details.

Battery Pack Calibration

The internal battery pack contains a micro controller that monitors the battery pack characteristics and maintains an internal “fuel gauge”. The internal fuel gauge may lose some accuracy after many cycles of partial discharge and charge. Should this happen, the fuel gauge can be calibrated with the following procedure:

To calibrate the battery pack fuel gauge:

1. Fully charge the battery pack.
2. Fully discharge the battery pack at a steady rate.

IMPORTANT:
The battery must be completely discharged! Operate the Diagnostic Tool until it shuts down by itself due to a lack of power. Continue operating the tool when the “low battery” warning displays, do not begin charging until after the tool has automatically shut down.

3. Fully charge the battery pack.

NOTE:
It is not recommended to perform the calibration procedure more than once within 30 days.

14.1.5 Operating System Restore

Snap-on System Restore is a hard disk drive recovery program that allows you recover the hard disk drive files in the event of a failure. Running the program replaces all of the C drive data with the original factory data. Be aware, all new or modified files on the C drive will be lost.

The directional arrow buttons on the D7 Diagnostic Tool are used to navigate when performing a system restore. Use the Enter icon to make selections.

To restore the operating system

1. Turn on the D7 Diagnostic Tool.
2. Wait for the “Press Up Arrow to run Snap-on System Restore” message to display, then Press the **Up Arrow** button.

   A progress indicator displays while the program loads.
3. Select **OK** from the confirmation message.

   A progress indicator displays while the files are being restored.
4. Select **OK** from the confirmation message.

   The D7 Diagnostic Tool shuts down, then reboots and the system recovery portion of the operation begins. Follow any on-screen prompts.

   The D7 Diagnostic Tool shuts down and reboots a second time. When the VERDICT Home screen displays, the procedure is complete and the D7 Diagnostic Tool is ready for use.

14.2 Scan Module

This section covers how to care for your Scan Module.

14.2.1 Cleaning and Inspecting the Scan Module

When using the Scan Module, make sure to do the following:

- Check the housing, wiring, and connectors for dirt and damage before and after each use.
- At the end of each work day, wipe the housing, wiring, and connectors clean with a slightly damp cloth.

IMPORTANT:
Do not use any abrasive cleansers or automotive chemicals on the Scan Module.

14.2.2 Replacing the Protective Handgrip

The soft protective handgrip that covers the outer edges of the Scanner is easily replaced should it become worn or damaged. Contact your sales representative for replacement parts.

To replace the protective handgrip:

1. Disconnect the data cable, and any other cables, if attached to the Scanner.
2. From the bottom of the Scanner, gently lift up and out on one side of the handgrip to free it from Scanner housing.
3. Repeat step 2 to loosen the other side of the handgrip.
4. Lift the handgrip off of the Scanner housing.

NOTE:
The handgrip tapers toward the front of the Scanner housing. Make sure the replacement handgrip is correctly oriented before attempting to install it.

5. Fit the new handgrip over the top, data cable end, of the Scanner housing.
6. With your fingers, work the new handgrip onto the Scanner housing from top to bottom. Make sure the tabs on the handgrip fit into the grooves on the housing.

14.3 M2 Data Acquisition Device

This section covers how to care for your M2 Data Acquisition Device.

14.3.1 Cleaning and Inspecting the M2 Data Acquisition Device

When using the VERDICT M2, make sure to do the following:

- Check the housing, wiring, and connectors for dirt and damage before and after each use.
- At the end of each work day, wipe the housing, wiring, and connectors clean with a slightly damp cloth.

IMPORTANT:
Do not use any abrasive cleansers or automotive chemicals to clean the Diagnostic Tool, cables, or probes.

14.3.2 Replacing the Battery Pack

If the battery pack no longer hold a charge, contact your sales representative to order a new one.

IMPORTANT:
The battery pack contains no user serviceable components. Tampering with the battery pack terminals or housing will void the product warranty.

Replace the battery pack with the exact replacement rechargeable nickel-metal hydride (Ni-MH) type battery only. Do not attempt to use standard (lead/zinc) batteries as they do not provide sufficient power to operate the Data Acquisition Device, and may leak and damage the tool.

WARNING

Risk of electric shock.

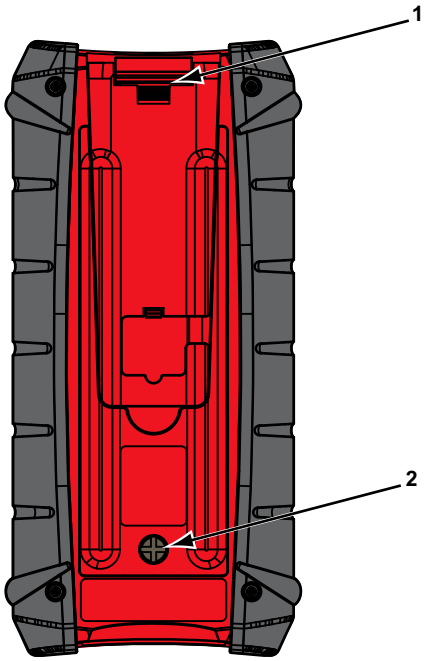
- **Prior to recycling the battery pack, protect exposed terminals with heavy insulating tape to prevent shorting.**
- **Disconnect all test leads and turn Diagnostic Tools off before removing the battery pack.**
- **Do not attempt to disassemble the battery or remove any component projecting from or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

Electric shock can cause injury.

IMPORTANT:
Be aware of all applicable safety considerations when replacing, handling, and recycling batteries. Refer to "Battery Safety Guidelines," on page 141 for details.

To replace the battery pack:

1. Refer to Figure 14-8:



1— Hanger Catch

2— Captive Screw

Figure 14-8 *M2 unit battery pack replacement*

2. Press to release the hanger catch on the back of the M2 unit (Figure 14-8), then swing the hanger up (180º) so that it is fully extended.
3. Loosen the captive screw that secures the battery cover (Figure 14-8).
4. Remove the battery cover.
5. Remove the battery pack from the M2 unit housing to access the electrical connector.

6. Separate the battery pack electrical connector.
7. Connect the new battery pack electrical connector to the M2 unit.
8. Fit the battery into the battery compartment.
9. Fit the battery compartment cover.
10. Tighten the captive screw and fold down the hanger.

Appendix A

Troubleshooting Bluetooth Communication Issues

The Scan Module and the M2 Scope Multimeter are wireless communications devices that use Bluetooth technology to transmit data to the Diagnostic Tool without a physical connection. The working range of the transmitter is about 30 feet (9.14 m). Simply moving the units closer together restores an out-of-range condition, and communication resumes immediately. Communications can be impacted by signal interference, or other conditions, that disrupt or otherwise impairs the wireless 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.

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

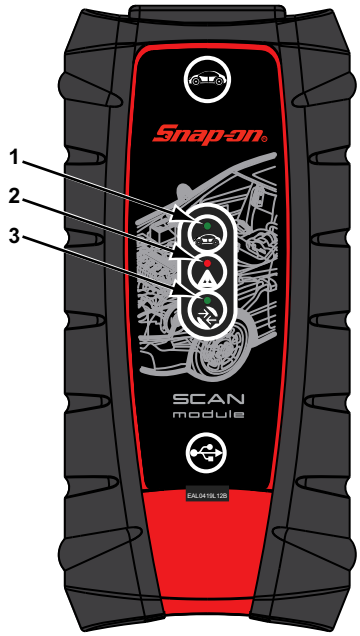
Hardware Status

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
Scanner	Meter			
		Red	Not Paired	Pair the module to the Diagnostic Tool. See “Paired Devices” on page 131 for instructions.
		Grey	Paired, but Not Communicating	You may have moved out of range. Move the Diagnostic Tool closer to the module to reestablish communications. If connectivity is not restored, perform the “Recovery Procedure” on page 151.
		Blue	Paired and Communicating	Hardware status is good and Bluetooth should be functional: Scan Module; verify the green Bluetooth LED on the Scan Module is flashing. Scope Multimeter; make sure the meter is displaying the communicating screen. If there is no connectivity, perform the “Recovery Procedure” on page 151.

Scan Module Connectivity Check

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 (Figure A-1).



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 A-1 *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.

Scope Multimeter Connectivity Check

Make sure the Scope Multimeter Rotary Switch is in the Remote Functions position (Figure A-2).

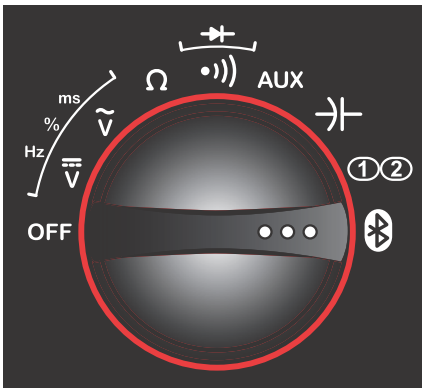


Figure A-2 *Sample remote functions selected*

In Remote Functions mode, the Scope Multimeter automatically searches for and connects to the Diagnostic Tool it has been paired to. A paired but not communicating graphic displays on the Scope Multimeter while the communications link is being established (Figure A-3).

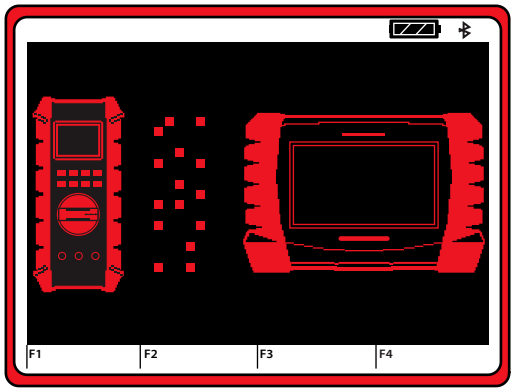


Figure A-3 *Sample paired, not communicating screen*

A communicating screen displays once the modules are actively exchanging data (Figure A-4).

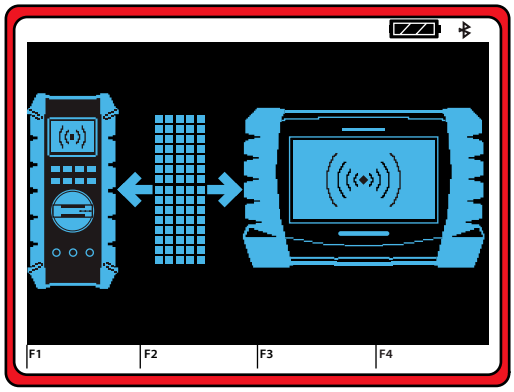


Figure A-4 *Sample communicating screen*

If the two modules are out of range of each other, the paired, not communicating screen displays on the Scope Multimeter and a message displays on the Diagnostic Tool. This is a self-correcting condition, simply bring the two units closer together and the communications link will reestablish itself momentarily.

Remember, the front panel keys on the Scope Multimeter module become inoperative once it is connected to a Diagnostic Tool. All Scope Multimeter controls are transferred to the Diagnostic Tool, as it is now the host computer. Turning the Rotary Switch off of the Remote Functions position returns control to the Scope Multimeter module and the front panel keys regain their functionality.

Recovery Procedure

This is a quick and easy method that reestablishes connectivity between the Diagnostic Tool and the Scan Module or Scope Multimeter. 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. Deactivate all paired wireless modules:
   - Disconnect the Scan Module from the vehicle.
   - Move the Scope Multimeter Rotary Switch off of the Remote Functions position.
2. Navigate to the Home Screen on the Diagnostic Tool.
3. Select **Exit** to close the ShopStream Diagnostic Suite.
4. Activate all paired wireless modules:
   - Connect the Scan Module to the vehicle.
   - Move the Scope Multimeter Rotary Switch to the Remote Functions position.
5. Tap the **ShopStream Diagnostic Suite** icon on the desktop.

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

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

The ShopStream Diagnostic Suite should open with connectivity restored. Verify by checking the Hardware Status icons in the lower-right corner of the Diagnostic Tool screen. Icons should have a grey-colored background to indicate they are paired, but not actively communicating. The icon background should switch to blue once the Diagnostic Tool accesses the module.

Alternate 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.

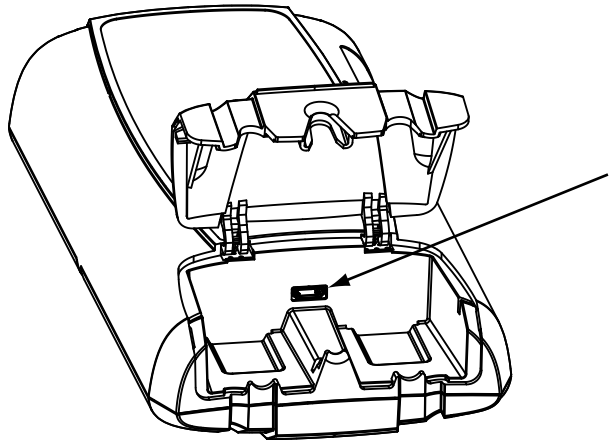


Figure A-6 *Scan Module USB port, handgrip removed*

3. Plug the small end of the USB cable into the USB port on the Scan Module.
4. Plug the large end of the USB cable into a USB port 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. Tap 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. Tap **Start** in the lower-left corner of the screen to open the menu.

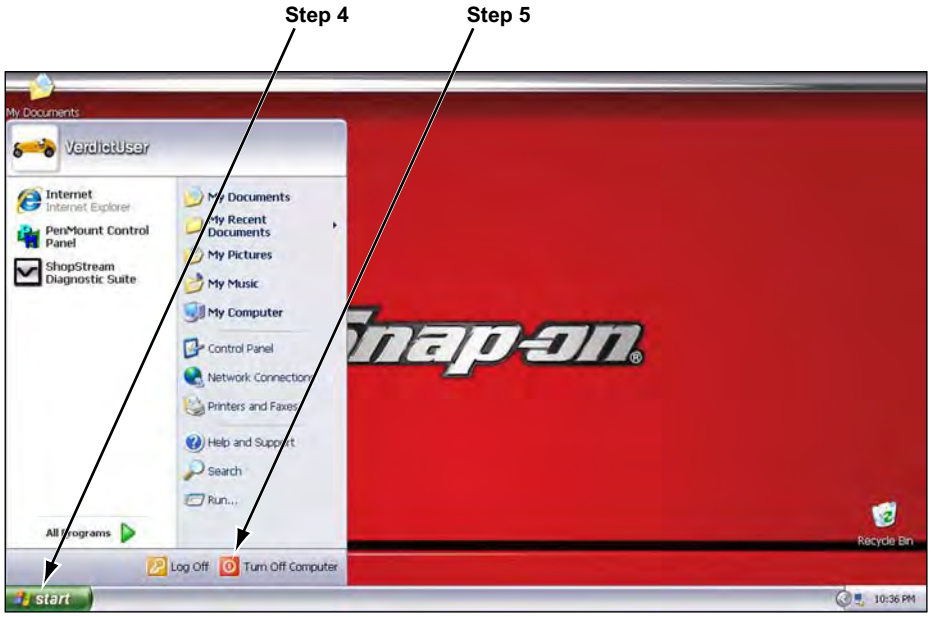


Figure A-7 *Sample Windows Start menu*

5. Select **Turn Off Computer** from the menu.
6. Select **Turn Off** when the Confirmation window opens.

Figure A-8 *Sample shutdown confirmation window*

7. Wait for the tool to completely turn off, then press the **Power** to restart the Diagnostic Tool.
8. Connect the Scan Module to the vehicle once the ShopStream Diagnostic Suite opens.

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