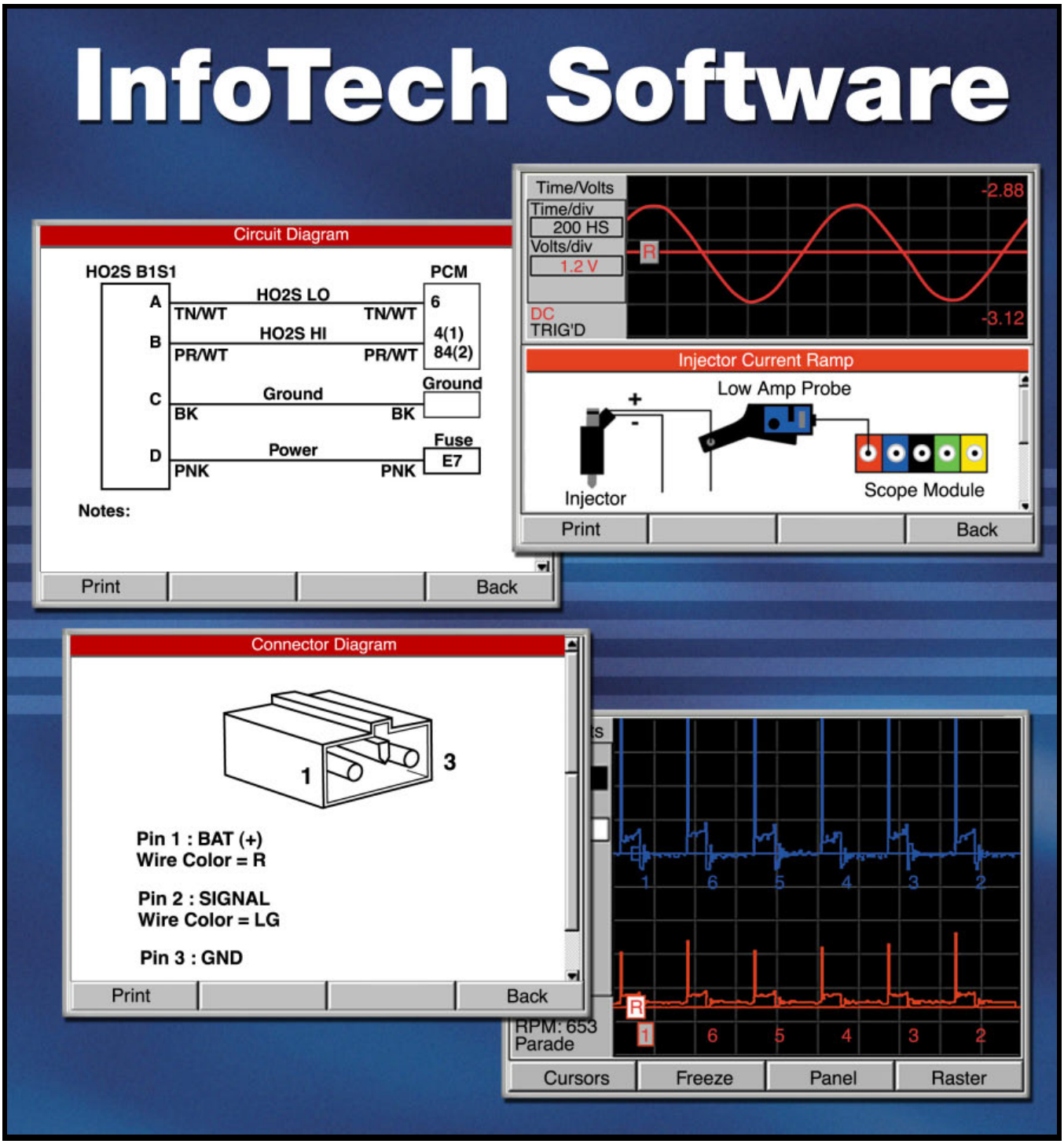
OTC®
AN SPX BRAND

Scope with InfoTech User Guide



IMPORTANT NOTICES

SAFETY DEFINITIONS

Follow all DANGER, WARNING, IMPORTANT, and Note messages in this manual. These safety messages are defined and formatted as follows:

DANGER or WARNING: Means you risk bodily harm and /or possible loss of life.

IMPORTANT: Means the information demands special attention or that you risk damage to the vehicle or the tool.

NOTE: *Provide clarity and helpful tips.*

The safety messages cover situations SPX is aware of. SPX cannot know, evaluate or advise you as to all of the possible hazards. You must be certain that any conditions or service procedures encountered do not jeopardize your personal safety.

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All software screens shown in this manual are examples. Actual test screens vary for each vehicle being tested.

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Contents

Safety Precautions

⚠ DANGER:

- **When an engine is operating, keep the service area WELL VENTILATED or attach a building exhaust removal system to the engine exhaust system. Engines produce carbon monoxide, an odorless, poisonous gas that causes slower reaction time and can lead to serious personal injury or loss of life.**
- **Do not exceed the limits of the tool. Doing so is dangerous and will expose you to serious injury or possible death. Carefully read and understand all safety precautions.**

⚠ WARNING:

- **Wear an American National Standards Institute (ANSI) approved eye shield when testing or repairing vehicles. Objects propelled by whirling engine components or pressurized liquids escaping may cause personal injury.**
- **Set the parking brake and block the wheels before testing or repairing a vehicle. It is especially important to block the wheels on front-wheel drive vehicles because the parking brake does not hold the drive wheels.**
- **Do not drive the vehicle and operate the tool at the same time. Any distractions may cause an accident. Have one person operate the tool as another person drives the vehicle.**
- **Maintain adequate clearance around moving components and belts during testing. Moving components and belts can catch loose clothing, body parts, or test equipment and cause serious damage or personal injury.**
- **Refer to the service manual for the vehicle being serviced and adhere to all diagnostic procedures and precautions. Failure to do so could result in personal injury or otherwise unneeded repairs.**
- **Do not use the tool if it is damaged.**
- **Do not use the test probes if the insulation is damaged or if metal is exposed. Before connecting test probes, make sure the vehicle's ignition and the tool are turned off.**
- **When testing for the presence of voltage or current, make sure the tool is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.**
- **When measuring current, connect in series with the load.**
- **Do not exceed 800 V AC or 600 V DC voltage between any terminal and ground.**
- **Use caution when measuring voltage above 25V AC or DC.**
- **Do not touch the test probes, tips, or the circuit being tested.**
- **Protect all circuits being tested with a 20A fuse or circuit breaker.**
- **Disconnect the live test probe before disconnecting the ground test probe.**

IMPORTANT: To avoid measuring error from outside interference, keep the tool away from spark plug or coil wires.

1: General Information

Introduction

The SCOPE / INFOTECH system consists of the Scope / Multimeter software and module (also called Scope module) and the InfoTech software.

The Scope module is an add-on module for both the Solarity diagnostic tool and the Next Generation Information System (NGIS) tool. The Scope module, which has one ground port and four channel ports (for connecting up to four probes), performs the functions of both a digital multimeter (DMM) and an oscilloscope (lab scope). The module includes special probes (leads) and adapters.

The InfoTech software is a database of vehicle repair information. It is compatible with both the Solarity diagnostic tool and in the NGIS tool.

Figure 1.1: Scope / InfoTech System Components

With the SCOPE / INFOTECH system installed in either diagnostic tool, you can use the tool to do oscilloscope tests, multimeter tests, and special component and vehicle system tests. The special tests let you display Scope / Multimeter live test data and InfoTech test instructions on the screen at the same time. They also automatically set up the tool for some vehicle-specific tests.

If you remove the Scope module from the tool, you can still use the InfoTech software to find special component test instructions and other vehicle information.

For the NGIS tool, you can also use the InfoTech software as a stand-alone database with or without the Scope software and module installed.

This rest of this chapter provides an overview of the SCOPE / INFOTECH system equipment and software.

Equipment Descriptions

Diagnostic Tools

The diagnostic tools (purchased separately) are portable, hand-held tools that integrate the add-on Scope module, the Scope/Multimeter software, and the InfoTech software. You connect the scope module to the tool and use the tool to operate the software and Scope module.

This User Guide assumes you are familiar with using the diagnostic tool. If necessary, refer to the User Guide for the tool you are using. As a quick reference, the tool's keys are described below.

- **ENTER** — executes a selected menu option or function.
- **EXIT** — displays the previous screen or exits a function.
- **Direction Key** (Up, Down, Left, Right) — Up or Down select a menu option or a data field. Left or Right change the data entry within a field.
- **Function keys** (four of them) — each key executes a command that corresponds with an option listed at the bottom of the screen.
- **HELP** — displays helpful information about a currently displayed screen.

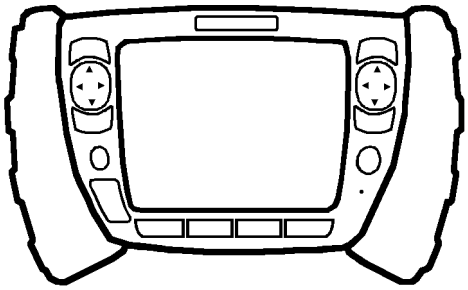

Figure 1.2: Solarity Diagnostic Tool

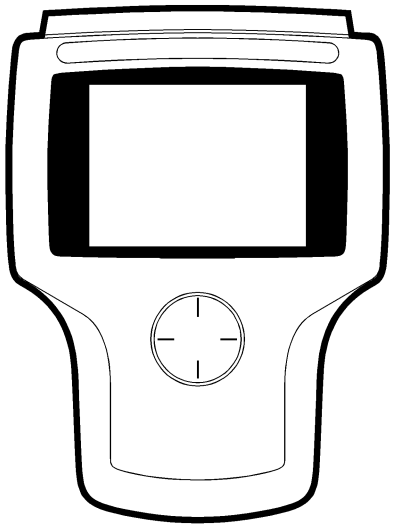

Figure 1.3: NGIS Tool

Scope Module

The Scope module connects to the hardware interface port (HIP) on the back of the diagnostic tool.

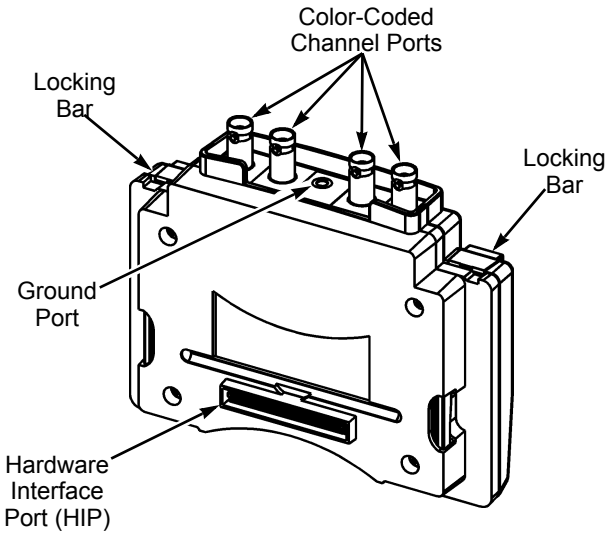

Figure 1.4: Scope Module - Front View

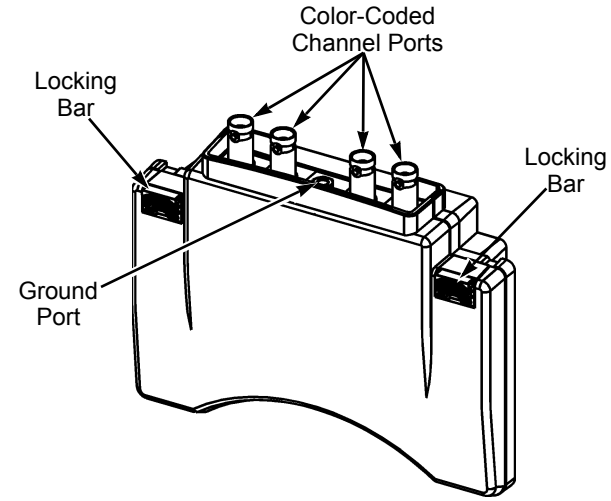

Figure 1.5: Scope Module - Back View

The Scope module has the following components:

- four color-coded channel ports on the top for connecting test probes
- a single port on the top for connecting a ground probe
- a HIP on the front of the module that connects to the diagnostic tool's HIP
- two locking bars at the top of the module to lock it in place on the diagnostic tool

For more information, refer to ***2: Setup*** on page 9.

Probes (Leads)

The Scope system includes four color-coded test probes (yellow, red, blue, green), a ground probe, an ignition secondary KV probe, and an ignition synchronization probe. The probes connect to the color-coded channel ports at the top of the Scope module.

The tip of each probe removes and can be fitted with a replacement tip or an optional tip.

NOTE: *To order additional probes or accessories, contact your OTC distributor or telephone Customer Services at 1-800-533-6127.*

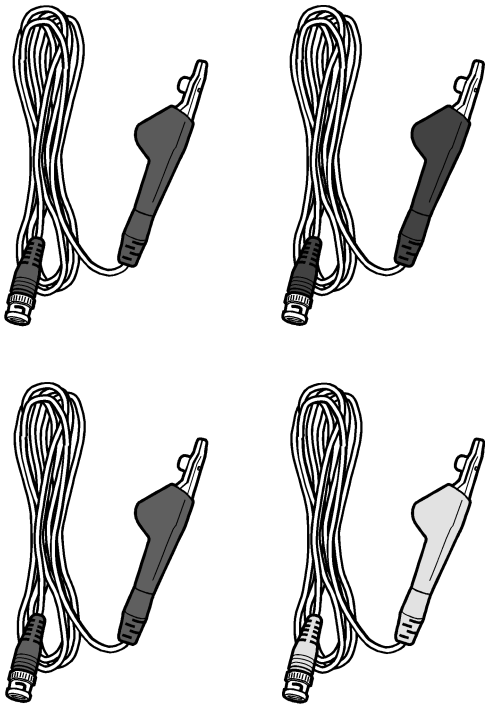

Figure 1.6: Color Coded Test Probes - Red, Blue, Green, Yellow

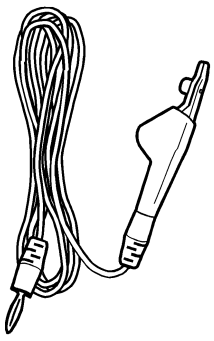

Figure 1.7: Ground Probe (Black)

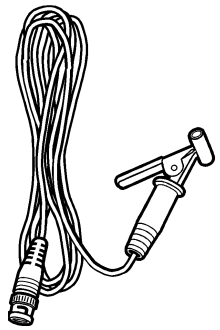

Figure 1.8: Ignition Secondary kV Probe

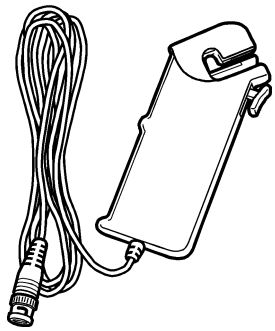

Figure 1.9: Ignition Synchronization Probe

Adapters

The Scope system includes a GM High Energy Ignition (HEI) adapter. For details, refer to the instructions included with the adapter.

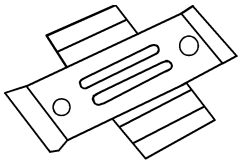

Figure 1.10: GM HEI Ignition Adapter

Software Description

Software Installation

Before using the SCOPE / INFOTECH system, the Scope / Multimeter software and the InfoTech software must be installed in the diagnostic tool and unlocked with a Smart Card. The software then lets you control the Scope module with the tool.

The software is either preinstalled in the diagnostic tool, provided on a compact disc or compact flash card, or can be downloaded from the SPX web site.

For complete instructions, refer to *Scan Tool Software Applications Installation and Updates* (OTC P/N 534168) or *Solarity Tool Software Applications Installation and Updates* (OTC P/N 532262).

NOTE: *The Scope module must be connected to the tool during the software installation. Refer to* ***Setup*** *on page 9.*

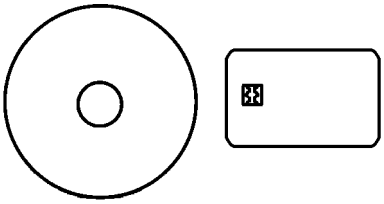

Figure 1.11: Software CD and Smart Card

Software Startup

The way you start the software varies for the Solarity diagnostic tool and the NGIS scan tool as described here and on the next page.

Solarity Diagnostic Tool

When you turn the Solarity tool on, the Application Manager screen appears.

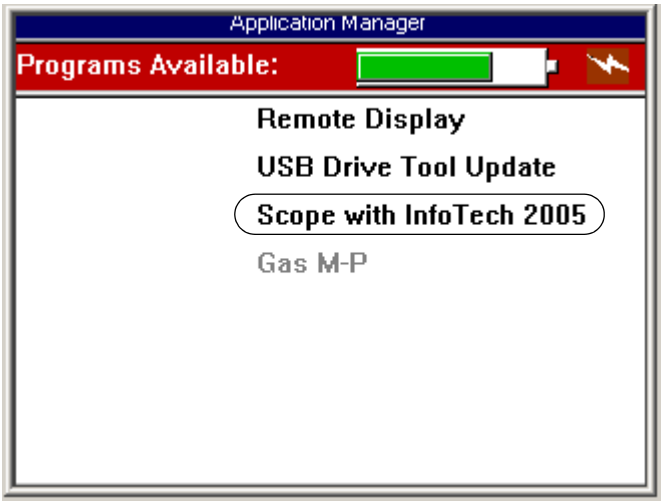

Figure 1.12: Application Manager Screen

You select Scope with InfoTech and press the ENTER key to display the next screen. The menu options that are available on the next screen and the order of the menu options vary as follows:

- If the Scope module is connected, the Scope with InfoTech software starts and all of the menu options are black to indicate they are all available for use (*Figure 1.13*).
- If the Scope module is removed, the InfoTech software starts (without Scope) and only the InfoTech menu options are available for use. The Scope options display at the bottom of the screen and are grey to indicate they cannot be used. (*Figure 1.14*).

For more information about the options on the main menu screens, refer to **Software Functions** on page 7.

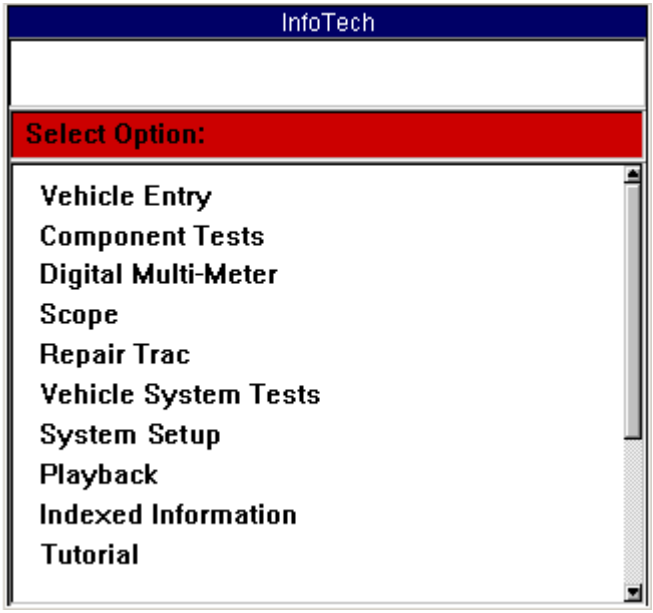

Figure 1.13: Solarity InfoTech Main Menu Screen, Scope Module Connected

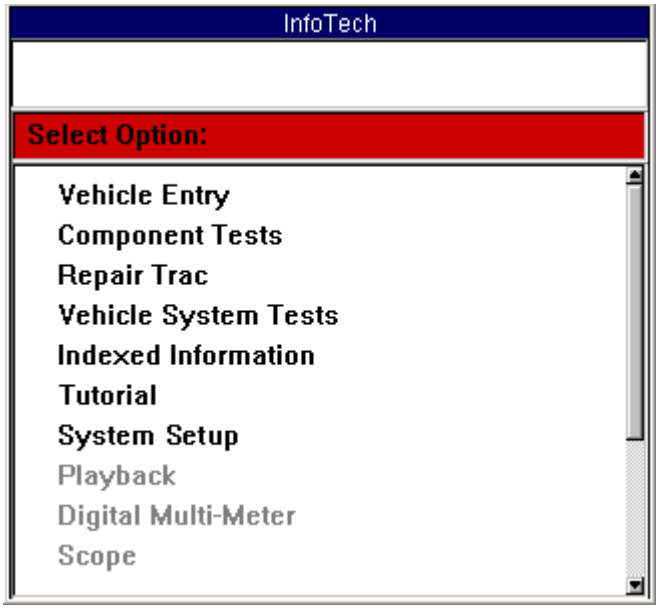

Figure 1.14: Solarity InfoTech Main Menu Screen, Scope Module Removed

NOTE: *The Vehicle Entry, Repair Trac, System Setup, and Indexed Information options work the same if the Scope module is connected or removed. The Components Tests and Vehicle System Tests options work differently if the Scope module is attached or removed, as described in* ***Software Functions*** *on page 7.*

NGIS Tool

When you turn the NGIS tool on, the Application Manager screen appears. You then choose either the Scope with InfoTech or the InfoTech option from the menu screens, as shown below.

NOTE: *The examples below show the Graphical User Interface. If the tool is set to Classic User Interface, the menu options are words only instead of icons with words.*

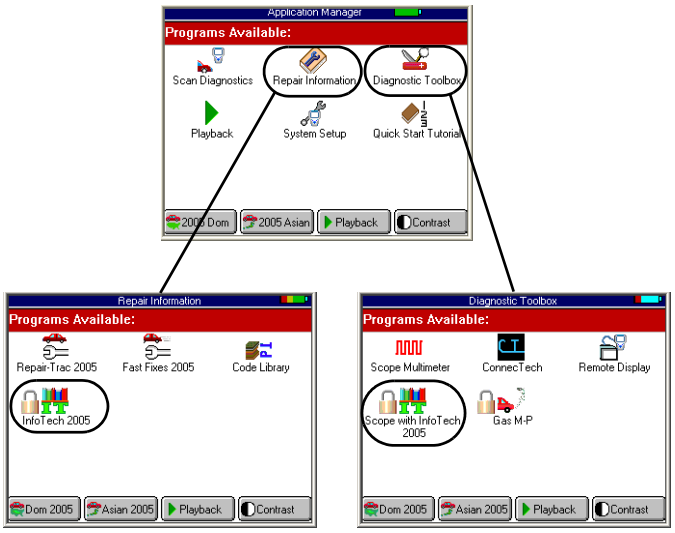

Figure 1.15: Application Manager Screen Selections

After you select a software application, the main menu that appears (and the options on it) depends on if the Scope module is connected (or not) and which software you started as follows:

- If the Scope module is connected and you select **Diagnostic Toolbox** and then **Scope with InfoTech** from the menu screens, the Scope with InfoTech software starts and the Scope Multimeter main menu screen appears. All of the menu options are black to indicate they are all available for use. (*Figure 1.16*).
- If the Scope module is removed and you select **Diagnostic Toolbox** and then **Scope with InfoTech** from the menu screens, the InfoTech software starts (without Scope) and the InfoTech main menu screen appears. Only the InfoTech menu options are black to indicate they are available for use. The Scope options display at the bottom of the screen and are grey to indicate they cannot be used. (*Figure 1.17*).
- If the Scope module is connected or removed and you select **Repair Information** and then **InfoTech** from the menu screens, the InfoTech software starts and the InfoTech main menu screen appears. Only the InfoTech menu options are available for use (*Figure 1.17*).

For more information about the options on the menu screens, refer to **Software Functions** on page 7.

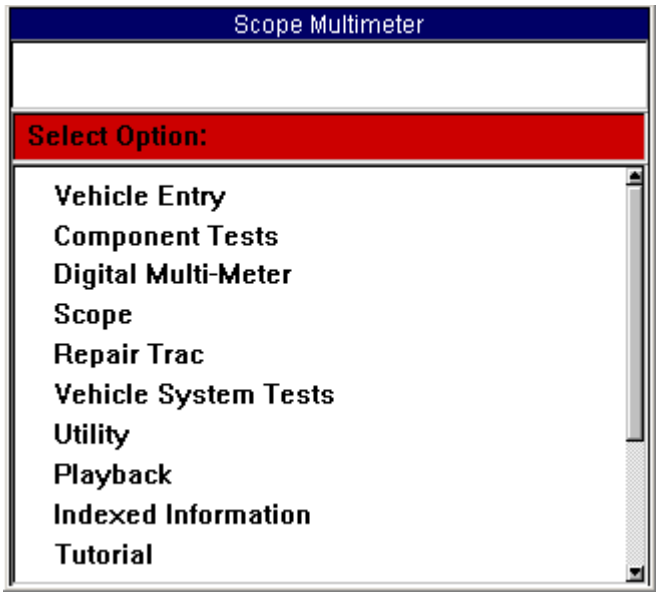

Figure 1.16: NGIS Tool Scope Multimeter Main Menu Screen

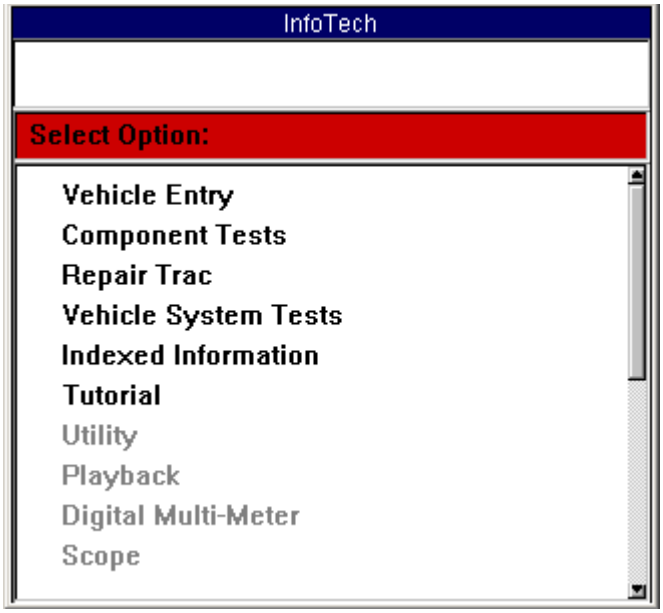

Figure 1.17: NGIS Tool InfoTech Main Menu Screen

Software Functions

The options that appear on the main menu screens access the software functions (see *Figure 1.13* and *Figure 1.14* on page 5, and *Figure 1.16* and *Figure 1.17* on page 6). The software functions are described below.

Vehicle Entry

When you select **Vehicle Entry**, more screens appear for you to identify the vehicle being diagnosed. You use this option to identify the vehicle before selecting the Component Tests option. For details, refer to ***3: Vehicle Entry*** on page 11.

Component Tests

When you select **Component Tests**, the way the function works varies if the Scope module is connected or removed or, for the NGIS tool, if you start only the InfoTech software as follows:

- If the Scope module is connected to the tool and you start the Scope (with InfoTech) software, the screens display the Scope / Multimeter live test data on the top half of the screen and the InfoTech test instructions on the bottom half of the screen. You use this option to perform component-specific testing; it combines the functions of the Scope software and the InfoTech software. For details, refer to ***5: Component Tests - Scope with InfoTech*** on page 23.
- If the Scope module is removed from the tool and you start the Scope (with InfoTech) software, or, for the NGIS tool, if you start the InfoTech software only, the screens display the InfoTech test instructions as full screens (without any live data readings). You use this option to find special component test instructions and other information. For details, refer to ***4: Component Tests - InfoTech*** on page 13.

Digital Multi-Meter (DMM)

When you select **Digital Multi-Meter**, the DMM screens appear. This option lets you use the tool as a digital multimeter (DMM). For details, refer to ***6: Digital Multi-Meter (DMM)*** on page 35.

NOTE: *If the Scope module is removed from the tool or, for the NGIS tool, if you start only the InfoTech software, the* ***Digital Multi-Meter*** *option is not available for use (it is "greyed-out").*

Scope

When you select **Scope**, a menu screen appears with the options of Lab Scope, Ignition Scope, and Single Cylinder. These options let you use the tool as a four-channel oscilloscope. For details, refer to the following:

- ***7: Scope - Lab Scope*** on page 45
- ***8: Scope - Ignition Scope*** on page 73
- ***9: Scope - Single Cylinder*** on page 97

NOTE: *If the Scope module is removed from the tool or, for the NGIS tool, if you start only the InfoTech software, the* ***Scope*** *option is not available for use (it is "greyed-out").*

Repair Trac

When you select **Repair Trac**, a list of vehicle-specific problems (symptoms) appears for you to look up problem-related repair information. For details, refer to ***10: Repair Trac*** on page 101.

Vehicle System Tests

When you select **Vehicle System Tests**, the way the function works varies if the Scope module is connected or removed or, for the NGIS tool, if you start only the InfoTech software as follows:

- If the Scope module is connected to the tool and you start the Scope (with InfoTech) software, the screens display the Scope / Multimeter live test data on the top half of the screen and the InfoTech test instructions on the bottom half of the screen. You use this option to perform vehicle system testing; it combines the functions of the Scope software and the InfoTech software. For details, refer to ***12: Vehicle System Tests - Scope with InfoTech*** on page 109.
- If the Scope module is removed from the tool and you start the Scope (with InfoTech) software, or, for the NGIS tool, if you start the InfoTech software only, the screens display the InfoTech test instructions as full screens (without any live data readings). You use this option to find vehicle system test instructions. For details, refer to ***11: Vehicle System Tests - InfoTech*** on page 103.

Utility

For the NGIS tool, when you select **Utility,** a menu screen appears with options that let you calibrate and configure the tool. For details, refer to ***13: Utility - NGIS Tool*** on page 117.

System Setup

For the Solarity diagnostic tool, when you select **System Setup**, a menu screen appears for you to select items for adjusting default settings in the tool or for viewing information about the tool. The menu also contains options that let you calibrate and configure the scope module. For details, refer to ***14: System Setup - Solarity Tool*** on page 121.

Playback

When you select **Playback**, a list of saved files appears. This option lets you view data readings you have previously recorded and saved with the Component Tests, DMM, Scope, and Vehicle System Tests functions. For details, refer to ***15: Playback*** on page 131.

NOTE: *If the Scope module is removed from the tool or, for the NGIS tool, if you start only the InfoTech software, the* ***Playback*** *option is not available for use; it is "greyed-out".*

Indexed Information

When you select **Indexed Information**, a screen displays the letters of the alphabet for you to look up definitions and explanations for specific items alphabetically. For details, refer to ***16: Indexed Information*** on page 135.

2: Setup

Before performing any tests with the Scope module, you must first set up the equipment by connecting the module to the diagnostic tool and by connecting the probes to the module. You then clamp the probes to the correct electrical components on the vehicle and use the diagnostic tool for testing.

To set up the Scope module, follow these steps:

1 Make sure the diagnostic tool's power is off. If necessary, use the On/Off button to turn the power off.

2 Connect the Scope module to the tool as follows:

- **a** Position the tool to access the back side, and open the protective HIP door.

  NOTE: *If necessary, remove any currently attached module from the tool by sliding the Locking Bars out and then pulling the module out of the compartment.*

- **b** On the Scope module, slide the Locking Bars out to unlock them (you may need to hold them out).

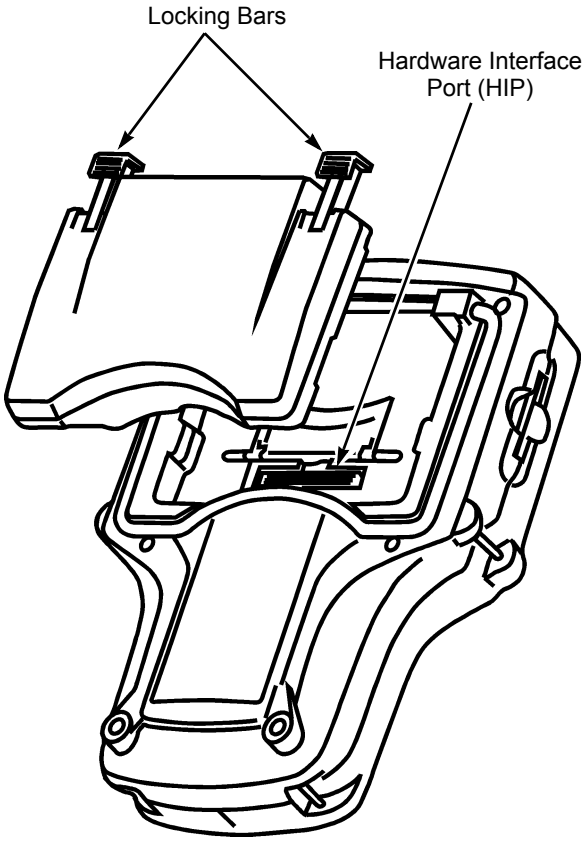

Figure 2.1: Scope Module Connection to Diagnostic Tool (NGIS tool shown)

- **c** Position the Scope module with the front side facing the compartment of the tool and with the hardware interface ports aligned.
- **d** Place the module into the compartment and press it into place.
- **e** Slide the Locking Bars in to lock the module in place.

3 Connect the tool's Power Supply into the diagnostic tool's Power Port and into a 110 volt wall outlet.

NOTE: *Optionally, you can skip this step and use the tool's battery power.*

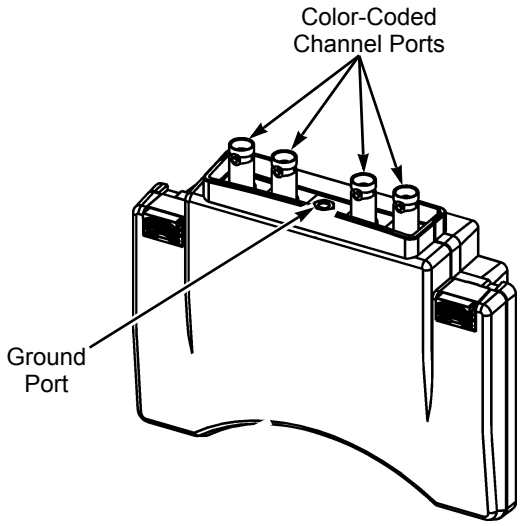

Figure 2.2: Scope Module - Back View

4 Insert the ground probe's connector pin into the ground port on the top of the Scope module.

5 Determine which test probe(s) are required for the test you are doing and connect their BNC connectors to the color-coded channel ports on the top of the Scope module. Match the colors of the probes to the colors of the channel ports. The channel colors are red, blue, green, and yellow.

6 Use the diagnostic tool's On/Off button to turn the power on.

NOTES:

3: Vehicle Entry

The Vehicle Entry function lets you identify the vehicle being diagnosed. You use this option to identify the vehicle before selecting the Component Tests option.

To enter the vehicle information, follow these steps:

1 Start the application to display the main menu screen. For details, refer to **Software Startup** on page 5.

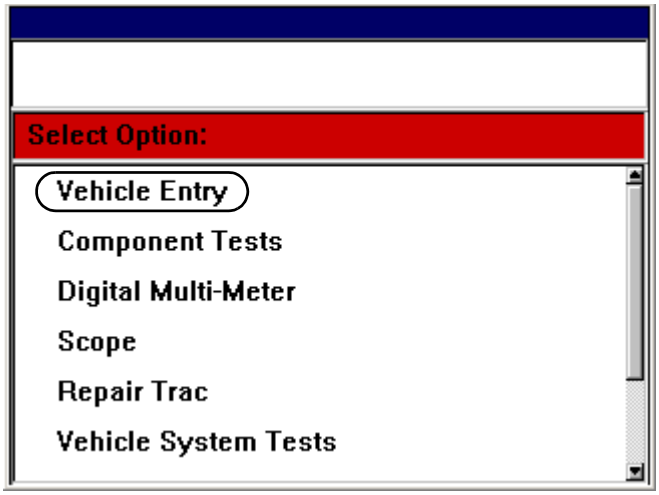

Figure 3.1: Main Menu Screen

2 From the main menu screen, select **Vehicle Entry** and press the **ENTER** key. This displays the first Vehicle Entry screen.

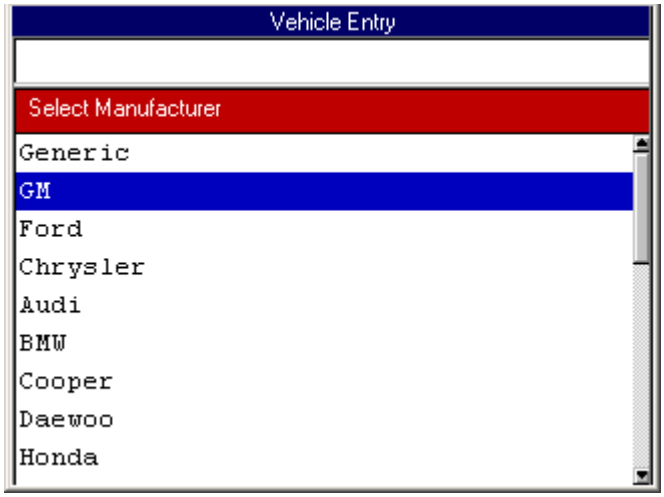

Figure 3.2: Vehicle Entry Screen

3 Select the **vehicle manufacturer** and press the **ENTER** key. This displays the selected vehicle description in the top part of the screen and changes the bottom part of the screen to the next selection screen in a series of selection screens, as shown below.

NOTE: *The screens shown below are examples. Actual screens vary for each vehicle.*

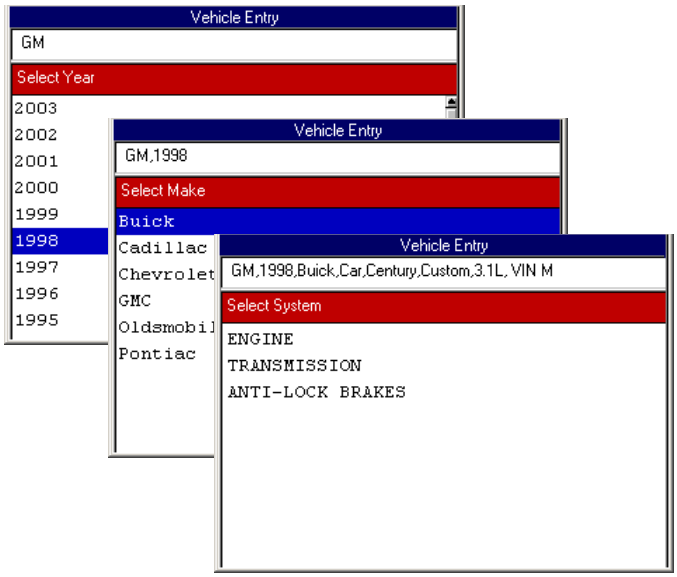

Figure 3.3: Series of Vehicle Entry Screens

4 On each screen that appears (*Figure 3.3*), **select the correct option** and then press the **ENTER** key. Do this until the vehicle is completely identified and the main menu screen reappears with the entire vehicle description in the top part of the screen.

NOTE: *Once you have identified a vehicle, it remains in the software's memory until you identify a different vehicle.*

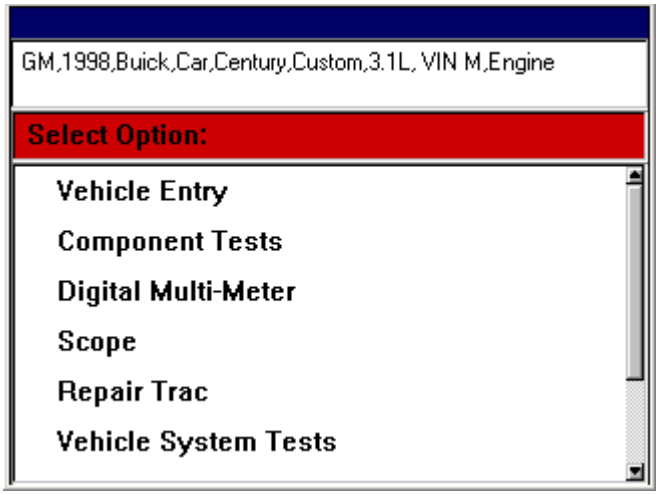

Figure 3.4: Main Menu Screen with Vehicle Entry Completed

5 Select the Component Tests option as necessary. For details, refer to ***4: Component Tests - InfoTech*** on page 13 and ***5: Component Tests - Scope with InfoTech*** on page 23.

4: Component Tests - InfoTech

Overview

The InfoTech software's Component Tests function lets you look up special component test instructions and other component information. The function also lets you look up a vehicle's Oil-Light Reset Procedure, Torque Specifications, Trans Pan Identification, Tune-up Specifications, and Control Module Locations.

IMPORTANT: The way the Component Tests function works varies if the Scope module is connected or removed or, for the NGIS tool, if you start the InfoTech software only. (For more information, refer to Software Startup on page 5.)

This chapter describes the Component Tests function if the Scope module is removed from the diagnostic tool or if you start the InfoTech software only on the NGIS tool. The chapter includes the following sections:

- **Basic Component Tests** in the next column
- **Component Tests Function Keys** on page 15
- **Special Component Tests** on page 20, including **Oil Light Reset Test Procedure**, **Torque Specifications**,**Transmission Pan Identification**, **Tune Up Specifications** and **Control Module Location**.

For instructions for the Components Tests function when the Scope module is connected to the tool, refer to ***5: Component Tests - Scope with InfoTech*** on page 23.

Basic Component Tests

The Component Tests function lets you look up component test instructions for a specific vehicle.

To look up component information, follow these steps:

1 Start the application to display the main menu screen. For details, refer to **Software Startup** on page 5.

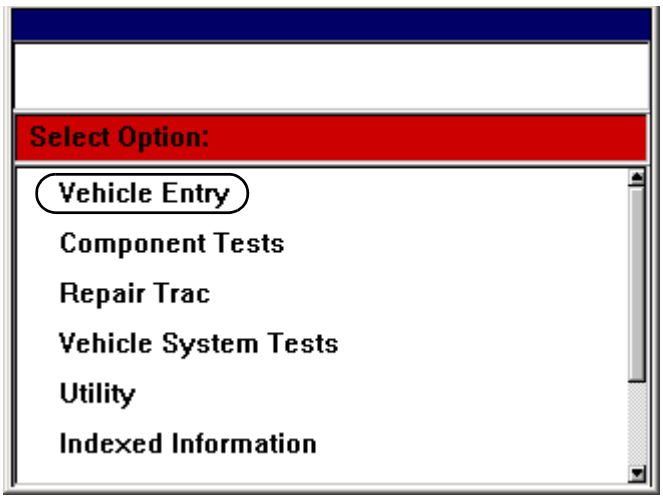

Figure 4.1: Main Menu Screen

2 If the correct vehicle information is not displayed in the top part of the screen, select **Vehicle Entry** and identify the vehicle. For complete instructions, refer to ***3: Vehicle Entry*** on page 11.

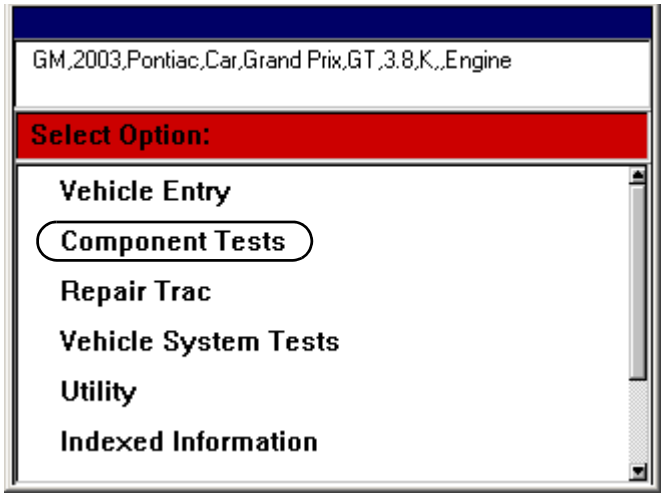

Figure 4.2: Main Menu Screen with Vehicle Entered

3 From the main menu screen, select **Component Tests**. This displays a list of components on the Component Tests screen.

NOTE: *The list displays only the components available for the vehicle being tested.*

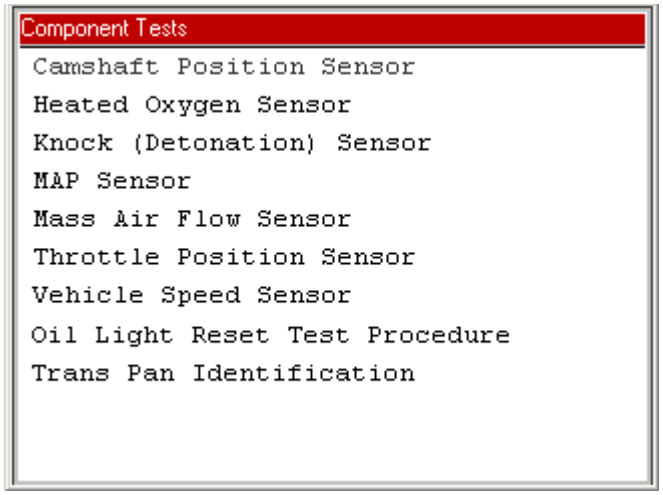

Figure 4.3: Component Tests Screen

4 Select a **component** and press the **ENTER** key.

NOTE: *If the Repair Trac option appears on this menu and you select it, refer to* ***10: Repair Trac*** *on page 101 for instructions. Also, refer to* ***Special Component Tests*** *on page 20 for instructions for special tests that have separate instructions.*

5 One or more additional screens may appear for identifying the component. On each screen that appears, **select the correct option** and then press the **ENTER** key. Do this until the component is completely identified and the Functional Tests screen appears (*Figure 4.4*).

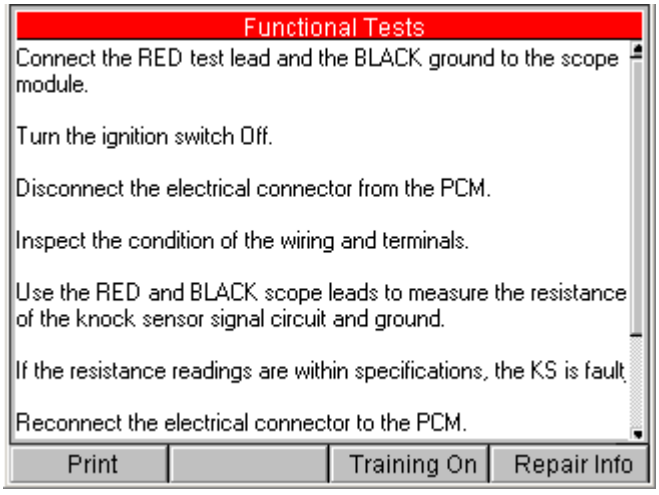

Figure 4.4: Functional Tests Screen

6 Notice the following about the screen:

- The screen displays instructions for testing the selected component.
- You use the Up and Down Direction keys to scroll through the instructions.

7 View the instructions as necessary. While viewing the instructions, do any of the following:

- Use the Print function key to print the instructions. For details, refer to **Print Function Key** on page 15.
- Use the Training On function key to view Scope Multimeter / InfoTech demonstration data. For details, refer to **Training On Function Key** on page 15.
- Use the Repair Info function key to look up information about the selected component. For details, refer to **Repair Info Function Key** on page 16.

  NOTE: *The Repair Info function key does not always appear because some vehicle system tests do not have additional repair information available.*

8 When finished, use the **EXIT** key to return to previous screens.

Component Tests Function Keys

After you have displayed the test instructions for a component on the Functional Tests screen (*Figure 4.5*, below), the function keys provide additional functions for the screen. This section describes the following Component Tests function keys:

- **Print** - (below)
- **Training On** - (next column)
- **Repair Info** - (page 16) including Location, Specification, Circuit Description, Circuit Diagram, Connector, and Reference Waveform

Print Function Key

The Print function key lets you print what is displayed on the screen. For printing instructions, refer to the hardware user guides for the diagnostic tool and the printer.

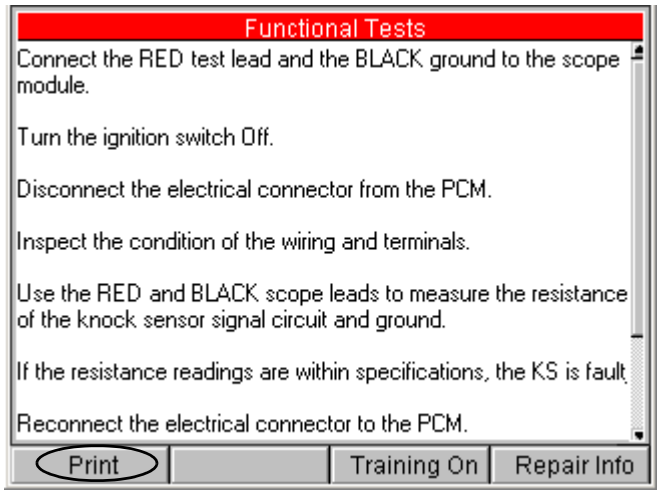

Figure 4.5: Functional Tests Screen - Print Function Key

Training On Function Key

The Training On function key lets you view demonstration data for the Scope with InfoTech software.

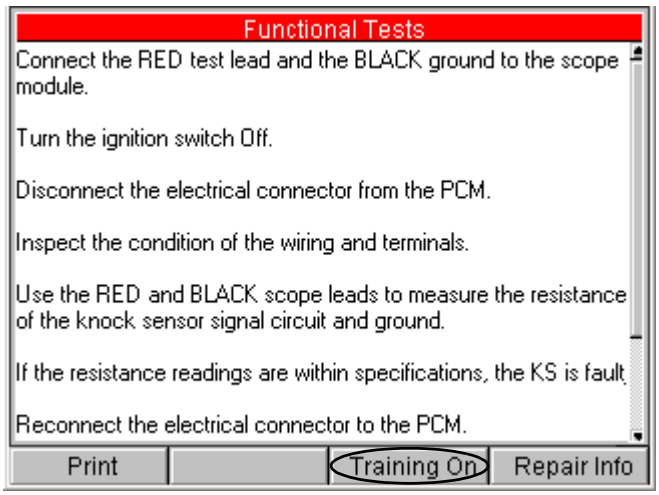

Figure 4.6: Functional Tests Screen - Training On Function Key

When you press the Training On function key, the Scope with InfoTech demonstration screen appears (*Figure 4.7*). The Training function stays on until you press the **EXIT** key and return to the Component Tests screen (*Figure 4.3* on page 14).

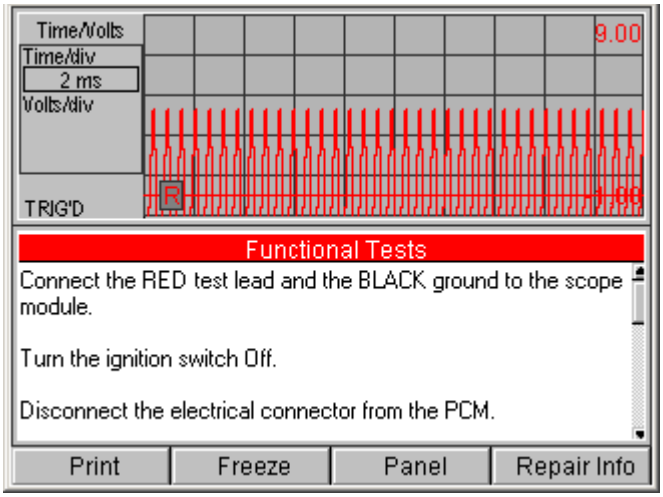

Figure 4.7: Component Tests - Scope Multimeter Demonstration Screen (Training On Screen)

To use the demonstration screens, refer to the instructions in ***Component Tests - Scope with InfoTech*** on page 23.

Repair Info Function Key

NOTE: *The Repair Info function key does not always appear because some vehicle system tests do not have additional repair information available.*

The Repair Info function key displays a menu of additional functions for the selected component. The menu options vary for each component. Possible options include the following:

- Location
- Specification
- Circuit Description
- Circuit Diagram
- Connector
- Reference Waveform

These options are described separately in the next few sections.

NOTE: *If you press the Repair Info function key to display the menu, but do not want to select an option, press the EXIT key or press the Repair Info function key again to close the menu.*

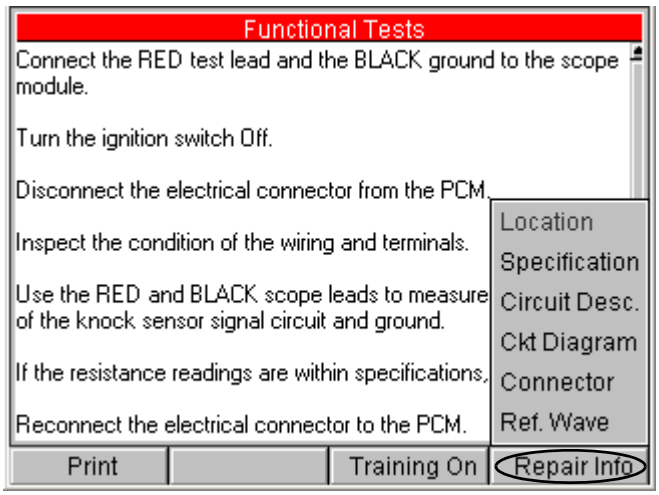

Figure 4.8: Component Tests - Repair Info Function Key

Repair Info Menu - Location Option

Use the Repair Info function key's Location option to view a description of the selected component's location in the vehicle.

To view a description of the component's location, follow these steps:

1 With the test screen displayed, press the **Repair Info** function key to display the Repair Info menu.

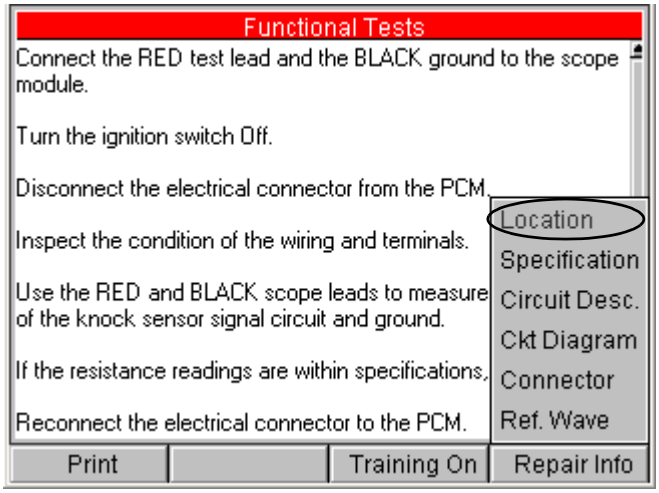

Figure 4.9: Component Tests - Repair Info Function Key

2 Select **Location** and press the **ENTER** key. This displays the Location screen.

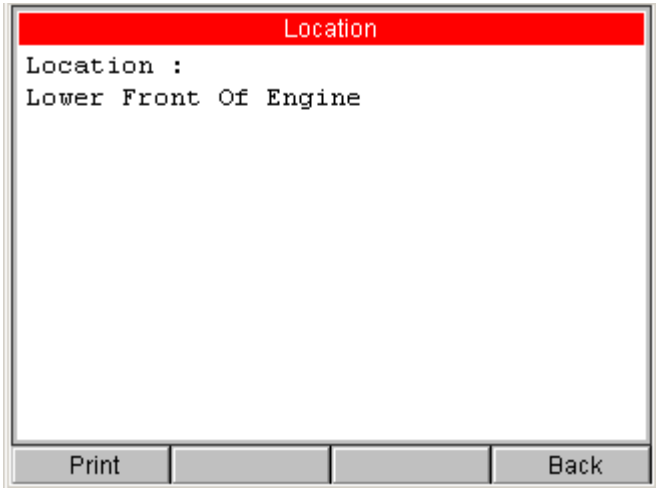

Figure 4.10: Repair Info Function Key, Location Screen

3 View the description and optionally use the **Print** function key to print it.

4 When finished, press the **Back** function key to return to the previous screen.

Repair Info Menu - Specification Option

Use the Repair Info function key's Specification option to view specifications for the selected component.

To view the specifications, follow these steps:

1 With the test screen displayed, press the **Repair Info** function key to display the Repair Info menu.

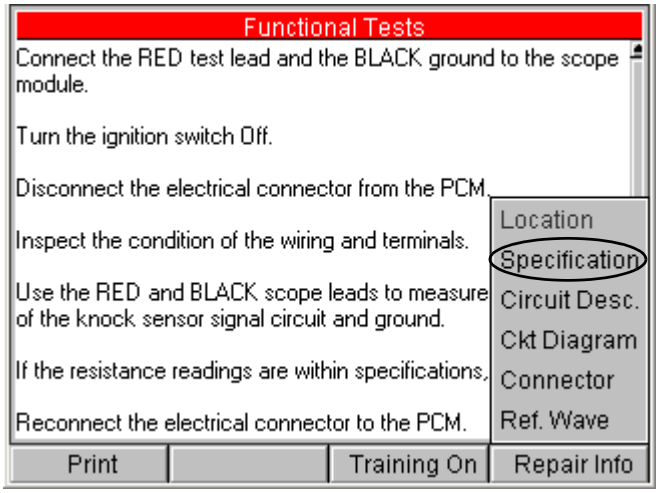

Figure 4.11: Component Tests - Repair Info Function Key

2 Select **Specification** and press the **ENTER** key. This displays the Specifications screen.

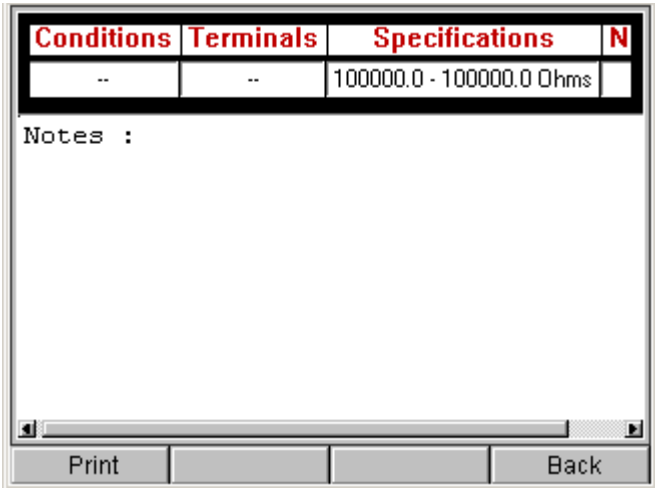

Figure 4.12: Repair Info Function Key, Specifications Screen

3 View the information and optionally use the **Print** function key to print it.

4 When finished, press the **Back** function key to return to the previous screen.

Repair Info Menu - Circuit Description Option

Use the Repair Info function key's Circuit Description option to view a description of the circuit for the selected component.

To view the circuit description, follow these steps:

1 With the test screen displayed, press the **Repair Info** function key to display the Repair Info menu.

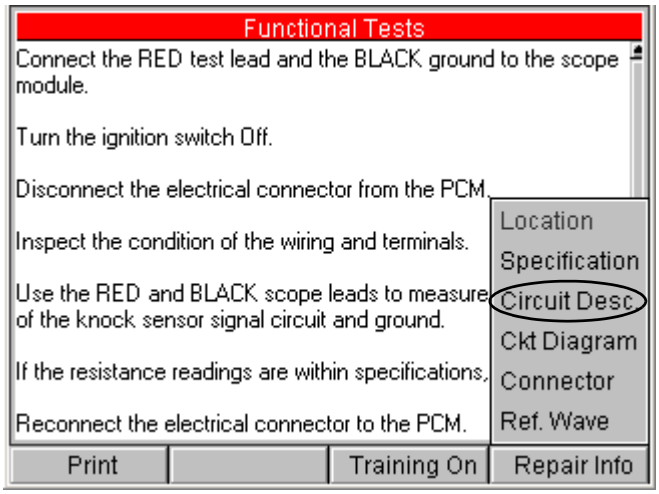

Figure 4.13: Component Tests - Repair Info Function Key

2 Select **Circuit Desc.** and press the **ENTER** key. This displays the Circuit Description screen.

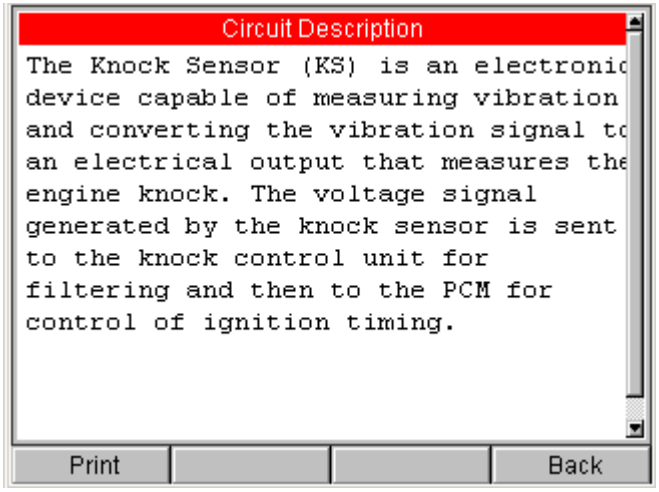

Figure 4.14: Repair Info Function Key, Circuit Description Screen

3 View the description and optionally use the **Print** function key to print it.

4 When finished, press the **Back** function key to return to the previous screen.

Repair Info Menu - Circuit Diagram Option

Use the Repair Info function key's Circuit Diagram option to view a diagram of the circuit for the selected component.

To view the circuit diagram, follow these steps:

1 With the test screen displayed, press the **Repair Info** function key to display the Repair Info menu.

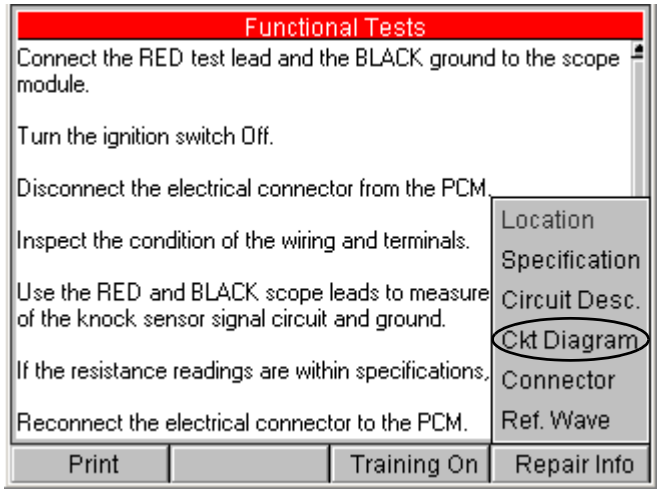

Figure 4.15: Component Tests - Repair Info Function Key

2 Select **Ckt Diagram** and press the **ENTER** key. This displays the Circuit Diagram screen.

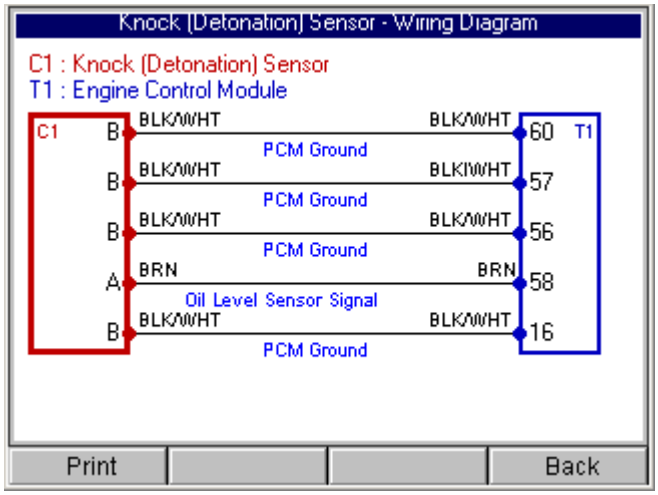

Figure 4.16: Repair Info Function Key, Circuit Diagram Screen

3 View the diagram and optionally use the **Print** function key to print it.

4 When finished, press the **Back** function key to return to the previous screen.

Repair Info Menu - Connector Option

Use the Repair Info function key's Connector option to view a diagram of connector(s) for the selected component.

To view the connector diagram, follow these steps:

1 With the test screen displayed, press the **Repair Info** function key to display the Repair Info menu.

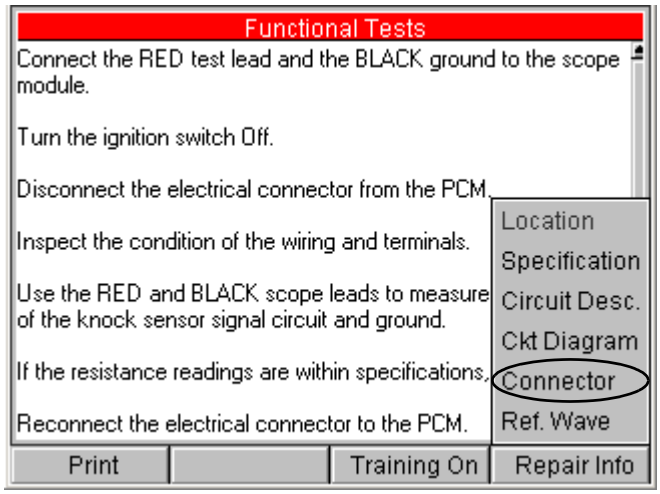

Figure 4.17: Component Tests - Repair Info Function Key

2 Select **Connector** and press the **ENTER** key. This displays the Connector Diagram screen.

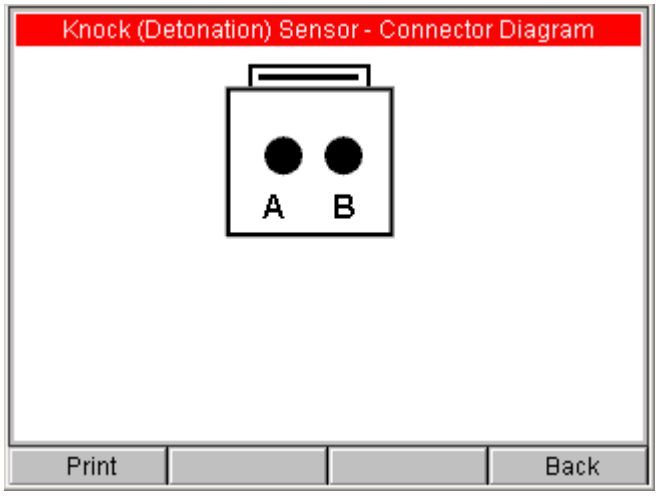

Figure 4.18: Repair Info Function Key, Connector Diagram Screen

3 View the diagram and optionally use the **Print** function key to print it.

4 When finished, press the **Back** function key to return to the previous screen.

Repair Info Menu - Reference Waveform Option

NOTE: *The Reference Waveform (Ref Wave) option appears only when you have the Training function turned on or when are using the Scope with InfoTech software (with the Scope module connected to the tool).*

Use the Repair Info function key's Reference Waveform (Ref Wave) option to view an example of a waveform for the selected component.

To view the reference waveform, follow these steps:

1 With the test screen displayed, press the **Repair Info** function key to display the Repair Info menu.

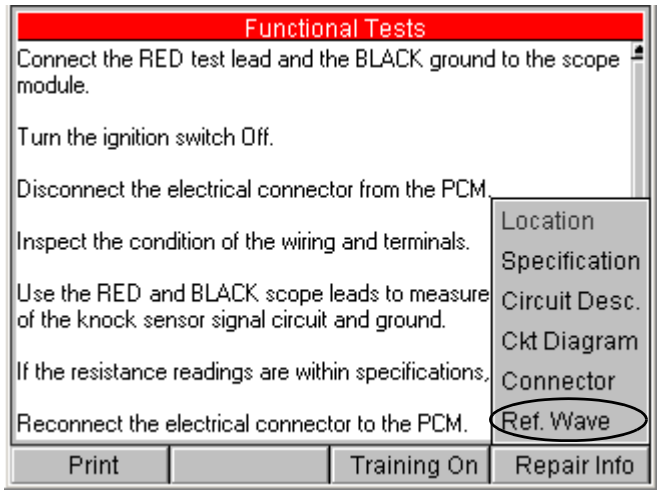

Figure 4.19: Component Tests - Repair Info Function Key

2 Select **Ref. Wave** and press the **ENTER** key. This displays the reference waveform in the bottom half of the screen.

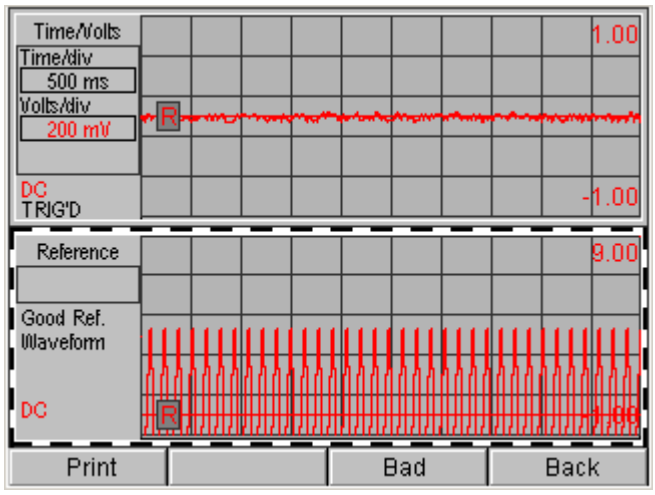

Figure 4.20: Repair Info Function Key, Ref. Waveform Option

3 View the waveform and optionally use the **Print** function key to print it.

4 If there is a **Bad** function key, use the function key to view an example of a known-bad waveform.

NOTE: *When you use the Bad function key, the name of the Bad function key changes to Good. Use the Good function key to return to the display of the known-good waveform.*

5 Use the **Back** function key to return to the previous screen.

Special Component Tests

Oil Light Reset Test Procedure

Torque Specifications

Transmission Pan Identification

Tune Up Specifications

Control Module Location

The Component Tests function lets you look up an oil light reset test procedure, torque specifications, the transmission pan identification, tune up specifications, and control module locations for some vehicles.

To look up special component test instructions, follow these steps:

1 Start the application to display the main menu screen. For details, refer to **Software Startup** on page 5.

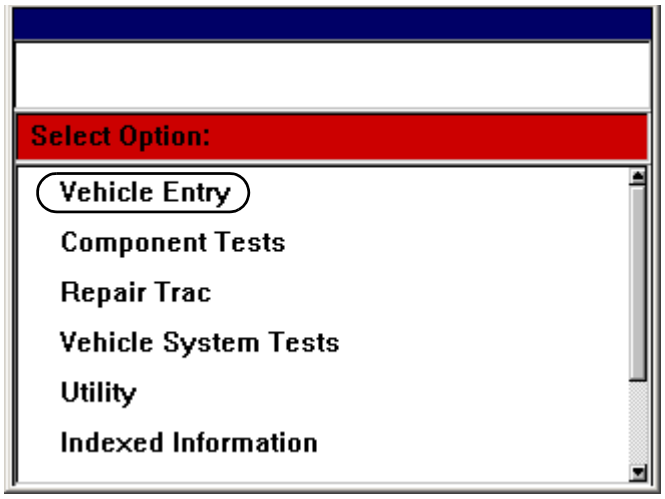

Figure 4.21: Main Menu Screen

2 If the correct vehicle information is not displayed in the top part of the screen, select **Vehicle Entry** and identify the vehicle. For complete instructions, refer to ***3: Vehicle Entry*** on page 11.

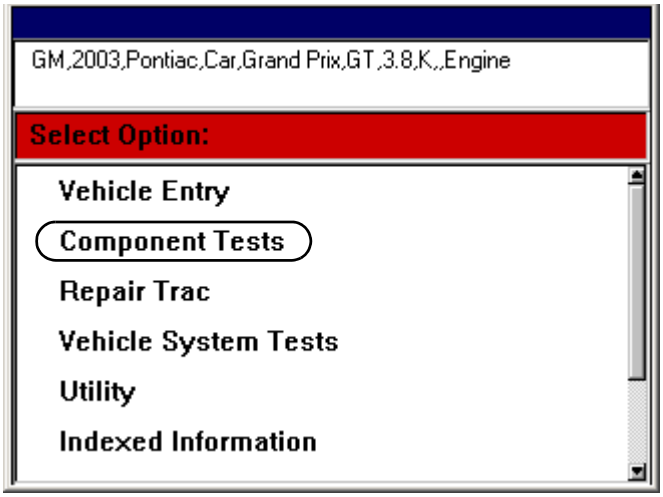

Figure 4.22: InfoTech Main Menu Screen with Vehicle Entered

3 From the main menu screen, select **Component Tests**. This displays a list of components on the Component Tests screen.

NOTE: *Test options vary for each vehicle. Only the options available for a vehicle appear on this list.*

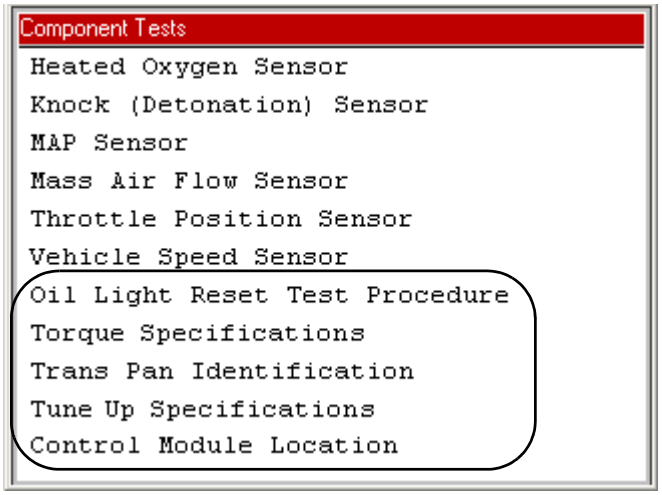

Figure 4.23: Component Tests Screen

4 Select one of the special tests (**Oil Light Reset Test Procedure, Torque Specifications, Trans Pan Identification**, **Tune Up Specifications,** or **Control Module Location**) and press the **ENTER** key. This displays the information screen for the selected item as shown in *Figure 4.24*, *Figure 4.25*, *Figure 4.26*, *Figure 4.27*, and *Figure 4.28* on page 21.

NOTE: *The options are at the very bottom of the list, if available.*

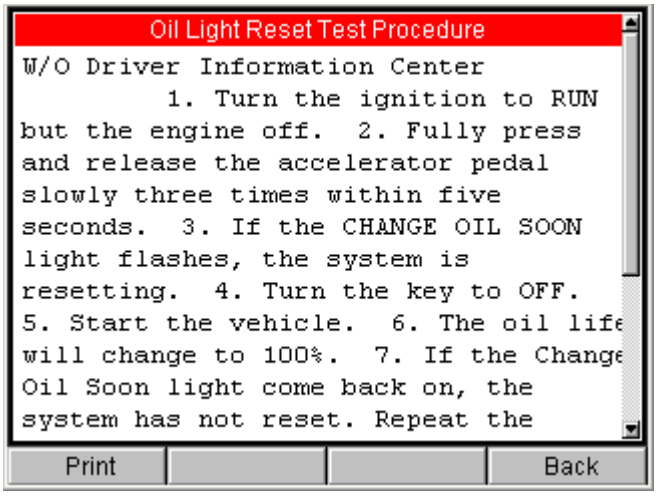

Figure 4.24: Oil Light Reset Test Procedure Screen

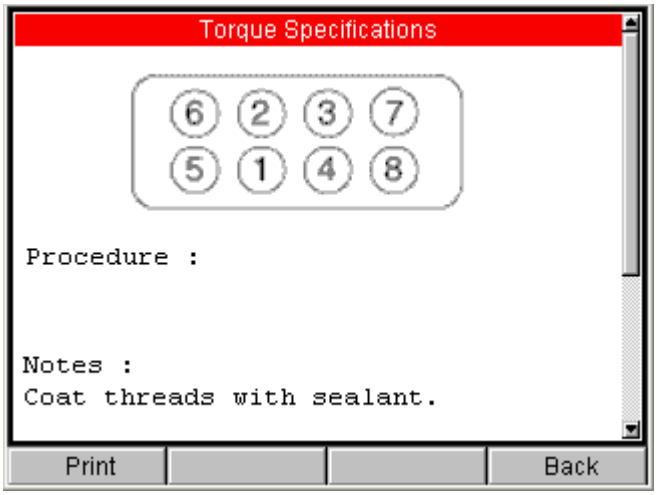

Figure 4.25: Torque Specifications Screen

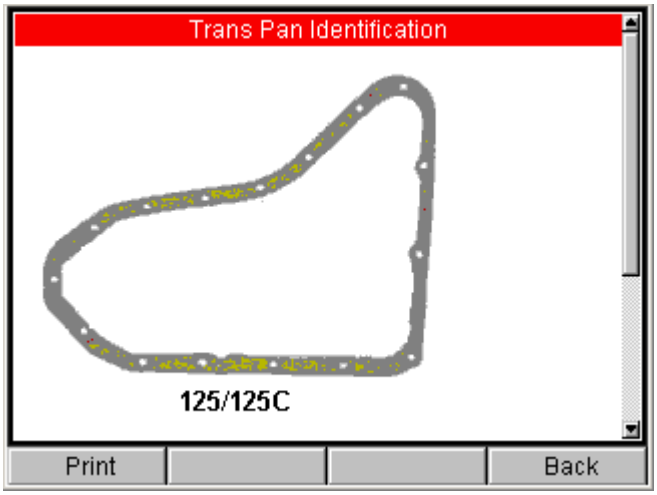

Figure 4.26: Trans-Pan Identification Screen

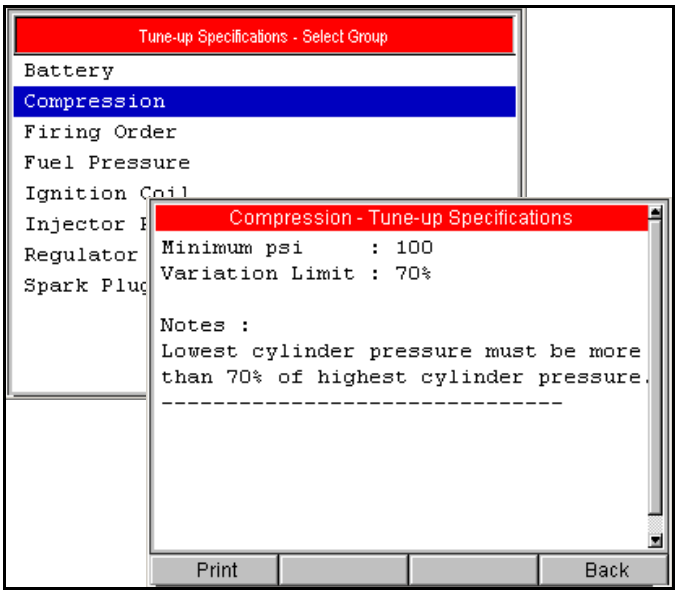

Figure 4.27: Tune-Up Specs Screen

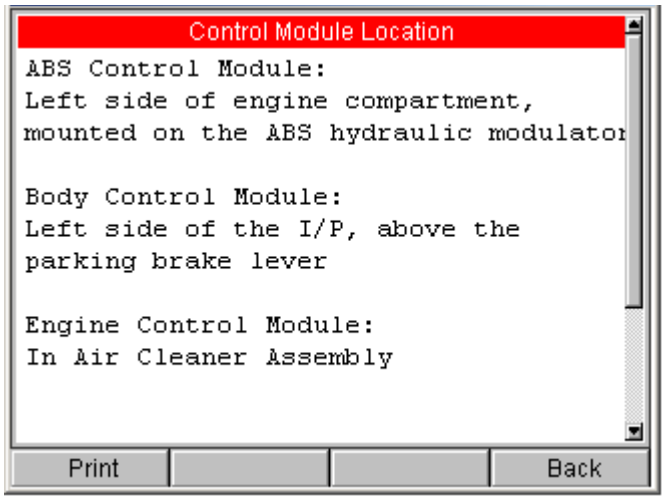

Figure 4.28: Control Module Location Screen

5 View the information and optionally use the **Print** function key to print it.

6 When finished, press the **Back** function key to return to the Component Tests screen.

NOTES:

5: Component Tests - Scope with InfoTech

Overview

The Scope with InfoTech software's Component Tests function lets you perform vehicle component testing. The Component Tests screens display Scope / Multimeter live test data and InfoTech test instructions on the same screen (see *Figure 5.6* on page 25). This combines the functions of the Scope software and the InfoTech software so you can view test instructions while performing tests.

IMPORTANT: The way the Component Tests function works varies if the Scope module is connected or removed or, for the NGIS tool, if you start the InfoTech software only. (For more information, refer to Software Startup on page 5.)

This chapter describes the Component Tests function if the Scope module is connected to the diagnostic tool and, for the NGIS tool, if you start the Scope with InfoTech software. The chapter includes the following sections:

- **Basic Component Tests** in the next column
- **Component Tests Function Keys** on page 26
- **Special Component Tests** on page 32 including **Oil Light Reset Test Procedure**, **Torque Specifications**, **Transmission Pan Identification**, **Tune Up Specifications**, **Control Module Locations**, and **O2 Bar Test**.

For instructions for the Component Tests function when the Scope module is removed from the tool and, for the NGIS tool, if you start the InfoTech software, refer to ***4: Component Tests - InfoTech*** on page 13.

Basic Component Tests

To use the Component Tests function, follow these steps:

1 Start the application to display the main menu screen. For details, refer to **Software Startup** on page 5.

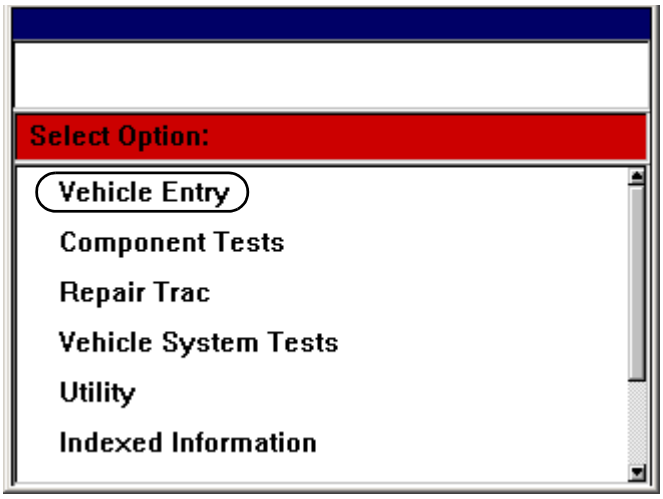

Figure 5.1: Main Menu Screen

2 If the correct vehicle information is not displayed in the top part of the screen, select **Vehicle Entry** and identify the vehicle. For complete instructions, refer to ***3: Vehicle Entry*** on page 11.

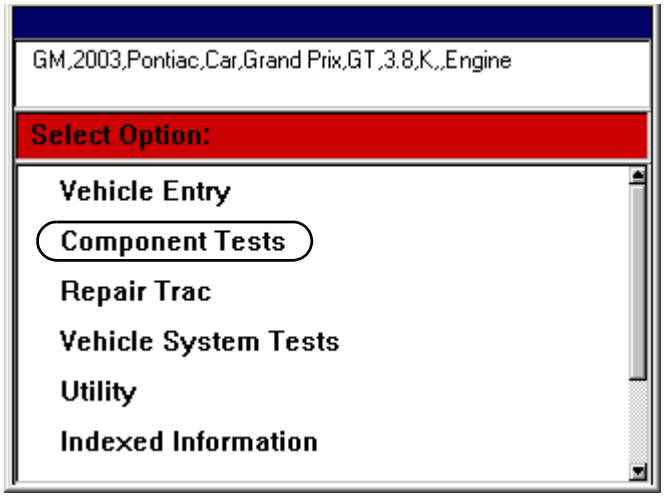

Figure 5.2: Main Menu Screen with Vehicle Entered

3 From the main menu screen, select **Component Tests**. This displays a list of components on the Component Tests screen.

NOTE: *Test options vary for each vehicle. Only the options available for a vehicle appear on this list.*

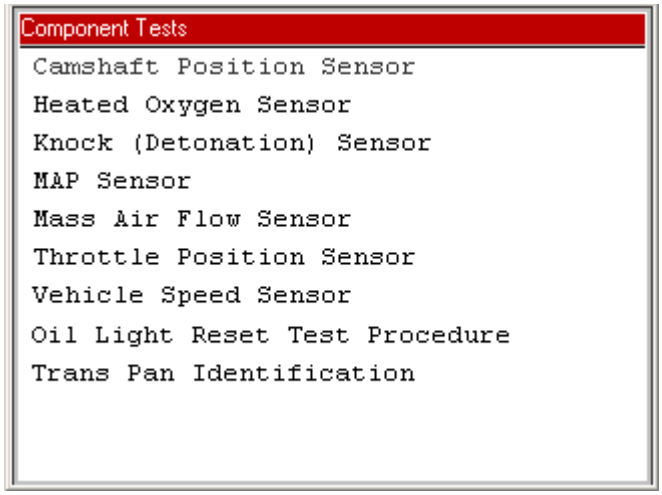

Figure 5.3: Component Tests Screen

4 Select a **component** and press the **ENTER** key.

NOTE: *If the Repair Trac option appears on this menu and you select it, refer to* ***10: Repair Trac*** *on page 101 for instructions. Also, refer to* ***Special Component Tests*** *on page 32 for instructions for the special tests that have separate instructions.*

5 One or more additional screens may appear for identifying the component. On each screen that appears, **select the correct option** and then press the **ENTER** key. Do this until the component is completely identified and the test screen appears (*Figure 5.4* or *Figure 5.6*).

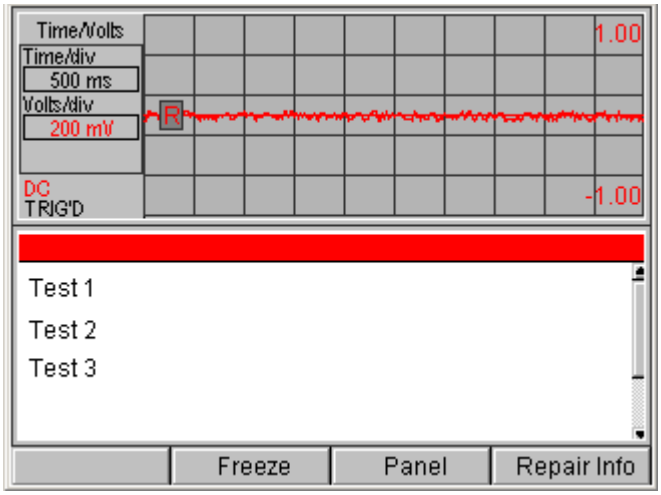

Figure 5.4: Component Test Screen with Test List in Bottom Panel

NOTE: *Depending on the test selected, the top half of the test screen displays either a scope waveform (shown above) or two digital multimeter (DMM) readings as described in step 7 (see Figure 5.5 and Figure 5.6).*

6 If there are multiple tests for the component, the bottom half of the screen displays a list of tests. If the list appears, do one of the following:

- Use the screen for testing. The screen operates similar to the screen with test instructions displayed in the bottom half of the screen (*Figure 5.5*), or
- Select a **Test** and press the **ENTER** key. This displays the test screen with the InfoTech test instructions in the bottom half of the screen (*Figure 5.5*).

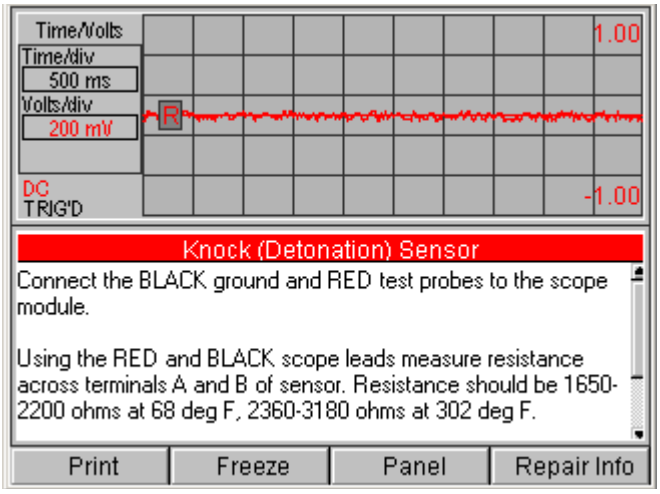

Figure 5.5: Component Test Screen with Scope Waveform in Top Panel and Test Instructions in Bottom Panel

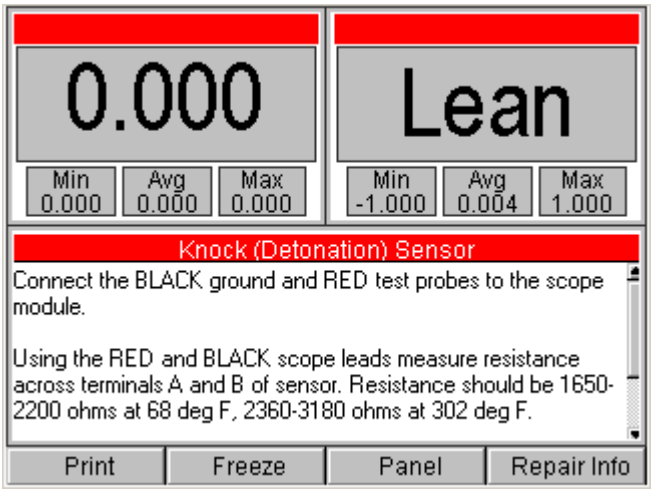

Figure 5.6: Component Test Screen with Two DMM Readings in Top Panel and Test Instructions in Bottom Panel

NOTE: *If there are no test instructions available, a message appears in the bottom half of the screen.*

7 Notice the following about the test screen:

- The top half of the screen displays either a Scope waveform panel (*Figure 5.5*) or two DMM panels (*Figure 5.6*).
  - » A waveform display operates the same as the Lab Scope waveform display (with DMM off). For a complete description of the display, refer to page 48 in ***7: Scope - Lab Scope*** on page 45.
  - » A DMM display operates the same as a full screen DMM display. For a complete description of the DMM panels, refer to ***6: Digital Multi-Meter (DMM)*** on page 35.
- The bottom half (panel) of the screen displays the InfoTech test instructions for the test. This display operates similar to the InfoTech test instructions described in ***4: Component Tests - InfoTech*** on page 13.
- One panel is always “selected.” When you first display the screen, the bottom panel (test instructions) is selected. You use the Up and Down Direction keys to scroll through the instructions. To select the top panel, you press the Panel function key and select a panel option (Edit Scope or DMM1 / DMM2).
- If the top half of the screen displays a waveform panel and is selected, you use the Direction keys to adjust the waveform settings.
- If the top half of the screen is displays two DMM panels and a DMM panel is selected, if the selected panel’s border a solid black line, the Direction keys move within the panel for changing the edit fields. If the selected panel’s border is moving dashes, you use the Left and Right Direction keys to select the other DMM panel.
- If a top panel is selected, you must press the EXIT key to select the bottom (test instructions) panel again.
- The function keys at the bottom of the screen change based on which panel is currently selected. For details, refer to **Component Tests Function Keys** on page 26

8 Use the instructions and the test screen to perform the component test, using the function keys to move between the panels, adjust the waveform and DMM readings, print and save data, freeze and reset the readings, turn on a training function, and view additional repair information as necessary. For details about the function keys, refer to **Component Tests Function Keys** on page 26.

9 When finished, use the **EXIT** key to return to previous screens.

Component Tests Function Keys

The function keys at the bottom of the Component Tests screen provide additional functions for using the screen. The function keys change based on which panel is currently selected. There are six groups of function keys that appear on the screen. The are:

- **Print, Freeze, Panel, Repair Info** (see page 26)
- **Trigger/Cursors/Time Volts, Freeze, Panel, Glitch On/Off** (see page 28)
- **Full Screen/Restore, Freeze, Panel, Reset** (see page 29)
- **Panel** (see page 30)
- **Cursors, Go, Panel, Print** (see page 30)
- **Full / Restore, Go, Panel, Print** (see page 31)

These groups of function keys are described in the next few sections.

The first group of function keys **[Print, Freeze, Panel, Repair Info]** appears when the ***bottom panel is selected and it contains the test list or test instructions***, as shown in *Figure 5.7*, *Figure 5.8*, and *Figure 5.9*.

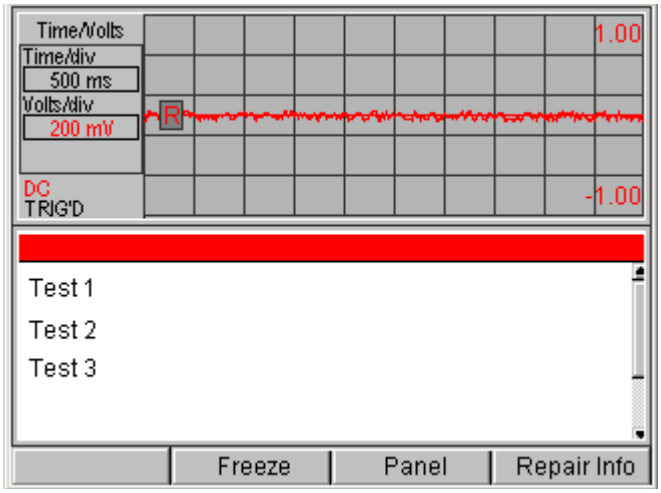

Figure 5.7: Component Test Screen - Function Keys with Scope Waveform in Top Panel and Bottom Panel Selected

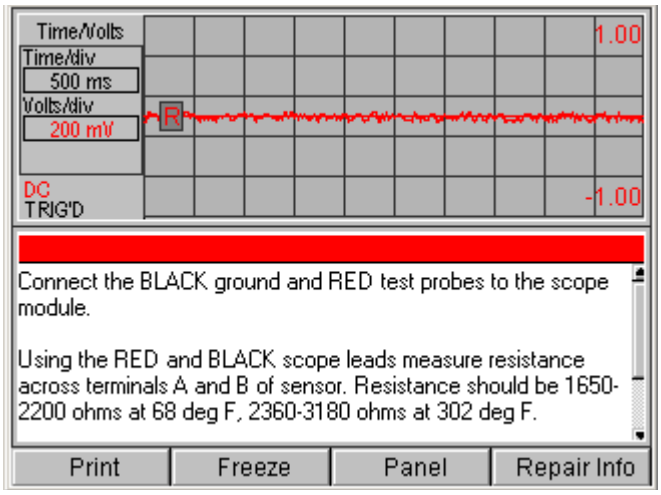

Figure 5.8: Component Test Screen - Function Keys with Scope Waveform in Top Panel and Bottom Panel Selected

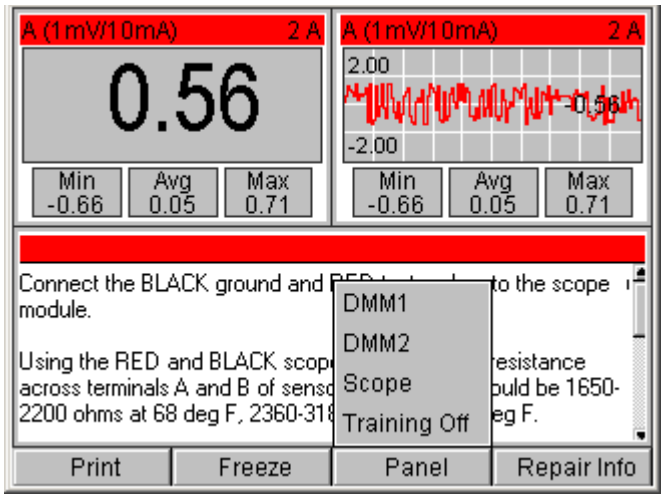

Figure 5.9: Component Test Screen - Function Keys with DMM Readings in Top Panel and Bottom Panel Selected

To use the **Print** function key, press the key to print the test instructions. Refer to the hardware user guides for the diagnostic tool and the printer.

> ***NOTE:*** *The print function key does not appear when the bottom panel displays a test list instead of instructions (see Figure 5.7).*

To use the **Freeze** function key, refer to the following sections:

- When the top panel displays a waveform, refer to the instructions in **Freeze Function Key (Lab Scope)** on page 66. Begin with step 2.
- When the top panel displays DMM readings, refer to the instructions in **Freeze Function Key (DMM)** on page 40. Begin with step 2.

To use the **Panel** function key menu options, use the following instructions:

- When the top panel displays a waveform and the bottom panel is selected, the **Panel** menu contains the options Edit Scope and DMM1/DMM2. Use them as follows:
  - » Use **Panel, Edit Scope** to select the top, waveform panel. With the panel selected, the screen operates the same as the normal Lab Scope waveform display (with DMM off). For a complete description, refer to page 48. (To select the bottom panel again, press the EXIT key.)
  - » Use **Panel, DMM1/DMM2** to replace the top panel waveform with two DMM panels.
- When the top panel displays DMM readings and the bottom panel is selected, the **Panel** menu contains the options DMM1, DMM2, Scope, and Training On/Off.
  - » Use **DMM1**, **DMM2** or **Edit DMM1**, **Edit DMM2** to select and edit the top DMM panels. When selected, the DMM panels operate the same as the normal DMM display. For a complete description, refer to ***6: Digital Multi-Meter (DMM)*** on page 35.
  - » Use **Panel, Scope** to replace the top two DMM panels with a Scope waveform.
  - » Use **Panel, Training On/Off** to turn demonstration data readings on and off. For details, refer to **Panel Menu - Training On/Off Option** on page 71.

To use the **Repair Info** function key, refer to **Repair Info Function Key** on page 106.

The second group of function keys **[Trigger/ Cursors/Time Volts, Freeze, Panel, Glitch On/Off]** appears when the ***top panel is selected and it contains the waveform display***, as shown in *Figure 5.10*, or when the top panel is selected and the Glitch panel is displayed in the bottom half of the screen, as shown in *Figure 5.11*. They also appear when you display a full screen waveform by using the Panel function key Full Screen option, as shown in *Figure 5.12*.

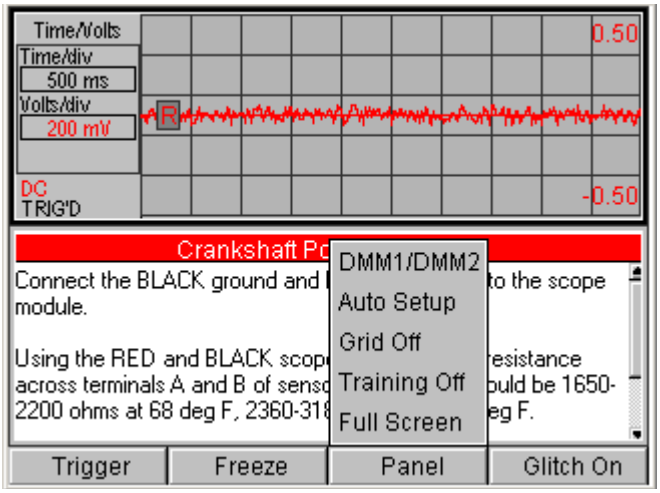

Figure 5.10: Component Test Screen - Function Keys with Waveform in Top Panel Selected

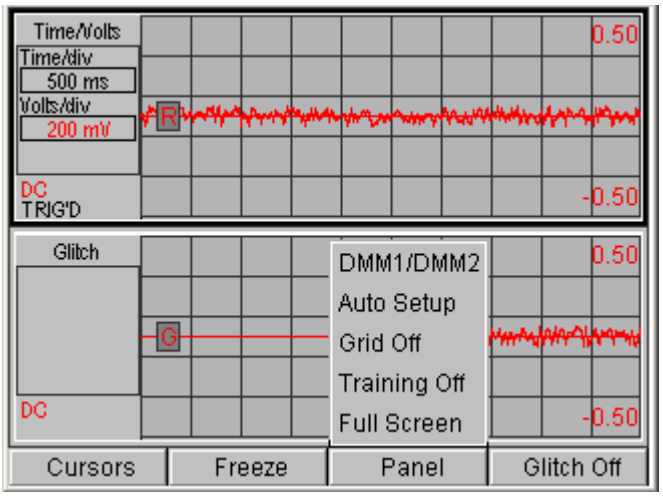

Figure 5.11: Component Test Screen - Function Keys with Glitch On

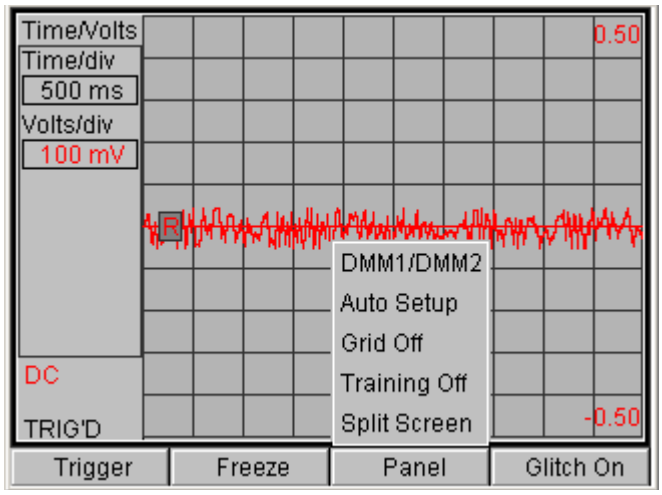

Figure 5.12: Component Test Screen - Function Keys with Waveform Selected and Displayed as Full Screen

To use the **Trigger / Cursors / Time Volts** function key, refer to **Trigger - Cursors - Time/Volts Function Key** on page 57.

To use the **Freeze** function key, refer to **Freeze Function Key (Lab Scope)** on page 66. Begin with step 2.

To use the **Panel** function key menu options, use the following instructions:

- Use **Panel, DMM1/DMM2** to replace the top panel waveform with two DMM panels.
- Use **Panel, Auto Setup** to have the Scope software automatically set up the waveform in the graph.
- Use **Panel, Grid On / Off** to turn the waveform's grid lines on or off. For details, refer to **Panel Menu - Grid Off/On Option** on page 70.
- Use **Panel, Training On/Off** to turn demonstration data readings on and off. For details, refer to **Panel Menu - Training On/Off Option** on page 71.
- Use **Panel, Full Screen** to change the split screen display to a full screen display as shown in *Figure 5.12*. With the full screen displayed, the menu option becomes Split Screen. Select the Split Screen option to return the display to a split screen (*Figure 5.10*).

To use the **Glitch On / Off** function key, refer to **Glitch Function Key** on page 71.

The third group of function keys **[Full Screen/ Restore, Freeze, Panel, Reset]** appears when ***one of the top DMM panels is selected and it contains a DMM reading***, as shown in *Figure 5.13*. When you use the Full Screen function key, the full screen displays and the name of the function key changes to Restore, as shown in *Figure 5.14*.

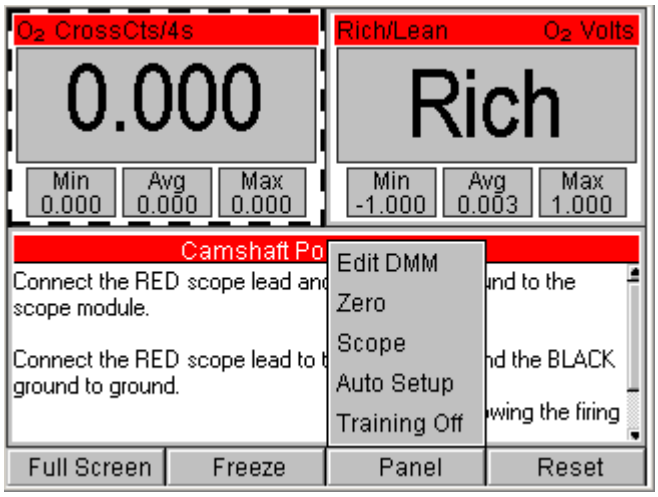

Figure 5.13: Component Test Screen - Function Keys with DMM Reading Selected

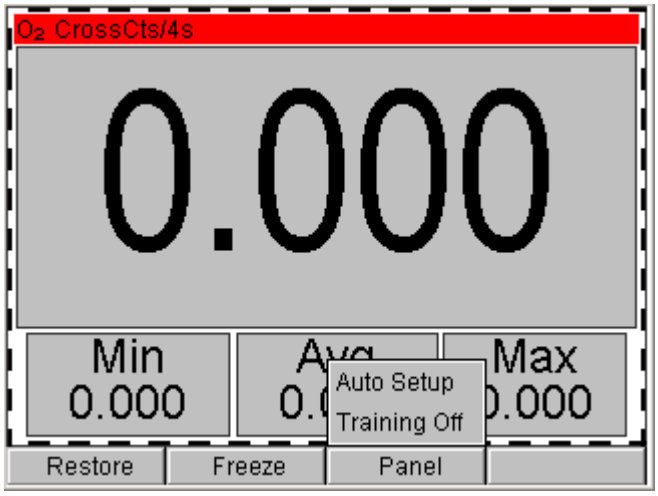

Figure 5.14: Component Test Screen - Function Keys with DMM Reading Selected and Displayed as Full Screen

To use the **Full Screen / Restore** function key, refer to **Full Function Key** on page 39.

To use the **Freeze** function key, refer to **Freeze Function Key (DMM)** on page 40. Begin with step 2.

To use the **Panel** function key menu options, use the following instructions:

- Use **Panel, Edit DMM** (**Edit DMM1**, **Edit DMM2**) to select and edit the top DMM panels. When selected, the DMM panels operate the same as the normal DMM display. For a complete description, refer to ***6: Digital Multi-Meter (DMM)*** on page 35.
- Use **Panel, Zero** to restart the readings for a selected DMM panel. For details, refer to **Panel Menu - Zero Option** on page 42.
- Use **Panel, Scope** to replace the top two DMM panels with a Scope waveform. With the waveform displayed and selected, the screen operates the same as the normal Lab Scope waveform display (with DMM off). For a complete description, refer to page 48. (To select the bottom panel again, press the EXIT key.)
- Use **Panel, Auto Setup** to have the Scope software automatically set up the DMM panels.
- Use **Panel, Training On/Off** to turn demonstration data readings on and off. For details, refer to **Panel Menu - Training On/Off Option** on page 71.

To use the **Reset** function key, press the key to restart all the readings. For details, refer to **Reset Function Key** on page 43.

The fourth group of function keys **[blank, blank, Panel, blank]** appears when one of the ***top DMM panels is selected and it contains edit fields***, as shown in *Figure 5.15*.

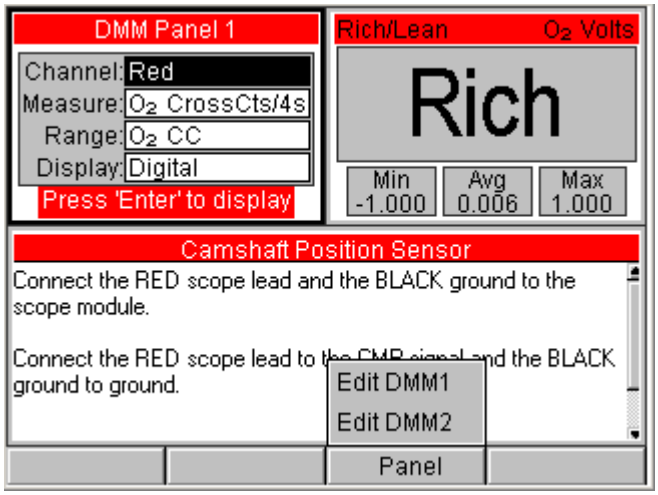

Figure 5.15: Component Test Screen - Function Keys with DDM Edit Fields Panel Selected

Use these function keys to select the panels for changing the setup. For instructions, refer to **DMM Setup and Display** on page 36.

The fifth group of function keys **[Cursors, Go, Panel, Print]** shown in *Figure 5.16* appears when the ***top panel displays a waveform and you use the Freeze function key***.

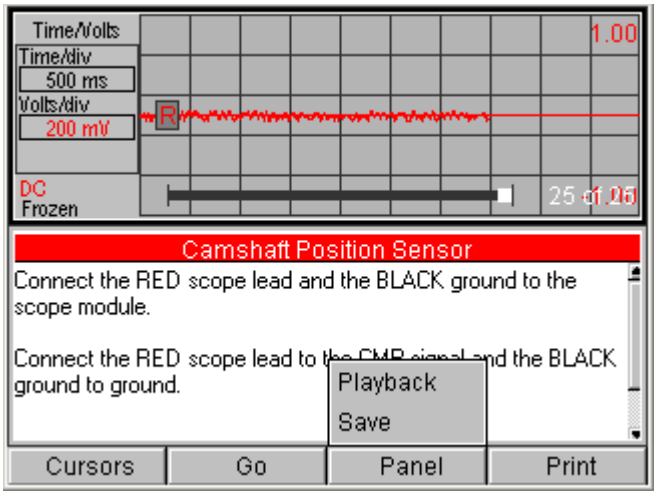

Figure 5.16: Component Test Screen - Function Keys with Waveform in Top Panel Selected and Frozen

To use these function keys, refer to **Freeze Function Key (Lab Scope)** on page 66.

NOTE: *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in* **Freeze Function Key (Lab Scope)** *on page 66.*

The sixth group of function keys **[Full/Restore, Go, Panel, Print]** as shown in *Figure 5.17* appears when the ***top panels display DMM readings and you use the Freeze function key***. When you use the Full Screen function key, the full screen displays and the name of the function key changes to Restore, as shown in *Figure 5.18*

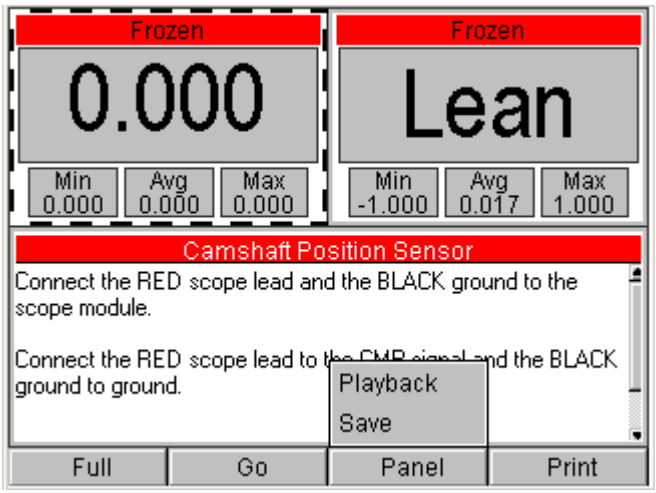

Figure 5.17: Component Test - Function Keys with DMM Reading in Top Panel Selected and Frozen

Figure 5.18: Component Test - Function Keys with DMM Reading in Top Panel Selected and Frozen and Displayed as Full Screen

To use the **Full** function key, refer to **Full Function Key** on page 39 in ***6: Digital Multi-Meter (DMM)***.

To use the **Go**, **Panel**, and **Print** function keys, refer to **Freeze Function Key (DMM)** on page 40.

NOTE: *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in* **Freeze Function Key (DMM)** *on page 40.*

Special Component Tests

The Component Tests function lets you look up an oil light reset test procedure, torque specifications, the transmission pan identification, tune up specifications, and control module locations for some vehicles. It also lets you perform a special O2 Bar Test.

Oil Light Reset Test Procedure

Torque Specifications

Transmission Pan Identification

Tune Up Specifications

Control Module Locations

These tests work the same in both the *Scope with InfoTech* software and the *InfoTech* software. For instructions, refer to **Special Component Tests** on page 20.

O2 Bar Test

The Scope with InfoTech software has a special O2 Bar Component Test that is different from the other Component Tests.

To use the O2 Bar Test function, follow these steps:

1 Start the application to display the main menu screen. For details, refer to **Software Startup** on page 5.

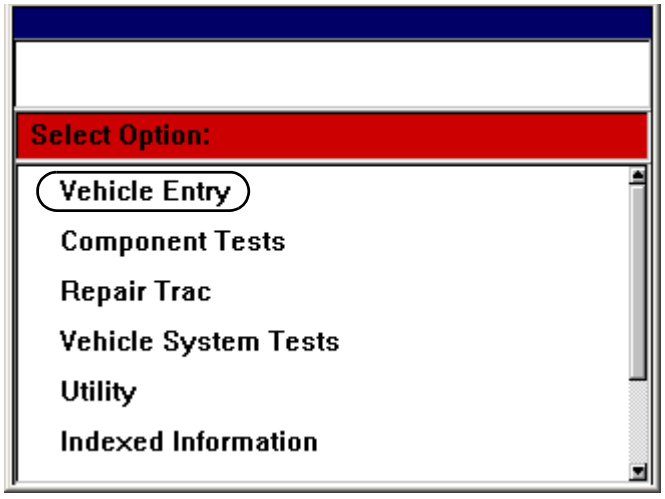

Figure 5.19: Main Menu Screen

2 If the correct vehicle information is not displayed in the top part of the screen, select **Vehicle Entry** and identify the vehicle. For complete instructions, refer to ***3: Vehicle Entry*** on page 11.

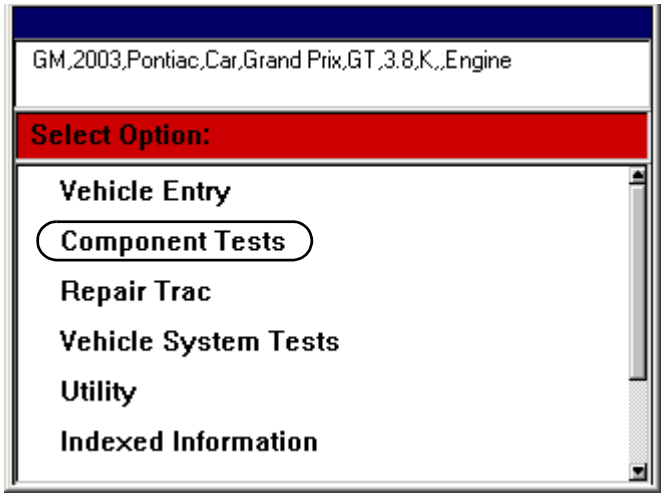

Figure 5.20: InfoTech Main Menu Screen with Vehicle Entered

3 From the main menu screen, select **Component Tests**. This displays a list of components on the Component Tests screen.

NOTE: *Test options vary for each vehicle. Only the options available for a vehicle appear on this list.*

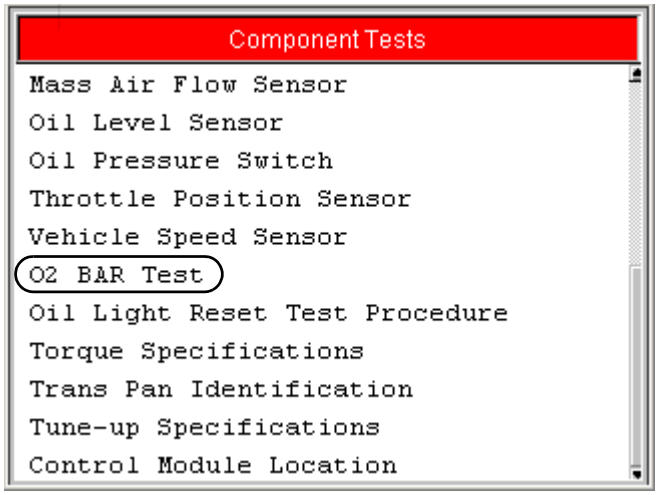

Figure 5.21: Component Tests Screen

4 Select **O2 BAR Test** and press the **ENTER** key. This displays the O2 BAR test on the Component Test screen (*Figure 5.22*).

NOTE: *The O2 BAR Test option is near the bottom of the list, if available.*

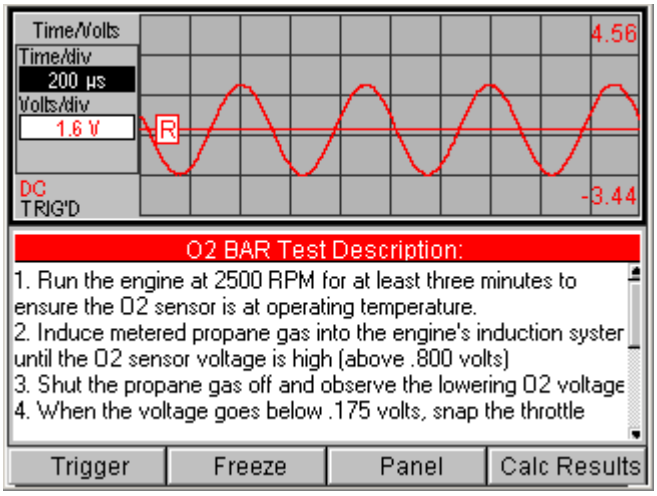

Figure 5.22: Component Test Screen - O2 BAR Test

5 Notice the following about the test screen:

- The top half of the screen displays the Scope waveform for the test. This display operates the same as the Lab Scope waveform display (with DMM off). For a complete description of the display, refer to page 48 in ***7: Scope - Lab Scope***.
- The bottom half (panel) of the screen displays the InfoTech test instructions for the test. This display operates similar to the InfoTech test instructions described in ***4: Component Tests - InfoTech*** on page 13.
- One panel is always "selected." When you first display the screen, the top waveform panel is selected.
- The function keys at the bottom of the screen change based on which panel is currently selected.

6 Press the **EXIT** key and then use the **Down Direction** key to select the bottom panel.

7 Use the **Up** and **Down Direction** keys to scroll through the test instructions.

8 As you perform the test, when you get to the test instruction step that says "When the voltage rises above .800 volts, freeze / record the signal," press the **Calc Results** function key. This does the following:

- Stops the readings (see *Figure 5.23*),
- Places cursors at the last place the voltage was below the lower limit (0.175V) and the first place after that where the voltage was above the upper limit (0.800V),
- Calculates the time difference as the difference between the vertical cursors, and
- Makes the top waveform panel the "selected" panel. (If the panel has a moving-dashes border, press the **ENTER** key to edit the waveform. To select the bottom panel again, press the **EXIT** key and then use the **Down Direction** key.)

NOTE: *For information about using cursors, refer to* ***Trigger - Cursors - Time/Volts Function Key*** *on page 57.*

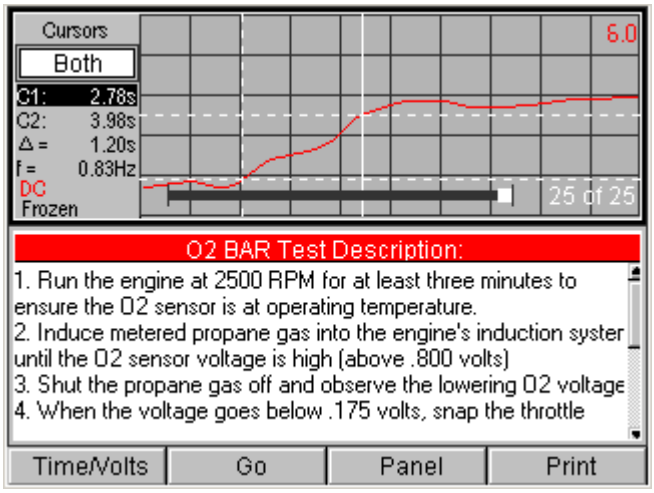

Figure 5.23: Component Test Screen - O2 BAR Test with Cursors

9 Use the function keys to move between the panels, adjust the waveform, display DMM readings, print and save data, freeze and reset the readings, and turn on a training function. For instructions for the function keys, refer to **Component Tests Function Keys** on page 26. Be aware of the following differences in the O2 Bar Test function keys:

- If the bottom panel contains the test instructions and the panel is selected, you must use the **Calc Results** function key to select the top waveform panel. This freezes the readings. Press the **Go** function key to restart the readings.
- The **Panel** function key **DMM** option places two DMM panels in the bottom half of the screen. With the DMM panels displayed, the **Panel** function key, **Test Text** option places the test instructions back into the bottom half of the screen.
- If the DMM panels are displayed in the bottom half of the screen and the top panel is selected, you must press the **EXIT** key and then use the **Direction keys** to move between the panels.

10 When finished, use the **EXIT** key to return to previous screens.

NOTES:

6: Digital Multi-Meter (DMM)

Overview

The Digital Multi-Meter function lets you view up to four different meters on one screen. Based on your testing requirements, you can set up the meters to display various combinations of channel readings.

When you select **Digital Multi-Meter** from the Scope Multimeter main menu screen, the Digital Multi-Meter (DMM) Panel Setup screen appears.

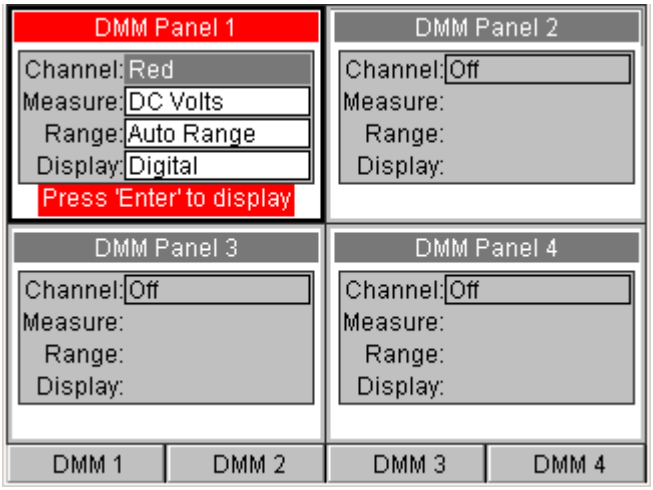

Figure 6.1: Digital Multi-meter Panel Setup Screen

This screen contains four panels for setting up four different digital multi-meter displays (for up to four channels). After setting up the panels, the multi-meter readings display in each panel, as shown in *Figure 6.2*.

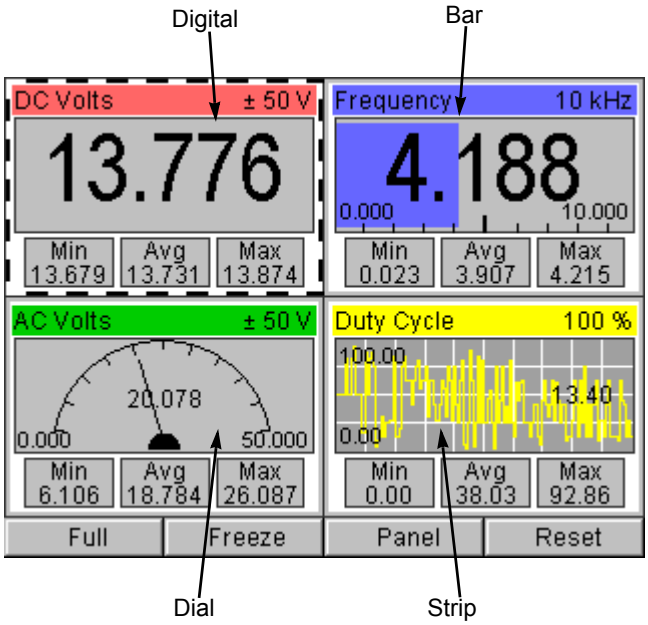

Figure 6.2: Digital Multi-meter Screen - After Setup

You can view each meter reading as a digital read-out, bar graph, dial, or strip (line) graph. You can also view each meter individually on the full screen, use a training function, use an automatic setup function, or "freeze" a screen of data for viewing, printing, or saving.

This chapter describes how to use the Digital Multi-Meter functions.

DMM Setup and Display

To set up and display the digital multi-meter readings, follow these steps:

1 Display the main menu screen. For details, refer to **Software Startup** on page 5.

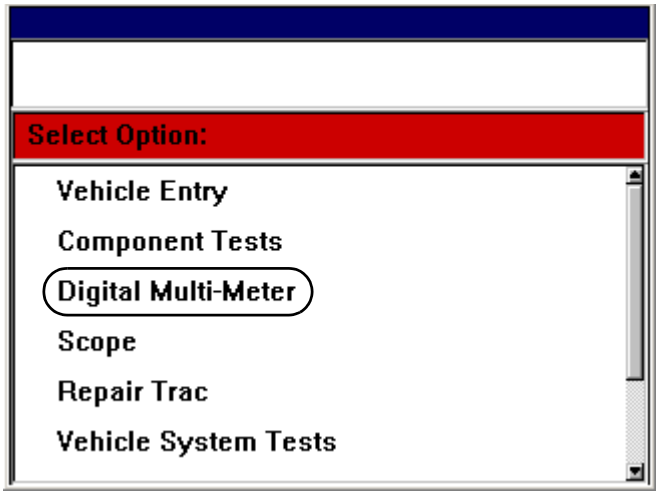

Figure 6.3: Main Menu Screen

2 From the main menu screen, select **Digital Multi-Meter**. This displays the digital multi-meter setup screen.

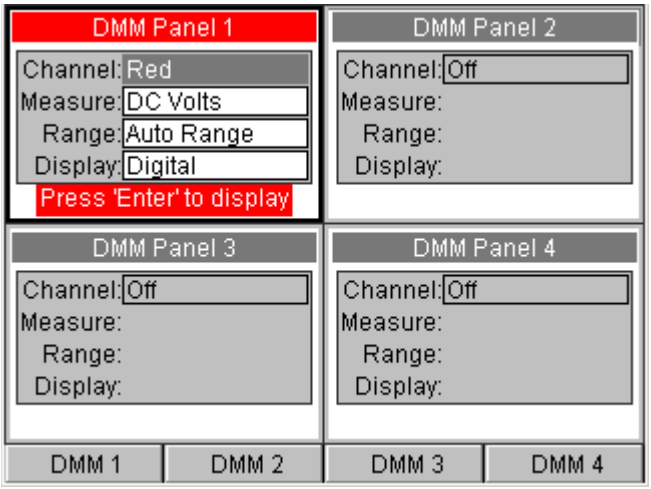

Figure 6.4: DMM Setup Screen

3 Notice the following about the Setup Screen:

- The screen has four panels for setting up four different meter readings. You set up the panels, one at a time, based on the probes connected to the Scope module and your testing requirements. After you set up a panel and press the ENTER key, the meter reading appears directly in the panel (in place of the setup boxes).
- One panel is always "selected." The selected panel either has a solid border around it and contains edit "fields" (*Figure 6.4*), or it has a "moving" dashes border and contains a meter reading (*Figure 6.6* on page 37).
- When the selected panel's border is solid, the Direction keys move within the panel for changing the edit fields. When the selected panel's border is moving dashes, the Direction keys move between panels for selecting other panels.
- The Scope software has a training demo function. To use this right away, press the ENTER key. Then press the Panel function key, select Training On from the menu, and press the ENTER key. For details, refer to **Panel Menu - Training On/Off Option** on page 43.
- The DMM screen has an automatic setup feature that determines range values for you based on the electrical signals through the channel(s). Details are included in the following steps.

4 Do the following to adjust the panel's settings:

NOTE: *The selected panel may still contain the settings from the last time you used it. If the panel is already set correctly, go to step 5.*

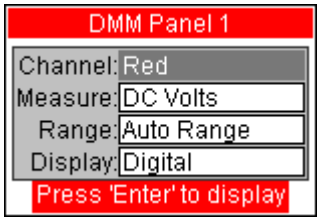

Figure 6.5: DMM Panel 1

a Use the **Left** and **Right Direction** keys to select the channel color of the probe you want to read from.

NOTE: *To turn a panel off, set the Channel to Off and then press either the EXIT key or a DMM function key.*

b Use the **Down Direction** key to select the next field.

c Use the **Left** and **Right Direction** keys to set the value for the selected field.

d **Repeat b and c** until all the values are set correctly, then go to the next step. The table below lists possible field values.

Field	Possible Values
Channel	Red, Blue, Green, Yellow, Off
Measure	Varies based on the selected Channel color: Amps, DC Volts, AC Volts, RMS, Frequency, Duty Cycle, O2 Cross Counts, Ohms
Range	Varies based on the selected Measure ***NOTE:*** *Select "Auto Range" to have the software automatically adjust the range as necessary during testing.*
Display	Identifies how the reading appears: Digital, Bar, Dial, or Strip

5 When finished setting up a panel, press the **ENTER** key to display the meter reading. The solid black border around the panel changes to moving dashes, indicating you can now use the Direction keys to select another panel. See *Figure 6.6*.

NOTE: *After changing the values and before pressing the ENTER key, you can optionally press the EXIT key and not display the meter reading right away, but come back and change or view it later (after setting up the other panels).*

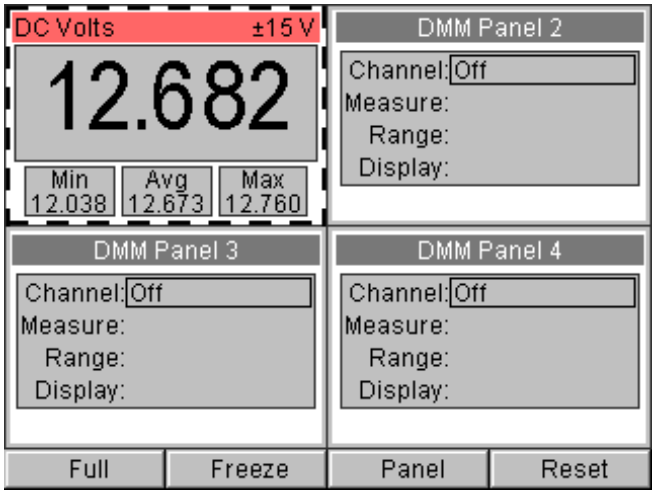

Figure 6.6: DMM Screen - Panel 1 Displayed

NOTE: *Each displayed panel shows the measurement and range at the top, the reading in the center, and the reading's minimum, average, and maximum at the bottom. If a panel is selected, you can repeatedly press the ENTER key to change the panel's display type from Digital to Bar to Dial to Strip (see Figure 6.7 on page 38).*

6 To set up another panel, use the **Direction** keys to select the panel to set up. This places the moving dashes around the newly selected panel.

7 With the panel selected, press the **ENTER** key to begin editing the panel. This changes the border to a solid black line.

8 Return to step 4 and repeat steps 4 through 7 until all the panels are set up as you want them. *Figure 6.7* shows all four panels set up.

NOTE: *You can optionally use the **Auto Setup** function to have the software automatically set up the Range values for multiple panels. To do this, "turn on" each panel you want to use by setting the Channel and Measure values and then displaying the panel. With all the required panel meter readings displayed, press the Panel function key, select Auto Setup from the menu, and press the ENTER key. Then go to step 9. For more information, refer to **Panel Menu - Auto Setup Option** on page 42.*

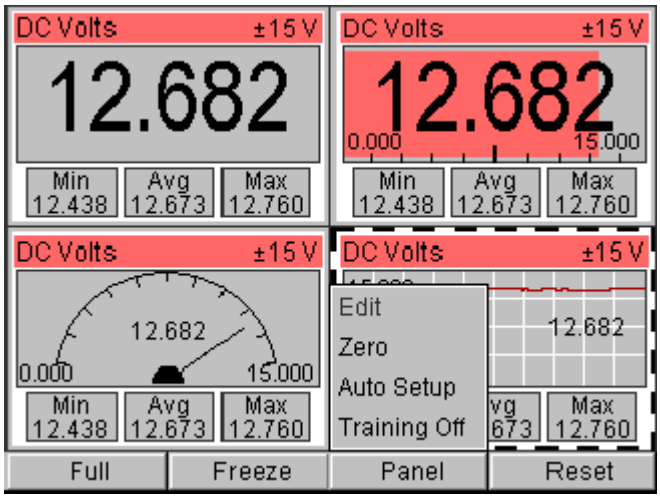

Figure 6.7: DMM Screen -All Panels Displayed

9 While viewing the readings, do any of the following:

- With a display panel selected (with a moving-dashes border), repeatedly press the **ENTER** key to change the display type (Digital, Bar, Dial, Strip) for that panel.
- Use the Full function key to view a selected panel as a full-screen display. Refer to **Full Function Key** on page 39.
- Use the Freeze function key to stop the readings and "freeze" them on the screen. Refer to **Freeze Function Key (DMM)** on page 40.
- Use the Panel function key, Edit option to change the settings for a panel. Refer to **Panel Menu - Edit Option** on page 41.
- Use the Panel function key, Zero option to reset the readings for a selected panel. Refer to **Panel Menu - Zero Option** on page 42.
- Use the Panel function key, Auto Setup option to have the Scope software automatically determine the Range settings for the displayed panels. Refer to **Panel Menu - Auto Setup Option** on page 42.
- Use the Panel function key, Training On/Off option to view demo readings in the panels. Refer to **Panel Menu - Training On/Off Option** on page 43.
- Use the Reset function key to reset the readings for all panels. Refer to **Reset Function Key** on page 43.

10 When you are finished using the screen, use the **EXIT** key to return to the main menu screen.

DMM Function Keys

Overview

The function keys at the bottom of the multi-meter screen change when the selected panel's border and contents change, and when you use the Freeze function. The three main groups of Function keys that appear on the DMM screens are:

- **DMM1, DMM2, DMM3, DMM4**
- **Full, Freeze, Panel, Reset**
- **Full, Go, Panel, Print**

The first two groups of function keys appear based on the selected panel's border and contents as shown in the following table.

Border/Contents	Function Keys
Solid border; Contains edit fields	DMM1, DMM2, DMM3, DMM4 (see *Figure 6.8*) For details, refer to **DMM1, DMM2, DMM3, and DMM4 Function Keys** on page 39.
Moving border; Contains the meter reading	Full, Freeze, Panel, Reset (see *Figure 6.9*) For details, refer to the following: • **Full Function Key** on page 39 • **Freeze Function Key (DMM)** on page 40 • **Panel Function Key (DMM)** on page 41 • **Reset Function Key** on page 43

The third group of Function keys [Full, Go, Panel, Print] appears when you use the Freeze function key (see *Figure 6.10*). For details, refer to **Freeze Function Key (DMM)** on page 40.

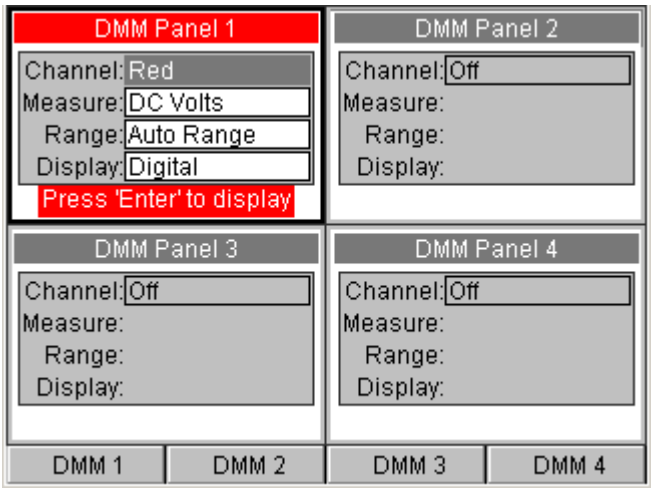

Figure 6.8: DMM Function Keys - Solid Border with Edit Fields

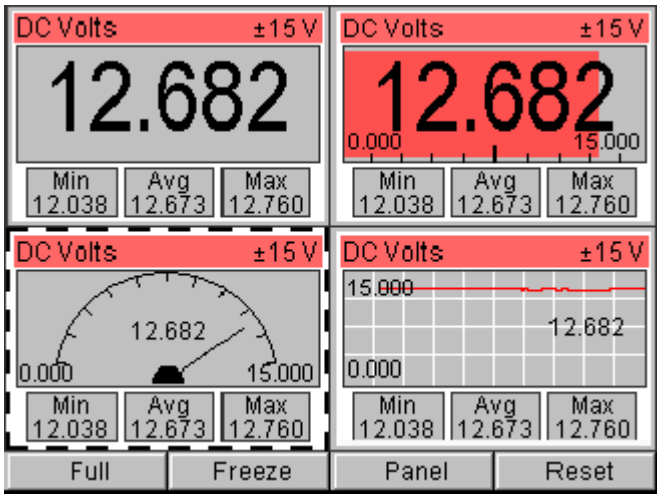

Figure 6.9: DMM Function Keys - Moving Border with Meter Reading

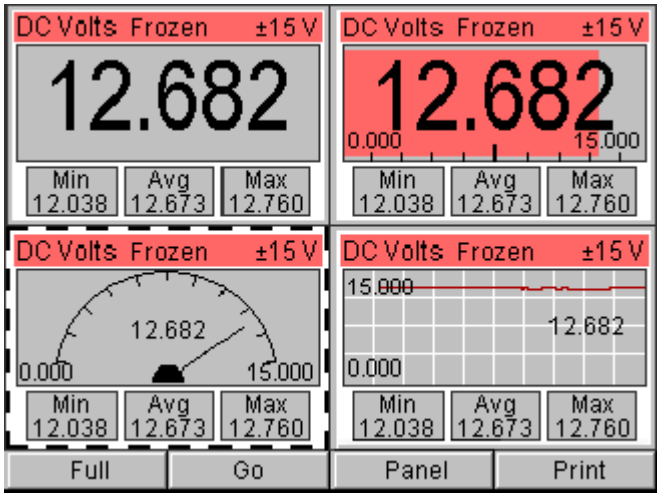

Figure 6.10: DMM Function Keys - after pressing Freeze function key

DMM1, DMM2, DMM3, and DMM4 Function Keys

Use the DMM 1, DMM2, DMM3, and DMM4 function keys to select other panels for setup and viewing.

Full Function Key

The Full function key lets you view a selected panel's meter reading on the entire (full) screen.

To display the full screen, follow these steps:

1 Select a panel for full display. The panel must currently display a meter reading.

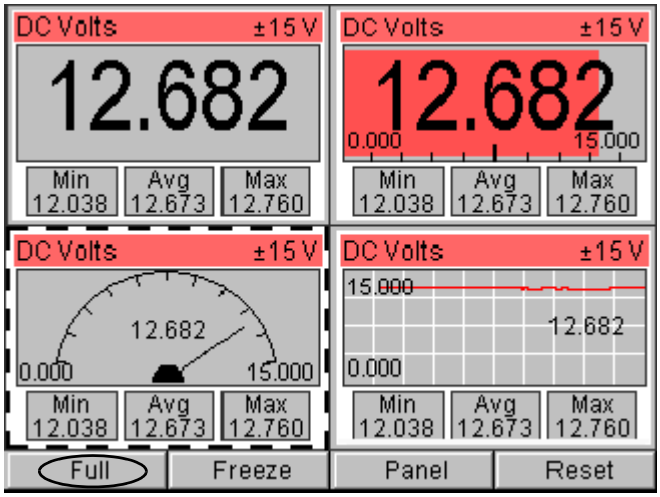

Figure 6.11: DMM Screen - Full Function Key

2 Press the **Full** function key. This changes the screen to the full display for the selected panel.

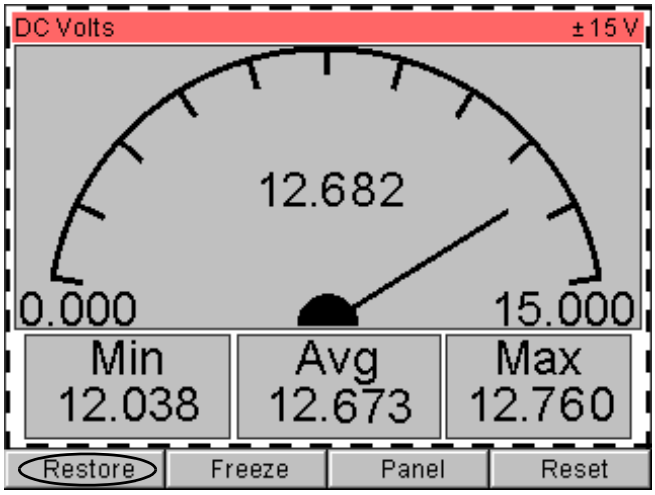

Figure 6.12: DMM Screen - Full Display

3 When finished, press the **Restore** function key to return to the four-panel DMM display screen.

Freeze Function Key (DMM)

The DMM's Freeze function key lets you stop and "freeze" the meter reading(s) at one specific point in time. When the reading(s) are "frozen," you can print or save the reading(s), or review already saved readings.

To "freeze" the readings, follow these steps:

1 Select any panel that currently displays a meter reading.

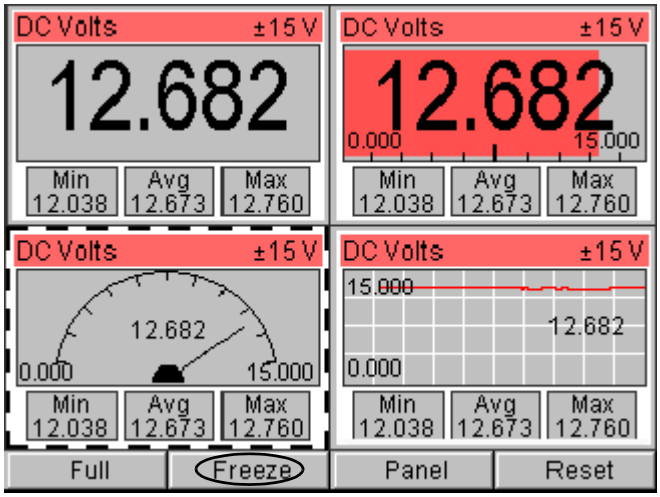

Figure 6.13: DMM Screen - Freeze Function Key

2 Press the **Freeze** function key. This stops all readings and "freezes" the display for all the panels. The word "Frozen" flashes at the top of each panel. In addition, the Function keys at the bottom of the screen change and provide options for printing, saving, and replaying the readings (see *Figure 6.14* on page 40).

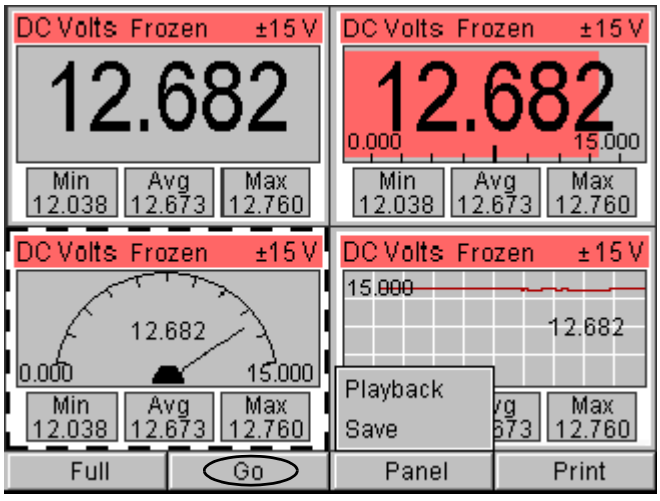

Figure 6.14: DMM Screen - Freeze Function

3 Use the **Function** keys on the "frozen" screen to do any of the following:

- Full - use this function key to view a selected panel on the entire (full) screen. When finished viewing the full screen, press the Restore function key to return to the four-panel DMM display screen.
- **Go** - use this function key to restart the live readings.
- **Panel: Playback -** use this function key to view saved files. When you use this key, a Load screen appears for selecting a file to view. Use the **Up and Down Direction keys** to select a file and then press the **ENTER** key.

  NOTE: *You can also use the Playback option on the main menu to "playback" files. For details, refer to* ***15: Playback*** *on page 131.*
- **Panel: Save** - use this function key to save a "snapshot" of what is currently displayed on the screen. When you use this key, a Save screen appears for saving a file. Use the **Up and Down Direction keys** to select an "Open" position and then press the **ENTER** key.

  NOTE: *The Save screen lists saved files and "Open" positions. When you save a new file you can either select an "Open" position or a file you want to over-write. The function keys at the bottom of the screen let you lock or unlock files. Locked files have a padlock icon next to the file name; they cannot be overwritten.*
- **Print** - use this function key to print what is currently displayed on the screen. If only one panel displays a reading, or if a panel is in full view, then only one panel prints. Otherwise, all the panels print.

4 When finished, press the **Go** function key to restart the live readings (see *Figure 6.14*).

NOTE: *The panel minimums, averages, and maximums automatically reset after pressing the Go function key. Any displayed strip charts also reset.*

Panel Function Key (DMM)

The Panel function key displays a menu of additional functions for the DMM screen. They are:

- Edit
- Zero
- Auto Setup
- Training On/Off

These options are described separately in the next few sections.

NOTE: *When the DMM screen is "frozen," the Panel menu options are Playback and Save. For details, refer to the previous column.*

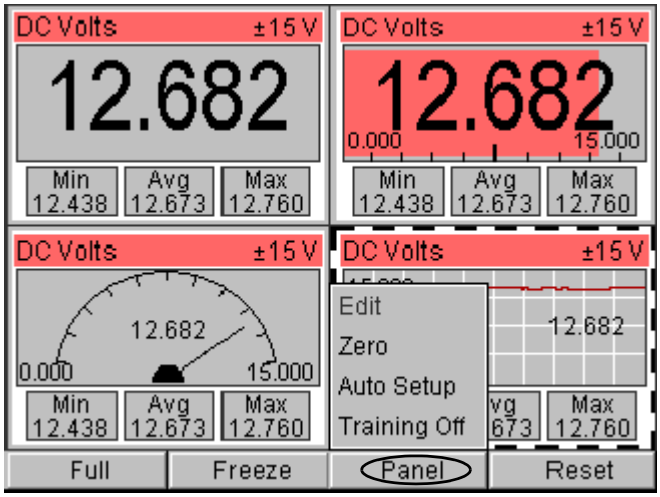

Figure 6.15: DMM Screen - Panel Function Key, Menu Options

NOTE: *If you press the Panel function key to display the menu, but do not want to select an option, either press the EXIT key or press the Panel function key again to close the menu.*

Panel Menu - Edit Option

Use the Panel function key's Edit menu option to change the settings for a panel that displays a meter reading.

To edit a panel that displays a meter reading, follow these steps:

1 Select the panel to edit. The panel must be a panel that currently displays a meter reading.

NOTE: *If you have a panel displayed as full display and then use this option, the fully-displayed panel becomes the panel selected for editing.*

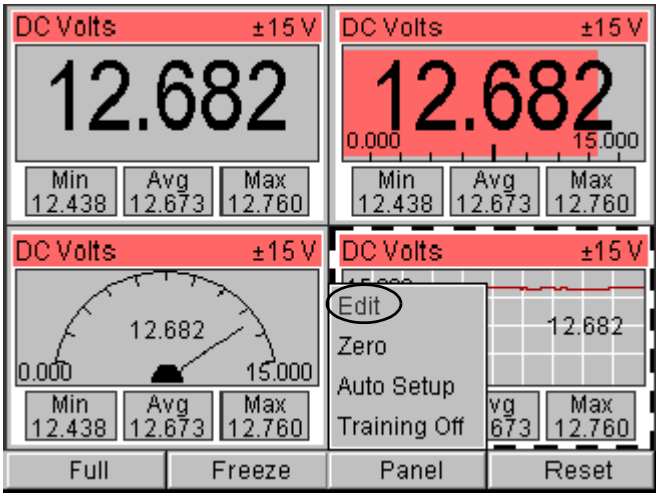

Figure 6.16: DMM Screen - Panel Function Key, Edit Option

2 Press the **Panel** function key.

3 Press the **ENTER** key to select the **Edit** option. The border around the panel changes to a solid border and the edit fields appear in the panel.

4 Do the following:

- **a** Use the **Left** and **Right Direction** keys to select the channel color of the probe you want to read from.
- **b** Use the **Down Direction** key to select the next field.
- **c** Use the **Left** and **Right Direction** keys to set the value for the selected field.
- **d** **Repeat b and c** until all the values are entered correctly.
- **e** Press the **ENTER** key to display the meter reading.

Panel Menu - Zero Option

Use the Panel function key's Zero menu option to restart the readings for a selected panel. It resets the panel's minimums, averages, and maximum values and restarts a displayed strip chart.

NOTE: *To reset the readings for all panels, refer to* ***Reset Function Key*** *on page 43.*

To reset a panel that displays a meter reading, follow these steps:

1 Select the panel to reset. The panel must be a panel that currently displays a meter reading.

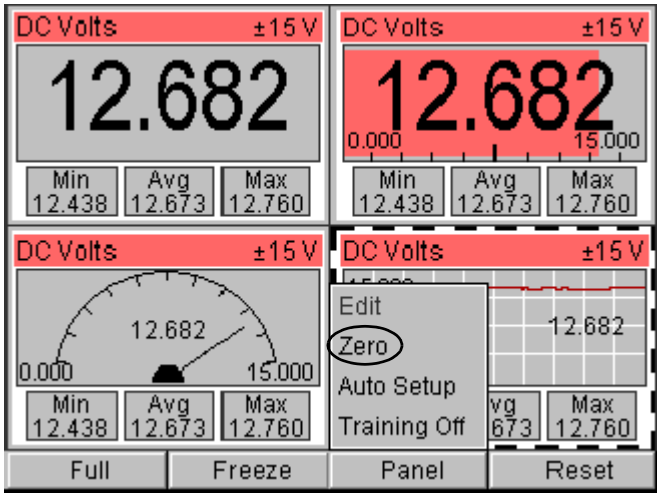

Figure 6.17: DMM Screen - Panel Function Key, Zero Option

2 Press the **Down Direction** key to select the **Zero** option.

3 Press the **ENTER** key to display the new meter reading.

Panel Menu - Auto Setup Option

Use the Panel function key's Auto Setup menu option to have the software automatically determine the range settings for multiple panels. Based on the signals present through the channels, the software sets the Range value for each panel (+ or - 10 from the current signal).

To use the Auto Setup function, follow these steps:

To use the Auto Setup function, refer to the steps in **DMM Setup and Display** on page 36. The steps include instructions for the auto setup function.

Basically, what you do is "turn on" each panel you want to use by setting a channel and a measurement type and then pressing the ENTER key. Then, with readings displayed in the panels, you press the Panel function key and select the Auto Setup option from the menu as described below.

1 Select a panel that currently displays a meter reading.

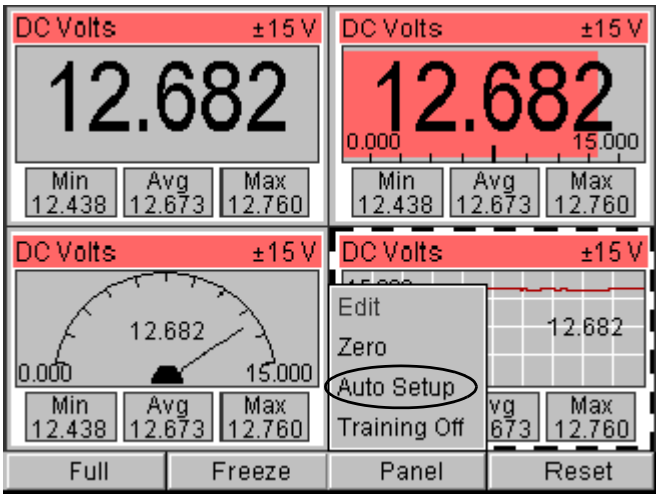

Figure 6.18: DMM Screen - Panel Function Key, Auto Setup Option

2 Press the **Panel** function key.

3 Use the **Down Direction** key to select the **Auto Setup** option.

4 Press the **ENTER** key to display the new meter readings.

Panel Menu - Training On/Off Option

Use the Panel function key's Training On/Off menu option to have the software display demonstration (demo) readings for the software. With the training function on, you can perform most procedures for training purposes.

When you turn on the Training function, it stays on until you exit the software or turn it off, even if you select a different option from the Scope Multimeter menu. To turn the Training function off, select the Training Off option from the Panel menu (when you select Training On, the menu option changes to Training Off).

To use the training function, follow these steps:

1 Select any panel that currently displays a meter reading.

NOTE: *If you have a panel displayed as full display and then use this option, the fully-displayed panel remains displayed and shows the demo meter readings.*

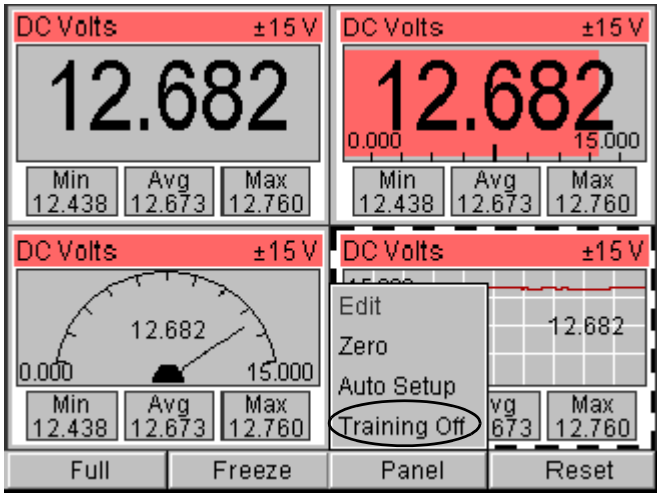

Figure 6.19: DMM Screen - Panel Function Key, Training On Option

2 Press the **Panel** function key.

3 Use the **Up** or **Down Direction** key to select the **Training On** option.

4 Press the **ENTER** key to display the demo readings.

NOTE: *When you want to quit using the demo readings, select Training Off from the Panel menu or exit the software.*

Reset Function Key

The Reset function key lets you restart the readings. It resets all of the panel's minimums, averages, and maximum values. It also clears and restarts any displayed strip charts.

NOTE: *To reset the readings for only one panel, refer to* ***Panel Menu - Zero Option*** *on page 42.*

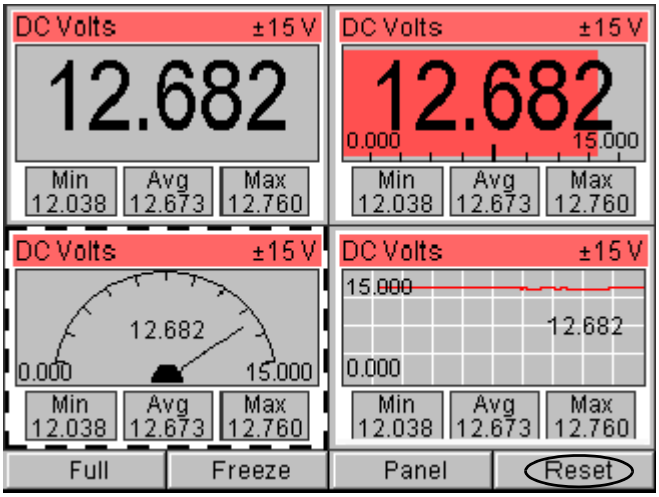

Figure 6.20: DMM Screen - Reset Function Key

To reset the meter readings, press the **Reset** function key. All the panel values reset, including any displayed strip charts.

NOTE: *If you have a panel displayed as full display and then use this option, the fully-displayed panel remains displayed but all the meter readings reset.*

NOTES:

7: Scope - Lab Scope

Overview

The Lab Scope function lets you use the tool as a four channel oscilloscope. The software reads the oscilloscope “waveforms” and displays them on the screen.

When you select **Scope** and then **Lab Scope** from the main menu screens (*Figure 7.4* on page 46), the Lab Scope Panel Setup screen appears.

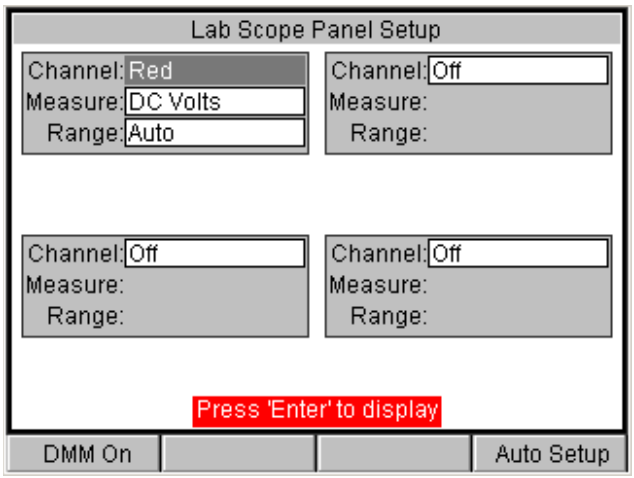

Figure 7.1: Lab Scope Panel Setup Screen

This screen contains four sections for setting up either of the following:

- DMM Off: a full-screen lab scope display with waveform readings for up to four channels, as shown below; or

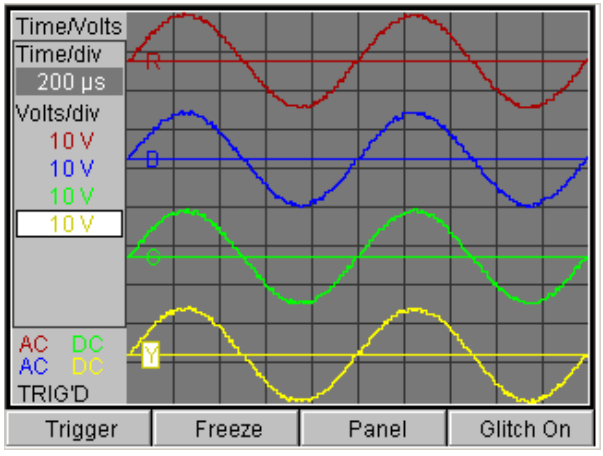

Figure 7.2: Lab Scope Screen, DMM Off - After Setup

- DMM On: a half-screen lab scope display with waveform readings for one or two channels on the top half of the screen, along with one or two multi-meter readings on the bottom half of the screen, as shown below.

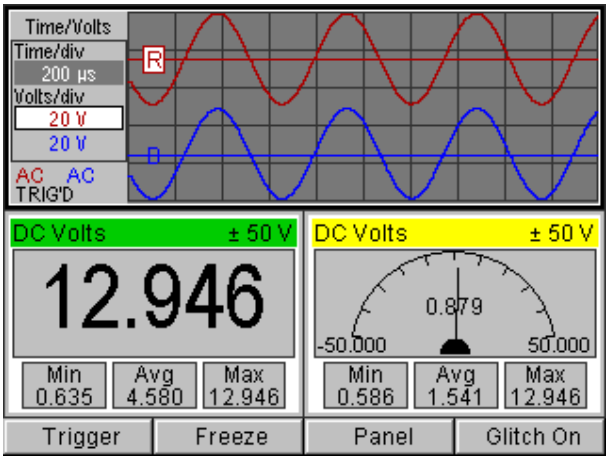

Figure 7.3: Lab Scope Screen, DMM On - After Setup

With the Lab Scope screen set up and displayed, you can adjust the horizontal and vertical settings of the graph, move the zero offset for each waveform, set up a trigger, set up cursors, use an automatic setup function, turn the grid lines on or off, use a training function, or “freeze” up to 50 screens of data for viewing, printing, or saving for later viewing. In addition, you can use a Glitch function that detects spikes or rapid drops in a reading.

This chapter describes how to use the Lab Scope functions. The chapter has the following main sections:

Lab Scope Only (with DMM Off)

Screen Setup and Display

This section describes how to use the Lab Scope function with DMM turned off. This function displays up to four waveforms on the entire screen.

To set up and display the full-screen lab scope waveform readings, follow these steps:

1 Display the main menu screen. For details, refer to **Software Startup** on page 5.

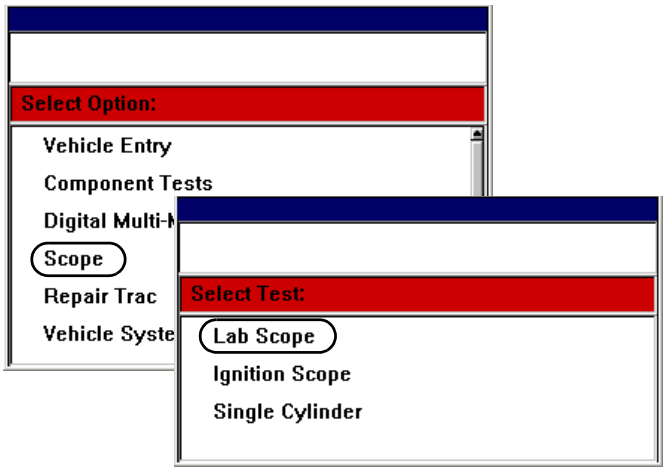

Figure 7.4: Main Menu Screens

2 From the main menu screens, select **Scope** and then **Lab Scope**. This displays the Lab Scope Panel Setup screen (see *Figure 7.5*).

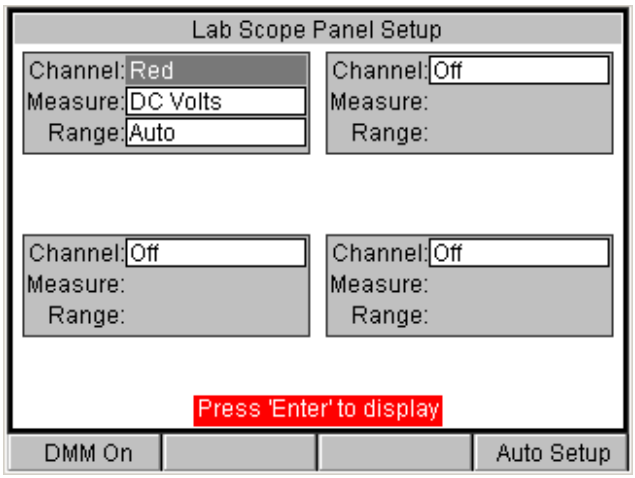

Figure 7.5: Lab Scope Panel Setup Screen, DMM Off

3 Notice the following about the setup screen:

- The screen has four sections for setting up four different channel waveform readings. You set up the sections based on the probes connected to the Scope module and your testing requirements. (You can use each channel color only once.) After you set up the section(s) and press the ENTER key, the waveform readings appear on the screen.
- You use the Up and Down Direction keys to move around on this screen and to select the "fields". The currently selected field is always highlighted. When a field is highlighted, you use the Left and Right Direction keys to make a selection in the field.
- The DMM On function key lets you turn on the function that displays one or two waveforms on the top half of the screen along with one or two DMM readings on the bottom half of the screen. To use this function, refer to **Lab Scope with DMM On** on page 51.
- The software has a training demo function. To use this function right away, press the ENTER key. Then press the Panel function key, select Training On from the menu, and press the ENTER key. For details, refer to **Panel Menu - Training On/Off Option** on page 71.
- The Lab Scope screen has two automatic (auto) setup features. One is per channel and the other one is for multiple channels. The auto setup features determine the range values for you based on the electrical signals through the channel(s). Details are included in the following steps.

4 Do the following to adjust the settings for the section:

NOTE: *The screen may still contain the setting(s) from the last time you used it. If the settings are correct, press the* ***ENTER*** *key and go to step 6.*

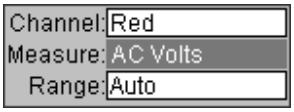

Figure 7.6: Lab Scope Panel Setup Screen - Single Section

a Use the **Left** and **Right Direction** keys to select the channel color of the probe you want to read from.

NOTE: *To turn a section off, set the Channel to Off.*

b Press the **Down Direction** key to select the next field.

c Use the **Left** and **Right Direction** keys to set the value.

d **Repeat b and c** to set the Range field, then continue with step 5. The table below lists possible field values.

Field	Possible Values
Channel	Red, Blue, Green, Yellow, Off
Measure	Varies based on the selected Channel color: Ohms (channel 1 only), Amps, DC Volts, AC Volts
Range	Varies based on the selected Measure. ***NOTE:*** *Select "Auto" to have the software automatically set up the channel. (To have the software automatically set up multiple channels, see the Note after step 5.*

5 Do one of the following:

- To set up another waveform, press the **Down Direction** key to select the next section's Channel field. Then repeat step 4.
- To display the waveforms you have set up, press the **Auto Setup** function key. This displays the following screen (*Figure 7.7* on page 48).

NOTE: *When you use the Auto Setup function, the software automatically determines the range for the channels that are turned on and evenly spaces the waveform lines on the screen. You can optionally press the ENTER key to display the waveforms with the range settings you have entered in the Range field(s). After displaying the waveforms, you can still use Auto Setup by pressing the Panel function key, selecting Auto Setup from the menu, and pressing the ENTER key. (Then go to step 6.)*

NOTE: *If you are using these steps to set up waveforms with DMM On, the Auto Setup function key is not available; you have to use the ENTER key to display the waveforms.*

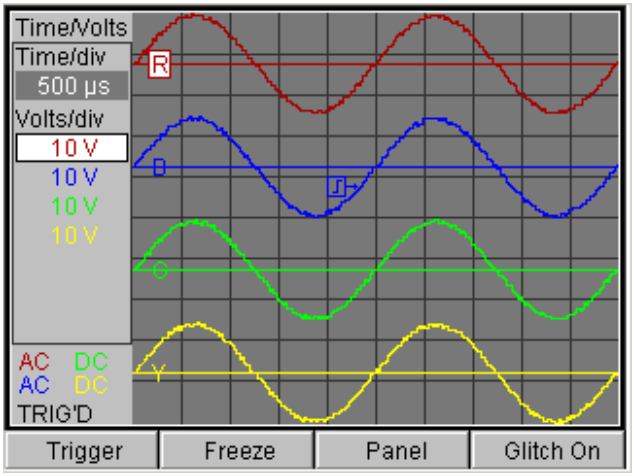

Figure 7.7: Lab Scope Screen, DMM Off - All Channels Displayed

6 Notice the following about this screen:

- The right side of the screen contains the waveform lines in a graph. (If you used Auto Setup, the lines are evenly spaced in the graph.) Each color-coded channel has a separate line. Each line represents the strength (amplitude) of the electrical signal over time.
- The graph's horizontal axis represents time; the vertical axis represents the amplitude of the signal. For details, refer to **Time/Volts Pane** on page 58.
- Each waveform line has an "offset" line that represents the zero voltage point for that channel. The offset line is labeled (on the left side of the line) with the first letter of the channel's color (R, B, G, or Y). For details, refer to **Time/Volts Pane** on page 58.
- If only one waveform line is displayed, the right side of the graph is labeled with the channel's voltage range, with the low value at the bottom and the high value at the top.
- The ⌞ or ⌜ marker indicates that a trigger is currently set. The color of the marker indicates the channel the trigger is assigned to. The position of the marker on the graph indicates the trigger time and amplitude. The shape of marker (⌞ or ⌜) indicates the trigger slope. For details, refer to **Trigger Pane** on page 61.
- The waveform graph's background grid can be turned on or off. For details, refer to **Panel Menu - Grid Off/On Option** on page 70.
- The color of the waveform graph's background can be changed to either black (grey) or white. For details, refer to **Background Color Selection** on page 119 and page 129.
- The left side of the screen contains additional setup fields for the waveform graph. These fields let you 1) change the time divisions for the graph and the amplitude divisions and zero offsets for each waveform line on the graph, 2) set up cursors, and 3) change the trigger point. For details, refer to **Trigger - Cursors - Time/Volts Function Key** on page 57.
- The bottom left side of the screen (directly above the Trigger function key) lists the color-coded measurement settings for the waveforms and shows the current trigger status (refer to **Trigger Pane** on page 61).
- The bottom of the screen contains the function keys described in **Lab Scope Function Keys** on page 57.

7 View the waveforms as necessary. While viewing the waveforms, do any of the following:

- If the waveform lines do not fit into the graph properly, adjust the horizontal and vertical settings. Use the Trigger-Cursors-Time/Volts function key to do this by changing the time and amplitude divisions and the zero offsets. Refer to **Time/Volts Pane** on page 58.
- Set up the trigger point. Use the Trigger-Cursors-Time/Volts function key to do this. Refer to **Trigger Pane** on page 61.
- Set up cursor lines for measuring amplitude and time differences and for measuring the frequency between two points in the graph. Use the Trigger-Cursors-Time/Volts function key to do this. Refer to **Cursors Pane** on page 64.
- Use the Freeze function key to stop the readings and "freeze" them on the screen, and to print or save waveforms or view saved waveforms. Refer to **Freeze Function Key (Lab Scope)** on page 66.
- Use the Panel function key, Edit option to return to the setup screen and change the waveform settings. Refer to **Panel Menu - Edit Option** on page 69.
- Use the Panel function key, Auto Setup option to have the Scope software automatically determine the Range settings for the displayed waveforms. Refer to **Panel Menu - Auto Setup Option** on page 70.
- Use the Panel function key, Grid Off/On option to turn the graph's grid off and on. Refer to **Panel Menu - Grid Off/On Option** on page 70.
- Use the Panel function key, Training On/Off option to view demo waveforms. Refer to **Panel Menu - Training On/Off Option** on page 71.
- Use the Glitch function key to automatically detect spikes or rapid drops in the waveform readings. Refer to **Glitch Function Key** on page 71.

8 When you are finished using the screen, press the **EXIT** key to return to the Scope menu screen.

Function Keys - Lab Scope with DMM Off

In addition to the DMM On and Auto Setup function keys that appear on the Lab Scope Panel Setup screen (*Figure 7.5*), there are two groups of function keys that appear after you display the waveforms.

The first group **[Trigger, Freeze, Panel, Glitch On/Off]** appears when you display the waveforms, as shown in *Figure 7.8*, or when you display the Glitch panel in the bottom half of the screen, as shown in *Figure 7.9*.

> ***NOTE:*** *When you turn the Glitch function on, the Trigger function key automatically changes to Cursors.*

The second group **[Cursors, Go, Panel, Print]** appears when you use the Freeze function key from the first group, as shown in *Figure 7.10*.

> ***NOTE:*** *When you use the Freeze function key, the Trigger function key automatically changes to Cursors and the options you can choose from the Panel menu also change (see the Note below).*

To use the function keys, refer to the steps in the following sections:

- Trigger - **Trigger - Cursors - Time/Volts Function Key** on page 57
- Freeze - **Freeze Function Key (Lab Scope)** on page 66
- Panel - **Panel Function Key (Lab Scope)** on page 69 (includes Edit, Auto Setup, Grid Off/On, and Training On/Off)
- Glitch - **Glitch Function Key** on page 71
- Cursors, Go, Panel, Print - **Freeze Function Key (Lab Scope)** on page 66

  > ***NOTE:*** *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in* **Freeze Function Key (Lab Scope)** *on page 66.*

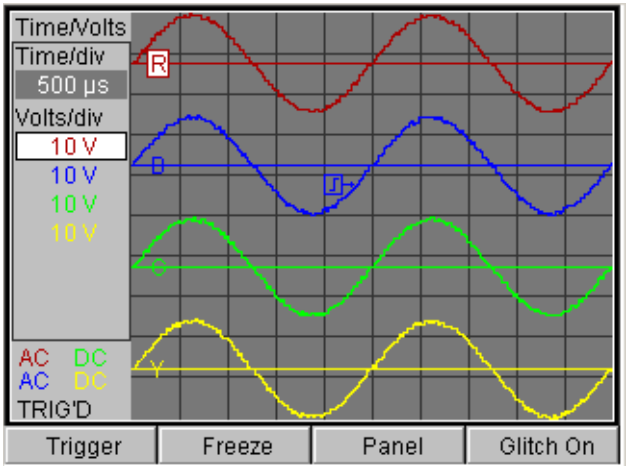

Figure 7.8: Lab Scope Screen, DMM Off - Function Keys

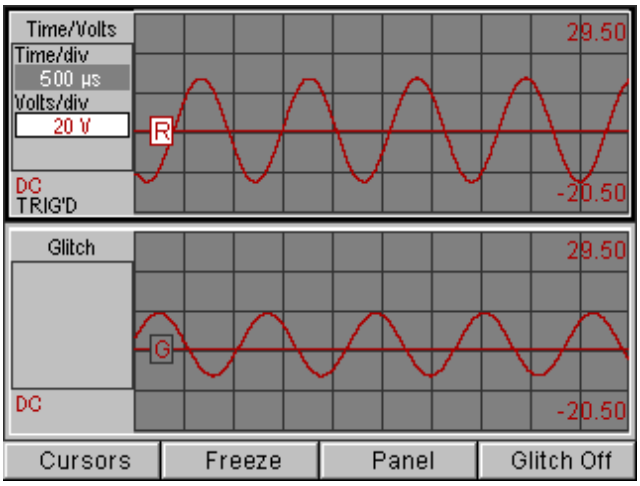

Figure 7.9: Lab Scope Screen, Glitch On - Function Keys

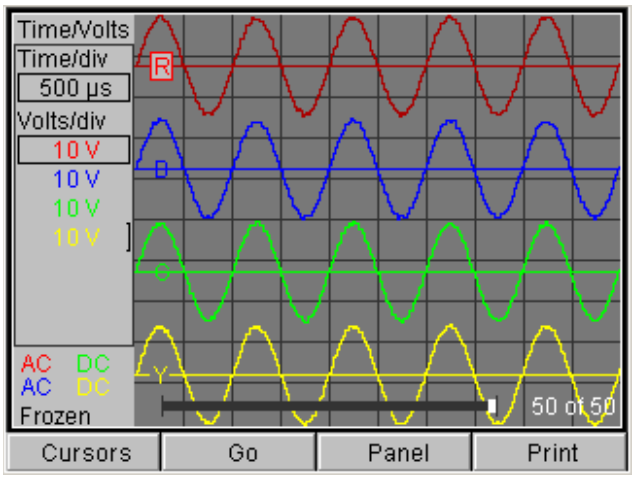

Figure 7.10: Lab Scope Screen, DMM Off - Function Keys, after pressing the Freeze function key

Lab Scope with DMM On

Screen Setup and Display

This section describes how to use the Lab Scope function with DMM turned on. This function displays one or two waveforms on the top half of the screen and one or two DMM readings on the bottom half of the screen.

To set up and display the Lab Scope with DMM On, follow these steps:

1 Display the main menu screen. For details, refer to **Software Startup** on page 5.

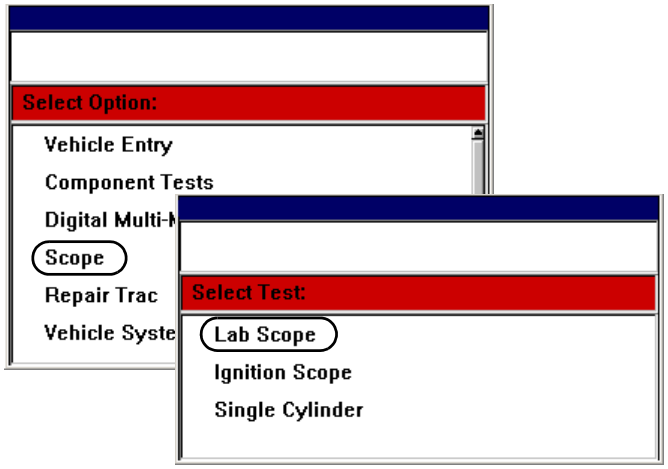

Figure 7.11: Main Menu Screens

2 From the main menu screens, select **Scope** and then **Lab Scope**. This displays the Lab Scope only setup screen.

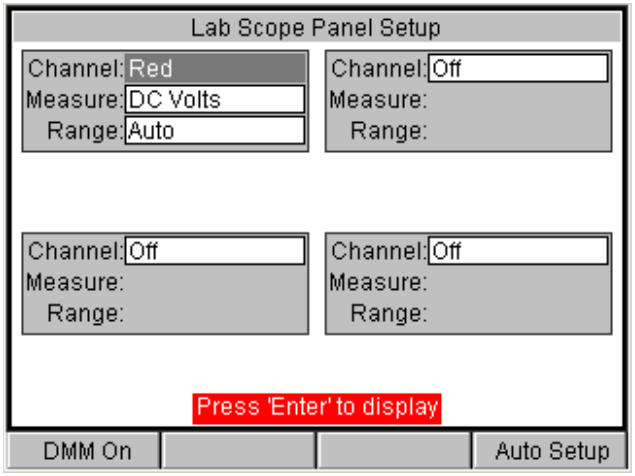

Figure 7.12: Lab Scope Panel Setup Screen

3 Press the DMM On function key. This displays the Lab Scope/DMM setup screen (*Figure 7.13* on page 52).

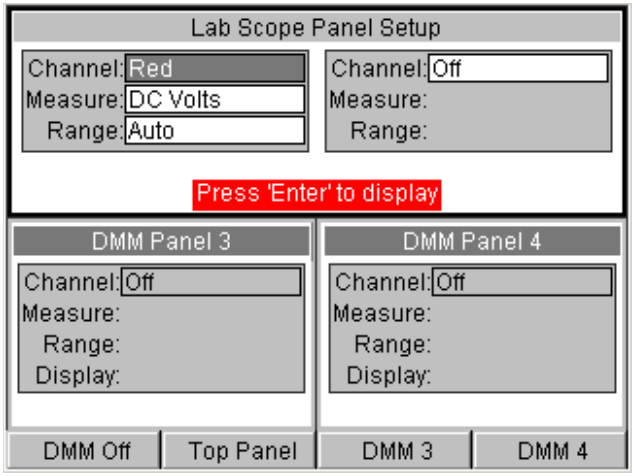

Figure 7.13: Lab Scope Panel Setup Screen, DMM On

4 Notice the following about the setup screen:

- The screen has three panels. The first panel covers the top half of the screen and contains two sections for setting up two channel waveform readings (you must use two different channel colors). The other two panels are on the bottom half of the screen. These panels are for setting up one or two DMM readings (you can use color channels more than once). You set up the panels based on the probes connected to the Scope module and your testing requirements.
- After you set up the panels, the waveform reading(s) appear together on the top half of the screen and the DMM readings appear separately on the bottom half of the screen.
- One panel is always “selected.” The selected panel either has a solid border around it and contains edit “fields,” or it has a “moving” dashes border and contains the waveforms or a meter reading.
- When the selected panel’s border is solid, the Direction keys move within the panel for changing the edit fields. When the selected panel’s border is moving dashes, the Direction keys move between panels for selecting other panels.
- You can use the DMM Off function key to turn the DMM function off and to return to the Lab Scope only setup screen. You can use the Top Panel, DMM3, and DMM 4 function keys to select other panels for setup.
- The Scope software has a training demo function. To use this right away, press the ENTER key. Then press the Panel function key, select Training On from the menu, and press the ENTER key. For details, refer to **Panel Menu - Training On/Off Option** on page 71.

5 With the top Lab Scope setup panel selected, refer to the steps in **Lab Scope Only (with DMM Off)** on page 47 and set up one or two channels in the waveform panel.

6 After setting up and displaying the waveform(s) in the top panel, press the **EXIT** key to change the top panel's border to moving dashes so you can select the DMM panels.

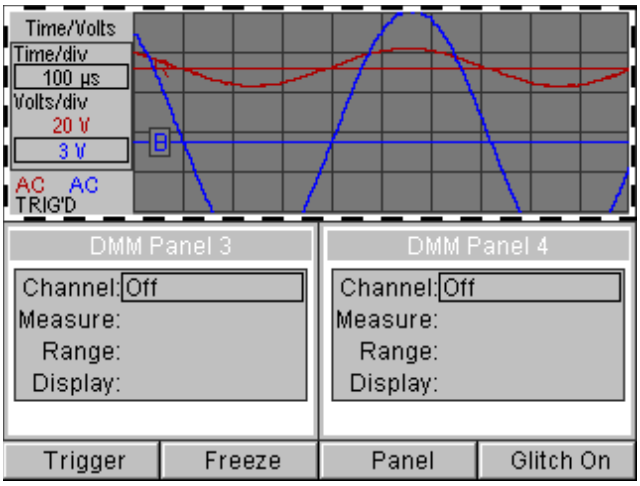

Figure 7.14: Lab Scope Screen, DMM On - Top Panel Displayed

7 Use the **Direction** keys and select a DMM panel to set up.

8 With the DMM panel selected, refer to the steps in **DMM Setup and Display** on page 36 and set up the DMM panel(s). After all the panels are set up, the screen looks similar to *Figure 7.15*.

NOTE: *You can optionally use the* ***Auto Setup*** *function to have the software automatically set up the Range values for the panels. To do this, do the following:*

- *"Turn on" each channel you want to use in the top panel by setting the Channel and Measure values. Then press the ENTER key to display the waveform(s).*
- *With the waveform(s) displayed, press the EXIT key so you can select the DMM panels.*
- *Select and "turn on" each DMM panel you want to use by selecting the panel, pressing the ENTER key, selecting a Channel and Measure value, and then pressing the ENTER key.*
- *With the waveform(s) and DMM readings displayed, press the Panel function key, select Auto Setup from the menu, and press the ENTER key.*

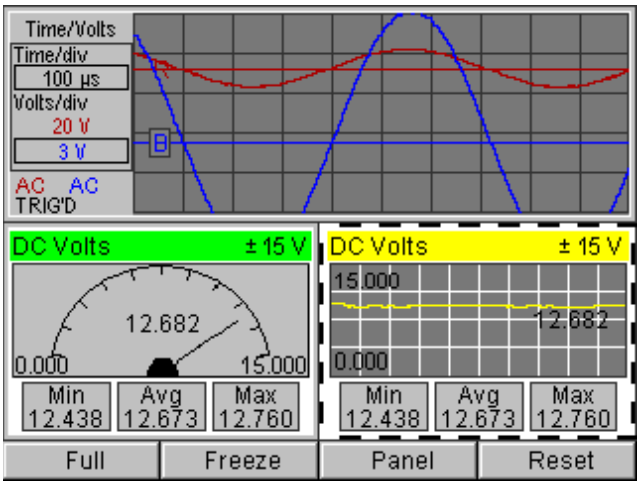

Figure 7.15: Lab Scope Screen, DMM On - All Panels Displayed

9 Notice the following about the screen:

- The top half of the screen contains the lab scope's waveform display. This operates the same as the normal Lab Scope waveform display (with DMM off). For a complete description of the display, refer to page 48.
- The bottom half of the screen contains the two DMM panels with the DMM readings. Each panel displays the measurement and range at the top, the reading in the center, and the reading's minimum, average, and maximum at the bottom. With either of these panels selected, you can repeatedly press the ENTER key to change the panel's display type.
- **If the top panel is selected and has a solid border, you must press the EXIT key before you can select a DMM panel. Pressing the EXIT key changes the top panel's border to moving dashes.**
- The function keys at the bottom of the screen change based on which panel is currently selected. For details, refer to **Function Keys - Lab Scope with DMM On** on page 54.

10 When you are finished using the screen, press the **EXIT** key to return to the Scope menu screen.

Function Keys - Lab Scope with DMM On

There are six groups of function keys that can appear on the Lab Scope / DMM setup and display screens after you turn DMM on. They are:

- DMM Off, Top Panel, DMM3, DMM4
- Top Panel, DMM3, DMM4
- Trigger, Freeze, Panel, Glitch On/Off
- Full, Freeze, Panel, Reset
- Cursors, Go, Panel, Print
- Full, Go, Panel, Print

The first group of function keys **[DMM Off, Top Panel, DMM3, DMM4]** appears when the top panel is selected and it contains edit fields, as shown in *Figure 7.16*.

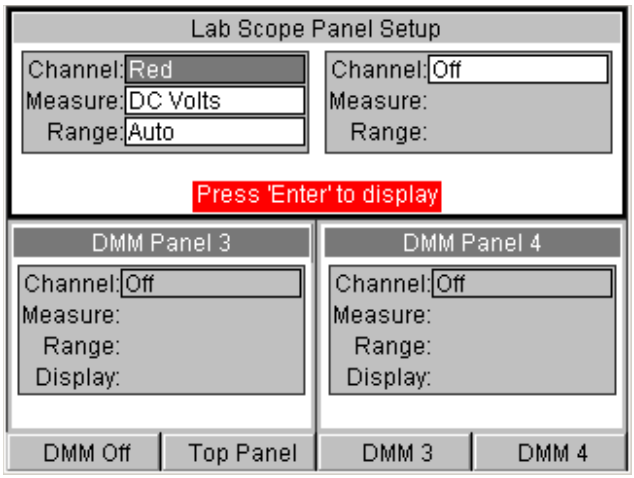

Figure 7.16: Lab Scope Screen, DMM On - Function Keys with Top Panel Edit Fields Selected

Use these function keys to turn the DMM function off and to select other panels.

The second group of function keys **[Top Panel, DMM3, DMM4]** appears when one of the bottom DMM panels is selected and it contains edit fields, as shown in *Figure 7.17*.

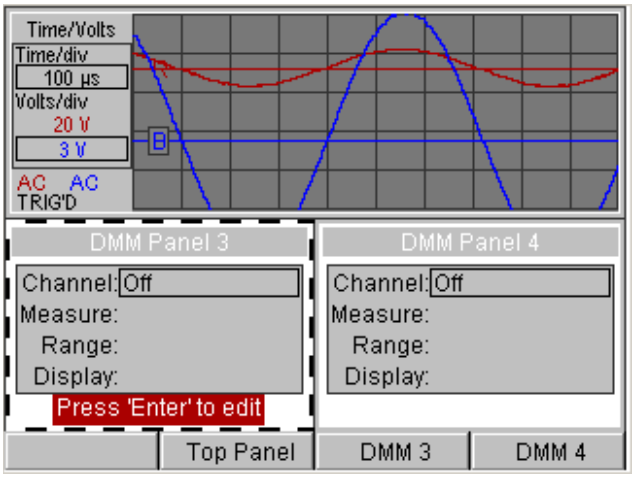

Figure 7.17: Lab Scope Screen, DMM On - Function Keys with Bottom DMM Panel Edit Fields Selected

Use these function keys to select other panels.

The third group of function keys **[Trigger, Freeze, Panel, Glitch On/Off]** appears when the top panel is selected and it contains the waveform display, as shown in *Figure 7.18*, or when the top panel is selected and the Glitch panel is displayed in the bottom half of the screen, as shown in *Figure 7.19*.

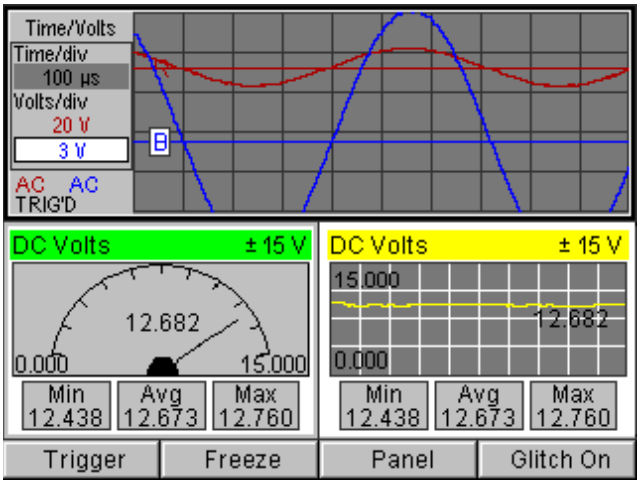

Figure 7.18: Lab Scope Screen, DMM On - Function Keys with Top Panel Display Selected

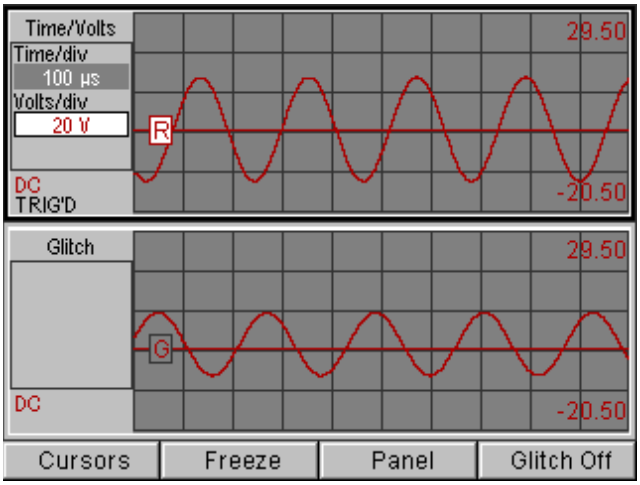

Figure 7.19: Lab Scope Screen, Glitch On - Function Keys

To use these function keys, refer to the steps in the following sections:

- Trigger - **Trigger - Cursors - Time/Volts Function Key** on page 57
- Freeze - **Freeze Function Key (Lab Scope)** on page 66
- Panel - **Panel Function Key (Lab Scope)** on page 69
- Glitch - **Glitch Function Key** on page 71

The fourth group of function keys **[Full, Freeze, Panel, Reset]** appears when one of the bottom DMM panels is selected and it contains a DMM reading, as shown in *Figure 7.20*.

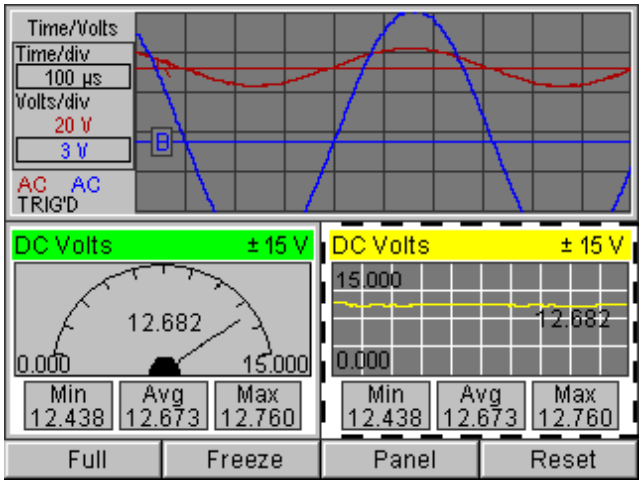

Figure 7.20: Lab Scope Screen, DMM On - Function Keys with Bottom DMM Panel Display Selected

To use the Full, Panel, and Reset function keys, refer to the following sections in ***6: Digital Multi-Meter (DMM)***:

- **Full Function Key** on page 39
- **Panel Function Key (DMM)** on page 41
- **Reset Function Key** on page 43

To use the Freeze function key, refer to **Freeze Function Key (Lab Scope)** on page 66.

The fifth group of function keys **[Cursors, Go, Panel, and Print]** shown in *Figure 7.21* appears when the top panel display is selected and you use the Freeze function key (from the third group).

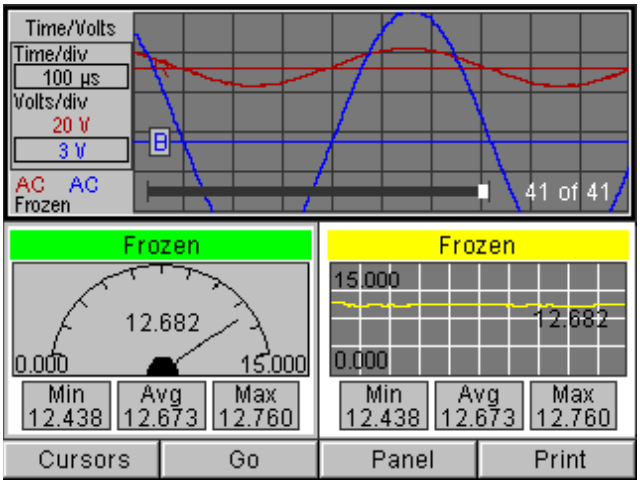

Figure 7.21: Lab Scope Screen, DMM On - Function Keys after pressing Freeze function key with top panel display selected

To use these function keys, refer to the steps in **Freeze Function Key (Lab Scope)** on page 66.

NOTE: *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in* **Freeze Function Key (Lab Scope)** *on page 66.*

The sixth group of function keys **[Full, Go, Panel, and Print]** as shown in *Figure 7.22* appears when one of the bottom panel DMM displays is selected and you use the Freeze function key (from the fourth group).

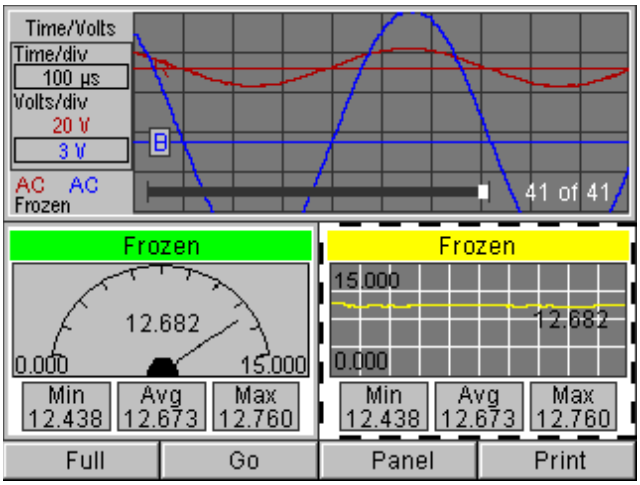

Figure 7.22: Lab Scope Screen, DMM On - Function Keys after pressing Freeze function key with DMM panel display selected

To use the Full function key, refer to **Full Function Key** on page 39 in ***6: Digital Multi-Meter (DMM)***.

To use the Go, Panel, and Print function keys, refer to **Freeze Function Key (Lab Scope)** on page 66.

NOTE: *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in* **Freeze Function Key (Lab Scope)** *on page 66.*

Lab Scope Function Keys

Overview

After you have set up and displayed the lab scope waveforms, with or without the DMM readings, the function keys provide additional functions for viewing and using the waveforms (and DMM readings). This section describes the following lab scope function keys:

- **Trigger - Cursors - Time/Volts** (page 57)
- **Freeze** - including **Cursors**, **Go**, **Panel**, and **Print** (page 66). (This also includes instructions for the Panel menu options, Playback and Save, that are available on a "frozen" screen.)
- **Panel** - including **Edit** (page 69), **Auto Setup** (page 70), **Grid On/Off** (page 70), and **Training On/Off** (page 71)
- **Glitch On/Off** (page 71)

NOTE: *If DMM is on and a DMM panel is selected, the options on the Panel menu are only Edit, Auto Setup, and Training On/Off. In addition, the Full and Reset function keys are available. To use these function keys, refer to the following sections in* ***6: Digital Multi-Meter (DMM)****:*

- **Full Function Key** on page 39
- **Panel Function Key (DMM)** on page 41
- **Reset Function Key** on page 43

Trigger - Cursors - Time/Volts Function Key

The Trigger - Cursors - Time/Volts function key controls what appears at the top, left side of the screen. When you first display the Lab Scope waveform(s), the title at the top left of the screen is Time/Volts and the F1 function key is named "Trigger" (see *Figure 7.18* on page 55). This function key is a "toggle" key that changes each time you press it. The name changes from Trigger to Cursors, to Time/Volts, and back to Trigger. Each time you press the key, the title and fields at the top left side of the screen change. Notice the key's name does not represent the current title at the top left side of the screen. Instead, it represents the next title and fields that will display when you press the key, as shown in the following table.

Title and Fields Displayed	Key Name	Pressing Key Displays This Title and Fields
Time/Volts	Trigger	Trigger
Trigger	Cursors	Cursors
Cursors	Time/Volts	Time/Volts

The title and fields displayed on the screen are also called "panes." Each pane lets you perform different adjustments to the waveform graph, as follows:

- **Time/Volts pane** - lets you adjust how the waveform lines fit in the graph by adjusting the graph's horizontal time scale, each waveform's vertical amplitude measurement scale, and each waveform's zero offset point. For details, refer to **Time/Volts Pane** on page 58.
- **Trigger pane** - lets you set up a "trigger" point for the waveforms. For details, refer to **Trigger Pane** on page 61.
- **Cursors pane** - lets you set up screen cursors (guide lines). For details, refer to **Cursors Pane** on page 64.

Time/Volts Pane

When you first display the waveforms on the screen, the waveform lines may not fit properly in the graph. You correct this by adjusting the graph's horizontal time measurement scale, each waveform's vertical amplitude measurement scale, and each waveform's zero offset point. The fields on the Time/Volts pane let you do this.

NOTE: *A quick way to make the waveform lines evenly spaced in the graph is to use Auto Setup. For more information, refer to* ***Panel Menu - Auto Setup Option*** *on page 70.*

To adjust the settings in the Time/Volts pane, follow these steps:

1 If DMM is On, make sure the top panel is selected and has a solid border (not moving dashes).

NOTE: *If the panel is selected but has moving dashes, press either the ENTER key or the Trigger - Cursors - Time/Volts function key to remove them.*

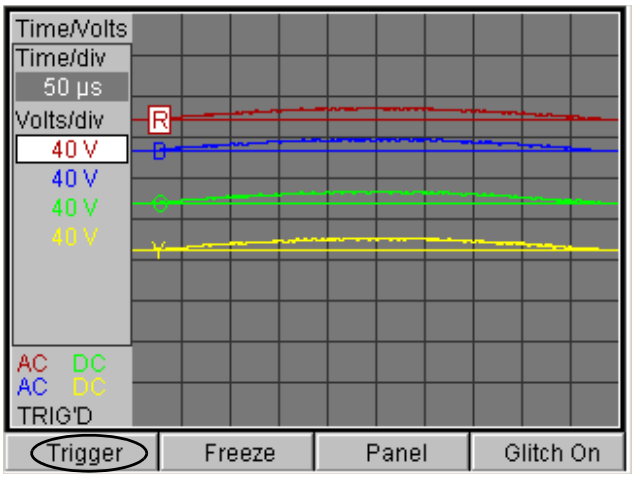

Figure 7.23: Lab Scope Screen, DMM On - Time/Volts Pane Displayed

2 Make sure the Time/Volts pane is displayed. If necessary, repeatedly press the **Trigger-Cursors-Time/Volts** function key until the label is "Trigger" and the Time/Volts pane is displayed.

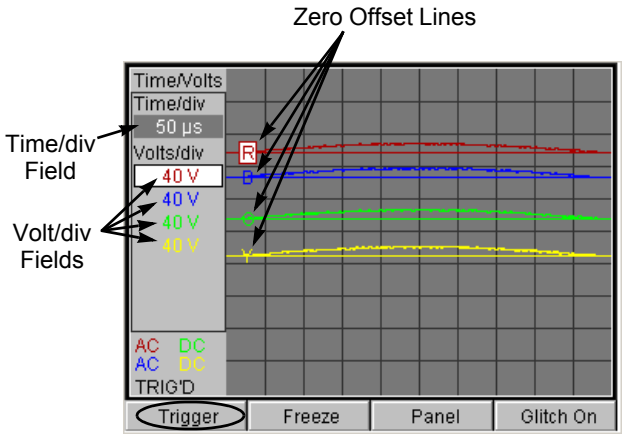

Figure 7.24: Lab Scope Screen, DMM Off - Time/Volts Pane Displayed (The selected color is red and the selected field is Time/div)

3 Notice the following about the waveform graph's measurement scales and the Time/Volts fields:

NOTE: *The following items assume the grid lines are turned on. For details, refer to* ***Panel Menu - Grid Off/On Option*** *on page 70.*

- If DMM is Off, there are ten divisions (squares) along each axis of the graph. If DMM is On, there are ten divisions along the horizontal axis and five divisions along the vertical axis.
- Each division on the horizontal axis (from left to right) represents the amount of time selected in the Time/div field (box) at the top left of the screen.
- Each division on the vertical axis (from bottom to top) varies for each waveform line. For each line, each division represents the amount of amplitude selected for that line's Volts/div field. (The Volts/div field may be named Amp/div, Ohms/Div, or whatever other measurement is being used).
- Each waveform line has a horizontal line through it. This is the "zero offset" line (the 0 baseline for the amplitude) for the waveform. The offset line is labeled (on the left side of the line) with the first letter of the channel's color (R, B, G, or Y).
- You can adjust the Time/div for the entire graph. You can adjust the amplitude (Volts/div) and the zero offset line for each waveform line.

- Keypad presses do the following:
  - » **Down Direction key** - selects the fields as follows: moves from the Time/div field to the Volts/div field for the currently selected color, to the line in the graph for the currently selected color, then back to the Time/div field. (The Up Direction key moves in the opposite direction.)
  - » **Left or Right Direction keys** - when a field is selected (shaded), changes the value for the field; when a line in the graph is selected, moves the line up or down.
  - » **ENTER key** - selects a different color (channel). The currently selected color has a box around the Volts/div field's number and the zero offset line's letter, as shown for the red line (R) in *Figure 7.24*.

NOTE: *The following steps provide one way of adjusting the settings. When you are familiar with how to move around on the screen using the ENTER key and the Direction keys, you can adjust these settings in any order. Remember, press the ENTER key to change colors, press the Up and Down Direction keys to select fields, and press the Left and Right Direction keys to change the field values and move the offset lines.*

4 If the waveform line(s) are too flat or too compressed, adjust the **Time/div** field so the waveform lines display correctly. Do the following to adjust the Time/div field:

a Make sure the Time/div field is selected (shaded), as shown in *Figure 7.24*. If necessary, use the **Up or Down Direction** key to select the field.

b Use the **Left or Right Direction** key to select each value. While doing this, watch the waveform lines in the graph. Select the value that provides the best fit.

NOTE: *The field values are in seconds (s), milliseconds (ms - one thousandth of a second), and microseconds (us - one millionth of a second).*

NOTE: *When you adjust this field, you are adjusting the horizontal axis for the entire graph by selecting the length of time for each division (square). No matter which color is selected, the Time/div field can be selected and changed. But remember, when you change this field you are changing it for the entire graph and not just the selected waveform color.*

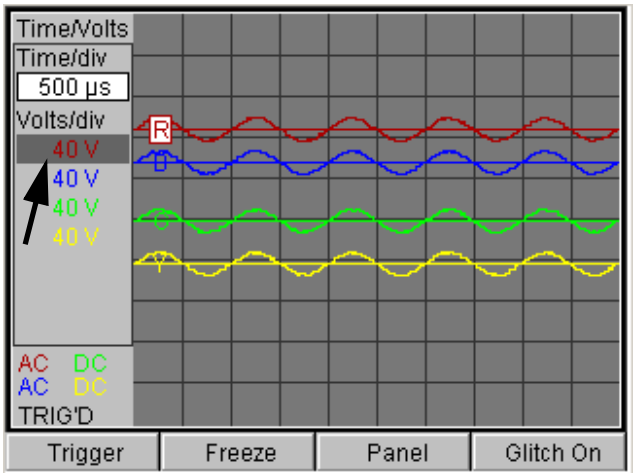

Figure 7.25: Lab Scope Screen, DMM Off - after adjusting Time/div Field (the selected color is red and the selected field is Volts/div)

5 Next, adjust the height of each line by adjusting the **Volts/div** field for each color. When you do this, you are changing the original Range setting for the channel (color) by setting an amplitude for each division (square). Do the following to adjust the Volts/div fields:

NOTE: *The Volts/div field described in this User Guide may have a different name on the actual screen. It changes based on the Measure setting made for each waveform line. For example, if the Measure setting for a line (color) is Amps, then, when that color is selected, the field is named Amps/div.*

a Press the **Down Direction** key to move the Volt/div field for the currently selected color. You know the field is selected when the field is shaded, as shown in *Figure 7.25*.

b Use the **ENTER** key to select the color to adjust. The shading moves to the field for the selected color.

NOTE: *The selected color's letter in the graph also has a box around it.*

c Use the **Left or Right Direction** key to select each value. While doing this, watch the waveform line in the graph. Select the value that provides the best fit.

d Repeat b and c for each waveform color.

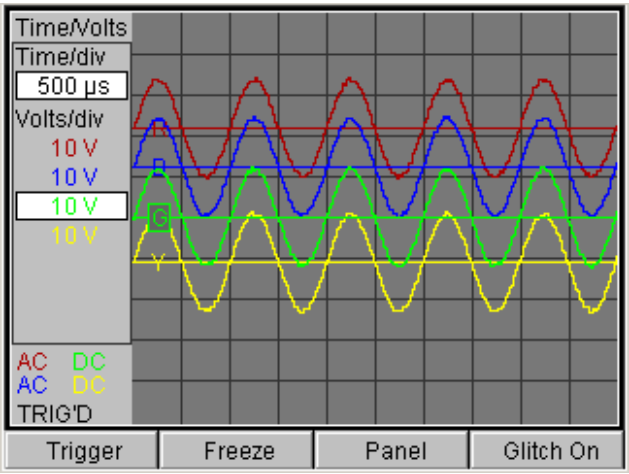

Figure 7.26: Lab Scope Screen, DMM Off - after adjusting Volts/div Field (the selected color is green and the selected field is the green zero offset line)

6 To move the lines up or down in the graph, adjust the **Zero Offset line** for each waveform line. Do the following to adjust the zero offset lines:

a Press the **Down Direction** key to move the waveform line in the graph for the currently selected color. You know the line is selected when the letter has a box around it that is shaded, as shown in *Figure 7.26* for the color green.

NOTE: *The box around the letter indicates the **color** is selected. The shading in the box indicates the **line** is selected and can be moved.*

b Use the **ENTER** key to select the color to adjust. The shaded box moves to the letter for the selected color.

NOTE: *The selected color's Volts/div value also has a box around it.*

c Press and hold down the **Left or Right Direction** keys to move the waveform line up or down on the graph.

NOTE: *DO NOT USE THE UP OR DOWN DIRECTION KEYS. If you do, the field selection changes to the Time/div or the Volts/div fields. If you accidentally use the Up or Down keys, stop and find which field is shaded (Time/div, Volts/div, or the line's letter). Then use the Down Direction key to reselect the line's letter. The box around the letter will be shaded.*

d Repeat b and c for each waveform color until all the lines are positioned where you want them (see *Figure 7.27* on page 62).

NOTE: *When finished, if DMM is On, the top panel is selected and it has a solid border (not moving dashes). To select either of the DMM panels for any reason, press the EXIT key to change the top panel's border to moving dashes so you can select a different panel.*

Trigger Pane

The fields on the Trigger pane let you set up a trigger for the waveforms. You set the trigger as Off, On or Glitch. For the On trigger or the Glitch Trigger™ you then set up the slope, time, and level for the trigger.

- **Trigger** - there are three trigger settings: Off, On, and Glitch as follows:

  Off - the trigger is preset to Off. This setting continually "streams" live data readings onto the graph. The trigger status is TRIG'D because the live data is being continuously triggered.

  On - you set up a trigger to occur whenever the waveform reaches a specific point (event) in the graph, depending on if the trigger is set to match the rising or falling slope of the waveform. When the waveform reaches this point (event), the screen displays one screen of data and then stops reading until the event occurs again. This results in a cycle of one-screen displays each time the event happens. When the Normal trigger is used, the screen is blank with a trigger status of WAITING until the event happens. When the event happens, the trigger status changes to TRIG'D and one screen of data displays. After that the trigger status changes to WAITING until the event happens again, then the screen display changes. (This may all happen very quickly.) An advantage of using this type of trigger is that the trigger synchronizes the starting point for all the displayed waveform lines.

  Glitch Trigger™ - you set up a trigger to occur when the waveform reaches a specific point (event) in the graph, depending on if the trigger is set to match the rising or falling slope of the waveform. When the waveform reaches this point (event), 50 screens of data are read and then the readings stop automatically. This results in a blank screen and a trigger status of WAITING until the event happens. When the event happens, the trigger status changes to TRIGG'D and 50 screens of data display. Then the trigger status changes to STOPPED and you use the Freeze function key to view the captured data (25 screens before the event and 25 screens after the event).

  ***NOTE:** After you press the Freeze function key, you can use the Panel function key options Save and Playback to save and review the data.*

- **Trigger Slope (Edge)** - direction of the voltage required for the trigger to occur. Falling means the trigger occurs when the amplitude is decreasing; Rising means the trigger occurs when the amplitude is increasing.
- **Trigger Time** - horizontal position (vertical cursor) of the trigger, adjustable to the left or right to set where the trigger event displays on the screen when it occurs. You use this to set whether you want to view more of the waveform line before the event occurs or more of the waveform line after the event occurs.
- **Trigger Level** - vertical position (horizontal cursor) of the trigger, adjustable up or down to set the amplitude value that will cause the trigger to occur and the screen to display the waveform(s).

To set up a trigger point, follow these steps:

NOTE: *Become familiar with the terms in the previous column before performing these steps.*

1 If DMM is On, make sure the top panel is selected and has a solid border (not moving dashes).

NOTE: *If the panel is selected but has moving dashes, press either the ENTER key or the Trigger-Cursors-Time/Volts function key to remove them.*

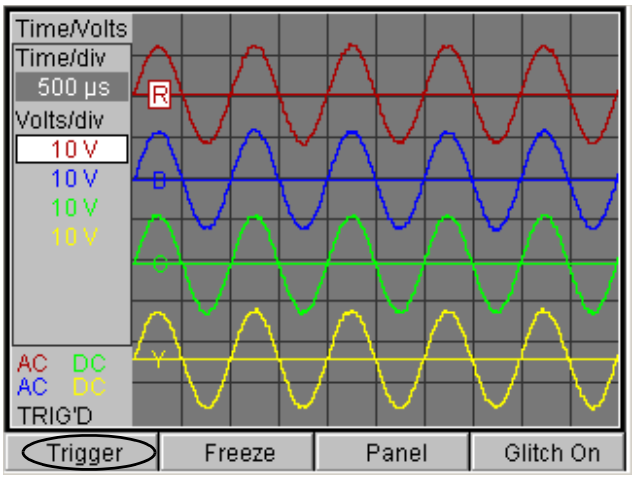

Figure 7.27: Lab Scope Screen, DMM Off - Trigger Function Key

2 Display the Trigger pane by repeatedly pressing the **Trigger-Cursors-Time/Volts** function key until the label is “Cursors” and the Trigger pane is displayed, as shown in *Figure 7.28*.

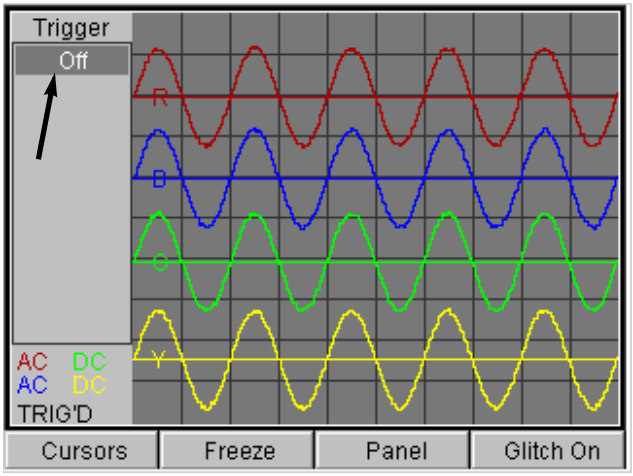

Figure 7.28: Lab Scope Screen, DMM Off - Trigger Pane Displayed

3 Make sure the top field is selected as shown in *Figure 7.28* (this field is always selected when you first display the Trigger pane).

4 Change the **Trigger** setting by pressing either the **Left or Right Direction** key until either Off, On, or Glitch appears in the field.

NOTE: *The default setting is Off. When you select a different value for the field (On or Glitch), another field appears on the screen for setting the trigger’s slope as rising or falling, a trigger status message appears above the Cursors key, and a trigger marker (⌝ or ⌟) appears in the graph, as shown in Figure 7.29.*

NOTE: *If you are changing the setting to Off, the procedure is complete.*

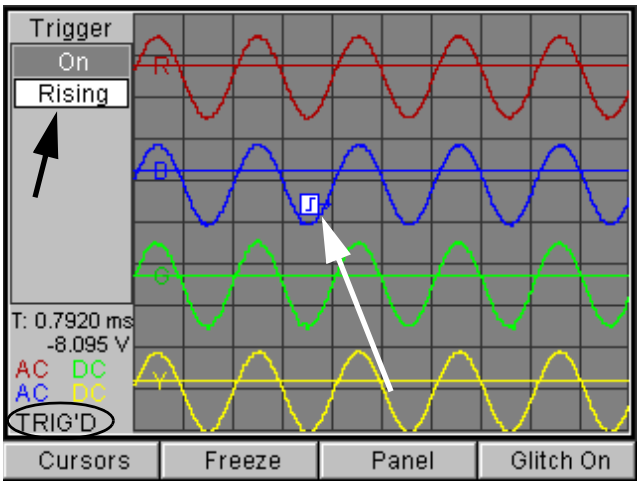

Figure 7.29: Lab Scope Screen, DMM Off - Trigger Selection

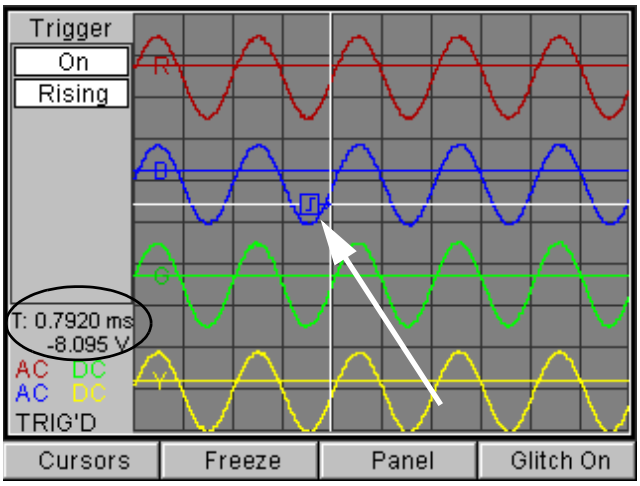

Figure 7.30: Lab Scope Screen, DMM Off - Trigger Setup

5 Press the **Down Direction** key to select the Trigger Slope field (Rising or Falling).

6 Use the **Left or Right Direction** key to select a slope (edge) of either Rising or Falling. Notice the marker in the graph changes from ⎍ for Rising to ⎏ for Falling.

7 Assign the trigger to a specific color channel by repeatedly pressing the **ENTER** key until the marker in the graph changes to the correct color.

8 Press the **Down Direction** key to select the marker in the graph. This displays trigger time and amplitude settings at the bottom left of the field and places two lines (cursors) on the screen for setting the trigger time and level, as shown in *Figure 7.30*.

9 Use the **Up or Down Direction** keys to set the trigger level by moving the horizontal cursor up or down. Notice the setting of the trigger level (at the bottom left side of the screen) changes as you move the cursor.

10 Use the **Left or Right Direction** keys to set the trigger time by moving the vertical cursor left or right.

11 When the trigger level and time are set, press the **ENTER** key to accept the settings.

NOTE: *Whenever the trigger cursors are displayed on the screen, the Direction keys move the cursors; you must press the ENTER key to return to the edit fields.*

NOTE: *When finished - if DMM is On, the top panel is the selected panel and it has a solid border (not moving dashes). If you want to select either of the DMM panels for any reason, press the EXIT key to change the top panel's border to moving dashes so you can select a different panel.*

Cursors Pane

The Cursors pane lets you set up either horizontal or vertical screen cursors and turn them on or off. The cursors are actually guide lines you can move around in the graph to measure the difference between two points in the graph. One pair of lines runs horizontally and can be used to measure amplitude (voltage, amps, etc.) differences; the other pair of lines runs vertically and can be used to measure time differences or frequencies.

The following are examples of how you can use the cursors to measure the amplitude difference between two points, the time difference between two points, or the frequency of a regularly repeating signal.

- **Amplitude difference** - you can use the horizontal cursors to measure the peak-to-peak voltage output of a variable reluctance sensor.
- **Time difference** - you can use the vertical cursors to measure the fuel injector pulse width by setting the cursors to measure the amount of time the fuel injector circuit is grounded (the injector's pulse width).
- **Frequency** - you can use the vertical cursors to test the output frequency of a frequency generating MAF/MAP sensor in order to determine if the output frequency is within specifications for the engine RPM and load. You must measure the full cycle of the output, including both the on and off time.

To set up the cursors, follow these steps:

1 If DMM is On, make sure the top panel is selected and has a solid border (not moving dashes).

NOTE: *If the panel is selected but has moving dashes, press either the ENTER key or the Trigger-Cursors-Time/Volts function key to remove them.*

2 Display the Cursors pane by repeatedly pressing the **Trigger-Cursors-Time/Volts** function key until the label is "Time/Volts" and the Cursors pane is displayed, as shown in *Figure 7.31*.

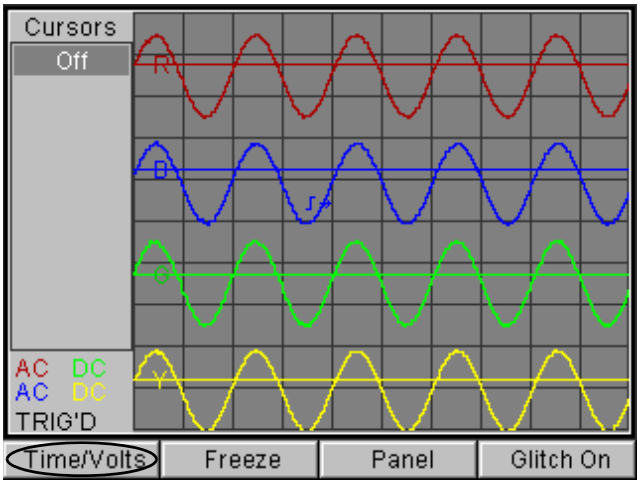

Figure 7.31: Lab Scope Screen, DMM Off - Cursors Pane Displayed

3 Make sure the top field is selected (this field is always selected when you first display the Cursors pane).

4 Change the **Cursor** setting by pressing either the **Left or Right Direction** key until either Off, Horizontal, or Vertical appears in the field, as shown in *Figure 7.32*.

NOTE: *If you are changing the setting to Off, the procedure is complete.*

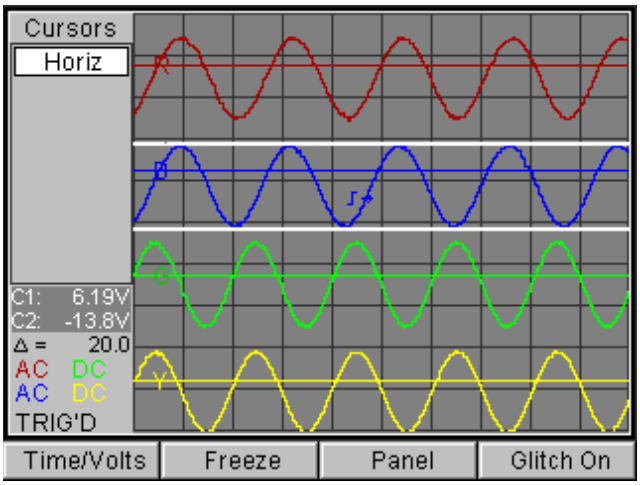

Figure 7.32: Lab Scope Screen, DMM Off - Cursors Setup

5 Notice the following about the Cursors pane and fields:

- The default setting is Off. When you select a different value for the field (Horizontal or Vertical), several fields appear at the bottom of the pane and the cursors appear in the graph.
- For the horizontal cursors, the fields that appear are: C1, C2, and d. You select the C1 (cursor 1) field, the C2 (cursor 2) field, or both the C1 and C2 fields to move the cursors in the graph either separately or together. The d field is display-only; it displays the amplitude difference between cursors 1 and 2 (C1 and C2).
- For vertical cursors, the fields that appear are: C1, C2, d, and f. You select the C1 (cursor 1) field, the C2 (cursor 2) field, or both the C1 and C2 fields to move the cursors in the graph either separately or together. The d field is display-only; it displays the time difference between cursors 1 and 2 (C1 and C2). The f field is also display-only; it displays the frequency between cursors 1 and 2 (C1 and C2).
- You can set either horizontal or vertical cursors, but not both at the same time.
- Keypad presses do the following:

ENTER key - moves from one waveform channel color to the next color so you can select a waveform color and assign the cursors to that color.

Up or Down Direction key - moves through the Cursors fields so you can select a field to change as follows: The Down Direction key moves from the cursor setting field to the C1 field, to the C2 field, to both the C1 and C2 fields, and then moves back to the cursor setting field. The Up Direction key moves in the opposite direction. The currently-selected field is always shaded.

Left or Right Direction key - for the cursor setting field, moves through the selection values in the field so you can select a value (Off, Horizontal, or Vertical). For the C1, C2, and Both fields, moves the cursor lines in the graph.

6 If more than one waveform line is displayed, assign the cursors to a specific color channel. To do this, repeatedly press the **ENTER** key to select the color channel for the cursors. (You can tell which color is selected because the line is thicker and appears to be highlighted.)

NOTE: *With the cursors assigned to a specific color channel, if you later turn off the channel, the cursors also turn off.*

7 Press the **Down Direction** key to select the C1 field. This highlights the C1 field and the cursor in the graph, as shown in *Figure 7.32*.

8 Press and hold down the appropriate **Left or Right Direction** key to move the cursor line in the graph until it is where you want it.

NOTE: *DO NOT USE THE UP OR DOWN DIRECTION KEYS. If you do, the field selection changes to the other cursors fields. If you accidentally use the Up or Down keys, stop and find out which field is shaded (Cursor, C1, C2, or Both). Then use the Down Direction key to reselect the C1 field. The field will be shaded.*

9 Press the **Down Direction** key to select the C2 field. This highlights the C2 field and the cursor in the graph.

10 Use the **Left or Right Direction** keys to move the cursor line in the graph until it is where you want it.

11 Press the **Down Direction** key to select both the C1 and C2 fields in order to move both of the cursor lines together. This highlights both the C1 and C2 fields and both of the cursor lines in the graph.

12 Use the **Left or Right Direction** keys to move the cursor lines in the graph until they are where you want them.

NOTE: *With the cursors turned on, when you display the other panes (Time/Volts or Trigger), the cursors remain in the graph. The cursors are always assigned to the color that is currently active (selected).*

NOTE: *When finished - if DMM is On, the top panel is the selected panel and it has a solid border (not moving dashes). If you want to select either of the DMM panels for any reason, press the EXIT key to change the top panel's border to moving dashes so you can select a different panel.*

Freeze Function Key (Lab Scope)

The Lab Scope Freeze function lets you stop and "freeze" the waveform readings (and DMM readings if DMM is on). You can then view up to 50 past frames of collected data. You can also print, save, or replay the readings.

NOTE: *The Freeze function also lets you view detected glitch data. Steps for this are included here. If necessary, refer to* ***Glitch Function Key*** *on page 71.*

To "freeze" the readings, follow these steps:

NOTE: *At this time, the screen should look like one of the following:*

- If DMM is off, the screen looks similar to *Figure 7.33*.
- If DMM is on, the screen looks similar to *Figure 7.34*.
- If Glitch is on, the screen looks similar to *Figure 7.35*. (If Glitch is turned on while DMM is on, DMM automatically turns off.)

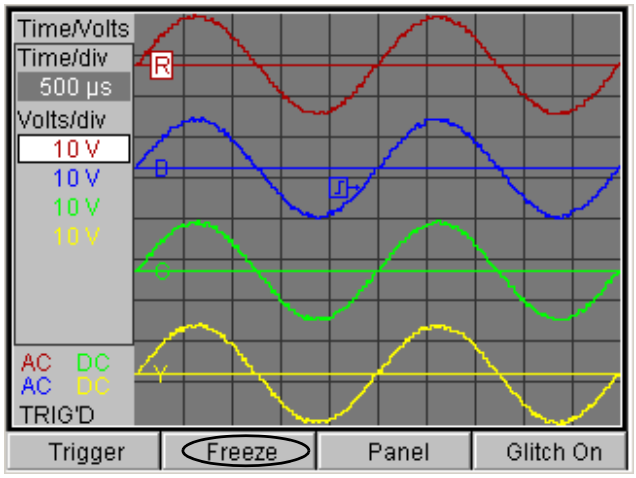

Figure 7.33: Lab Scope Screen, DMM Off - Freeze Function Key

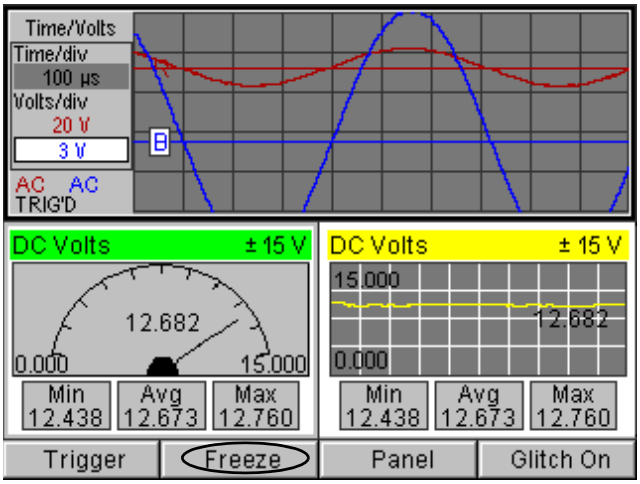

Figure 7.34: Lab Scope Screen, DMM On - Freeze Function Key

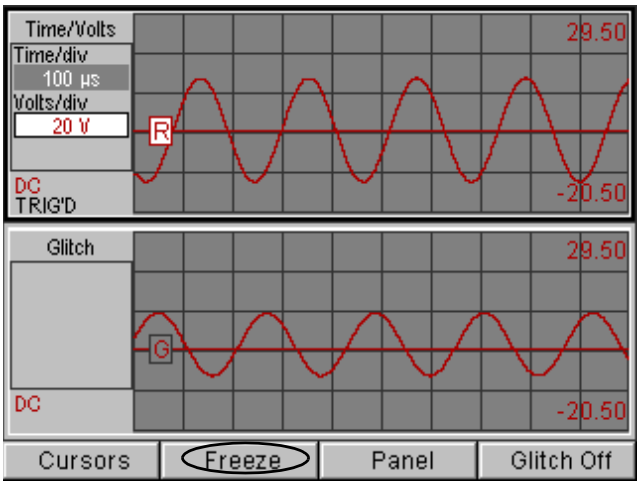

Figure 7.35: Lab Scope Screen, Glitch On - Freeze Function Key

1 Press the **Freeze** function key. This stops all readings and "freezes" all the displayed panels, as shown in *Figure 7.36*, *Figure 7.37*, and *Figure 7.38*.

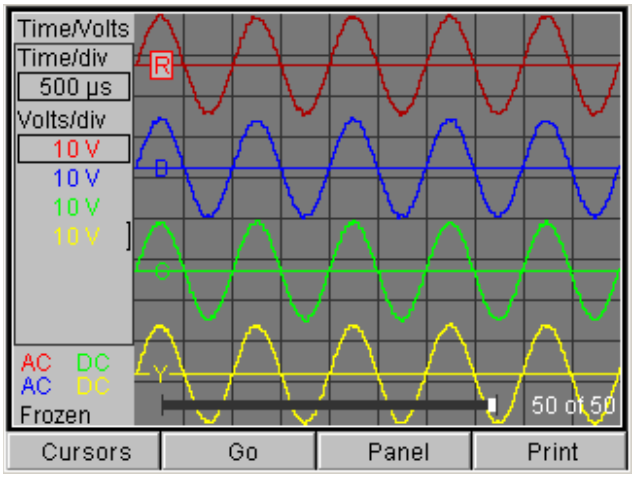

Figure 7.36: Lab Scope Screen, DMM Off - Frozen Screen

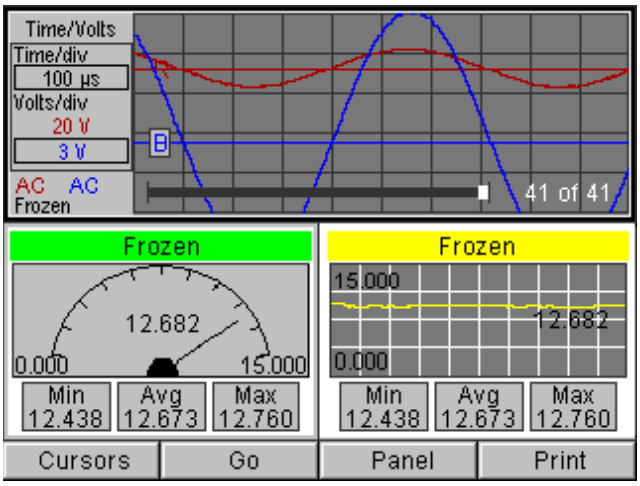

Figure 7.37: Lab Scope Screen, DMM On - Frozen Screen

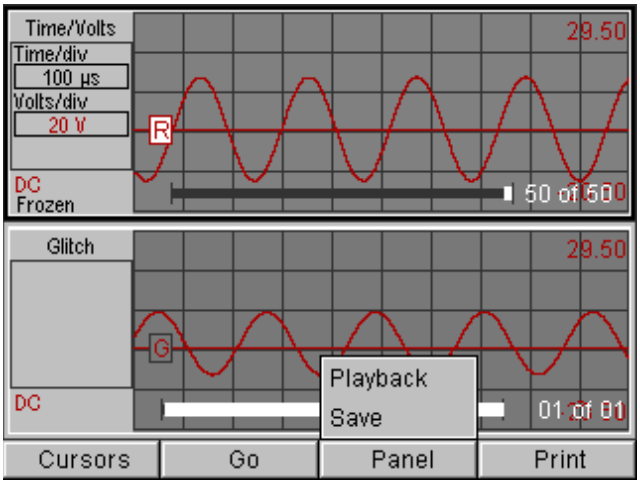

Figure 7.38: Lab Scope Screen, Glitch On - Frozen Screen

2 Notice the following about the "frozen" screens:

- A scroll bar appears on the waveform graph.
- The Function keys at the bottom of the screen change (the options on the Panel menu also change and provide options for replaying and saving the readings).
- If DMM is on, the word "Frozen" flashes at the top of each DMM panel.

3 If DMM is on, make sure the top panel is selected and has a solid border (not moving dashes).

NOTE: *If the panel is selected but has moving dashes, press either the ENTER key or the Trigger-Cursors-Time/Volts function key to remove them.*

4 Use the **Up and Down Direction** keys to scroll through the readings as necessary. The scroll bar number changes to indicate which frame is displayed.

NOTE: *If DMM is on, the Frozen DMM panels also change to display past data.*

NOTE: *If Glitch is on, only the top panel displays past data and the bottom, Glitch pane, contains snapshots of glitch data. To view the glitch data, press the EXIT key to change the top panel's border to moving dashes. Then press the Down Direction key and the ENTER key to select the bottom panel. Use the Direction keys to view the data. To return to the top panel, press the EXIT key to change the bottom panel's border to moving dashes.*

The way the Lab Scope Freeze function displays data depends on the current trigger setting as follows:

- **Freeze screen with trigger Off or On** - at any time you can use the Freeze function key to stop the readings and view the past frames since the last trigger occurred. You can scroll through the past 50 frames of collected data. If the Time/div field is set at 500 ms or slower, you can view the entire timeline by "smooth scrolling." If the Time/div field is set at 250 ms or faster, you can view the data screen-by-screen.
- **Freeze screen with Glitch Ttrigger™** - when the trigger occurs, 50 frames of data are automatically collected (or you can press the Freeze function key to stop the readings any time before 50 frames are read). You can then use the Freeze function to scroll through the frames of collected data. No matter what the Time/div field is set at, you can view the entire timeline by "smooth scrolling."

5 Optionally, use the Function keys on the "frozen" screen to do any of the following:

- **Cursors** - use this function key as described in **Trigger - Cursors - Time/Volts Function Key** on page 57.
- **Go** - use this function key to restart the live readings.
- **Panel: Playback -** use this function key to view saved files. When you use this key, a Load screen appears for selecting a file to view. Use the **Up and Down Direction keys** to select a file and then press the **ENTER** key.

  NOTE: *You can also use the Playback option on the main menu to "playback" files. For details about Playback, refer to* ***15: Playback*** *on page 131*.
- **Panel: Save** - use this function key to save the captured frames of data as a file. When you use this key, a Save screen appears for saving a file. Use the **Up and Down Direction keys** to select an "Open" position and then press the **ENTER** key.

  NOTE: *The Save screen lists saved files and "Open" positions. When you save a new file you can either select an "Open" position or a file you want to over-write. The function keys at the bottom of the screen let you lock or unlock files. Locked files have a padlock icon next to the file name; they cannot be overwritten.*
- **Print** - use this function key to print what is currently displayed on the screen.

6 When finished, press the **Go** function key to restart the live readings.

NOTE: *If a trigger is set, the trigger must occur before readings restart. If DMM is on, the DMM panel minimums, averages, and maximums automatically reset and any displayed strip charts also reset.*

NOTE: *If you press the Freeze key again, the Freeze display includes only data collected after a trigger occurs.*

Panel Function Key (Lab Scope)

The Panel function key displays a menu of additional functions for the Lab Scope screen. They are:

- Edit
- Auto Setup
- Grid Off/On
- Training Off/On

These options are described separately in the next few sections.

NOTE: *When the lab scope screen is "frozen," the Panel menu options are Playback and Save. For details, refer to* ***Freeze Function Key (Lab Scope)*** *on page 66.*

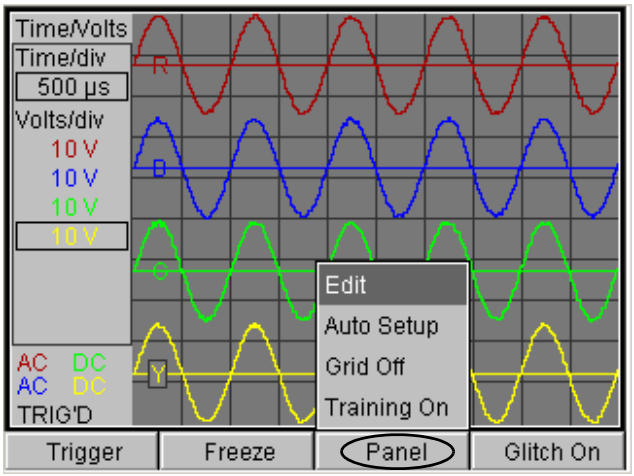

Figure 7.39: Lab Scope Screen, DMM Off - Panel Function Key

NOTE: *If you press the Panel function key to display the menu, but do not want to select an option, either press the EXIT key or press the Panel function key again to close the menu.*

Panel Menu - Edit Option

Use the Panel function key's Edit menu option to change the settings for a panel that displays a reading.

To edit a panel that displays a reading, follow these steps:

1. If DMM is on, select the panel to edit. The panel must be a panel that currently displays a reading.

   NOTE: *If the top panel is selected and has a solid border, and you want to select a bottom DMM panel, press the EXIT key to change the border to moving dashes. Then select a DMM panel.*

2. Press the **Panel** function key (see *Figure 7.39*).
3. Press the **ENTER** key to select the **Edit** option. The edit fields are displayed.

   NOTE: *If the panel's border was moving dashes, the border changes to a solid line.*

4. Change the fields as necessary.

Panel Menu - Auto Setup Option

Use the Panel function key's Auto Setup menu option to have the Scope software automatically determine the waveform range settings (and DMM Range settings if DMM is turned on) for all channels that are turned on. Based on the signals present through the channels, the software determines the appropriate Range values.

To use the Auto Setup function, refer to **Lab Scope Only (with DMM Off)** on page 46 or **Lab Scope with DMM On** on page 51. The sections include steps for using the auto setup function.

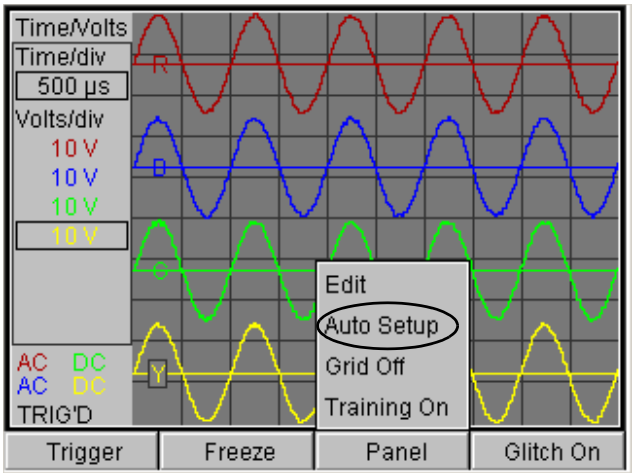

Figure 7.40: Lab Scope Screen, DMM off - Panel Function Key, Auto Setup Option

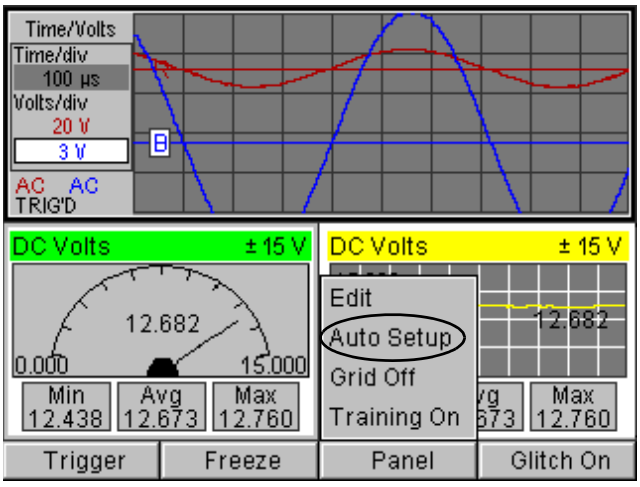

Figure 7.41: Lab Scope Screen, DMM on - Panel Function Key, Auto Setup Option

Panel Menu - Grid Off/On Option

Use the Panel function key's Grid On/Off menu option to turn the waveform graph's grid lines on or off.

To turn the grid lines on or off, follow these steps:

1. If DMM is On, make sure the top panel is selected.
2. Press the **Panel** function key (see *Figure 7.42*).
3. Use the **Up** or **Down Direction** key to select the **Grid Off** option.
4. Press the **ENTER** key. The grid lines no longer appear in the graph. They are "turned off" (see *Figure 7.43*).

NOTE: *To turn the grid lines back on, select the Grid On option from the Panel menu (when you select Grid Off, the menu option changes to Grid On - see Figure 7.43).*

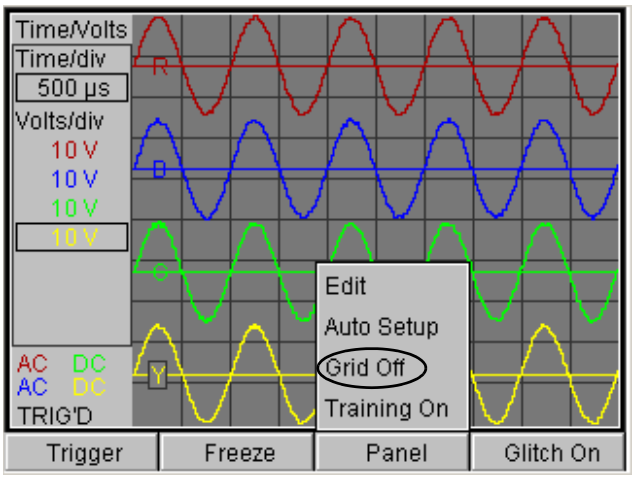

Figure 7.42: Lab Scope Screen, DMM off - Panel Function Key, Grid Off Option

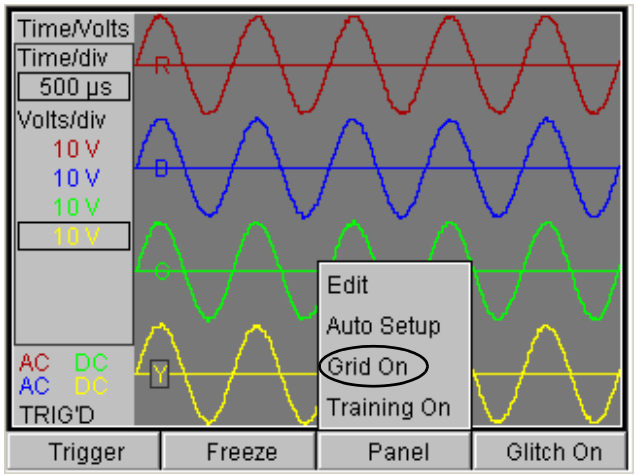

Figure 7.43: Lab Scope Screen, DMM off - Panel Function Key, Grid On Option

Panel Menu - Training On/Off Option

Use the Panel function key's Training On/Off menu option to have the software display demonstration (demo) readings for the software.

When you turn the Training function on, it stays on until you turn it off (or exit the Scope software), even if you select a different option from the Scope main menu. To turn the Training function off, select the Training Off option from the Panel menu (when you select Training On, the menu option changes to Training Off).

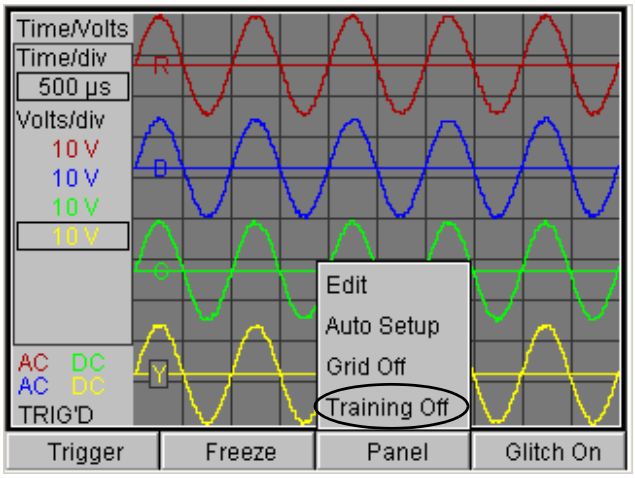

Figure 7.44: Lab Scope Screen, DMM off - Panel Function Key, Training Off Option

Glitch Function Key

The Glitch function lets you automatically find "glitches" in the waveform for the red channel. (A glitch is a momentary spike in the waveform.)

NOTE: *If the Glitch function cannot detect a glitch or if the signal has too much "noise," you may need to adjust the Glitch Sensitivity setting. For details, refer to* ***Glitch Sensitivity*** *on page 117.*

To use the Glitch function, follow these steps:

1 If DMM is On, make sure the top panel is selected and has a solid border (not moving dashes).

NOTE: *If the panel is selected but has moving dashes, press either the ENTER key or the Trigger-Cursors-Time/Volts function key to remove them.*

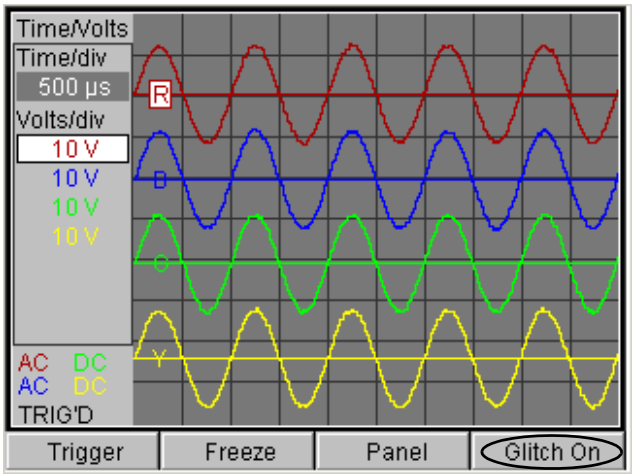

Figure 7.45: Lab Scope Screen, DMM On - Glitch Function Key

2 Press the **Glitch On** function key. This displays the Glitch panel in the bottom half of the screen, as shown in *Figure 7.46*.

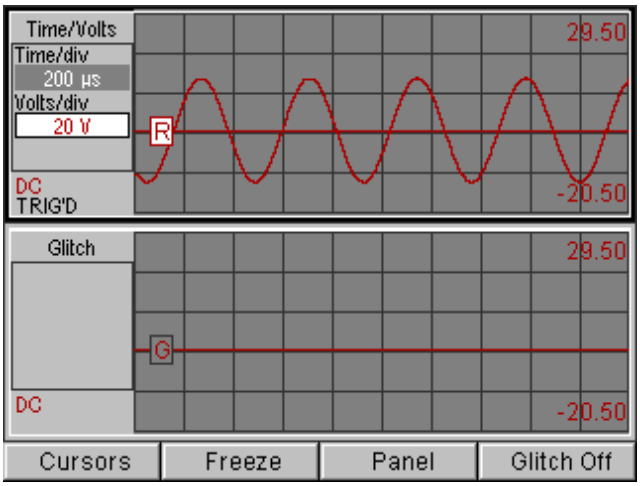

Figure 7.46: Lab Scope Screen, Glitch On - Before Glitch Occurs

3 Notice the following about the Glitch display screen:

- The red channel's waveform line displays in the top half of the screen. If the blue, green, or yellow channels were "turned on," they automatically "turn off."
- The glitch panel appears in the bottom half of the screen. It is a contains the waveform line for the red channel only and also switches to DC Volts (if any other measurement type was being used).
- If you adjust the waveform line in the top panel, the bottom panel automatically reflects the change(s).
- The letter next to the waveform line in the bottom panel is G, for Glitch (not Green).
- The bottom panel does not display a waveform until a glitch occurs. Each time a glitch occurs, the bottom panel changes to display the new glitch data.
- If DMM is turned on and then Glitch is turned on, DMM automatically turns off. When you turn the Glitch function off, DMM stays off and a full screen waveform displays with only the red channel's waveform line.
- If the previous trigger setting was On or Glitch, the trigger setting automatically changes to Off. When you turn the Glitch function off, the trigger stays set at Off.

4 If necessary, readjust the waveform in the top panel so it fits better in the graph. If necessary, follow the steps in **Time/Volts Pane** on page 58.

5 The software now monitors the waveform for a glitch to occur. When a glitch occurs, the glitch area of the waveform displays in the bottom panel, as shown in *Figure 7.47*. Each time a glitch occurs, the bottom panel changes to the new glitch data.

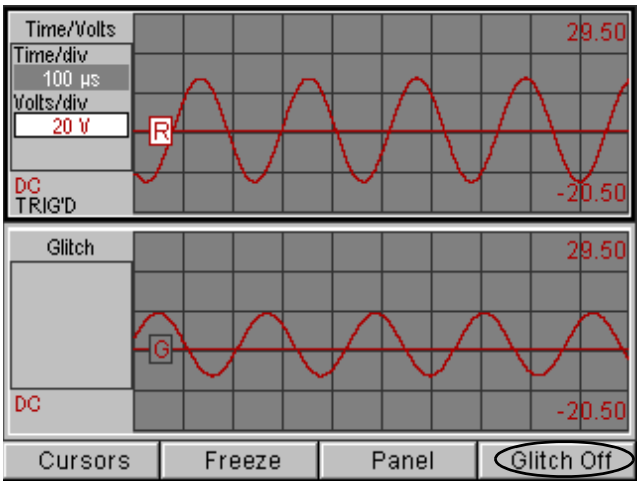

Figure 7.47: Lab Scope Screen, Glitch On - After Glitch Occurs

6 Optionally, use the Freeze function key to "freeze" the collected data, or to print or save it. For details, refer to **Freeze Function Key (Lab Scope)** on page 66.

7 When you are finished with the Glitch function, press the **Glitch Off** function key to return to a full screen lab scope display with DMM off and only the red channel turned on.

8: Scope - Ignition Scope

Overview

The Ignition Scope function lets you use the tool as an oscilloscope that measures the primary and secondary ignition signals for a conventional ignition system and displays them both on one screen. The software reads the signals and displays them on the screen as “waveforms.”

With the Ignition Scope function, you can test multiple cylinders all at once (for conventional ignition systems). You can view waveforms for up to twelve cylinders for both the primary and secondary signals all on one screen. You can also view the primary or secondary signals separately.

When you select **Ignition Scope** from the screens (*Figure 8.8* on page 76), the Engine Setup screen appears.

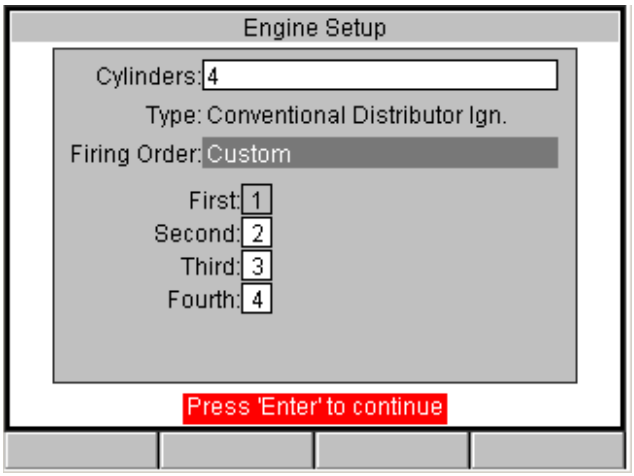

Figure 8.1: Ignition Scope Engine Setup Screen

The Engine Setup screen contains options for identifying the number of cylinders on a vehicle being tested. After identifying the number of cylinders, the Ignition Scope Panel Setup screen appears for setting up an ignition system test on a conventional ignition system.

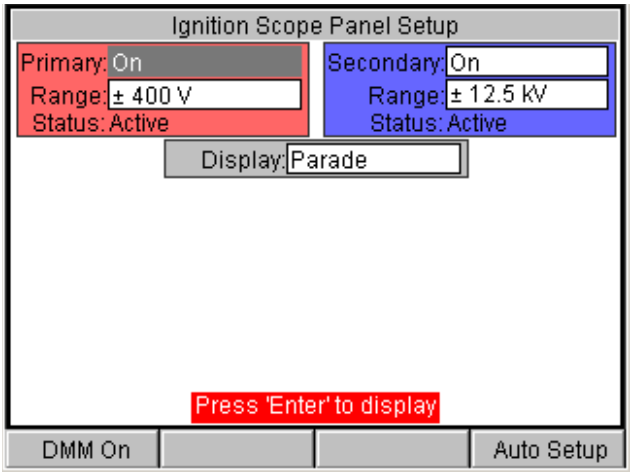

Figure 8.2: Ignition Scope Panel Setup Screen

The Ignition Scope Panel Setup screen contains two sections for setting up the primary and secondary channels and a field for selecting a display mode (parade, raster, or superimposed).

Any of the following ignition scope screens can be set up and displayed:

- Digital Multi-Meter (DMM) Off: a full-screen Ignition Scope display with waveform readings for both the primary and secondary signals displayed in “Parade” mode, as shown below for four cylinders.

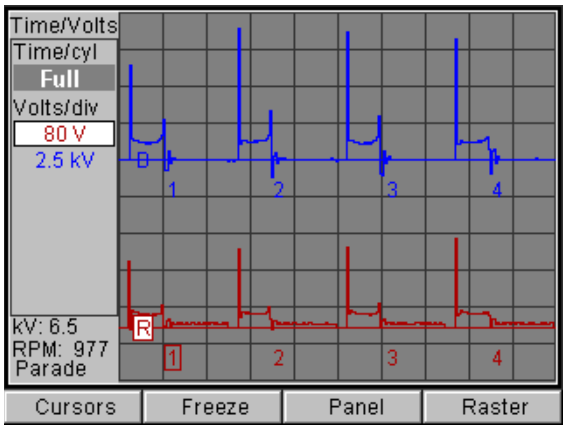

Figure 8.3: Ignition Scope Screen, DMM Off - Parade Mode

- DMM Off: a full-screen Ignition Scope display with waveform readings for both the primary and secondary signals displayed in “Raster” mode, as shown below for four cylinders.

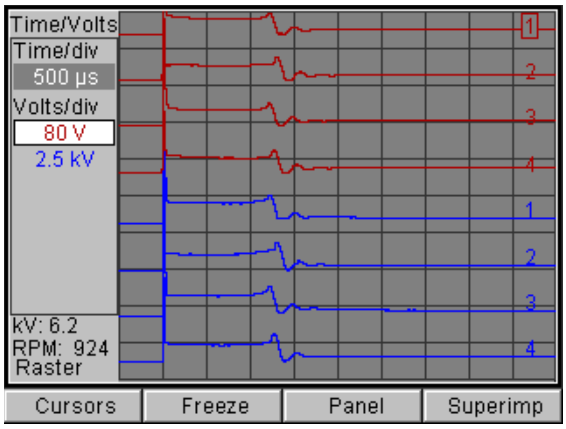

Figure 8.4: Ignition Scope Screen, DMM Off - Raster Mode

- DMM Off: a full-screen Ignition Scope display with waveform readings for both the primary and secondary signals displayed in “Superimposed” mode, as shown below for four cylinders.

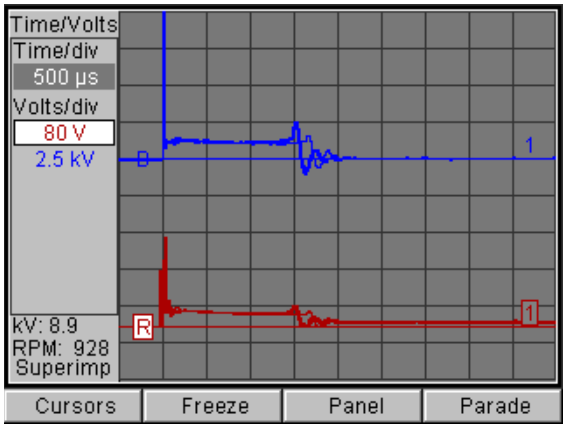

Figure 8.5: Ignition Scope Screen, DMM Off- Superimposed Mode

- DMM On: a half-screen Ignition Scope display with waveform readings on the top half of the screen, along with one or two multi-meter readings on the bottom half of the screen, as shown below (“Superimposed” mode shown).

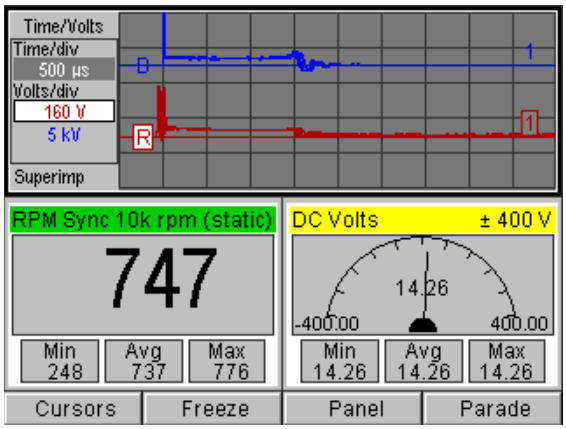

Figure 8.6: Ignition Scope Screen, DMM On

With the Ignition Scope screen set up and displayed, you can change the display to any of the three display modes (parade, raster, or superimposed) and you can change the display to view the primary and secondary signals either separately or together. In addition, you can adjust the horizontal and vertical settings of the graph, move the zero offset for each waveform, set up cursors, use a training function, turn the grid lines on or off, return to the Engine Setup screen, or “freeze” up to 50 screens of data for viewing, printing, or saving.

This chapter describes how to use the Ignition Scope functions. The chapter has the following main sections:

Probe Connections

Use the following steps to connect the test probes to the Scope module and the ignition system.

NOTE: *The following steps are for testing a Conventional ignition system. To test a Direct Ignition Spark (DIS) system, use the Single Cylinder function. Refer to* ***9: Scope - Single Cylinder*** *on page 97.*

1 Insert the pin connector of the black ground probe into the **black** ground port of the Scope module.

2 Connect the BNC connectors of the following test probes to the Scope module:

- **a** Connect the red test probe to the **red** channel port.
- **b** Connect the Secondary kV probe to the **blue** channel port.
- **c** Connect the Synchronization probe to the **green** channel port.
- **d** Optionally, connect the yellow test probe to the yellow channel port. (Connect this only if you are using the Ignition scope with DMM On and want to display a DMM reading for some other component.)

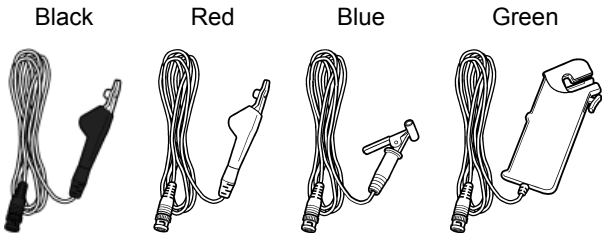

Figure 8.7: Ground Probe (black), Test Probe (red), Ignition Secondary kV Probe (blue), Synchronization Probe (green)

3 Attach the test probes' clamps to the ignition system as follows:

- **a** Attach the black ground probe to a good ground on the engine.
- **b** Attach the red test probe to the negative (-) lead on the primary side of the coil.
- **c** Attach the Ignition Secondary kV probe (blue) to the high tension kV wire on the secondary side of the coil.
- **d** Attach the Synchronization probe (green) to the spark plug wire of the #1 cylinder.

  NOTE: *To reduce "noise" in the signal, connect the probe as close to the spark plug as possible and make sure the clamp is entirely closed.*
- **e** Optionally, attach the yellow test probe to the component you want to test.

4 Start the vehicle's engine and begin testing.

Ignition Scope Only (DMM Off)

Screen Setup and Display

This section describes how to use the Ignition Scope function with digital multi-meter (DMM) turned off. With DMM off, the Ignition Scope screen displays the waveforms on the entire screen.

To set up and display the full-screen ignition scope waveform readings, follow these steps:

NOTE: *Before performing these steps, connect the test probes to the Scope module and the vehicle. For details, refer to* ***Probe Connections*** *on page 75.*

1 Display the menu screen. For details, refer to **Software Startup** on page 5.

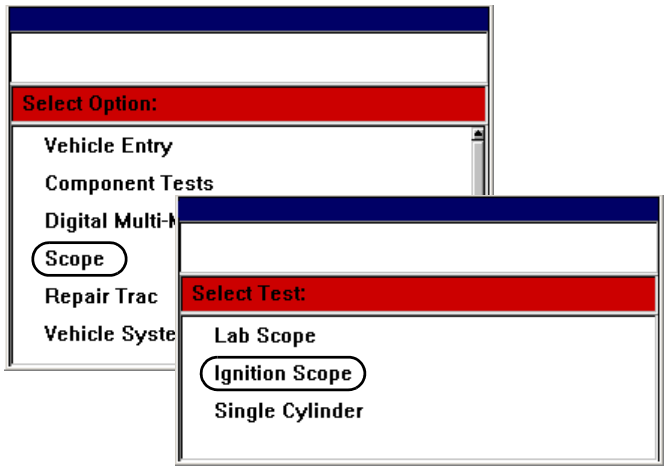

Figure 8.8: Main Menu Screens

2 From the main menu screens, select **Scope** and then **Ignition Scope**. This displays the Engine Setup screen (*Figure 8.9*).

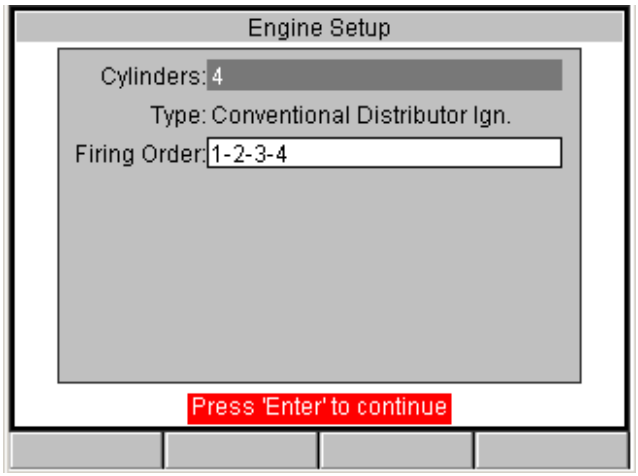

Figure 8.9: Ignition Scope Engine Setup Screen

3 On the Engine Setup screen, do the following to select the number of cylinders and the firing order for the ignition system being tested:

- **a** Use the **Left** and **Right Direction** keys to select the number of cylinders for the ignition system.
- **b** Press the **Down Direction** key to select the Firing Order field.
- **c** Use the **Left** and **Right Direction** keys to select the firing order for the cylinders.

  NOTE: *If the correct firing order isn't available, set the firing order to "Custom" and set up the correct firing order for the cylinders in the fields that appear on the screen, as shown in Figure 8.10. Use the Down Direction key to move to each field and use Left and Right Direction keys to select a value within each field.*

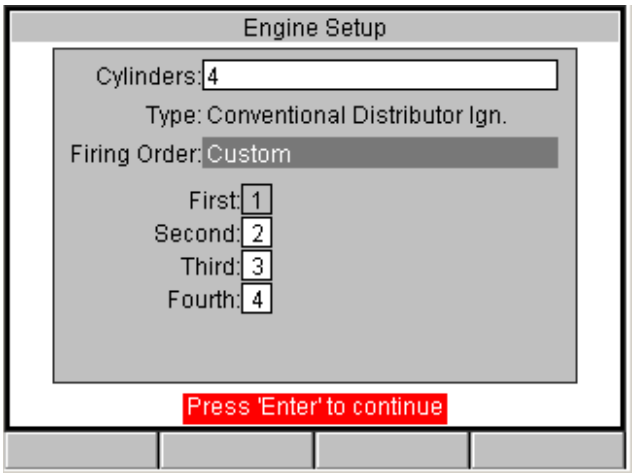

Figure 8.10: Ignition Scope Engine Setup Screen - Custom Firing Order

4 When finished with the engine setup, press the **ENTER** key. This displays the Ignition Scope Panel Setup screen.

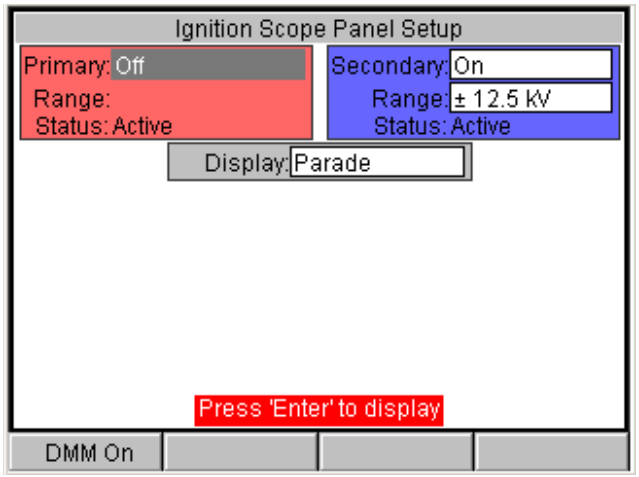

Figure 8.11: Ignition Scope Panel Setup Screen

5 Notice the following about the setup screen:

- The screen has a section for turning on and setting up the primary channel, a section for turning on and setting up the secondary channel, and a field for selecting the type of display for the waveforms. After you set up the sections and press the ENTER key, the waveform readings display on the screen.
- The section colors indicate the colors for the primary (red) and secondary (blue) channels, probes, and ignition wires.
- You use the Up and Down Direction keys to move around on this screen and to select the "fields." The currently selected field is always highlighted. When a field is highlighted, you use the Left and Right Direction keys to make a selection in the field.
- The DMM On function key lets you turn on the function that displays the waveforms on the top half of the screen along with one or two DMM readings on the bottom half of the screen. For using this function, refer to **Ignition Scope with DMM On** on page 82.
- The Scope software has a training demo function. To use this right away, press the Left Direction key to turn the Primary channel on and then press the ENTER key. With the waveform screen displayed, press the Panel function key, select Training On from the menu, and press the ENTER key. For details, refer to **Panel Menu - Training On/Off Option** on page 94.

6 With the setup screen displayed, do the following to set up the channels:

a Press the **Left** or **Right Direction** key to turn the Primary (Red) channel on. (The Range is preset and cannot be changed.)

b Press the **Down Direction k**ey to select the Secondary field.

c Press the **Left** or **Right Direction** key to turn the Secondary (Blue) channel on.

d Press the **Down Direction** key to select the Range field.

e Use the **Left** and **Right Direction** keys to set the Range value.

7 After setting up the channels, press the **Down Direction** key to select the Display field.

8 Use the **Left and Right Direction** keys to select one of the display modes (described on the next page).

9 After selecting the display mode, press the **ENTER** key to display the waveforms. See *Figure 8.12*, *Figure 8.13*, and *Figure 8.14*.

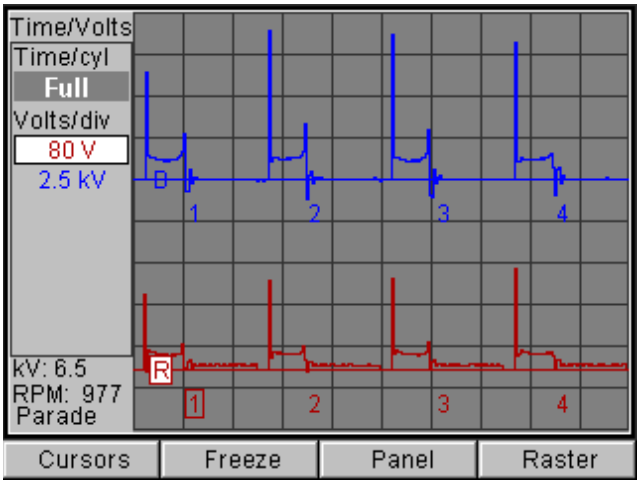

Figure 8.12: Ignition Scope Screen, DMM Off - Parade Display Mode

- The **Parade** mode displays a waveform line for each channel that is turned on (red primary and blue secondary).
- Each waveform line shows the channel's individual cylinder readings, in their firing order.
- You can use the Panel function key to optionally view the primary or secondary waveform lines separately.
- You can use the Raster function key to change the screen to the Raster display mode.

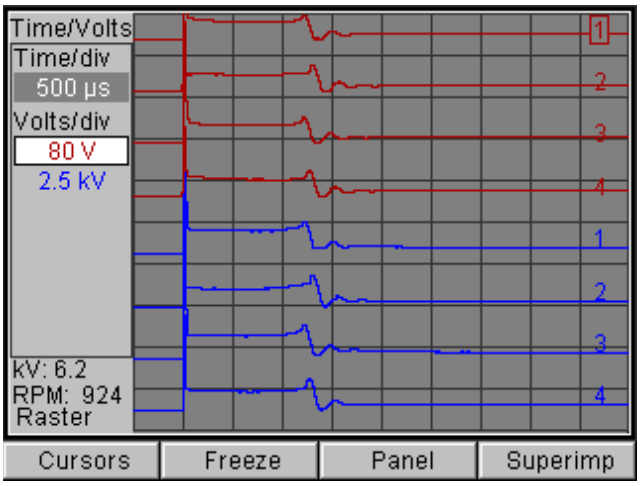

Figure 8.13: Ignition Scope Screen, DMM Off - Raster Display Mode

- The **Raster** mode displays a waveform line for each cylinder of each channel that is turned on (red primary and blue secondary).
- You can use the Panel function key to optionally view the primary or secondary waveform lines separately.
- You can use the Superimp function key to change the screen to the Superimposed display mode.

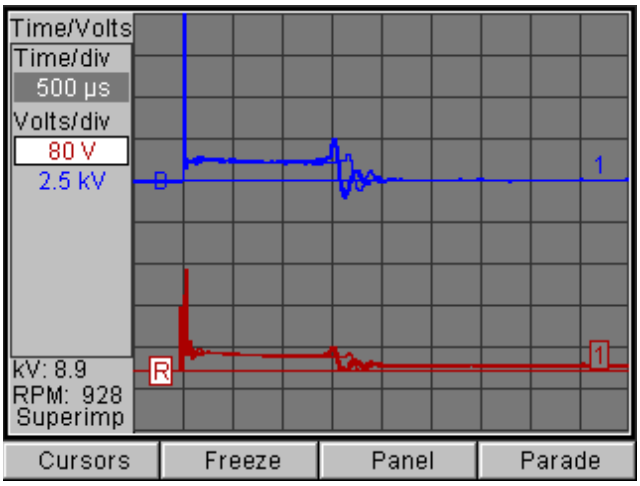

Figure 8.14: Ignition Scope Screen, DMM Off - Superimposed Display Mode

- The **Superimposed** mode displays a group of waveform lines for each channel that is turned on (red primary and blue secondary).
- Each group of waveform lines contains a separate waveform line for each of the channel's cylinders.
- You can use the Panel function key to optionally view the primary or secondary waveform lines separately.
- You can use the Parade function key to change the screen to the Parade display mode.

10 Notice the following about the displayed screen:

- The right side of the screen contains the waveform lines in a graph. The graph's horizontal axis (from left to right) represents time; the vertical axis (from bottom to top) represents the strength (amplitude) of the signal.
- Each waveform line has an "offset" line that represents the zero voltage point for that channel (parade and superimposed only). The offset line is labeled with the first letter of the channel's color (R or B), or the number of the cylinder within the channel (1, 2, 3, etc.).
- The left side of the screen contains additional setup fields for the waveform graph. These fields let you adjust how the lines fit in the graph by: 1) changing the time divisions for the graph, and 2) changing the amplitude divisions and zero offsets for each waveform line on the graph. You can also use these fields to set up cursors. For details, refer to **Cursors - Time/Volts Function Key** on page 88.
- The waveform graph's background grid can be turned on or off. For details, refer to **Panel Menu - Grid Off/On Option** on page 93.
- The color of the waveform graph's background can be changed to either black (grey) or white. For details, refer to **Background Color Selection** on page 119 and page 129.
- The bottom left side of the screen (directly above the Cursors function key) lists the current kV and RPM readings and the current display mode (parade, raster, or superimposed).
- The bottom of the screen contains the function keys described in **Function Keys - Ignition Scope with DMM Off** on page 81.

11 While viewing the waveforms, do any of the following:

- If the waveform lines do not fit into the graph properly, adjust the horizontal and vertical settings. Use the Cursors-Time/Volts function key to do this by changing the time and amplitude divisions and the zero offsets. Refer to **Time/Volts Pane** on page 89.
- Set up cursor lines for measuring amplitude and time differences and for measuring the frequency between two points in the graph. Use the Cursors-Time/Volts function key to do this. Refer to **Cursors Pane** on page 90.
- Use the Freeze function key to stop the readings and "freeze" them on the screen; and to print or save waveforms, or view saved waveforms. Refer to **Freeze Function Key (Ignition Scope)** on page 91.
- Use the Panel function key, Edit option to return to the setup screen and change the waveform settings. Refer to **Panel Menu - Edit Option** on page 92.
- Use the Panel function key, Grid Off/On option to turn the graph's grid off and on. Refer to **Panel Menu - Grid Off/On Option** on page 93.
- Use the Panel function key, Edit Engine option to return to the Engine Setup screen. Refer to **Panel Menu - Edit Engine Option** on page 93.
- Use the Panel function key, Training On/Off option to view demo waveforms. Refer to **Panel Menu - Training On/Off Option** on page 94.
- Use the Panel function key Primary, Secondary, or Both options to display only the red primary waveform lines, only the blue secondary waveform lines, or both the red primary and blue secondary waveform lines. Refer to **Panel Menu - Primary, Secondary, and Both Options** on page 94.
- Use the Raster - Superimposed - Parade function key to change the display mode. Refer to **Raster - Superimposed - Parade Function Key** on page 95.
- Use the **ENTER** key to view data for each of the displayed cylinders. Each time you press the ENTER key, the next cylinder is selected. You can tell which cylinder is selected by the shaded box around the cylinder's number in the graph.

12 When you are finished using the screen, press the **EXIT** key to return to the Scope menu screen.

Function Keys - Ignition Scope with DMM Off

After displaying the waveforms, there are two groups of function keys that appear on the Ignition Scope display screens.

The first group **[Cursors, Freeze, Panel, Raster (or Superimposed or Parade)]** appears when you display the waveforms, as shown in *Figure 8.15*.

The second group **[Cursors, Go, Panel, Print]** appears when you use the Freeze function key from the first group, as shown in *Figure 8.16*.

To use the function keys, refer to the steps in the following sections:

- Cursors (or Time/Volts) - **Cursors - Time/Volts Function Key** on page 88
- Freeze - **Freeze Function Key (Ignition Scope)** on page 91
- Panel - **Panel Function Key (Ignition Scope)** on page 92
- Raster (or Superimposed, or Parade) - **Raster - Superimposed - Parade Function Key** on page 95
- Cursors, Go, Panel, Print - **Freeze Function Key (Ignition Scope)** on page 91

  NOTE: *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in **Freeze Function Key (Ignition Scope)** on page 91.*

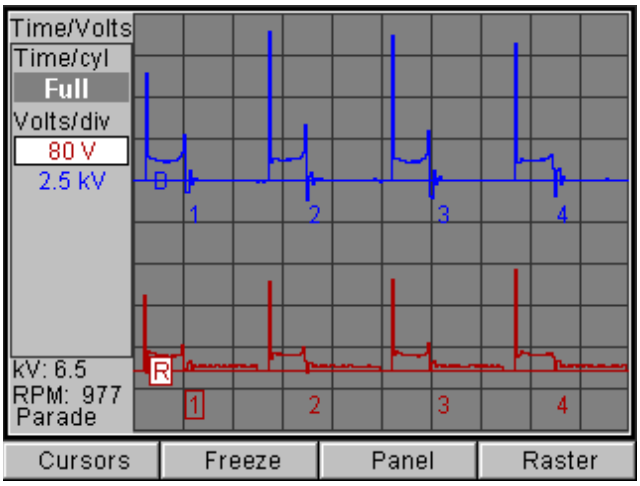

Figure 8.15: Ignition Scope Screen, DMM Off - Function Keys

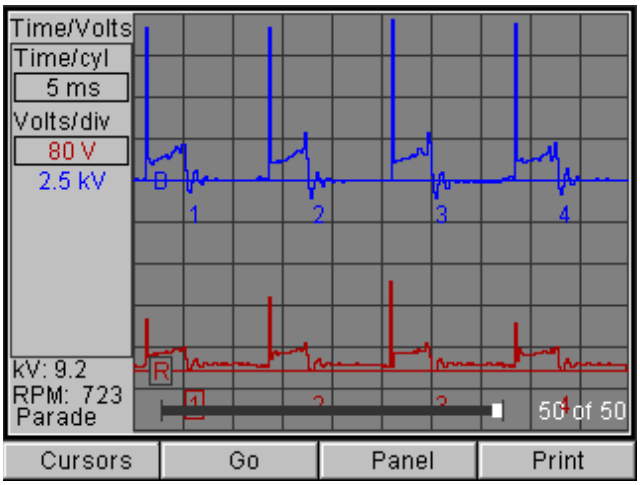

Figure 8.16: Ignition Scope Screen, DMM Off - Function Keys, after pressing the Freeze function key

Ignition Scope with DMM On

Screen Setup and Display

This section describes how to use the Ignition Scope function with DMM turned on. This function displays waveforms on the top half of the screen and one or two DMM readings on the bottom half of the screen.

To set up and display the Ignition Scope with DMM On, follow these steps:

NOTE: *Before performing these steps, connect the test probes to the Scope module and the vehicle. For details, refer to.**Probe Connections** on page 75.*

1 Display the main menu screen. For details, refer to **Software Startup** on page 5.

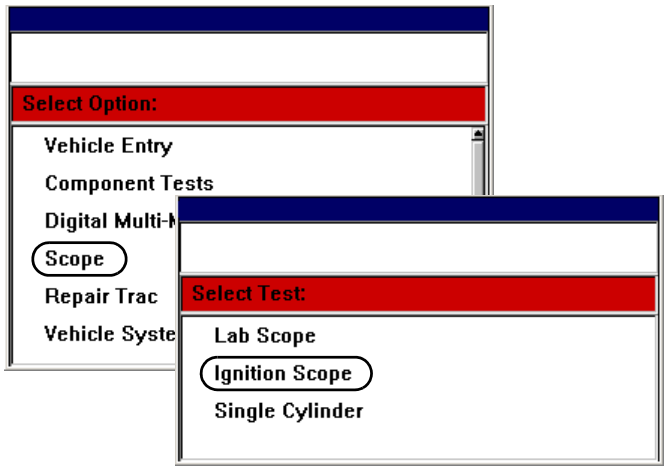

Figure 8.17: Main Menu Screens

2 From the Main Menu screens, select **Scope** and then **Ignition Scope**. This displays the Engine Setup screen.

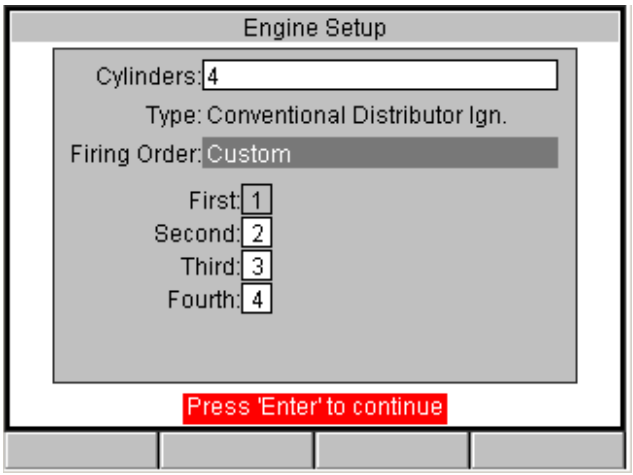

Figure 8.18: Ignition Scope Engine Setup Screen - Custom Firing Order

3 Select the number of cylinders and the firing order for the ignition system being tested and then press the **ENTER** key. (For specific steps, refer to page 76). This displays the Ignition Scope Panel Setup screen.

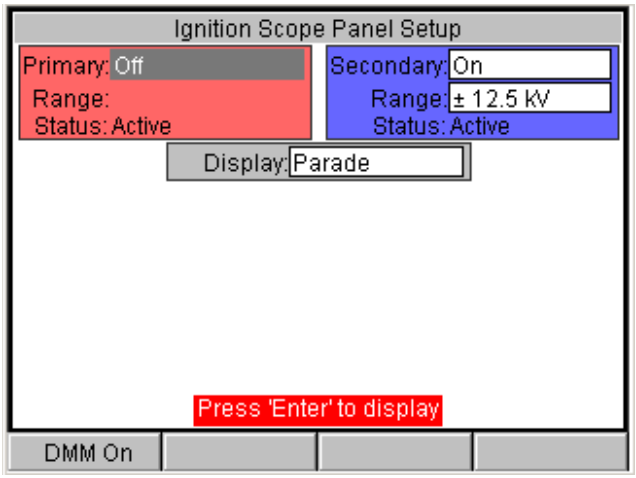

Figure 8.19: Ignition Scope Panel Setup Screen

4 Press the **DMM On** function key. This displays the ignition scope/DMM setup screen, as shown in *Figure 8.20* on page 83.

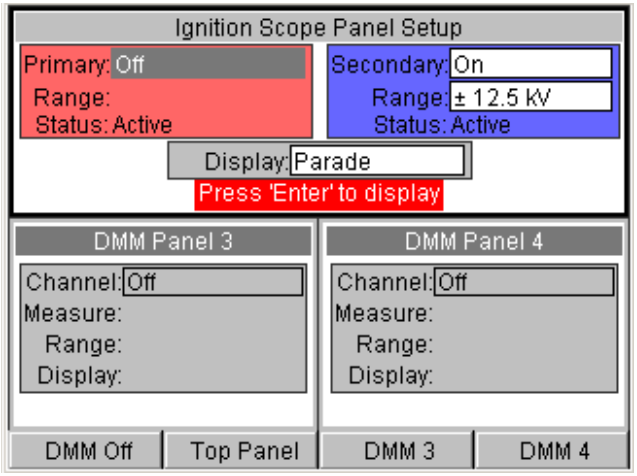

Figure 8.20: Ignition Scope Panel Setup Screen, DMM On

5 Notice the following about the setup screen:

- The screen has three panels. The first panel covers the top half of the screen and contains two sections for turning on the primary (red) and secondary (blue) channels. The other two panels, on the bottom half of the screen, are for setting up one or two DMM readings.
- After you set up the panels, the waveform reading(s) appear together on the top half of the screen and the DMM readings appear separately on the bottom half of the screen.
- One panel is always “selected.” The selected panel either has a solid border around it and contains edit “fields,” or it has a “moving” dashes border and contains the waveforms or a meter reading.
- When the selected panel’s border is solid, the Direction keys move within the panel for changing the edit fields. When the selected panel’s border is moving dashes, the Direction keys move between panels (for selecting other panels).
- You can use the DMM Off function key to turn the DMM function off and to return to the Ignition Scope only setup screen. You can use the Top Panel, DMM3, and DMM 4 function keys to select other panels for setup.
- The Scope software has a training demo function. To use this right away, press the Left Direction key to turn the Primary channel on and then press the ENTER key. With the waveform screen displayed, press the Panel function key, select Training On from the menu, and press the ENTER key. For details, refer to **Panel Menu - Training On/Off Option** on page 94.

6 With the top Ignition Scope setup panel selected, refer to the steps on page 77 in **Ignition Scope Only (DMM Off)** and set up the waveform panel.

7 After setting up and displaying the waveform(s) in the top panel, press the **EXIT** key to change the top panel's border to moving dashes so you can select the DMM panels.

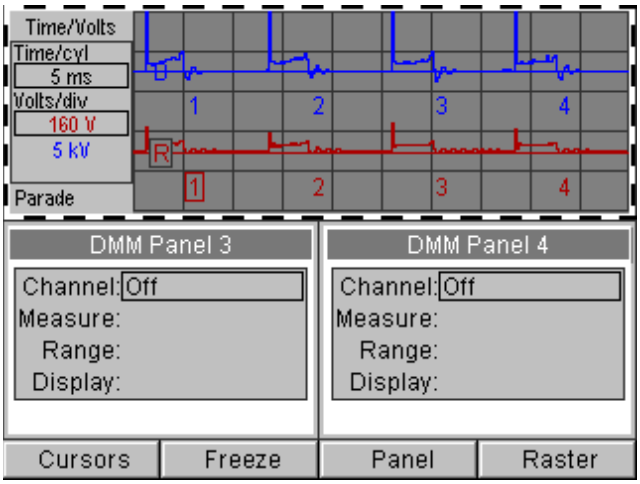

Figure 8.21: Ignition Scope Screen, DMM On - Top Panel Displayed

8 Use the **Direction** keys and select a DMM panel to set up.

9 With the DMM panel selected, refer to the steps in **DMM Setup and Display** on page 36 and set up the DMM panel(s). After all the panels are set up, the screen looks similar to *Figure 8.22*.

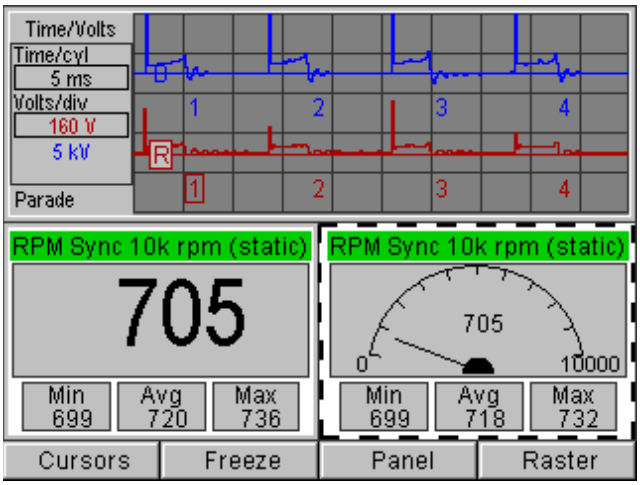

Figure 8.22: Ignition Scope Screen, DMM On - All Panels Displayed

10 Notice the following about the screen:

- The top half (panel) of the screen contains the Ignition Scope's waveform display. This display operates the same as the Ignition Scope waveform display (with DMM off). For a complete description of the display, refer to page 79.
- When the top panel is selected and the current display mode is Parade, you can repeatedly press the ENTER key to view separate data for each of the displayed cylinders. Each time you press the ENTER key, the next cylinder is selected and the screen data changes (including the DMM readings). You can tell which cylinder is selected by the shaded box around the cylinder's number in the graph.
- **If the top panel is selected and has a solid border, you must press the EXIT key before you can select a bottom, DMM panel. Pressing the EXIT key changes the top panel's border to moving dashes.**
- The bottom half of the screen contains the two DMM panels with the DMM readings. Each panel displays the measurement and range at the top, the reading in the center, and the reading's minimum, average, and maximum at the bottom. With either of these panels selected, you can repeatedly press the ENTER key to change the panel's display type.
- The function keys at the bottom of the screen change based on which panel is currently selected. For details, refer to **Function Keys - Ignition Scope with DMM On** on page 85.

11 When you are finished using the screen, press the **EXIT** key to return to the Scope menu screen.

Function Keys - Ignition Scope with DMM On

There are six groups of function keys that appear on the Ignition Scope / DMM setup and display screens after you turn DMM on. They are:

- DMM Off, Top Panel, DMM3, DMM4
- Top Panel, DMM3, DMM4
- Cursors (or Time/Volts), Freeze, Panel, Raster (or Superimposed, or Parade)
- Full, Freeze, Panel, Reset
- Cursors, Go, Panel, Print
- Full, Go, Panel, Print

The first group of function keys **[DMM Off, Top Panel, DMM3, DMM4]** appears when the top panel is selected and it contains edit fields, as shown in *Figure 8.23*.

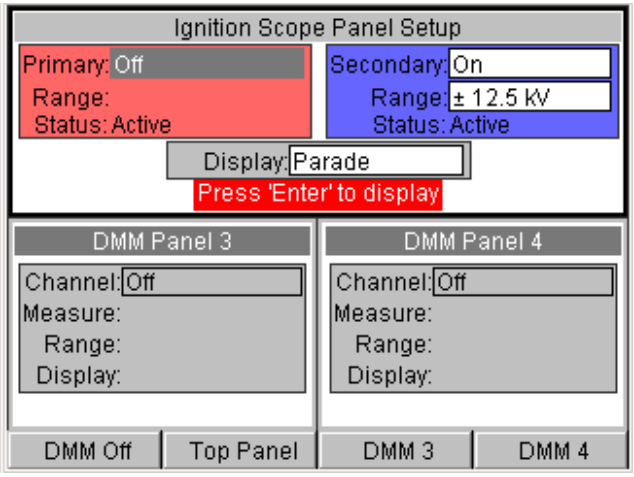

Figure 8.23: Ignition Scope Screen, DMM On - Function Keys with Top Panel Edit Fields Selected

Use these function keys to turn the DMM function off and to select the DMM panels.

The second group of function keys **[Top Panel, DMM3, DMM4]** appears when one of the bottom DMM panels is selected and it contains edit fields, as shown in *Figure 8.24*.

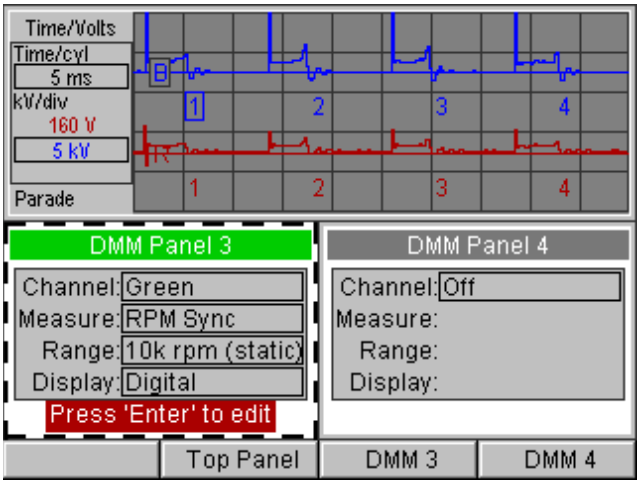

Figure 8.24: Ignition Scope Screen, DMM On - Function Keys with Bottom DMM Panel Edit Fields Selected

Use these function keys to select other panels.

The third group of function keys **[Cursors, Freeze, Panel, Raster (or Superimposed or Parade]** appears when the top panel is selected and it contains the waveform display, as shown in *Figure 8.25*.

NOTE: *The panel's border is a solid line.*

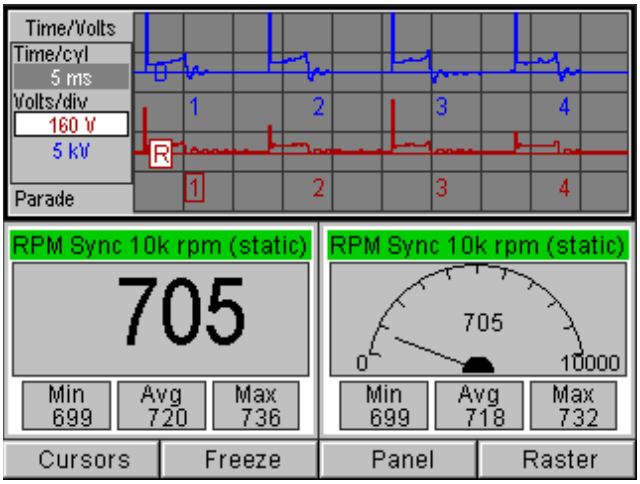

Figure 8.25: Ignition Scope Screen, DMM On - Function Keys with Top Panel Display Selected

To use these function keys, refer to the steps in the following sections:

- Cursors (or Time/Volts) - **Cursors - Time/Volts Function Key** on page 88
- Freeze - **Freeze Function Key (Ignition Scope)** on page 91
- Panel - **Panel Function Key (Ignition Scope)** on page 92
- Raster (or Superimposed, or Parade) - **Raster - Superimposed - Parade Function Key** on page 95

The fourth group of function keys **[Full, Freeze, Panel, Reset]** appears when one of the bottom DMM panels is selected and it contains a DMM reading, as shown in *Figure 8.26*.

NOTE: *The panel's border is moving dashes.*

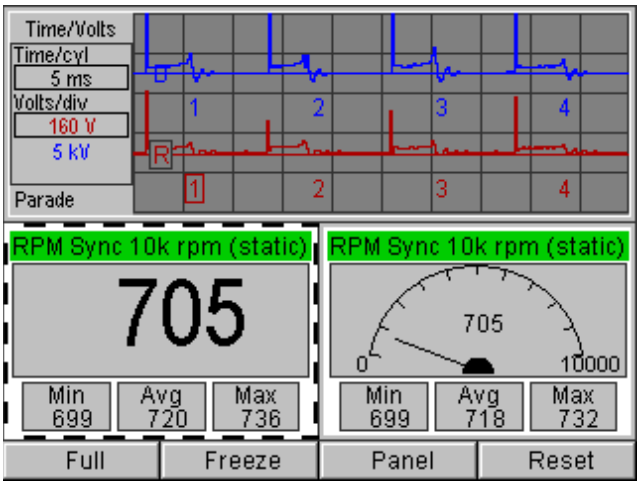

Figure 8.26: Ignition Scope Screen, DMM On - Function Keys with Bottom DMM Panel Display Selected

To use the Full and Reset function keys, refer to the following sections in ***6: Digital Multi-Meter (DMM)***:

- **Full Function Key** on page 39
- **Reset Function Key** on page 43

To use the Freeze function key, refer to **Freeze Function Key (Ignition Scope)** on page 91.

To use the Panel function key, refer to **Panel Function Key (Ignition Scope)** on page 92.

The fifth group of function keys **[Cursors, Go, Panel, Print],** as shown in *Figure 8.27*, appears when the top panel display is selected and you use the Freeze function key (from the third group).

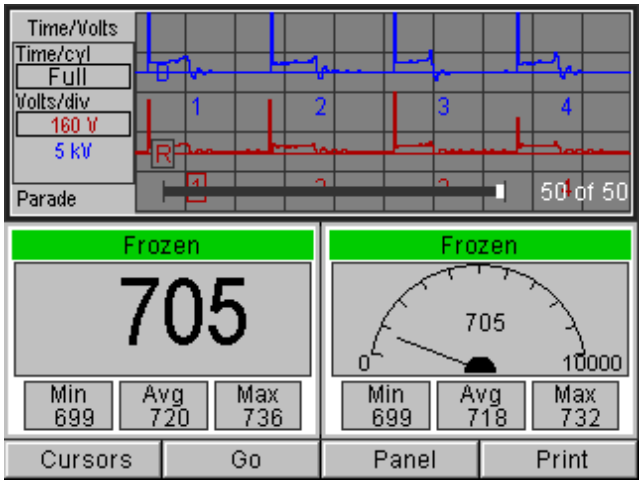

Figure 8.27: Ignition Scope Screen, DMM On - Function Keys after pressing Freeze function key with top panel display selected

To use these function keys, refer to the steps in **Freeze Function Key (Ignition Scope)** on page 91.

NOTE: *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in* ***Freeze Function Key (Ignition Scope)*** *on page 91.*

The sixth group of function keys **[Full, Go, Panel, and Print]**, as shown in *Figure 8.28*, appears when one of the bottom DMM panel displays is selected and you use the Freeze function key (from the fourth group).

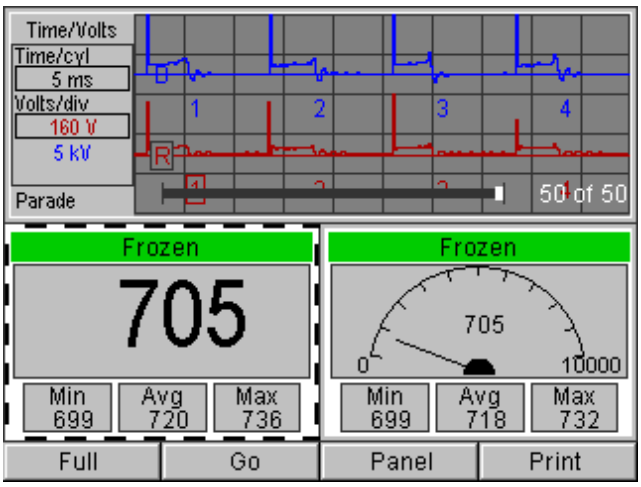

Figure 8.28: Lab Scope Screen, DMM On - Function Keys after pressing Freeze function key with DMM panel display selected

To use the Full function key, refer to **Full Function Key** on page 39 in ***6: Digital Multi-Meter (DMM)***:

To use the Go, Panel, and Print function keys, refer to the steps in **Freeze Function Key (Ignition Scope)** on page 91.

NOTE: *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in* ***Freeze Function Key (Ignition Scope)*** *on page 91.*

Ignition Scope Function Keys

Overview

After you have set up and displayed the ignition scope waveforms, with or without the DMM readings, the function keys provide additional functions for viewing and using the waveforms (and DMM readings). This section describes the following ignition scope function keys:

- **Cursors - Time/Volts** (page 88)
- **Freeze** - including **Cursors**, **Go**, **Panel**, and **Print** (page 91). (This also includes instructions for the Panel menu options available on a "frozen" screen. This includes Playback and Save.)
- **Panel** - including **Edit** (page 92), **Grid On/Off** (page 93), **Edit Engine** (page 93), **Training On/Off** (page 94), and **Primary - Secondary - Both** (page 94)
- **Raster - Superimposed - Parade** (page 95)

NOTE: *If DMM is on and a DMM panel is selected, the Full and Reset function keys are also available. To use these function keys, refer to the following sections in* ***6: Digital Multi-Meter (DMM)****:*

- **Full Function Key** on page 39
- **Reset Function Key** on page 43

Cursors - Time/Volts Function Key

The Cursors - Time/Volts function key controls what appears at the top, left side of the screen. When you first display the Ignition Scope waveform screen, the title at the top left of the screen is Time/Volts and the F1 function key is named "Cursors." This function key is a "toggle" key that changes each time you press it. The name changes from Cursors to Time/Volts and back to Cursors. When you press the key, the title and fields at the top left side of the screen change. Notice the key's name does not represent the current title at the top left side of the screen. Instead, it represents the next title and fields that will display when you press the key, as shown in the table below.

Title and Fields Displayed	Key Name	Pressing Key Displays This Title and Fields
Time/Volts	Cursors	Cursors
Cursors	Time/Volts	Time/Volts

The title and fields displayed on the screen are also called "panes." Each pane lets you perform different adjustments to the waveform graph, as follows:

- **Time/Volts pane** - lets you set up the waveform graph's horizontal time scale (Raster and Superimposed display modes only), each waveform's vertical amplitude measurement scale, and each waveform's zero offset point. For details, refer to **Time/Volts Pane** on page 89.
- **Cursors pane** - lets you set up screen cursors (guide lines). For details, refer to **Cursors Pane** on page 90.

Time/Volts Pane

When you first display the waveforms on the screen, the waveform lines may not fit properly in the graph. You correct this by adjusting the graph's horizontal time measurement scale, each waveform's vertical amplitude measurement scale, and each waveform's zero offset point. The fields on the Time/Volts pane let you do this.

To adjust the settings in the Time/Volts pane, follow these steps:

1 If DMM is On, make sure the top panel is selected and has a solid border (not moving dashes).

__NOTE:__ If the panel is selected but has moving dashes, press either the __ENTER__ key or the __Cursors - Time/Volts__ function key to remove them.

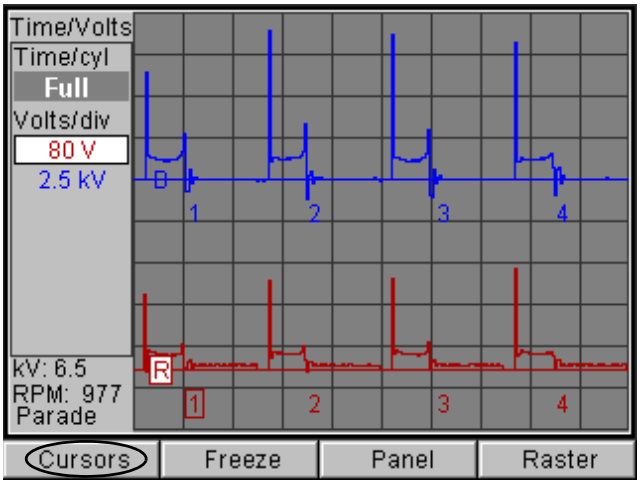

Figure 8.29: Ignition Scope Screen, DMM On - Time/Volts Pane

2 Make sure the Time/Volts pane is displayed. If necessary, press the **Cursors - Time/Volts** function key so the label is "Cursors" and the Time/Volts pane is displayed.

3 Refer to the steps on page 58 for the Lab Scope Time/Volts pane. Begin with step 3 and adjust the settings as necessary.

__NOTE:__ The steps for the Ignition Scope Time/Volts pane are the same as the steps for the Lab Scope Time/Volts pane in __7: Scope - Lab Scope__ (beginning with step 3), except for the following:

- *For the Ignition Scope waveforms, when you use the ENTER key to select a different channel (color), you have to cycle through all the cylinders to get to the next color.*
- *Raster display mode does not have a zero offset line; therefore, the steps for adjusting the zero offset line do not apply when the current display mode is Raster.*
- *Parade display mode measurement scale is fixed at FULL (full ignition displayed). Therefore, the steps for adjusting the measurement scale do not apply when the current display mode is Parade.*

Cursors Pane

The Cursors pane lets you set up either horizontal or vertical screen cursors and turn them on or off. The cursors are actually guide lines you can move around in the graph to measure the difference between two points in the graph. For a more detailed description of the cursors, refer to **Cursors Pane** on page 64 of ***7: Scope - Lab Scope***.

To set up the cursors, follow these steps:

1 If DMM is On, make sure the top panel is selected and has a solid border (not moving dashes).

NOTE: *If the panel is selected but has moving dashes, you can press either the ENTER key or the Cursors-Time/Volts function key to remove them.*

2 Display the Cursors pane by pressing the **Cursors - Time/Volts** function key so the label is "Time/ Volts" and the Cursors pane is displayed, as shown in *Figure 8.30*.

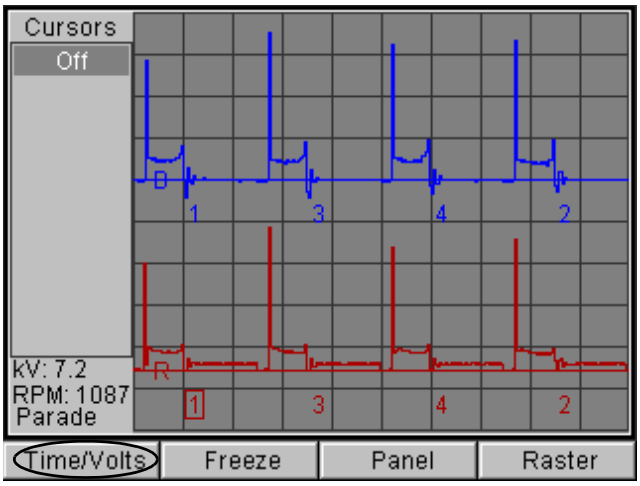

Figure 8.30: Ignition Scope Screen, DMM Off - Cursors Pane

3 Refer to the steps on page 64 for the Lab Scope Cursors pane. Begin with step 3 and set up the cursors.

NOTE: *The steps for the Ignition Scope Cursors pane are the same as the steps for the Lab Scope Cursors pane in **7: Scope - Lab Scope** (beginning with step 3), except for the following:*

When you set up cursors on the Lab Scope screen, the cursors are assigned to the currently selected (active) color channel. When you set up cursors on the Ignition Scope screen, the cursors are assigned to the currently selected (active) cylinder. This is important only for horizontal cursors when using Raster display mode and for vertical cursors when using the Parade display mode as follows:

- *For Raster mode horizontal cursors, changing the active cylinder changes the voltages in the cursor display to the voltages for the active cylinder.*
- *For Parade mode vertical cursors, changing the active cylinder changes the time values in the cursor display.*

Freeze Function Key (Ignition Scope)

The Ignition Scope Freeze function lets you stop and "freeze" the waveform readings (and DMM readings if DMM is on). You can then view up to 50 past frames of collected data. You can also print, save, or replay the readings.

To "freeze" the readings, follow these steps:

1 With the waveforms (and DMM readings if DMM is on) displayed on the Ignition Scope screen, press the **Freeze** function key. This stops all readings and "freezes" all the displayed panels, as shown below.

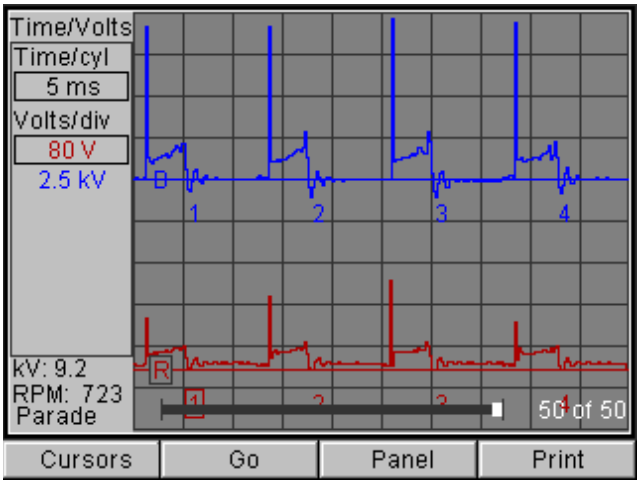

Figure 8.31: Ignition Scope Screen, DMM Off - Frozen Screen

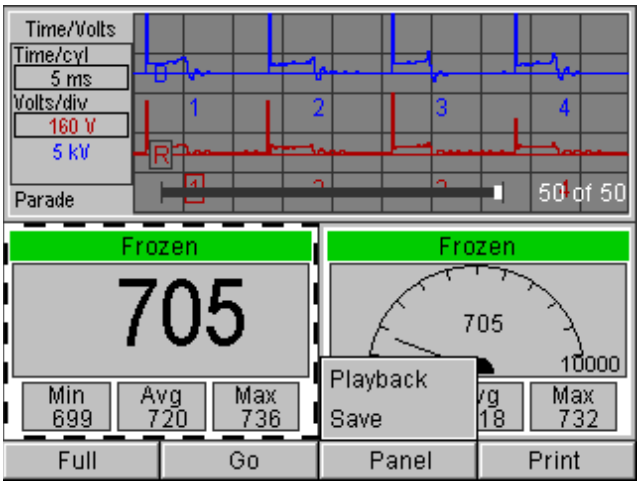

Figure 8.32: Ignition Scope Screen, DMM On - Frozen Screen

2 Notice the following about the "frozen" screens:

- A scroll bar appears on the waveform graph.
- The Function keys at the bottom of the screen change and provide options for printing, saving, and replaying the readings.
- If DMM is on, the word "Frozen" flashes at the top of each DMM panel.

3 If DMM is on, make sure the top panel is selected and has a solid border (not moving dashes).

NOTE: *If the panel is selected but has moving dashes, you can press either the ENTER key or the Cursors-Time/Volts function key to remove them.*

4 Use the **Up and Down Direction** keys to scroll through the readings as necessary. The scroll bar number changes to indicate which frame is displayed.

NOTE: *If DMM is on, the Frozen DMM panels also change to display past data.*

5 Optionally, use the **Function** keys on the "frozen" screen to do any of the following:

- **Cursors** - use this function key as described in **Cursors - Time/Volts Function Key** on page 88.
- **Go** - use this function key to restart the live readings.
- **Panel: Playback -** use this function key to view saved files. When you use this key, a Load screen appears for selecting a file to view. Use the **Up and Down Direction keys** to select a file and then press the **ENTER** key.

  NOTE: *You can also use the Playback option on the main menu to "playback" files. For details about Playback, refer to* ***15: Playback*** *on page 131*.
- **Panel: Save** - use this function key to save the captured frames of data as a file. When you use this key, a Save screen appears for saving a file. Use the **Up and Down Direction keys** to select an "Open" position and then press the **ENTER** key.

  NOTE: *The Save screen lists saved files and "Open" positions. When you save a new file you can either select an "Open" position or a file you want to over-write. The function keys at the bottom of the screen let you lock or unlock files. Locked files have a padlock icon next to the file name; they cannot be overwritten.*
- **Print** - use this function key to print what is currently displayed on the screen.

6 When finished, press the **Go** function key to restart the live readings.

NOTE: *If DMM is on, the DMM panel minimums, averages, and maximums automatically reset and any displayed strip charts also reset. If you press the Freeze key again, the Freeze display includes only data collected after a trigger occurs.*

Panel Function Key (Ignition Scope)

The Panel function key displays a menu of additional functions for the Ignition Scope screen as follows.

If DMM is not on (off) or if DMM is on and the top waveform panel is selected, the Panel menu contains the following options:

- Edit
- Grid On/Off
- Edit Engine
- Training On/Off
- Primary, Secondary, Both (This option appears only when both the Primary and Secondary channels are turned on.)

If DMM is on and one of the bottom, DMM panels is selected, the Panel menu contains the following options:

- Edit
- Zero
- Training On/Off

These options are described separately in the next few sections.

NOTE: *When the lab scope screen is "frozen," the Panel menu options are Playback and Save. For details, refer to* ***Freeze Function Key (Ignition Scope)*** *on page 91.*

7 Notice the following about the Panel menu:

- If you press the Panel function key to display the menu, but do not want to select an option, either press the EXIT key or press the Panel function key again to close the menu.
- When a menu option is selected, the background is grey and the letters are white, as shown for "Edit" in *Figure 8.33*.

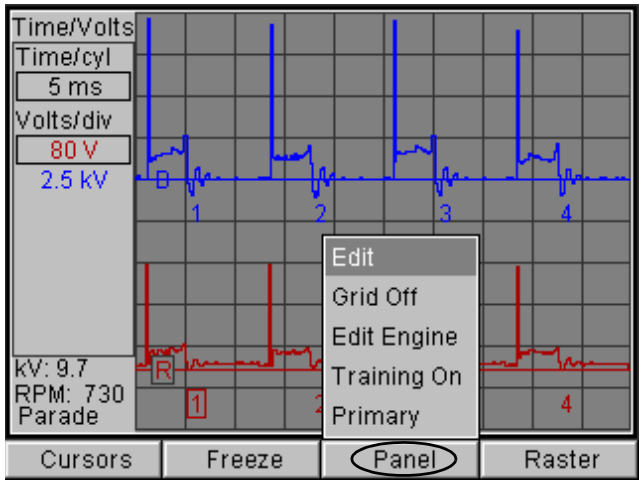

Figure 8.33: Ignition Scope Screen, DMM Off - Panel Function Key

Panel Menu - Edit Option

When a panel displays a reading, use the Edit menu option to display the edit fields so you can change the panel's settings.

To edit a panel that displays a reading, follow these steps:

1 If DMM is on, select the panel to edit. The panel must be a panel that currently displays a reading.

NOTE: *If the top panel is selected and has a solid border, and you want to select a bottom DMM panel, press the EXIT key to change the border to moving dashes. Then select a DMM panel.*

2 Press the **Panel** function key.

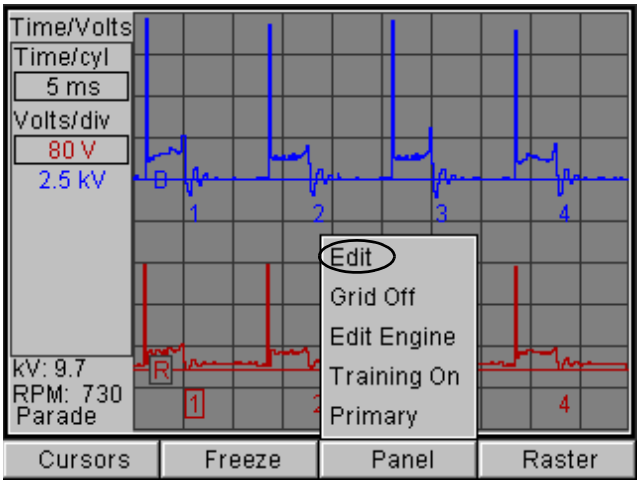

Figure 8.34: Ignition Scope Screen, DMM Off - Panel Function Key, Edit Option

3 Press the **ENTER** key to select the **Edit** option. The edit fields are displayed.

NOTE: *If the panel's border was moving dashes, the border changes to a solid line.*

4 Change the fields as necessary.

Panel Menu - Grid Off/On Option

Use the Panel function key's Grid On/Off menu option to turn the waveform graph's grid lines on or off.

To turn the grid lines on or off, follow these steps:

1 If DMM is On, make sure the top panel is selected.

2 Press the **Panel** function key.

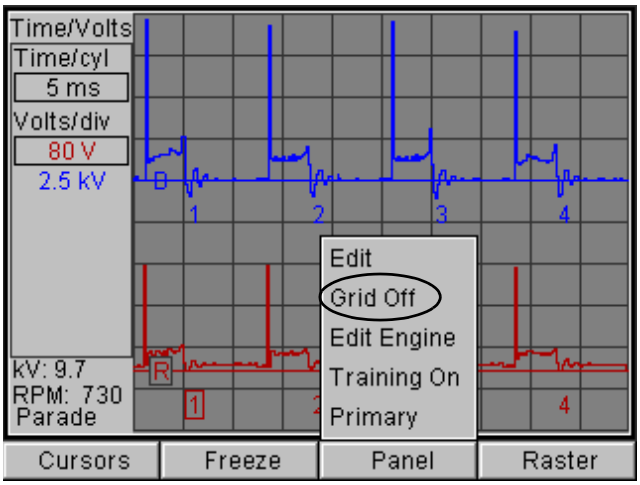

Figure 8.35: Ignition Scope Screen, DMM Off - Panel Function Key, Grid Off Option

3 Use the **Up** or **Down Direction** key to select the **Grid Off** option.

4 Press the **ENTER** key. The grid lines no longer appear in the graph. They are "turned off."

NOTE: *To turn the grid lines back on, select the Grid On option from the Panel menu (when you select Grid Off, the menu option changes to Grid On).*

Panel Menu - Edit Engine Option

Use the Panel function key's Edit Engine menu option to display the Engine Setup screen so you can change the number of cylinders and / or the firing order for the cylinders.

To display the Engine Setup screen, follow these steps:

1 If DMM is On, make sure the top panel is selected.

2 Press the **Panel** function key.

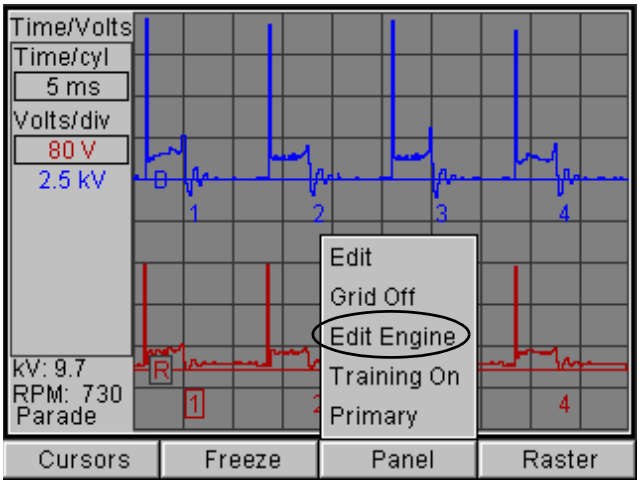

Figure 8.36: Ignition Scope Screen, DMM Off - Panel Function Key, Edit Engine Option

3 Use the **Up** or **Down Direction** key to select the **Edit Engine** option from the menu

4 Press the **ENTER** key. This displays the Engine Setup screen. Change the setup as necessary. For steps, refer to **Screen Setup and Display** on page 76.

Panel Menu - Training On/Off Option

Use the Panel function key's Training On/Off menu option to have the software display demonstration (demo) readings.

When you turn the Training function on, it stays on until you turn it off (or exit the software), even if you select a different option from the Scope menu.

To use the training function, follow these steps:

1 Select any panel that displays a reading.

2 Press the **Panel** function key.

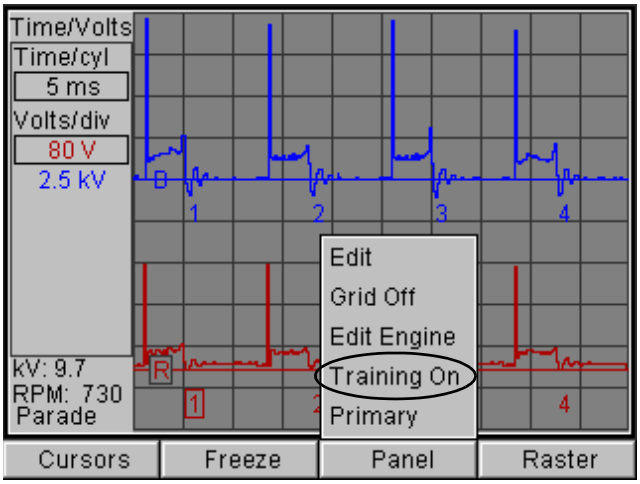

Figure 8.37: Ignition Scope Screen, DMM Off - Panel Function Key, Training On Option

3 Use the **Up** or **Down Direction** key to select the **Training On** option from the menu

4 Press the **ENTER** key.

NOTE: *To turn the Training function off, select the Training Off option from the Panel menu (when you select Training On, the menu option changes to Training Off).*

Panel Menu - Primary, Secondary, and Both Options

If you are viewing waveforms for both the primary (red) and secondary (blue) channels, use the Panel function key's Primary, Secondary, and Both menu options to change the display to show only the red primary waveform lines, only the blue secondary waveform lines, or both the red primary and blue secondary waveform lines. If only one channel is turned on, the options do not appear on the Panel menu.

This menu option is a "toggle" option that changes each time you select it from the menu. The name of the option represents the next channel(s) that will display when you select the option, as follows:

- If both channels are currently displayed, the option is Primary.
- When you select Primary from the menu, the primary channel's waveform displays and the name of the menu option changes to Secondary.
- When you select Secondary from the menu, the secondary channel's waveform displays and the name of the menu option changes to Both.
- When you select Both from the menu, both channel waveforms display again and the name of the menu option changes back to Primary.

To change the waveforms displayed on the screen, follow these steps:

1 If DMM is On, make sure the top panel is selected.

2 Press the **Panel** function key.

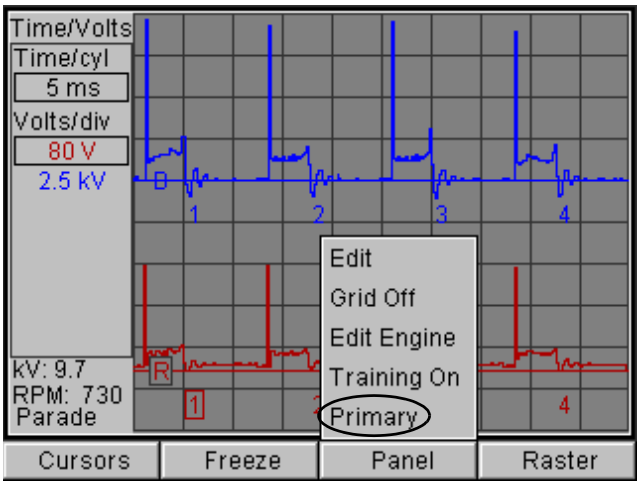

Figure 8.38: Ignition Scope Screen, DMM Off - Panel Function Key -Primary Option

3 Use the **Up** or **Down Direction** key to select Primary, Secondary, or Both option from the menu.

4 Press the **ENTER** key to change the display.

Raster - Superimposed - Parade Function Key

Use the Raster - Superimposed - Parade function key to change the display mode while the waveforms are displayed on the screen. This function key is a "toggle" key that changes each time you press the key. Notice the key's name does not represent the current display mode. Instead, it represents the next display mode that will display when you press the key as follows:

When you first display the Ignition Scope waveforms, the function key's name is the name of the next display mode available. When you press the function key, the waveforms display in the next display mode and the function key's name changes.

The name of the current display mode appears directly above the Cursors (or Time/Volts) function key.

Figure 8.39, *Figure 8.40*, and *Figure 8.41* show the display modes. For more information, refer to page 78.

NOTE: *If DMM is On, make sure the top panel is selected.*

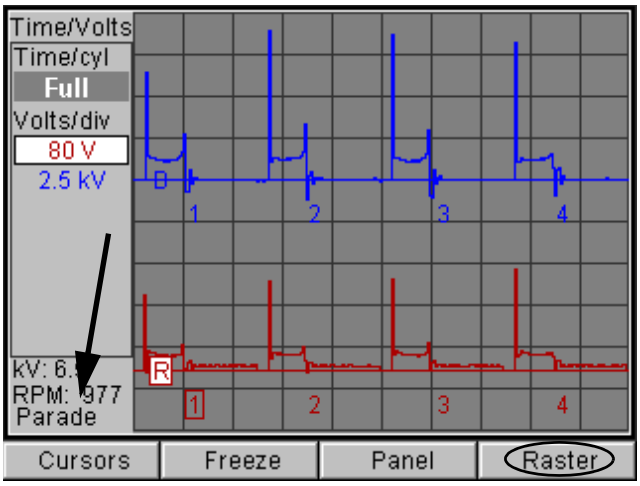

Figure 8.39: Ignition Scope Screen, DMM Off - Parade Display Mode

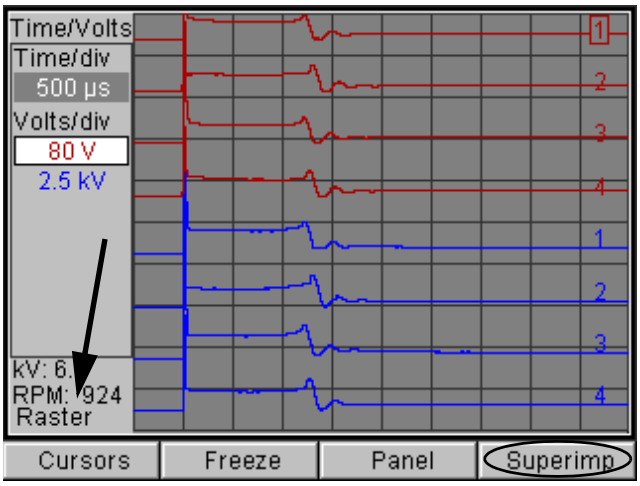

Figure 8.40: Ignition Scope Screen, DMM Off - Raster Display Mode

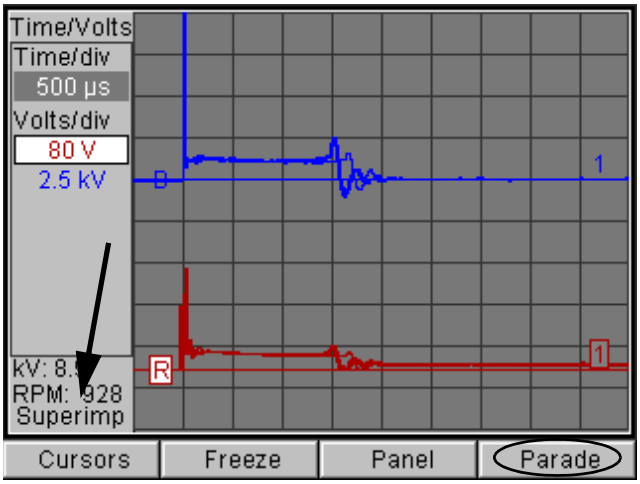

Figure 8.41: Ignition Scope Screen, DMM Off - Superimposed Display Mode

NOTES:

9: Scope - Single Cylinder

The Single Cylinder function provides a preset test for testing a single cylinder on conventional (distributor), direct ignition spark (DIS, also called distributorless), and multistrike distributorless ignition systems.

The single cylinder tests are preset for viewing a cylinder's secondary signal waveform, RPM, burn kV, and Burn Time on a conventional ignition system, and for viewing a cylinder's compression and waste signal waveforms, RPM, Burn kV, and Burn Time on a distributorless ignition system. In addition, you can change the preset settings to view other readings for a cylinder.

Single Cylinder Setup and Display

NOTE: *The Single Cylinder test can be used for DIS coil-on-plug (COP) ignition systems with the use of optional probes. For more information, contact Technical Services at 1-800-533-6127.*

To test a single cylinder, follow these steps:

1. Insert the pin connector of the black ground probe into the **black** ground port of the Scope module.
2. Connect the Secondary kV probe's BNC connector to the Scope module's **blue** channel port.
3. Optionally, connect the Synchronization probe's BNC connector to the Scope module's **green** channel port. (Connect this only if you want to read RPM.)

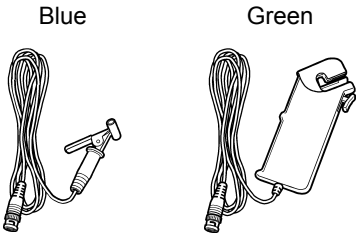

Figure 9.1: Ignition Secondary kV Probe and Synchronization Probe

4. Attach the ground probe's clamp to a good ground on the engine.
5. Attach the Secondary KV probe's clamp to the spark plug wire of the cylinder to test.

   NOTE: *To reduce "noise" in the signal, connect the probe as close to the spark plug as possible.*
6. If you are using the Synchronization probe to read RPM, attach the clamp to the spark plug wire of the cylinder.

   NOTE: *To avoid erratic readings, make sure all clamps are completely connected.*
7. Start the vehicle's engine to begin testing.
8. On the diagnostic tool, display the main menu screen. For details, refer to **Software Startup** on page 5.

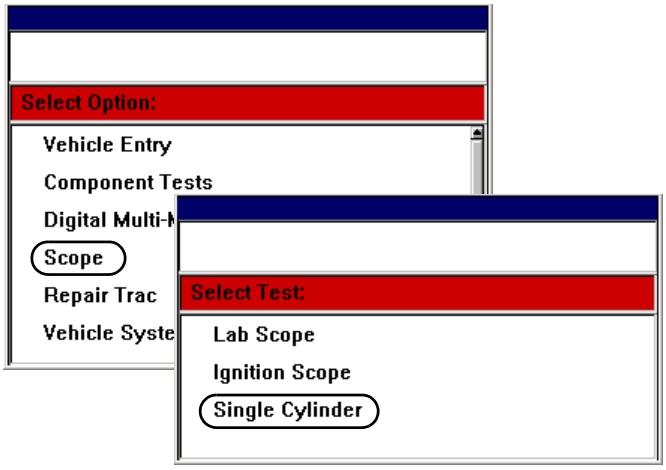

Figure 9.2: Main Menu Screens

9. From the main menu screens, select **Scope** and then **Single Cylinder**. This displays the Single Cylinder setup screen (*Figure 9.3*).

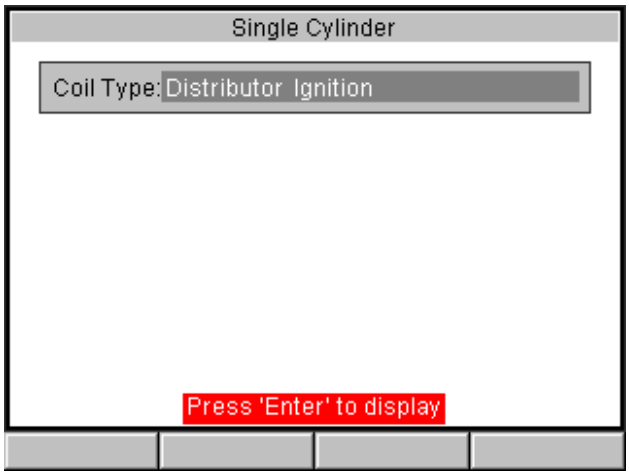

Figure 9.3: Ignition Single Cylinder Setup Screen

10 Press the **Left or Right Direction** key to select the ignition type.

11 Press the **ENTER** key. This displays the waveform for the test.

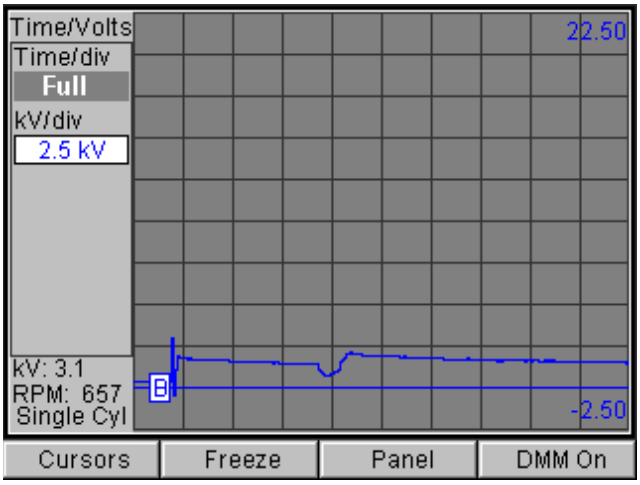

Figure 9.4: Ignition Single Cylinder Screen - DMM Off

12 Notice the following about the waveform screen:

- The right side of the screen contains the secondary signal's waveform line in a graph. The line represents the strength (amplitude) of the electrical signal over time.
- For conventional ignition systems, there is one waveform line. For distributorless ignition systems, there are two waveform lines (compression and waste).
- The graph's horizontal axis (from left to right) represents time; the vertical axis (from bottom to top) represents the amplitude of the signal. For details, refer to page 58.
- The right side of the graph is labeled with the channel's voltage range, with the low value at the bottom and the high value at the top.
- The waveform line(s) have an "offset" line that represents the zero voltage point for the signal. The offset line is labeled with a B for blue and with C for compression and W for waste (distributorless). You can move the lines in the graph by changing this offset point. For details, refer to page 60.
- The color of the waveform graph's background can be changed to either black (grey) or white. For details, refer to **Background Color Selection** on page 119 and page 129.
- The left side of the screen contains additional setup fields for the waveform graph. These fields let you 1) change the time divisions for the graph and the amplitude divisions and zero offset for the waveform line on the graph, and 2) set up cursors. For details, refer to **Cursors - Time/Volts Function Key** on page 88.
- The bottom left side of the screen (directly above the Cursors function key) lists the current measurements for the channel.
- The bottom of the screen contains the function keys described in step 13 on page 99.
- If you press the DMM On function key, the bottom half of the screen displays two DMM panels with the Burn kV and Burn Time readings, as shown in *Figure 9.5*.

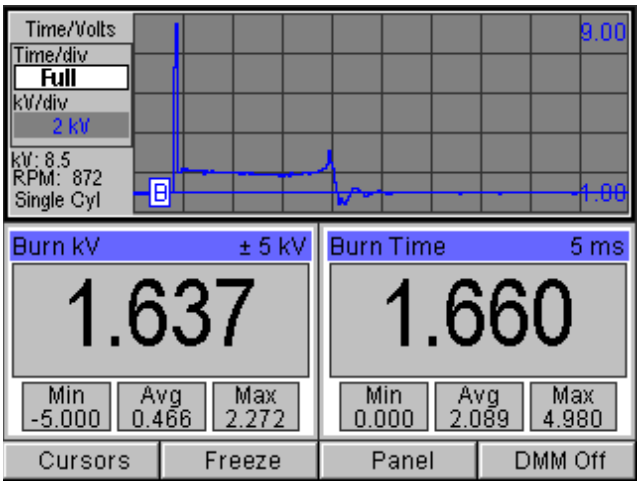

Figure 9.5: Ignition Single Cylinder Screen - DMM On

- With DMM On, each DMM panel displays the measurement and range at the top, the reading in the center, and the reading's minimum, average, and maximum at the bottom. With either DMM panel selected, you can use the ENTER key to change the panel's display type.
- **If the top panel is selected and has a solid border, you must press the EXIT key before you can select a bottom, DMM panel. Pressing the EXIT key changes the top panel's border to moving dashes.**

13 View the waveforms as necessary. Do any of the following:

- If most of the waveform line is below the zero offset line, use the Panel function key, Invert option to invert the waveform line in the graph. Refer to **Single Cylinder Invert Function Key** in the next column.
- If the waveform line does not fit into the graph properly, adjust the horizontal and vertical settings. Use the Cursors-Time Volts function key to do this by changing the time and amplitude divisions and zero offsets. This works similar to the Ignition Scope screen. Therefore, refer to **Cursors - Time/Volts Function Key** on page 88.
- Set up cursor lines for measuring amplitude and time differences and for measuring the frequency between two points in the graph. This works similar to the Ignition Scope screen. Therefore, refer to **Cursors - Time/Volts Function Key** on page 88.
- Use the Freeze function key to stop the readings and "freeze" them on the screen; and to print or save waveforms, or view saved waveforms.This works the same as the Lab Scope screen. Therefore, refer to **Freeze Function Key (Lab Scope)** on page 66.

  NOTE: *The Freeze function key works the same as on the Lab Scope screen except the Single Cylinder screen doesn't have the Glitch function. When reviewing the Freeze Function key steps, disregard all information about the Glitch function.*
- With a bottom, DMM panel selected, use the Panel function key, Edit option to change the DMM settings to other channels or measurement types (Peak kV, RPM Sec). For details about changing the DMM settings, refer to **DMM Setup and Display** on page 36.
- With the waveform panel selected, use the Panel function key, Edit option to change the ignition type. Refer to *Figure 9.3* on page 98.
- With the waveform panel selected, use the Panel function key, Grid Off/On option to turn the graph's grid off and on. This works the same as the Lab Scope screen. Therefore, refer to **Panel Menu - Grid Off/On Option** on page 70.
- Use the Panel function key, Training On/Off option to view demo data. This works the same as the Lab Scope screen. Therefore, refer to **Panel Menu - Training On/Off Option** on page 71.
- With a DMM panel selected, use the Full or Reset function keys that are also available. To use these function keys, refer to **Full Function Key** on page 39 and **Reset Function Key** on page 43.
- Use the DMM Off function key to turn the DMM panels off.

14 When you are finished using the screen, press the **EXIT** key to return to the Scope menu screen.

Single Cylinder Invert Function Key

The Invert function key lets you invert the waveform line in the graph. Use this function key if most of the waveform line is below the zero offset line and you want to view it above the offset line.

NOTE: *This option provides easier viewing of the secondary waveform for vehicles with distributorless ignition systems that fire spark plugs with a positive (+) or negative (-) polarity. For example, Waste Spark Systems have companion cylinders that share a single coil and fire one plug positive and another negative.*

To invert the waveform, follow these steps:

1. If DMM is On, make sure the top panel is selected.
2. Press the **Panel** function key.

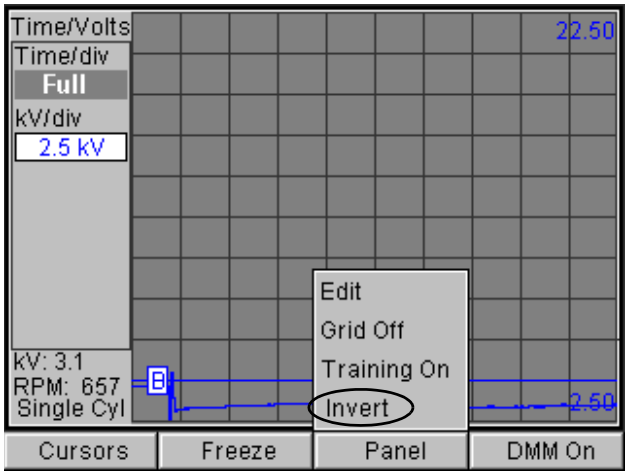

Figure 9.6: Ignition Single Cylinder Screen - Panel Function Key, Invert Option

3. Use the **Up** or **Down Direction** key to select the **Invert** option.
4. Press the **ENTER** key.
5. The line “flips over” in the graph.

10: Repair Trac

The Repair Trac function lets you look up vehicle-specific repair instructions for hard-to-diagnose “pattern failures” on vehicles.

To use the Repair Trac function, follow these steps:

1 Start the application to display the main menu screen. For details, refer to **Software Startup** on page 5.

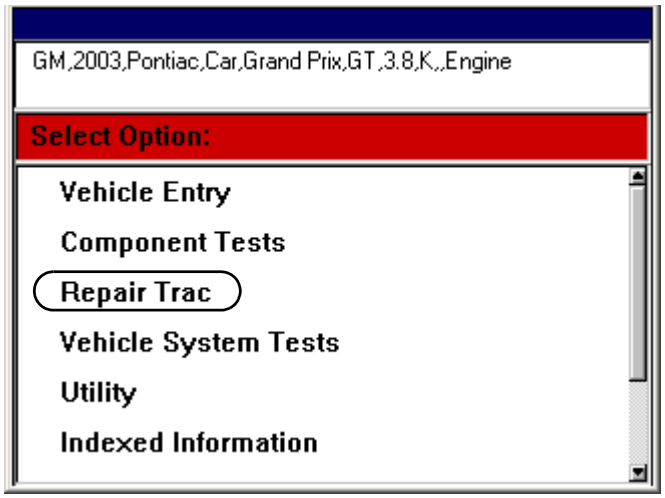

Figure 10.1: Main Menu Screen

2 From the main menu screen, select **Repair Trac**. This displays the first of a series of vehicle entry screens (*Figure 10.2*).

NOTE: *You can also access the Repair Trac function from within the Component Tests function. If you do this, go to step 4 because the Symptoms screen appears first and you do not have to enter the vehicle information again.*

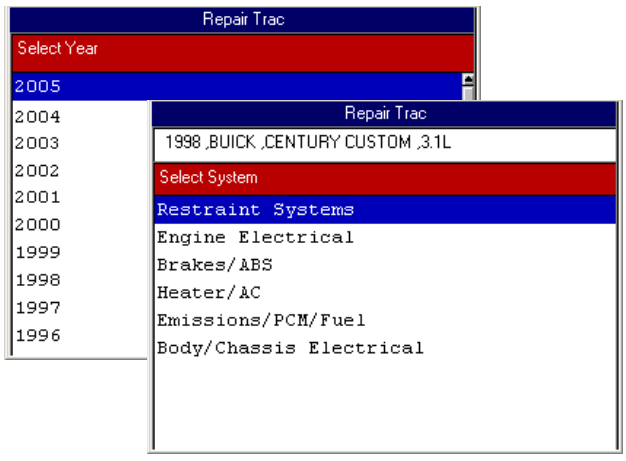

Figure 10.2: Repair Trac Vehicle Entry Screens

3 On each screen that appears, **select an option** and then press the **ENTER** key. Do this until the vehicle is fully identified and the Repair Trac Symptoms screen appears (*Figure 10.3*).

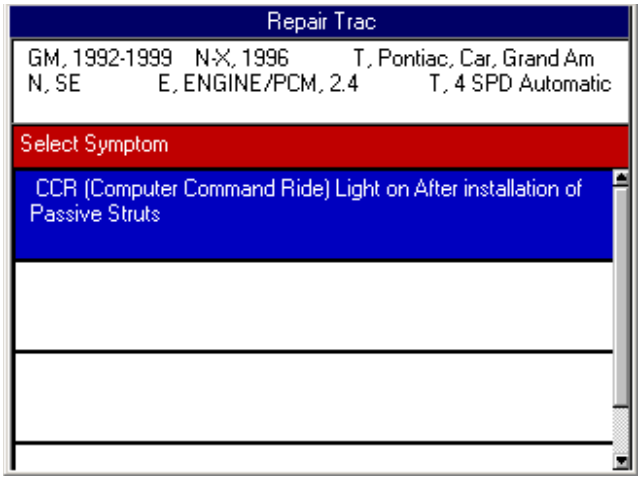

Figure 10.3: Repair Trac Symptoms Screen

4 **Select a symptom to view** and press **the ENTER** key. This displays the Repair Trac Problems and Fixes screen (*Figure 10.4*).

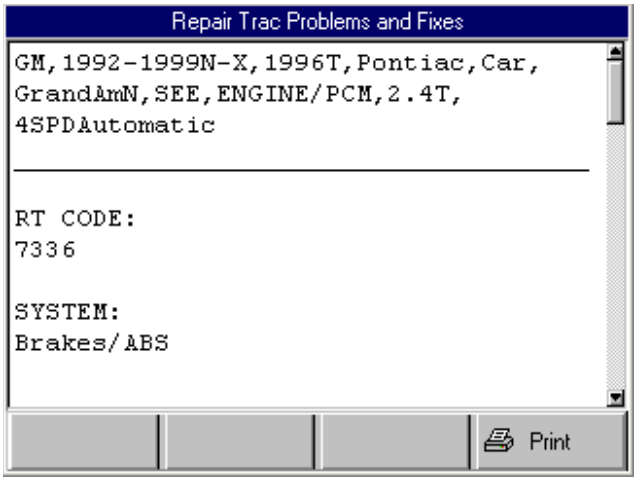

Figure 10.4: Repair Trac Problems and Fixes Screen

NOTE: *The RT (Repair Trac) Code on this screen is a software code only. It is not a part of any diagnostic trouble code (DTC).*

5 View the description and optionally use the **Print** function key to print the description.

6 When finished, use the **EXIT** key to return to previous screens.

NOTES:

11: Vehicle System Tests - InfoTech

Overview

The InfoTech software's Vehicle System Tests function lets you look up vehicle system test instructions.

IMPORTANT: The way the Vehicle System Tests function works varies if the Scope module is connected or removed or, for the NGIS tool, if you start the InfoTech software only. (For more information, refer to Software Startup on page 5.)

This chapter describes the Vehicle System Tests function if the Scope module is removed from the diagnostic tool or if you start the InfoTech software only on the NGIS tool. The chapter includes the following sections:

For instructions for the Vehicle System Tests function when the Scope module is connected to the tool, refer to ***12: Vehicle System Tests - Scope with InfoTech*** on page 109.

Basic Procedure

The Vehicle System Tests function lets you look up system test instructions.

To look up system test instructions, follow these steps:

1 Start the application to display the main menu screen. For details, refer to **Software Startup** on page 5.

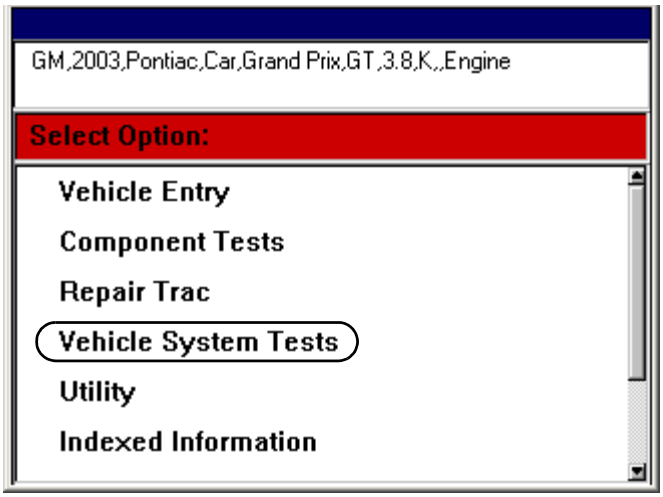

Figure 11.1: Main Menu Screen

2 From the main menu screen, select **Vehicle System Tests**. This displays a list of vehicle systems on the Vehicle System Tests menu screen (*Figure 11.2*).

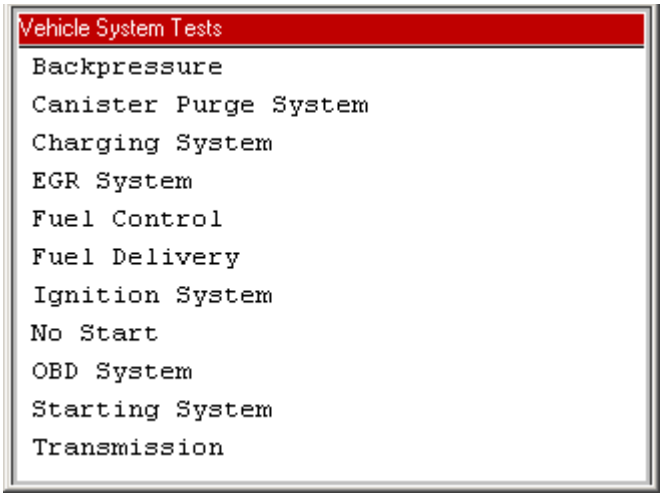

Figure 11.2: Vehicle System Tests Menu Screen

3 Select a **system** and press the **ENTER** key.

4 One or more additional screens may appear for further identifying the system test. On each screen that appears, **select the correct option** and then press the **ENTER** key. Do this until the system test is completely identified and the test instructions appear (*Figure 11.3*).

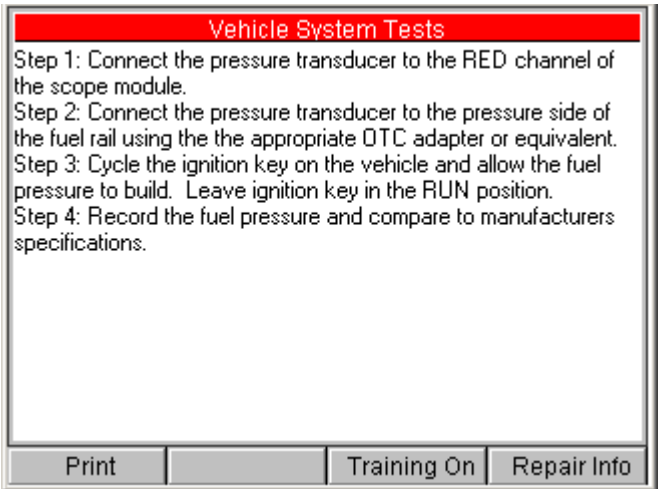

Figure 11.3: Test Instructions Screen

5 Notice the following about the test instructions screen:

- The screen displays instructions for testing the selected vehicle system.
- If the instructions require more than one screen, you use the Up and Down Direction keys to scroll through the instructions.

6 View the instructions as necessary. While viewing the instructions, do any of the following:

- Use the Print function key to print the instructions. For details, refer to **Print Function Key** on page 105.
- Use the Training On function key to view Scope Multimeter / InfoTech demonstration data. For details, refer to **Training On Function Key** on page 105.
- Use the Repair Info function key to look up information about the selected vehicle system. For details, refer to **Repair Info Function Key** on page 106.

  NOTE: *The Repair Info function key does not always appear because some vehicle system tests do not have additional repair information available.*

7 When finished, use the **EXIT** key to return to previous screens.

Vehicle System Tests Function Keys

After you have displayed the test instructions for a vehicle system on the Vehicle System Tests screen (*Figure 11.4*, below), the function keys provide additional functions for the screen. This section describes the following Vehicle System Tests function keys:

- **Print** - (below)
- **Training On** - (next column)
- **Repair Info** - (page 106) including Circuit Description, Connection, and Reference Waveform

Print Function Key

The Print function key lets you print what is displayed on the screen. For printing instructions, refer to the hardware user guides for the diagnostic tool and the printer.

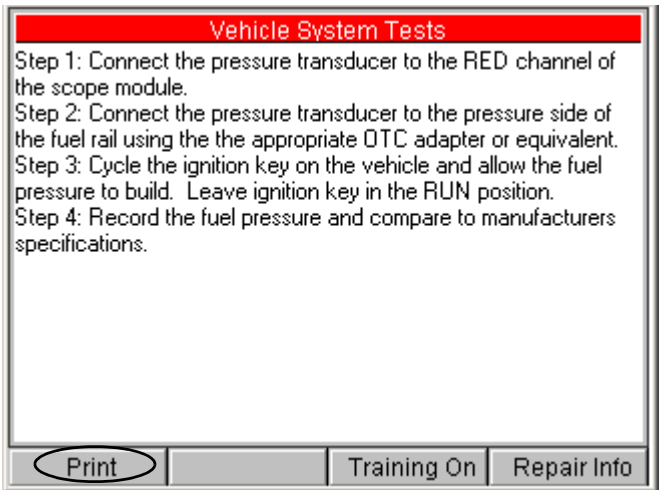

Figure 11.4: Vehicle System Tests Screen - Print Function Key

Training On Function Key

The Training On function key lets you view demonstration data for the Scope with InfoTech software.

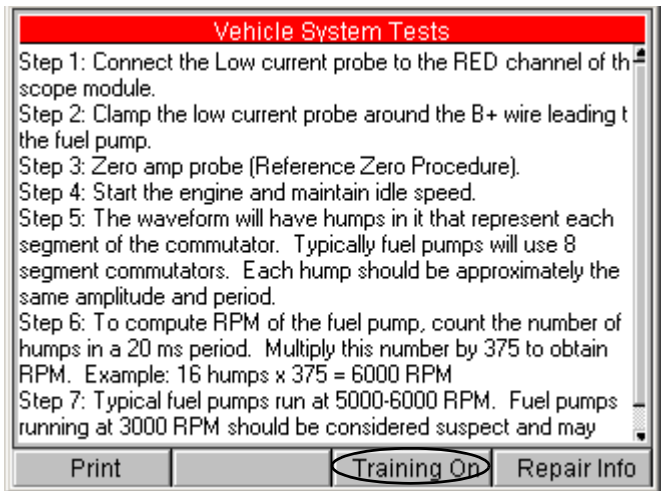

Figure 11.5: Vehicle System Tests Screen - Training On Function Key

When you press the Training On function key, the Scope with InfoTech demonstration screen appears (*Figure 11.6*). The Training function stays on until you press the **EXIT** key and return to the Vehicle System Tests screen.

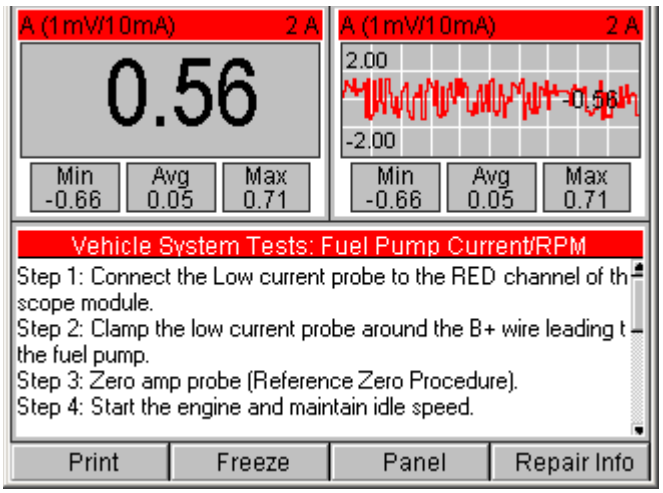

Figure 11.6: Vehicle System Tests - Scope Multimeter Demonstration Screen (Training On Screen)

To use the demonstration screens, refer to the instructions in ***Vehicle System Tests - Scope with InfoTech*** on page 109.

Repair Info Function Key

NOTE: *The Repair Info function key does not always appear because some vehicle system tests do not have additional repair information available.*

The Repair Info function key displays a menu of additional functions for the selected vehicle system. The menu options vary for each vehicle system. Possible options include the following:

- Circuit Description
- Connection
- Reference Waveform

These options are described separately in the next few sections.

NOTE: *If you press the Repair Info function key to display the menu, but do not want to select an option, press the EXIT key or press the Repair Info function key again to close the menu.*

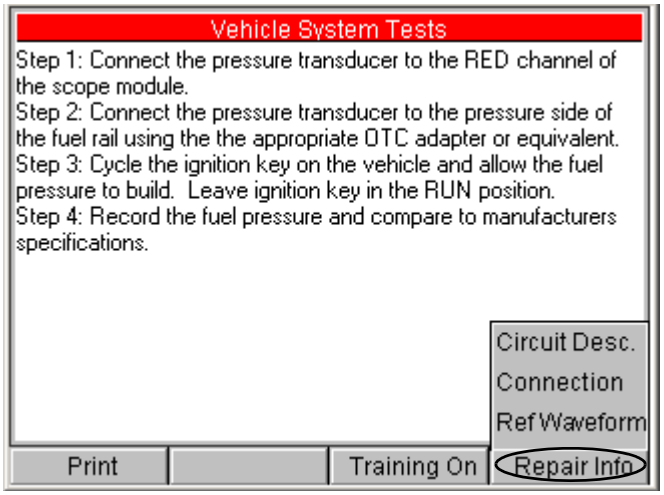

Figure 11.7: Vehicle System Tests - Repair Info Function Key

Repair Info Menu - Circuit Description Option

Use the Repair Info function key's Circuit Description option to view a description of the circuit for the selected vehicle system test.

To view the circuit description, follow these steps:

1 With the test screen displayed, press the **Repair Info** function key to display the Repair Info menu.

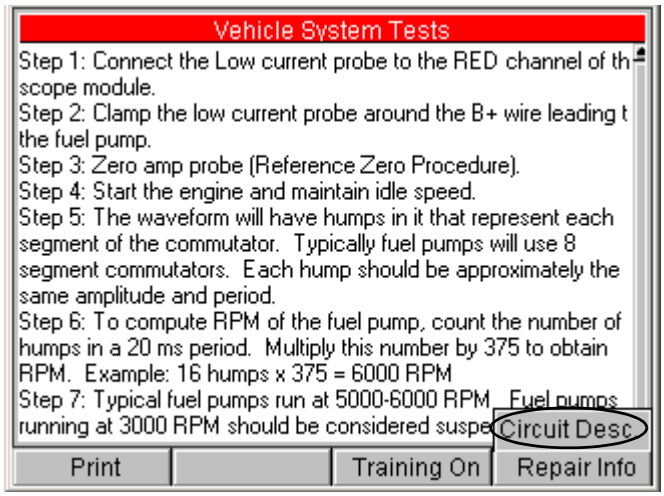

Figure 11.8: Vehicle System Tests - Repair Info Function Key

2 Select **Circuit Desc.** and press the **ENTER** key. This displays the Circuit Description screen.

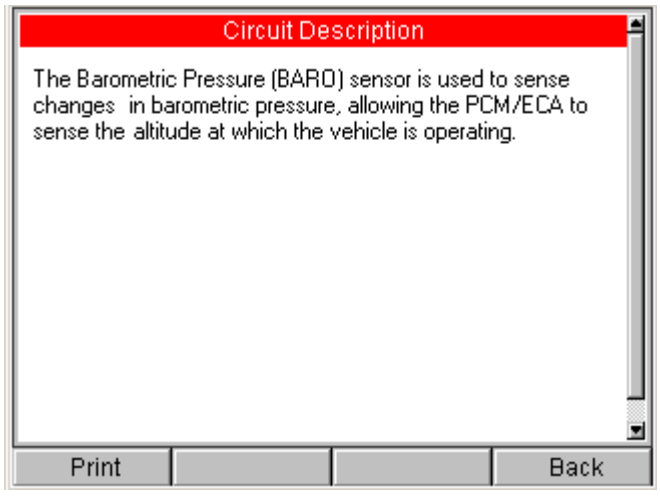

Figure 11.9: Repair Info Function Key, Circuit Description Screen

3 View the description and optionally use the **Print** function key to print it.

4 When finished, press the **Back** function key to return to the previous screen.

Repair Info Menu - Connection Option

Use the Repair Info function key's Connection option to view a diagram of connector(s) for the selected vehicle system test.

To view the connection diagram, follow these steps:

1 With the test screen displayed, press the **Repair Info** function key to display the Repair Info menu.

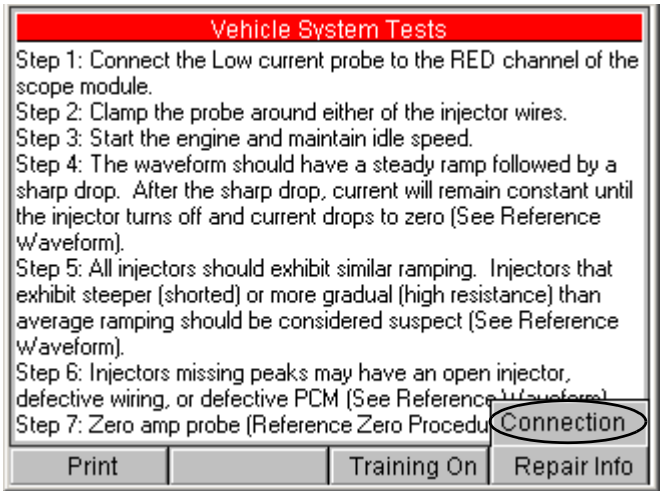

Figure 11.10: Vehicle System Tests - Repair Info Function Key

2 Select **Connection** and press the **ENTER** key. This displays the Connection Diagram screen (*Figure 11.11*).

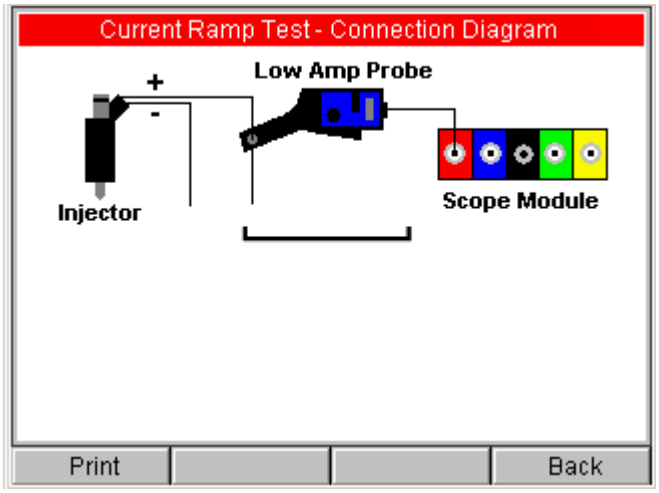

Figure 11.11: Repair Info Function Key, Connection Diagram Screen

3 View the diagram and optionally use the **Print** function key to print it.

4 When finished, press the **Back** function key to return to the previous screen.

Repair Info Menu - Reference Waveform Option

NOTE: *The Reference Waveform (Ref Wave) option appears only when you have the Training function turned on or when are using the Scope with InfoTech software (with the Scope module connected to the tool).*

Use the Repair Info function key's Reference Waveform (Ref Wave) option to view an example of a waveform for the selected system test.

To view the reference waveform, follow these steps:

1 With the test screen displayed, press the **Repair Info** function key to display the Repair Info menu.

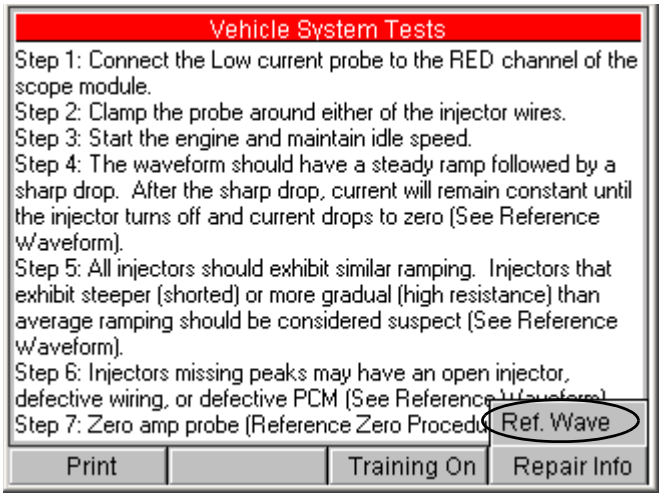

Figure 11.12: Vehicle System Tests - Repair Info Function Key

2 Select **Ref. Wave** and press the **ENTER** key. This displays the reference waveform in the bottom half of the screen.

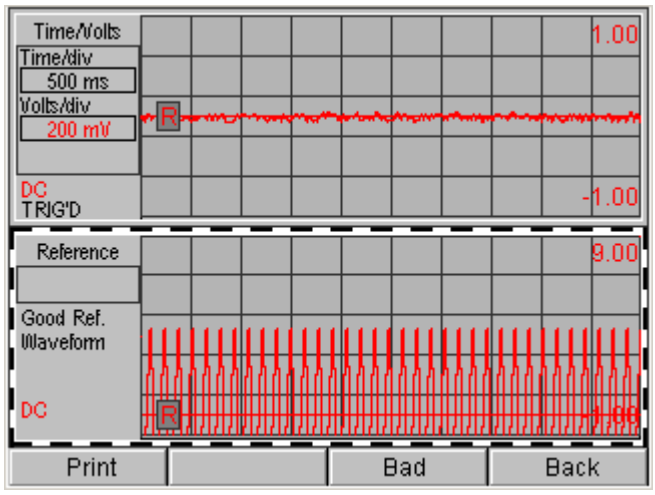

Figure 11.13: Repair Info Function Key, Ref. Waveform Option

3 View the waveform and optionally use the **Print** function key to print it.

4 If there is a **Bad** function key, use the function key to view an example of a known bad waveform.

NOTE: *When you use the Bad function key, the name of the Bad function key changes to Good. Use the Good function key to return to the display of the known-good waveform.*

5 Use the **Back** function key to return to the previous screen.

12: Vehicle System Tests - Scope with InfoTech

Overview

The Scope with InfoTech software's Vehicle System Tests function lets you perform vehicle system testing. The Vehicle System Tests screens display Scope / Multimeter live test data and InfoTech test instructions on the same screen (see *Figure 12.3* and *Figure 12.4* on page 110). This combines the functions of the Scope software and the InfoTech software so you can view test instructions while performing tests.

IMPORTANT: The way the Vehicle System Tests function works varies if the Scope module is connected or removed or, for the NGIS tool, if you start the InfoTech software only. (For more information, refer to Software Startup on page 5.)

This chapter describes the Vehicle System Tests function if the Scope module is connected to the diagnostic tool and, for the NGIS tool, if you start the Scope with InfoTech software. The chapter includes the following sections:

For instructions for the Vehicle System Tests function when the Scope module is removed from the tool and, for the NGIS tool, if you start the InfoTech software, refer to ***11: Vehicle System Tests - InfoTech*** on page 103.

Basic Procedure

To use the Vehicle System Tests function, follow these steps:

1 Start the application to display the main menu screen. For details, refer to **Software Startup** on page 5.

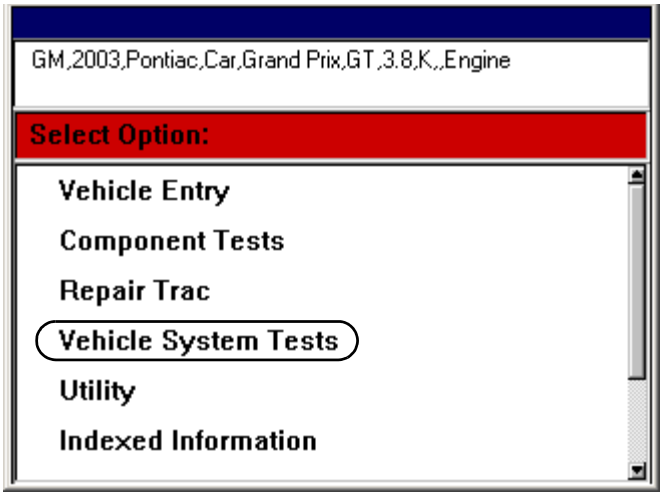

Figure 12.1: Main Menu Screen

2 From the main menu screen, select **Vehicle System Tests**. This displays a list of vehicle systems on the Vehicle System Tests menu screen (*Figure 12.2*).

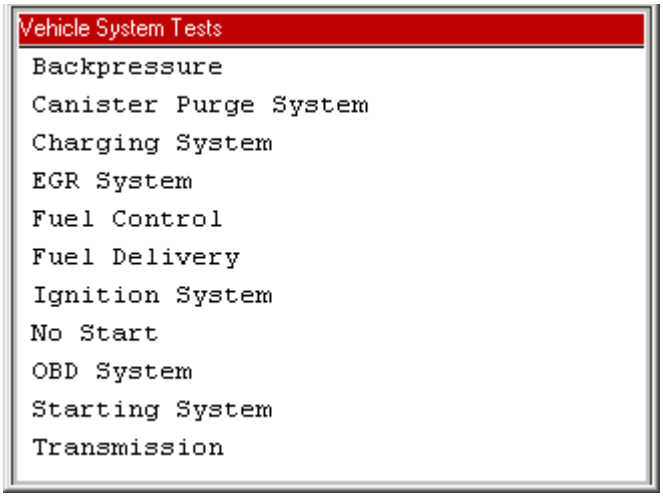

Figure 12.2: Vehicle System Tests Menu Screen

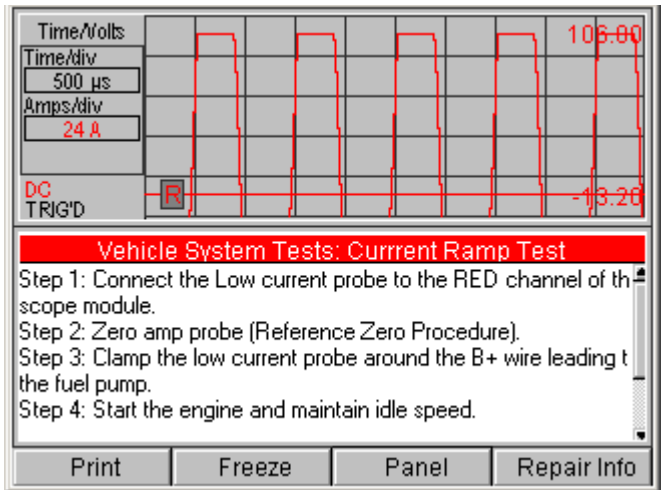

Figure 12.3: Vehicle System Tests - Test Screen with Scope Waveform in Top Panel

3 Select a **system** and press the **ENTER** key.

4 One or more additional screens may appear for further identifying the system test. On each screen that appears, **select the correct option** and then press the **ENTER** key. Do this until the system test is completely identified and the test screen appears.

NOTE: *Depending on the test selected, the test screen displays either a scope waveform or two digital multimeter (DMM) readings as described in the next step (see Figure 12.3 and Figure 12.4).*

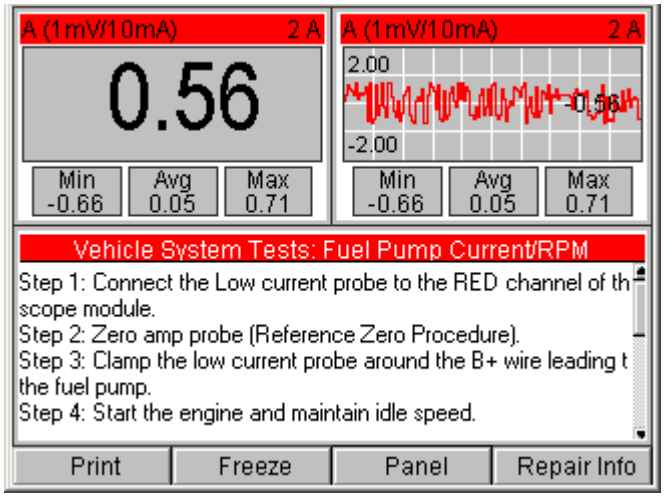

Figure 12.4: Vehicle System Tests - Test Screen with DMM Readings in Top Panel

5 Notice the following about the test screen:

- The top half of the screen displays either a Scope waveform panel or two DMM panels.
  - » A waveform display operates the same as the Lab Scope waveform display (with DMM off). For a complete description of the display, refer to page 48 in ***7: Scope - Lab Scope*** on page 45.
  - » A DMM display operates the same as a full screen DMM display. For a complete description of the DMM panels, refer to ***6: Digital Multi-Meter (DMM)*** on page 35.
- The bottom half (panel) of the screen displays the InfoTech test instructions for the test. This display operates similar to the InfoTech test instructions described in ***4: Component Tests - InfoTech*** on page 13.
- One panel is always "selected." When you first display the screen, the bottom panel (test instructions) is selected. You use the Up and Down Direction keys to scroll through the instructions. To select the top panel, you press the Panel function key and select a panel option (Edit Scope or DMM1 / DMM2).
- If the top half of the screen displays a waveform panel and is selected, you use the Direction keys to adjust the waveform settings.
- If the top half of the screen is displays two DMM panels and a DMM panel is selected, if the selected panel's border a solid black line, the Direction keys move within the panel for changing the edit fields. If the selected panel's border is moving dashes, you use the Left and Right Direction keys to select the other DMM panel.
- If a top panel is selected, you must press the EXIT key to select the bottom (test instructions) panel again.
- The function keys at the bottom of the screen change based on which panel is currently selected. For details, refer to **Vehicle System Tests Function Keys** on page 111

6 Use the instructions and the test screen to perform the vehicle system test, using the function keys to move between the panels, adjust the waveform and DMM readings, print and save data, freeze and reset the readings, turn on a training function, and view additional repair information as necessary. For details about the function keys, refer to **Vehicle System Tests Function Keys** on page 111.

7 When finished, use the **EXIT** key to return to previous screens.

Vehicle System Tests Function Keys

The function keys at the bottom of the Vehicle System Tests screen provide additional functions for using the screen. The function keys change based on which panel is currently selected. There are six groups of function keys that appear on the screen. The are:

- **Print, Freeze, Panel, Repair Info** (see page 112)
- **Trigger/Cursors/Time Volts, Freeze, Panel, Glitch On/Off** (see page 113)
- **Full Screen/Restore, Freeze, Panel, Reset** (see page 114)
- **Panel** (see page 115)
- **Cursors, Go, Panel, Print** (see page 115)
- **Full / Restore, Go, Panel, Print** (see page 116)

These groups of function keys are described on the next few pages.

The first group of function keys **[Print, Freeze, Panel, Repair Info]** appears when the ***bottom panel is selected and it contains the test instructions***, as shown in *Figure 12.5* and *Figure 12.6*.

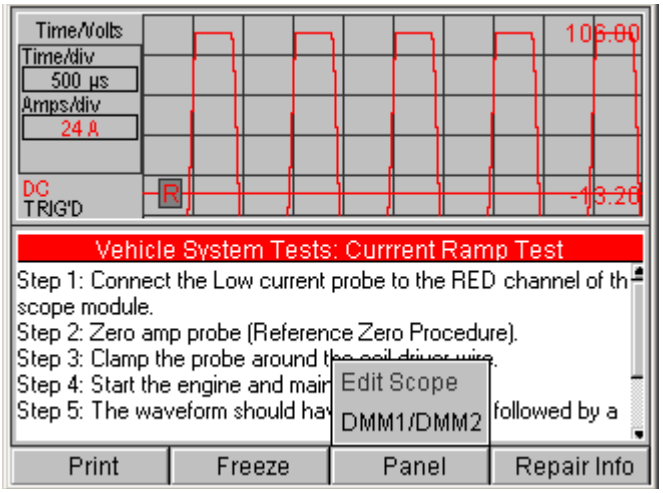

Figure 12.5: Vehicle System Tests Screen - Function Keys with Scope Waveform in Top Panel and Bottom Panel Selected

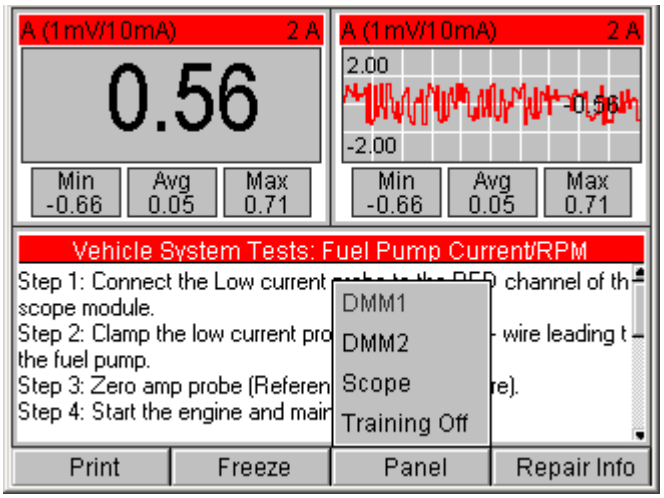

Figure 12.6: Vehicle System Tests Screen - Function Keys with DMM Readings in Top Panel and Bottom Panel Selected

To use the **Print** function key, press the key to print the test instructions. Refer to the hardware user guides for the diagnostic tool and the printer.

To use the **Freeze** function key, refer to the following sections:

- When the top panel displays a waveform, refer to the instructions in **Freeze Function Key (Lab Scope)** on page 66. Begin with step 2.
- When the top panel displays DMM readings, refer to the instructions in **Freeze Function Key (DMM)** on page 40. Begin with step 2.

To use the **Panel** function key menu options, use the following instructions:

- When the top panel displays a waveform and the bottom panel is selected (*Figure 12.5*), the **Panel** menu contains the options Edit Scope and DMM1/DMM2. Use them as follows:
  - » Use **Panel, Edit Scope** to select the top, waveform panel. With the panel selected, the screen operates the same as the normal Lab Scope waveform display (with DMM off). For a complete description, refer to page 48. (To select the bottom panel again, press the EXIT key.)
  - » Use **Panel, DMM1/DMM2** to replace the top panel waveform with two DMM panels.
- When the top panel displays DMM readings and the bottom panel is selected (*Figure 12.6*), the **Panel** menu contains the options DMM1, DMM2, Scope, and Training On/Off.
  - » Use **DMM1**, **DMM2** or **Edit DMM1**, **Edit DMM2** to select and edit the top DMM panels. When selected, the DMM panels operate the same as the normal DMM display. For a complete description, refer to ***6: Digital Multi-Meter (DMM)*** on page 35.
  - » Use **Panel, Scope** to replace the top two DMM panels with a Scope waveform.
  - » Use **Panel, Training On/Off** to turn demonstration data readings on and off. For details, refer to **Panel Menu - Training On/Off Option** on page 71.

To use the **Repair Info** function key, refer to **Repair Info Function Key** on page 106.

The second group of function keys **[Trigger/ Cursors/Time Volts, Freeze, Panel, Glitch On/Off]** appears when the ***top panel is selected and it contains the waveform display***, as shown in *Figure 12.7*, or when the top panel is selected and the Glitch panel is displayed in the bottom half of the screen, as shown in *Figure 12.8*. They also appear when you display a full screen waveform by using the Panel function key Full Screen option, as shown in *Figure 12.9*.

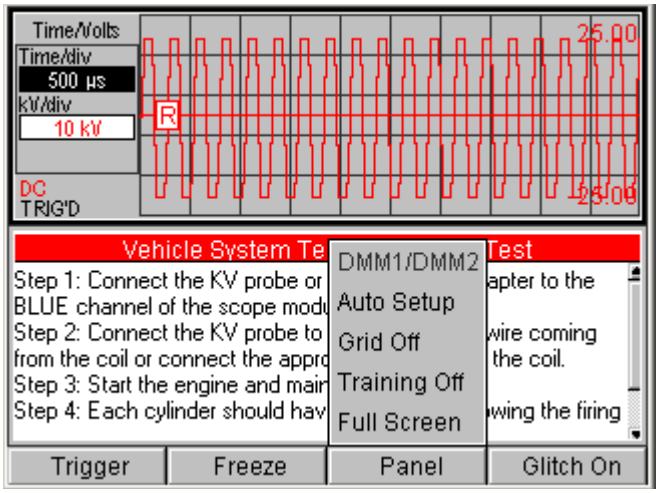

Figure 12.7: Vehicle System Tests Screen - Function Keys with Waveform in Top Panel Selected

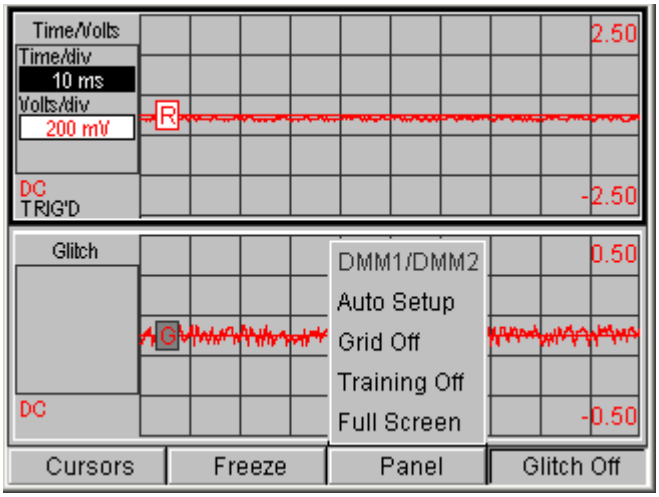

Figure 12.8: Vehicle System Tests Screen - Function Keys with Glitch On

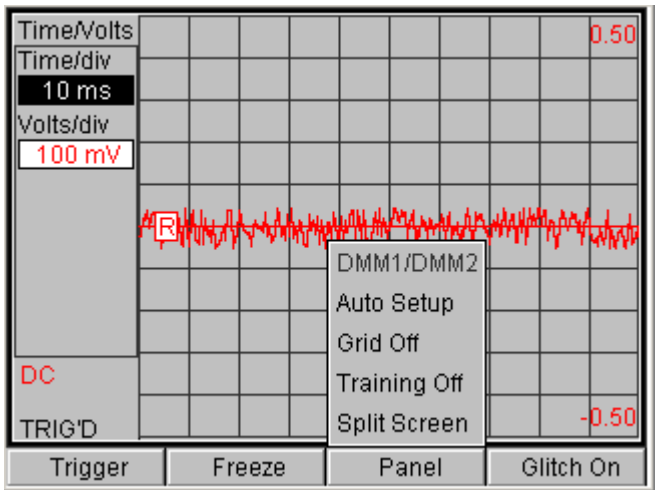

Figure 12.9: Vehicle System Tests Screen - Function Keys with Waveform Selected and Displayed as Full Screen

To use the **Trigger / Cursors / Time Volts** function key, refer to **Trigger - Cursors - Time/Volts Function Key** on page 57.

To use the **Freeze** function key, refer to **Freeze Function Key (Lab Scope)** on page 66. Begin with step 2.

To use the **Panel** function key menu options, use the following instructions:

- Use **Panel, DMM1/DMM2** to replace the top panel waveform with two DMM panels.
- Use **Panel, Auto Setup** to have the Scope software automatically set up the waveform in the graph.
- Use **Panel, Grid On / Off** to turn the waveform's grid lines on or off. For details, refer to **Panel Menu - Grid Off/On Option** on page 70.
- Use **Panel, Training On/Off** to turn demonstration data readings on and off. For details, refer to **Panel Menu - Training On/Off Option** on page 71.
- Use **Panel, Full Screen** to change the split screen display to a full screen display as shown in *Figure 12.9*. With the full screen displayed, the menu option becomes Split Screen. Select the Split Screen option to return the display to a split screen (*Figure 12.7*).

To use the **Glitch On / Off** function key, refer to **Glitch Function Key** on page 71.

The third group of function keys **[Full Screen/ Restore, Freeze, Panel, Reset]** appears when ***one of the top DMM panels is selected and it contains a DMM reading***, as shown in *Figure 12.10*. When you use the Full Screen function key, the full screen displays and the name of the function key changes to Restore, as shown in *Figure 12.11*.

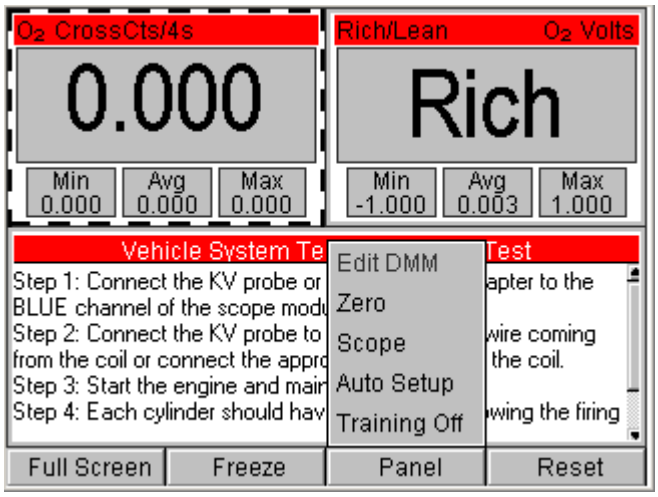

Figure 12.10: Vehicle System Tests Screen - Function Keys with DMM Reading Selected

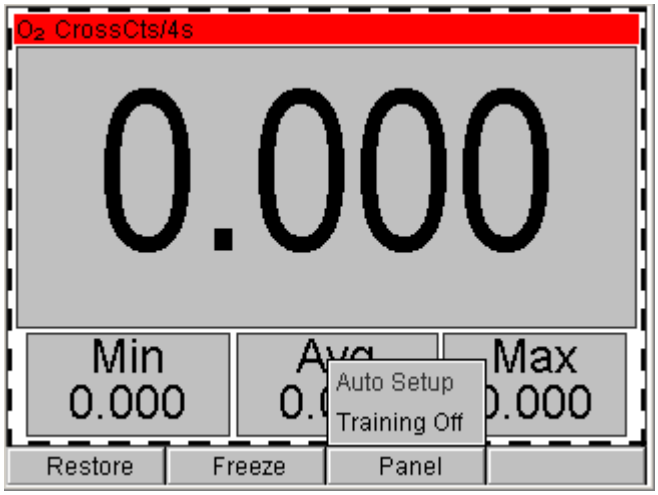

Figure 12.11: Vehicle Systems Test Screen - Function Keys with DMM Reading Selected and Displayed as Full Screen

To use the **Full Screen / Restore** function key, refer to **Full Function Key** on page 39.

To use the **Freeze** function key, refer to **Freeze Function Key (DMM)** on page 40. Begin with step 2.

To use the **Panel** function key menu options, use the following instructions:

- Use **Panel, Edit DMM** (**Edit DMM1**, **Edit DMM2**) to select and edit the top DMM panels. When selected, the DMM panels operate the same as the normal DMM display. For a complete description, refer to ***6: Digital Multi-Meter (DMM)*** on page 35.
- Use **Panel, Zero** to restart the readings for a selected DMM panel. For details, refer to **Panel Menu - Zero Option** on page 42.
- Use **Panel, Scope** to replace the top two DMM panels with a Scope waveform. With the waveform displayed and selected, the screen operates the same as the normal Lab Scope waveform display (with DMM off). For a complete description, refer to page 48. (To select the bottom panel again, press the EXIT key.)
- Use **Panel, Auto Setup** to have the Scope software automatically set up the DMM panels.
- Use **Panel, Training On/Off** to turn demonstration data readings on and off. For details, refer to **Panel Menu - Training On/Off Option** on page 71.

To use the **Reset** function key, press the key to restart all the readings. For details, refer to **Reset Function Key** on page 43.

The fourth group of function keys **[blank, blank, Panel, blank]** appears when one of the ***top DMM panels is selected and it contains edit fields***, as shown in *Figure 12.12*.

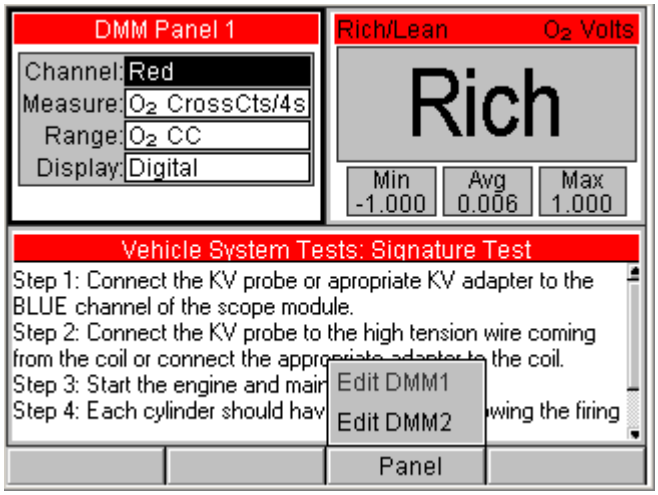

Figure 12.12: Vehicle System Tests Screen - Function Keys with DDM Edit Fields Panel Selected

Use these function keys to select the panels for changing the setup. For instructions, refer to**DMM Setup and Display** on page 36.

The fifth group of function keys **[Cursors, Go, Panel, Print]** shown in *Figure 12.13* appears when the ***top panel displays a waveform and you use the Freeze function key***.

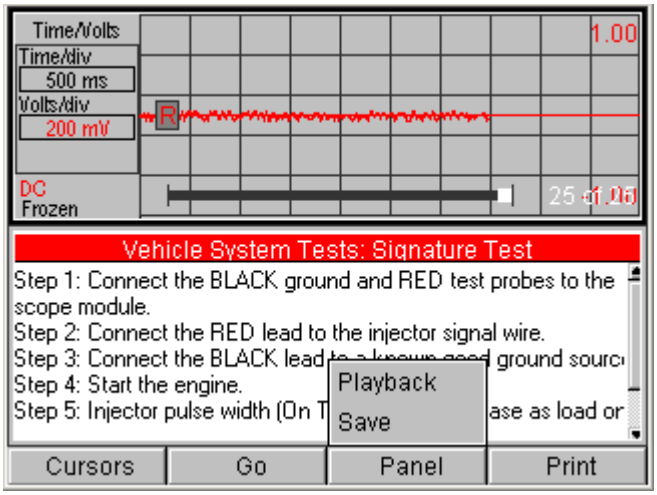

Figure 12.13: Vehicle System Tests Screen - Function Keys with Waveform in Top Panel Selected and Frozen

To use these function keys, refer to **Freeze Function Key (Lab Scope)** on page 66.

NOTE: *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in* **Freeze Function Key (Lab Scope)** *on page 66.*

The sixth group of function keys **[Full/Restore, Go, Panel, Print]** as shown in *Figure 12.14* appears when the ***top panels display DMM readings and you use the Freeze function key***. When you use the Full Screen function key, the full screen displays and the name of the function key changes to Restore, as shown in *Figure 12.15*

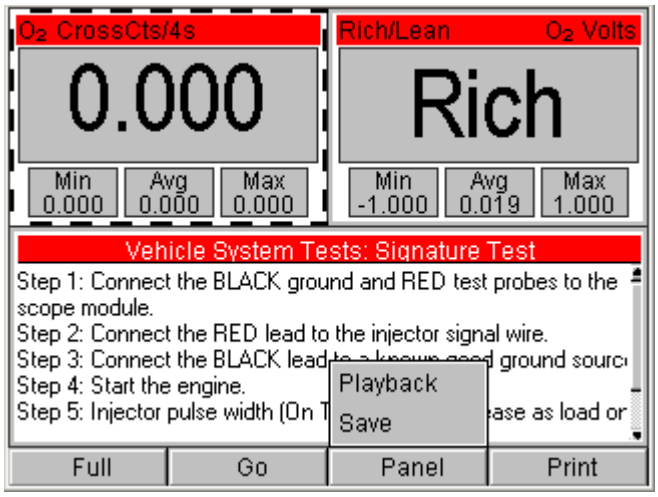

Figure 12.14: Vehicle System Tests - Function Keys with DMM Reading in Top Panel Selected and Frozen

Figure 12.15: Vehicle System Tests - Function Keys with DMM Reading in Top Panel Selected and Frozen and Displayed as Full Screen

To use the **Full** function key, refer to **Full Function Key** on page 39 in ***6: Digital Multi-Meter (DMM)***.

To use the **Go**, **Panel**, and **Print** function keys, refer to **Freeze Function Key (DMM)** on page 40.

NOTE: *When you use the Freeze function key, the options on the Panel menu change to Playback and Save. These options are also described in* **Freeze Function Key (DMM)** *on page 40.*

13: Utility - NGIS Tool

Overview

For the NGIS tool, the Utility function lets you set a glitch sensitivity level for the lab scope glitch function, lets you calibrate (zero) the Scope module, and lets you set the background color of the scope waveform screens to either black or white.

NOTE: *For the Solarity tool, these functions are on the System Setup menu. Refer to* ***14: System Setup - Solarity Tool*** *on page 121.*

This chapter has the following main sections:

- **Glitch Sensitivity** below
- **Calibration** on page 118
- **Background Color Selection** on page 119

Glitch Sensitivity

The Glitch Sensitivity option lets you set a sensitivity level for the Glitch function, described in **Glitch Function Key** on page 71. The software uses this setting while automatically detecting glitches in a signal. If the Glitch function cannot detect a glitch, set the sensitivity level higher. If the signal has too much "noise," set the sensitivity level lower. (This option is available only when the Scope module is connected to the tool.)

To set the Glitch sensitivity level, follow these steps:

1 Display the main menu screen. For details, refer to **Software Startup** on page 5.

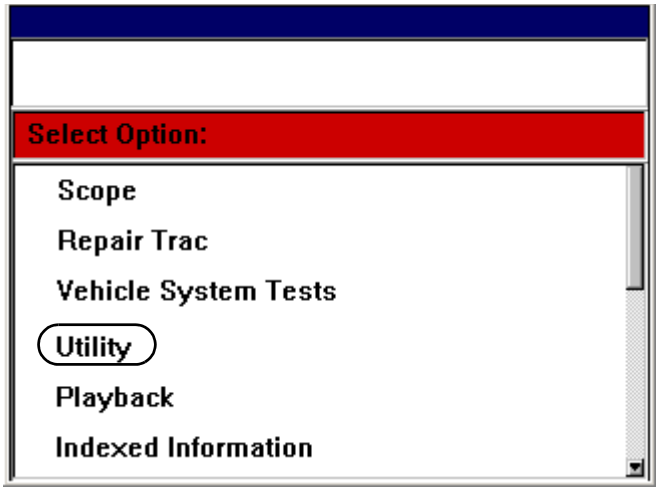

Figure 13.1: Main Menu Screen

2 From the main menu screen, select **Utility** and press the **ENTER** key. This displays the Utility menu screen.

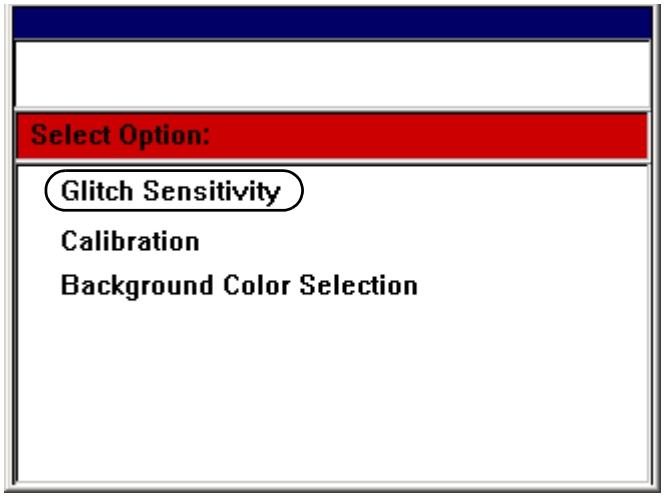

Figure 13.2: Utility Menu Screen

3 Select **Glitch Sensitivity** and press the **ENTER** key. This displays the Utility Setup screen.

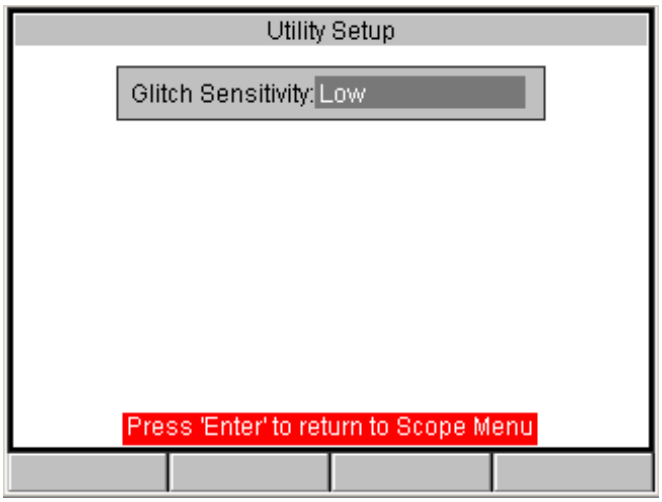

Figure 13.3: Utility Setup Screen

4 Use the **Left or Right Direction** keys to set the Glitch Sensitivity as required. Possible values are: Low, Medium, and High.

5 When finished, press the **ENTER** key to return to the previous screen.

Calibration

The Calibration option lets you prepare the Scope module for use by adjusting the module's internal measurements based on the resistance of the leads. (This option is available only when the Scope module is connected to the tool.)

To calibrate the Scope module, follow these steps:

1 Display the main menu screen. For details, refer to **Software Startup** on page 5.

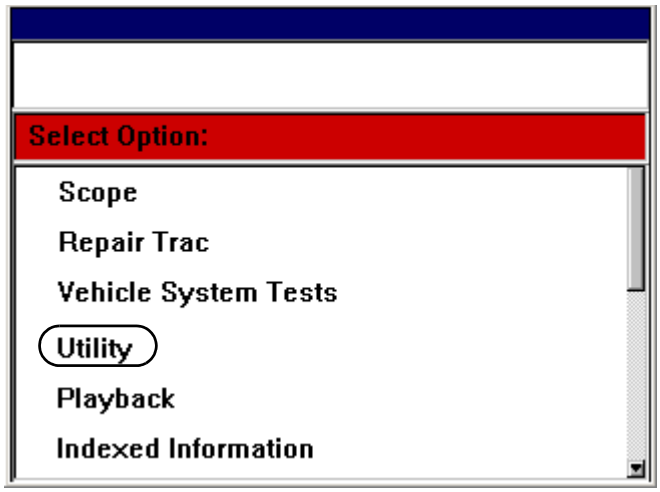

Figure 13.4: Main Menu Screen

2 From the main menu screen, select **Utility** and press the **ENTER** key. This displays the Utility menu screen.

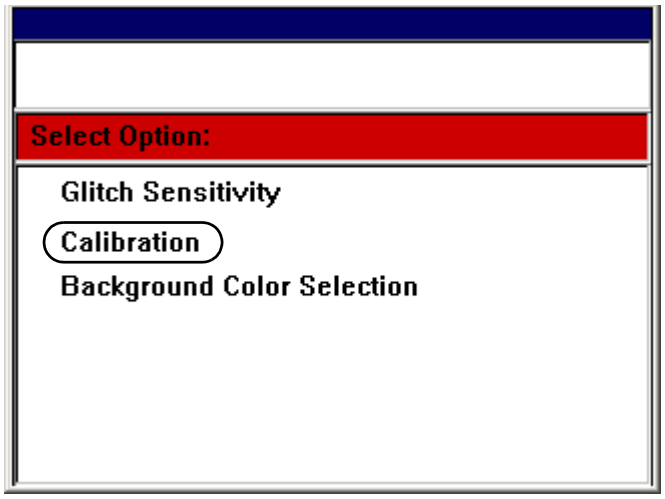

Figure 13.5: Utility Menu Screen

3 Select **Calibration** and press the **ENTER** key. This displays the Calibration screen (*Figure 13.6*).

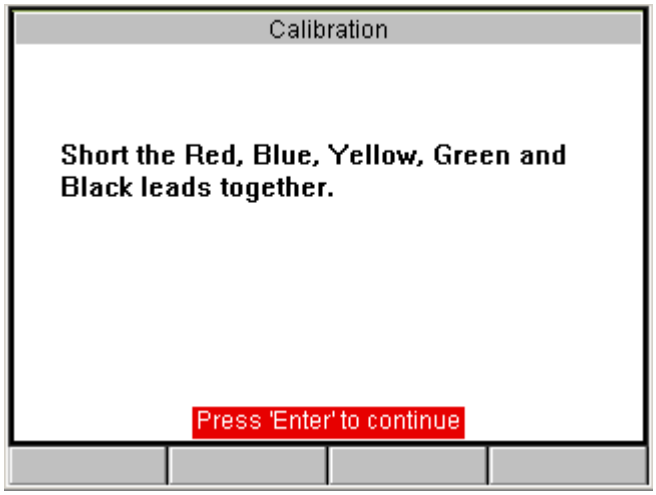

Figure 13.6: Calibration Screen

4 Insert the colored probes (leads) into the appropriate Scope module channel ports (matching the colors).

5 Touch the ends of the leads together and, while holding the leads together, press the **ENTER** key.

6 Use the **EXIT** key to return to previous screens.

Background Color Selection

The Background Color Selection function lets you set the background color for the Scope waveform screens to black or white, as shown in the examples below. (This option is available only when the Scope module is connected to the tool.)

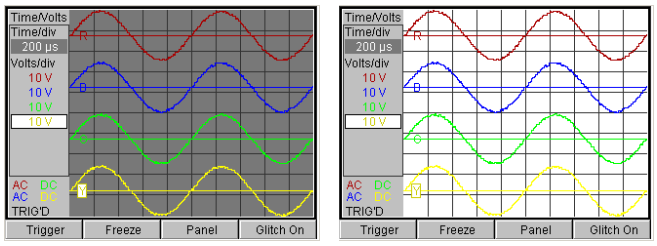

Figure 13.7: Scope Background Color Screen Examples

To set the background color, follow these steps:

1 Display the main menu screen. For details, refer to **Software Startup** on page 5.

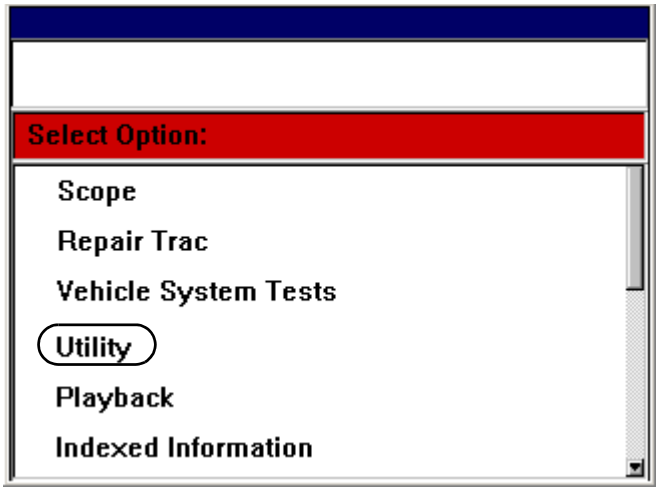

Figure 13.8: Main Menu Screen

2 From the main menu screen, select **Utility**. This displays the Utility menu screen.

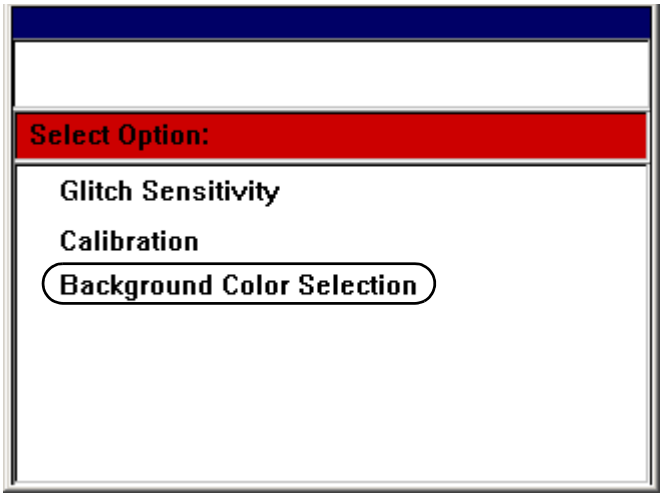

Figure 13.9: Utility Menu Screen

3 Select **Background Color Selection** and press the **ENTER** key. This displays the Scope Color Selection screen.

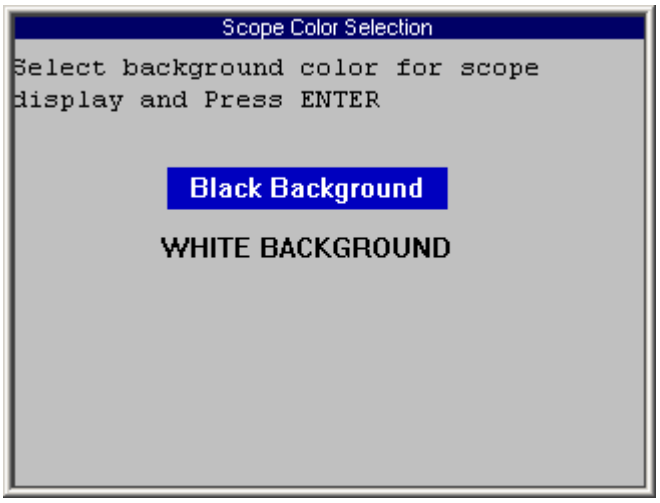

Figure 13.10: Scope Color Selection Screen

4 Select a **background color** and press the **ENTER** key.

5 Use the **EXIT** key to return to previous screens.

NOTES:

14: System Setup - Solarity Tool

Overview

For the Solarity diagnostic tool, the System Setup function lets you adjusting default settings in the tool and view system information about the tool. The function also lets you set a glitch sensitivity level for the lab scope glitch function and lets you calibrate (zero) the Scope module. This chapter includes a basic procedure followed by specific instructions.

Basic Procedure

To access the System Setup functions, follow these steps:

1 Make sure the tool has power.

2 Press the **On / Off** button to turn the scan tool on; wait for the main menu screen to appear.

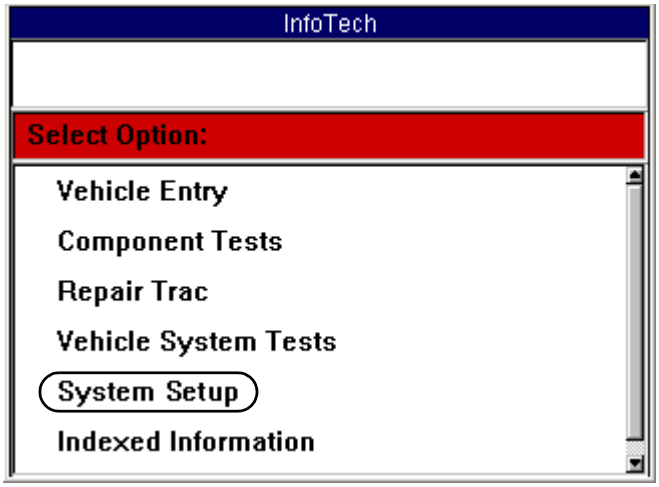

Figure 14.1: Main Menu Screen

3 Select **System Setup** and press the **ENTER** key. This displays the system setup menu screen.

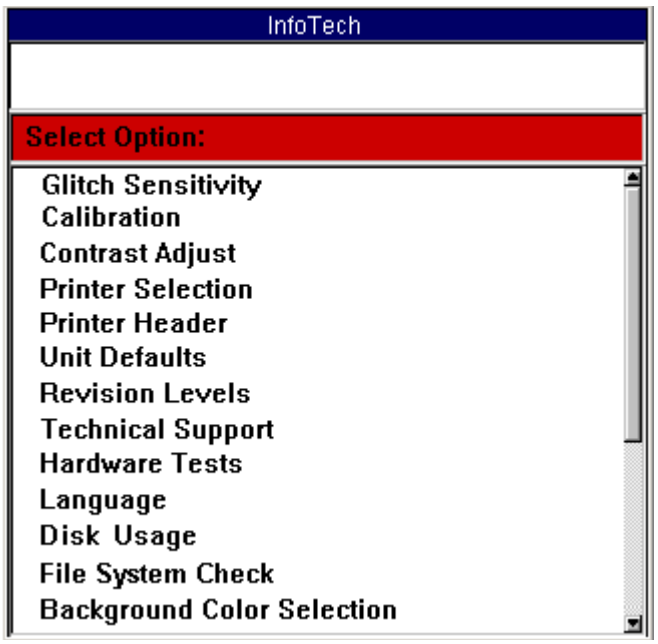

Figure 14.2: System Setup Menu Screen

4 **Select an item** to adjust and press the **ENTER** key.

5 Refer to the instructions in the following sections:

- **Glitch Sensitivity** on page 122
- **Calibration** on page 122
- **Contrast Adjust** on page 123
- **Printer Selection** on page 123
- **Printer Header** on page 124
- **Unit Defaults** on page 125
- **Revision Levels** on page 126
- **Technical Support** on page 126
- **Hardware Tests** on page 127
- **Language** on page 127
- **Disk Usage** on page 128
- **File System Check** on page 128
- **Background Color Selection** on page 129

Glitch Sensitivity

The Glitch Sensitivity option lets you set a sensitivity level for the Glitch function, described in **Glitch Function Key** on page 71. The software uses this setting while automatically detecting glitches in a signal. If the Glitch function cannot detect a glitch, set the sensitivity level higher. If the signal has too much "noise," set the sensitivity level lower. (This option is available only when the Scope module is connected to the tool.)

To set the Glitch sensitivity, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

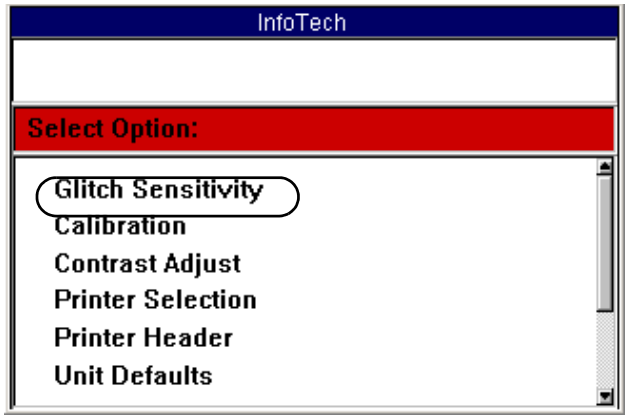

Figure 14.3: System Setup Menu Screen

2 Select **Glitch Sensitivity** and press the **ENTER** key. This displays the Utility Setup screen.

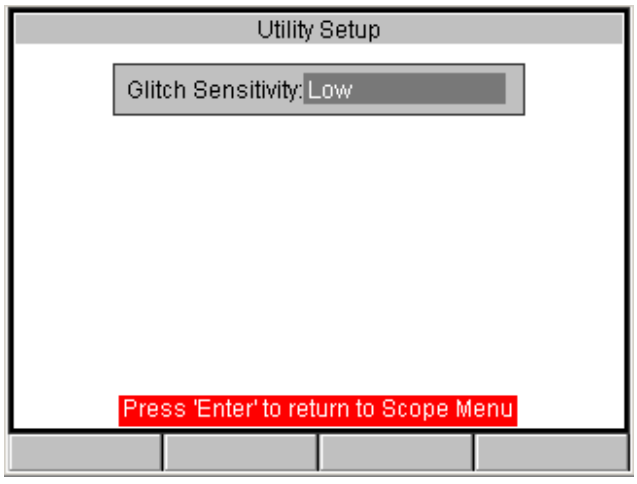

Figure 14.4: Utility Setup Screen

3 Use the **Left or Right Direction** keys to set the Glitch Sensitivity as required. Possible values are: Low, Medium, and High.

4 When finished, press the **ENTER** key to return to the previous screen.

Calibration

The Calibration option lets you prepare the Scope module for use by adjusting the module's internal measurements based on the resistance of the leads. (This option is available only when the Scope module is connected to the tool.)

To calibrate the Scope module, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

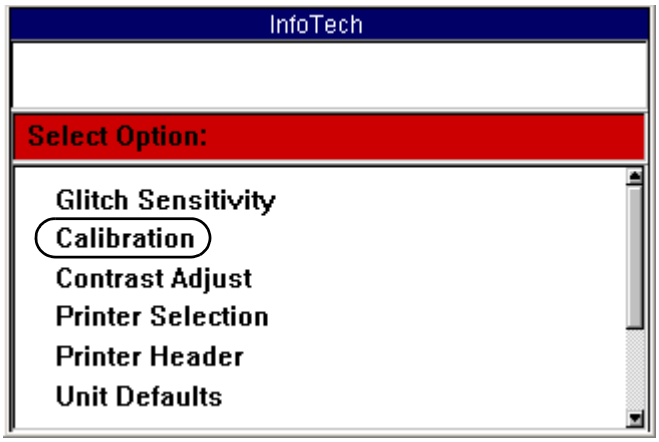

Figure 14.5: System Setup Menu Screen

2 Select **Calibration** and press the **ENTER** key. This displays the Calibration screen.

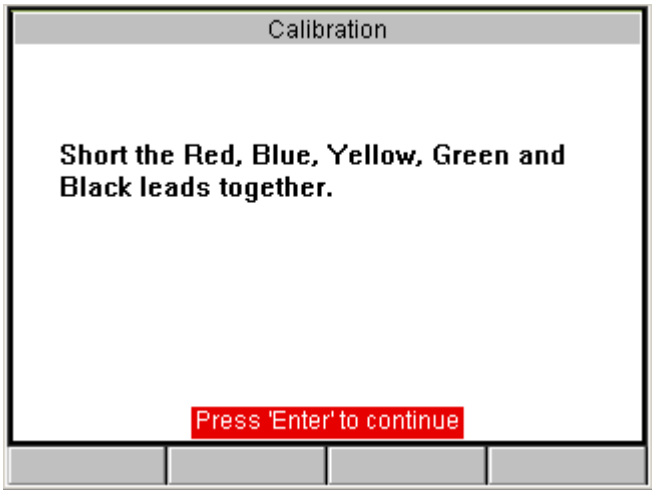

Figure 14.6: Calibration Screen

3 Insert the colored probes (leads) into the appropriate Scope module channel ports (matching the colors).

4 Touch the ends of the leads together and, while holding the leads together, press the **ENTER** key.

5 Use the **EXIT** key to return to previous screens.

Contrast Adjust

The Contrast Adjust function lets you adjust the contrast of the LCD screen.

To adjust the LCD contrast, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

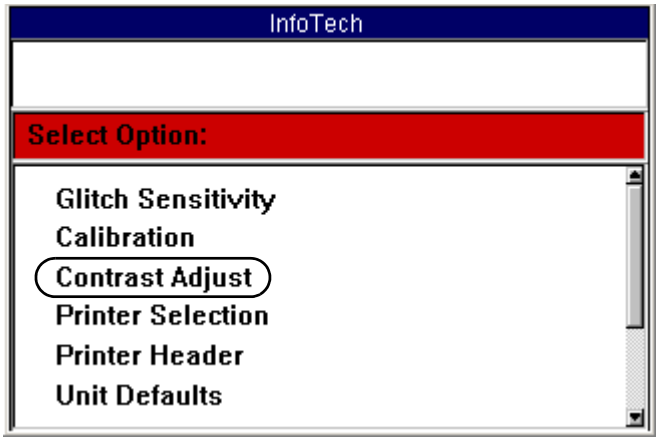

Figure 14.7: System Setup Menu Screen

2 Select **Contrast Adjust** and press the **ENTER** key.

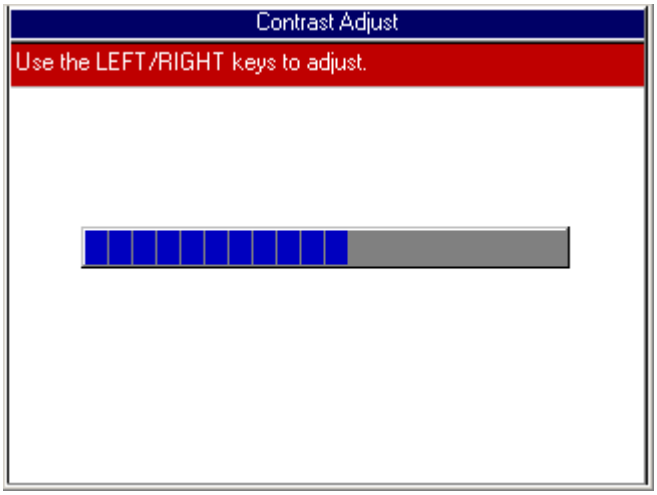

Figure 14.8: Contrast Adjust Screen

3 Use the **Left** and **Right Direction** keys to adjust the contrast.

4 Use the **EXIT** key to return to previous screens.

Printer Selection

The Printer Selection function lets you select a printer for the tool.

To select a printer, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

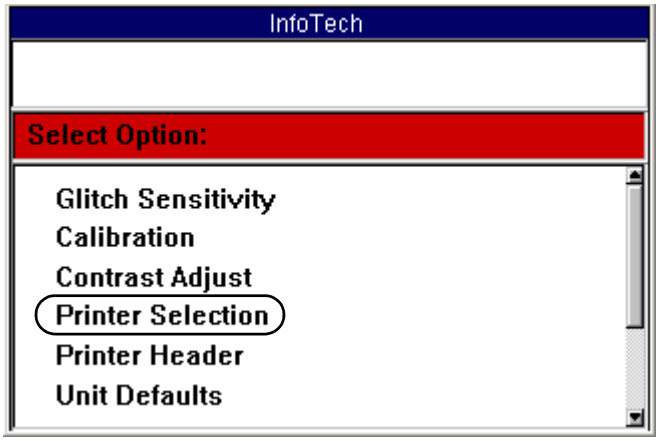

Figure 14.9: System Setup Menu Screen

2 Select **Printer Selection** and press the **ENTER** key. This displays a printer selection screen.

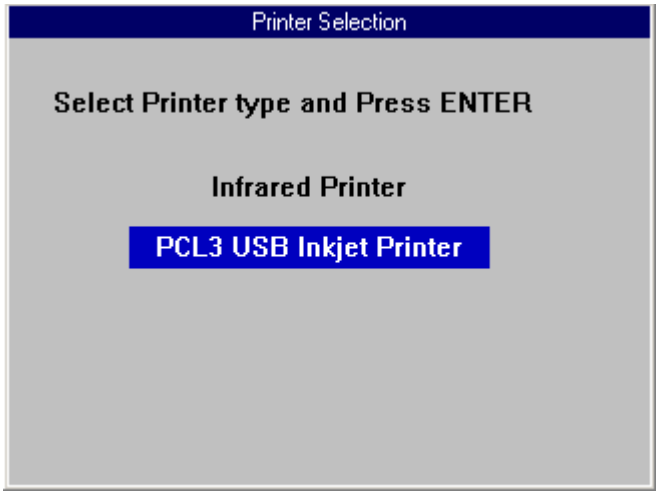

Figure 14.10: Printer Selection Screen

3 **Select a printer** and press the **ENTER** key.

IMPORTANT PRINTING NOTES:

- The USB Inkjet printer is recommended.
- When printing, do not press any keys on the tool until the printing stops.
- If using an infrared printer, make sure the distance between the tester and printer is less than 3 feet; point the top of the tester at the printer's infrared LED until the printing stops.

Printer Header

The Print Header function lets you set up a heading for reports that you print from the tool.

NOTE: *You can turn the Print Header function on and off with the Unit Defaults settings. Refer to* ***Unit Defaults*** *on page 125.*

To set up a report heading, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

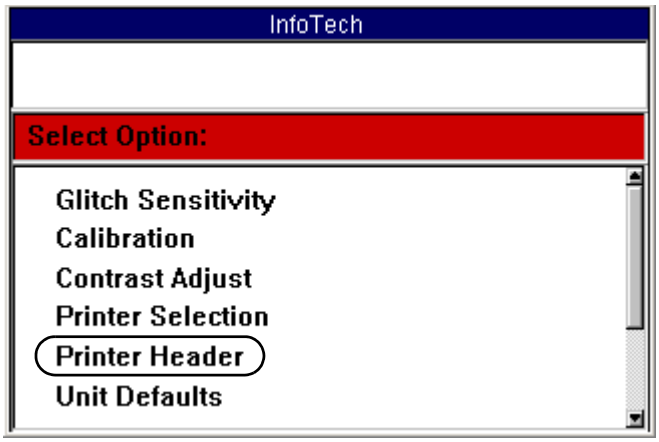

Figure 14.11: System Setup Menu Screen

2 Select **Printer Header** and press the **ENTER** key. This displays the Printer Header screen (*Figure 14.12*).

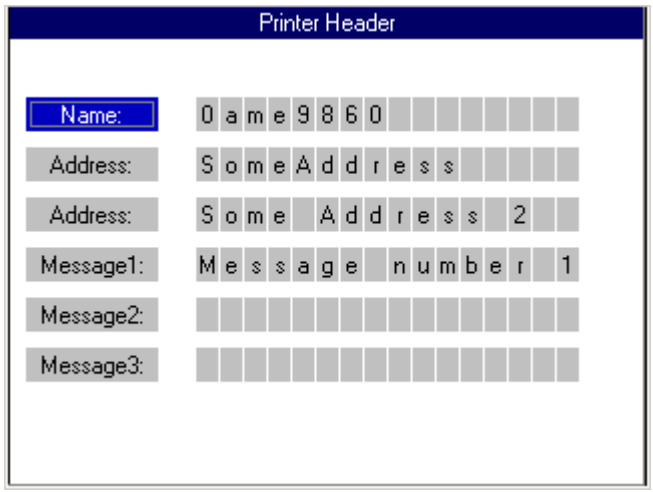

Figure 14.12: Printer Header Screen

3 Use the **Up** and **Down Direction** keys to select Name, Address, or Message.

4 Press the **Right Direction** key once to move to the first edit box.

5 Use the **Up** and **Down Direction** keys to select a character for the box.

NOTE: *To remove a character and leave a box blank, select the character that is blank (it is between 0 and A).*

6 Press the **Right Direction** key to select the next box.

NOTE: *Pressing the Left Direction key selects the previous box.*

7 Repeat steps 5 and 6 until the line is entered as you want it.

8 Repeatedly press either the **Left** or **Right Direction** key to return to the Name, Address, or Message box.

9 Repeat steps 3 through 8 until all the information is entered.

10 Use the **EXIT** key to return to previous screens.

Unit Defaults

The Unit Defaults function lets you set the date, time, units-of-measure, and automatic shut down time. It also lets you turn the audible beep and print header functions on or off.

To set the unit defaults, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

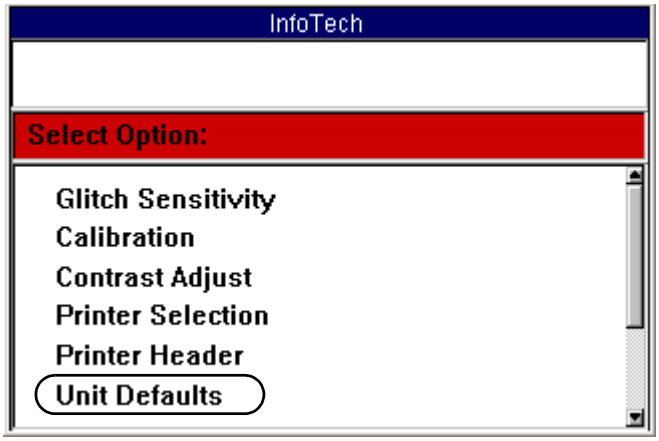

Figure 14.13: System Setup Menu Screen

2 Select **Unit Defaults** and press the **ENTER** key. This displays the Unit Defaults screen.

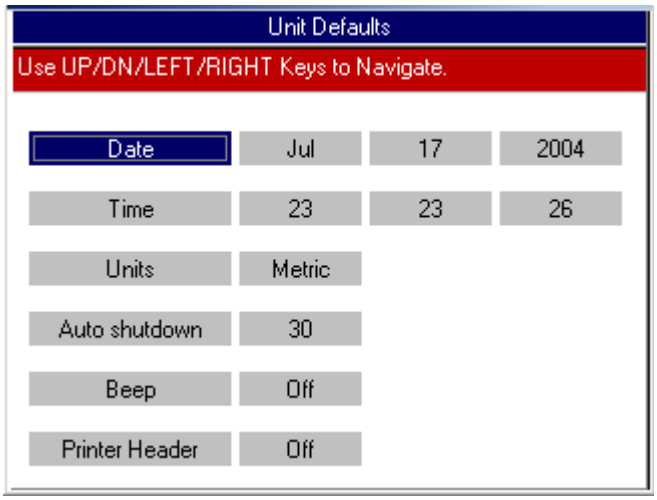

Figure 14.14: Unit Defaults Screen

3 Use the **Up** and **Down Direction** keys to select the item to set from the far left column:

- **Date —** sets the date in the scan tool as month, date, and year.
- **Time —** sets the time in the scan tool as hours, minutes, and seconds (24 hour clock).
- **Units —** sets the units-of-measure as English or Metric.
- **Auto Shutdown —** sets the amount of time the scan tool stays on before shutting off automatically (only when using internal battery power). This is the amount of time since the last key press. The setting can be made for between 5 and 60 minutes, in 5 minute increments.
- **Beep —** turns the audible beep on or off.
- **Print Header—** turns the print header function on or off. Refer to **Printer Header** on page 124.

4 Press the **Right Direction** key once to move to the edit box.

5 Use the **Up** or **Down Direction** key to select an option for the box.

6 For Date and Time, repeat steps 4 and 5 to enter the entire date or time.

7 Use the **Left Direction** key to return to the far left column.

8 Repeat steps 3 through 7 until all the settings are made.

9 Use the **EXIT** key to return to previous screens.

Revision Levels

The Revision Levels function displays software version numbers (for use when calling technical support).

To view the software version numbers, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

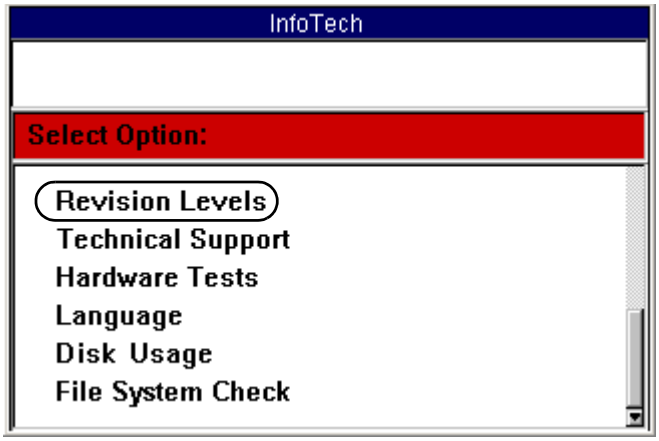

Figure 14.15: System Setup Menu Screen

2 Select **Revision Levels** and press the **ENTER** key. This displays the Revision Levels screen.

3 View the information.

4 Use the **EXIT** key to return to previous screens.

Technical Support

The Technical Support function displays technical support information.

To view the technical support information, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

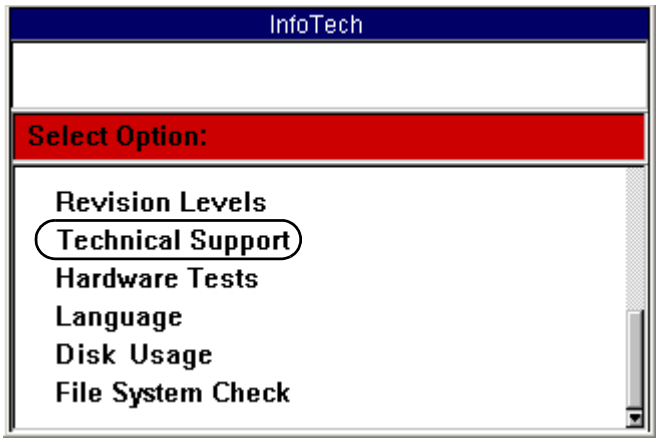

Figure 14.16: System Setup Menu Screen

2 Select **Technical Support** and press the **ENTER** key. This displays the Technical Support screen.

Figure 14.17: Technical Support Screen

3 View the information.

4 Use the **EXIT** key to return to previous screens.

Hardware Tests

The Hardware Tests function lets you test the LCD screen, keypad keys, and beeper. It also lets you view the time clock and the serial number for the scan tool.

To test the hardware, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

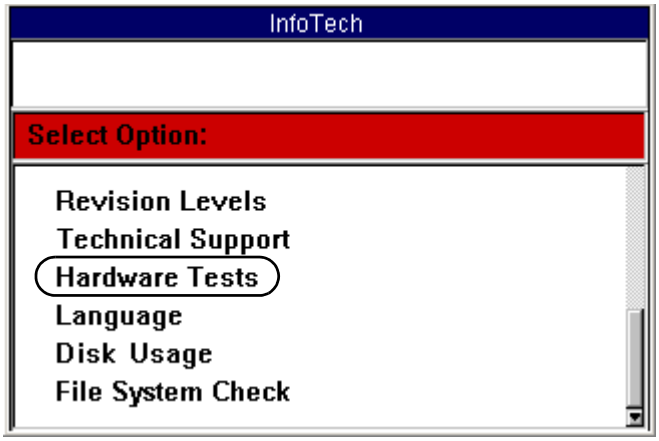

Figure 14.18: System Setup Menu Screen

2 Select **Hardware Tests** and press the **ENTER** key. This displays the Hardware Tests screen.

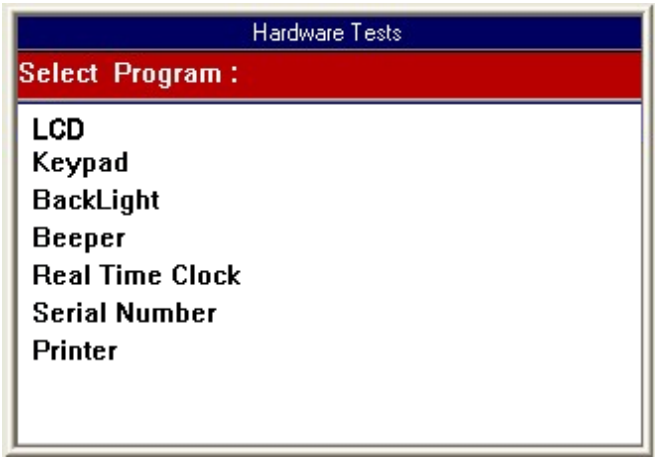

Figure 14.19: Hardware Tests Screen

3 **Select an option** and press the **ENTER** key.

4 Follow the instructions on the screen that appears.

NOTE: *If you select Keypad, a screen appears with the message "To test the Backlight key, just observe the backlight itself." To display the next screen, press the ENTER key.*

5 When finished with the tests, use the **EXIT** key to return to previous screens.

Language

The Language function lets you set the default language for the scan tool software.

To set the language, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

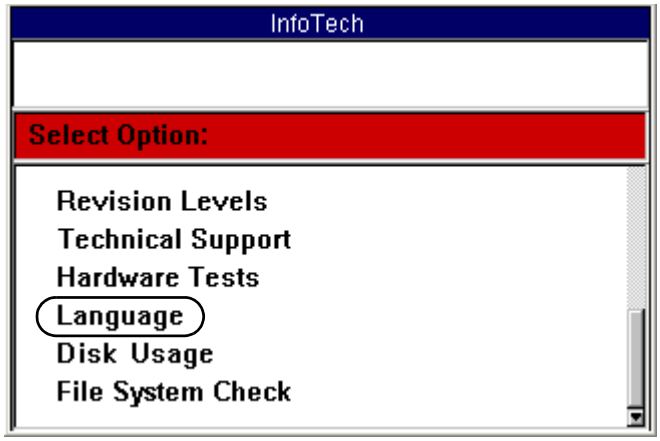

Figure 14.20: System Setup Menu Screen

2 Select **Language** and press the **ENTER** key. This displays the Language Selection screen.

Figure 14.21: Language Selection Screen

3 Use the **Up** and **Down Direction** keys to select the language.

4 Press the **Select** function key.

5 Use the **EXIT** key to exit the screen and to exit the software.

6 Restart the software to display the changed language.

Disk Usage

The Disk Usage function displays how much of the tools internal memory is used and remaining.

To check the disk usage, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

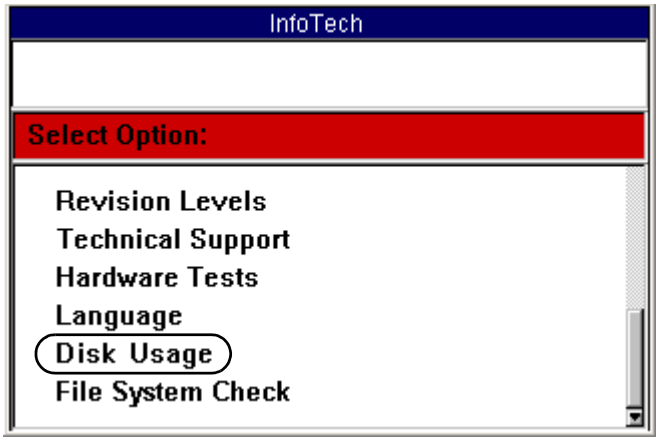

Figure 14.22: System Setup Menu Screen

2 Select **Disk Usage** and press the **ENTER** key. The Disk Usage screen displays the memory information.

3 View the information.

4 Use the **EXIT** key to return to previous screens.

File System Check

The File System Check function lets you test the integrity of the system files.

To check the file system, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

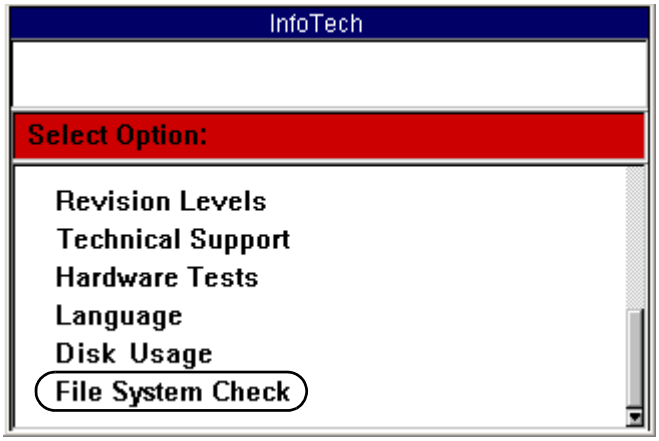

Figure 14.23: System Setup Menu Screen

2 Select **File System Check** and press the **ENTER** key.

3 Follow any on-screen instructions that appear.

4 Use the **EXIT** key to return to previous screens.

Background Color Selection

The Background Color Selection function lets you set the background color for the Scope waveform screens to black or white, as shown in the examples below. (This option is available only when the Scope module is connected to the tool.)

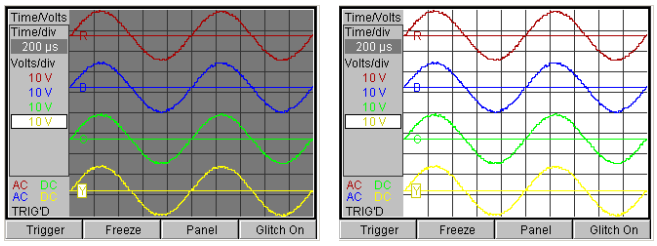

Figure 14.24: Scope Background Color Screen Examples

To set the background color, follow these steps:

1 Follow the steps in **Basic Procedure** on page 121 to display the system setup menu screen.

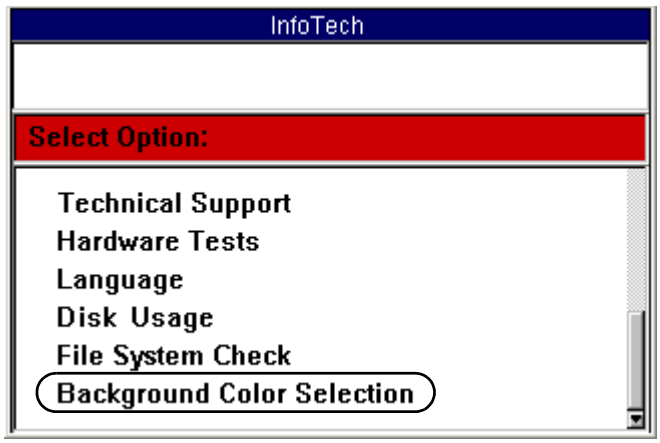

Figure 14.25: System Setup Menu Screen

2 Select **Background Color Selection** and press the **ENTER** key. This displays the Scope Color Selection screen.

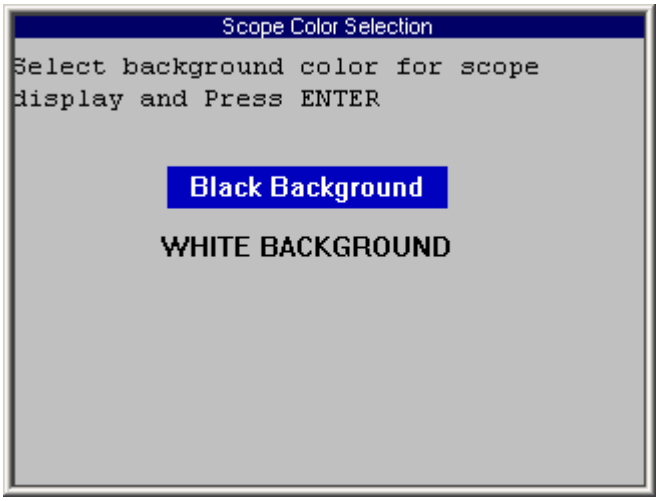

Figure 14.26: Scope Color Selection Screen

3 Select a **background color** and press the **ENTER** key.

4 Use the **EXIT** key to return to previous screens.

NOTES:

15: Playback

Overview

The Playback function provides options for viewing and deleting saved data files, viewing ideal waveforms from a "library," and copying saved files to and from a portable USB drive. This chapter describes how to use these options.

Playback

The Playback function lets you view and delete files you saved while using the Component Tests, DMM, Scope, and Vehicle System Tests Freeze functions.

To use the playback functions, follow these steps:

1 Display the main menu screen. For details, refer to **Software Startup** on page 5.

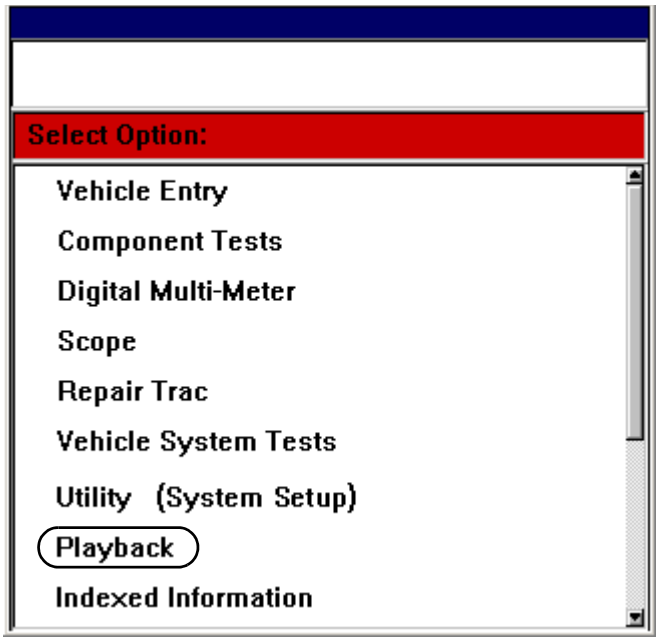

Figure 15.1: Main Menu Screen

2 From the main menu screen, select **Playback**. This displays the Load screen (*Figure 15.2*).

NOTE: *You can also access the Playback option from some test screens. For details, see the following sections:*

- ***Component Tests Function Keys*** *on page 26,*
- ***Freeze Function Key (DMM)*** *on page 40,*
- ***Freeze Function Key (Lab Scope)*** on page 66,
- ***Freeze Function Key (Ignition Scope)*** *on page 91,*
- ***Vehicle System Tests Function Keys*** *on page 111.*

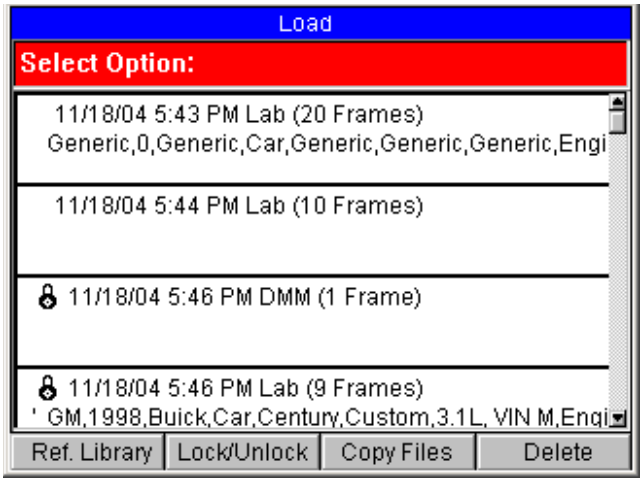

Figure 15.2: Playback Load Screen - Solarity Tool

3 Notice the following about this screen:

- The files are named with the date and time they were saved, the software function used to save them, and the number of frames saved. Files saved from within the Component Tests function also include the vehicle description.
- The list holds up to 50 saved files.
- The Ref. Library function key lets you view waveforms from the ideal waveforms library. Refer to ***Reference Waveforms Library*** on page 132.
- The Lock/Unlock function key let you "lock" or "unlock" files. Locked files have a padlock icon next to the file name; they cannot be overwritten or deleted. For the Solarity Tool, to lock or unlock a file, select the file, press the Lock/Unlock function key, select either Lock or Unlock, and then press the ENTER key. For the NGIS tool, select a file and then press either the Lock or Unlock function key.
- The Copy Files function key (Solarity Tool only) lets you copy files to or from a portable USB drive. Refer to **Copy Files to / from USB Drive (Solarity Tool only)** on page 133.
- The Delete function key lets you delete unlocked files. To delete a file, select the file and press the Delete function key.

4 Use the **Up and Down Direction keys** to select a file to view.

5 Press the **ENTER** key. The saved file displays on the screen.

Reference Waveforms Library

The waveform library contains saved files of ideal waveforms.

You can use the ideal waveforms to learn about the different signals from sensors, actuators, ignition circuits, and other electrical components.

You can also use the ideal waveforms for comparison purposes while testing. That is, you can compare an actual test waveform to an ideal (known good) waveform to see the differences and to find faults in a test waveform.

To view ideal waveforms, follow these steps:

1 Refer to the **Playback** steps on the previous page and display the Load screen.

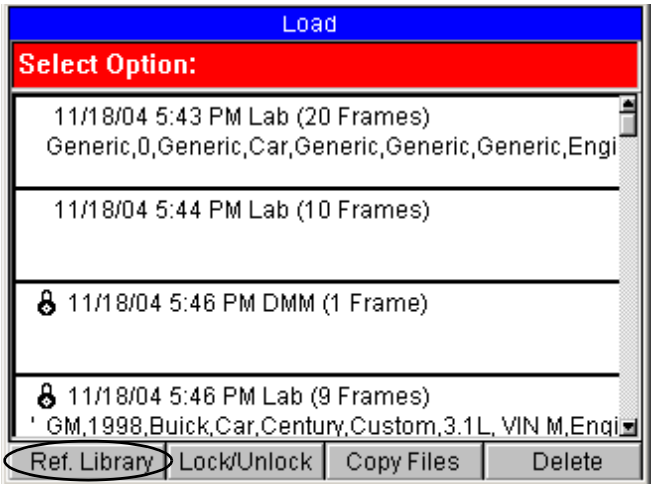

Figure 15.3: Playback Load Screen

2 Press the **Ref. Library** function key. This displays another Load screen that lists the saved ideal waveforms (*Figure 15.4*).

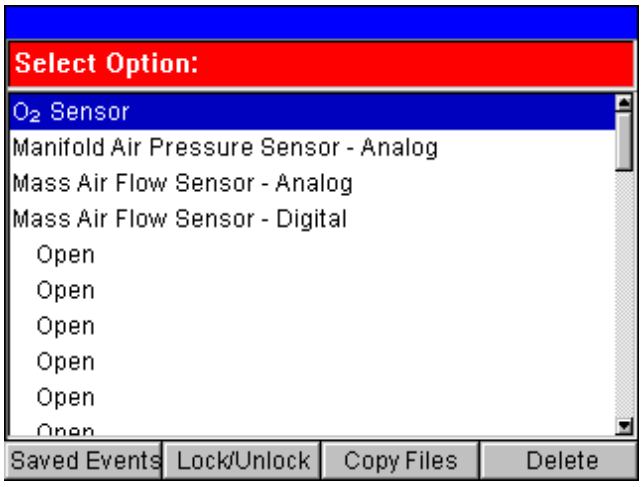

Figure 15.4: Ideal Waveform Load Screen

3 Use the **Up and Down Direction keys** to select the file for the ideal waveform to view.

NOTE: *If necessary, use the Saved Events function key to return to the Playback Load screen or use the Lock/Unlock, Copy Files, and Delete function keys to manage the saved files (as described on the previous page).*

4 Press the **ENTER** key. The waveform file displays on the screen.

Copy Files to / from USB Drive (Solarity Tool only)

The Copy Files function lets you copy saved files to and from a portable USB Drive for either temporary or permanent storage.

To copy files to or from a portable USB drive, follow these steps:

IMPORTANT: Do not insert or remove the USB Drive with the Solarity tool turned on; exit the application, turn the tool off, and then insert or remove the drive.

1 Turn the Solarity Tool off.

2 Insert the portable USB drive into the port on the top of the Solarity tool.

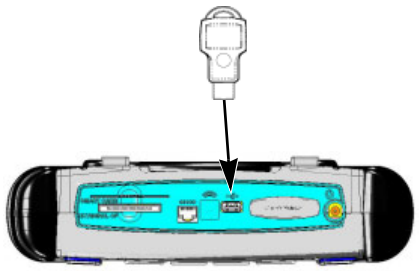

Figure 15.5: USB Drive and Port

3 Refer to **Playback** on page 131 and follow the steps to display the Playback, Load screen. (Turn the tool on, select Scope with InfoTech, and then Playback.)

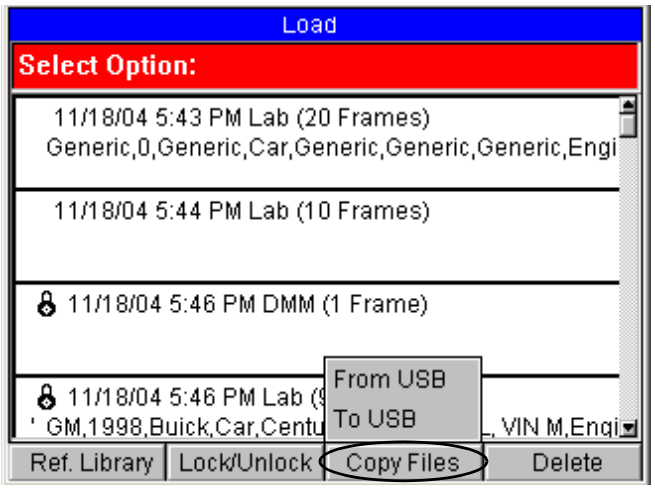

Figure 15.6: Playback Load Screen

4 Press the **Copy Files** function key. This displays the copy files menu, shown above.

5 Select an **option** and press the **ENTER** key as follows:

- Select **From USB** to copy files from the USB drive to the Solarity tool.

  NOTE: *The tool holds up to 50 files. If necessary, delete files from the tool to make room for copying files from the USB drive.*

- Select **To USB** to copy files from the Solarity tool to the USB drive.

  NOTE: *The number of files you can copy depends on the free space available on the USB drive.*

6 After selecting a copy option, a message screen appears. If instructed, press the **ENTER** key to continue. This displays a list of files to copy.

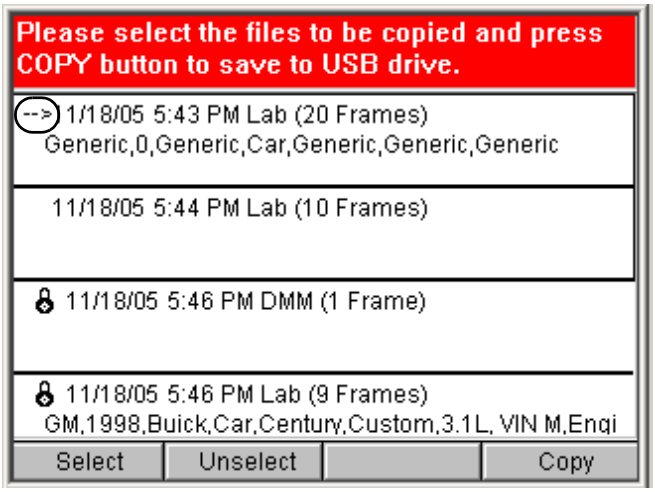

Figure 15.7: Copy Files Screen

7 For each file to copy, **select the file** and then press the **Select** function key. This places a small arrow to the left side of the file name, as shown for the top line in *Figure 15.7*.

NOTE: *To deselect a selected file, select the file and then press the Unselect function key.*

8 After selecting files, press the **Copy** function key to begin the file copy.

9 Wait for the files to copy and for a message screen to display the results of the copy.

10 Press the EXIT key to return to previous screens.

11 Turn the Solarity tool off and remove the USB drive.

NOTES:

16: Indexed Information

The Indexed Information function lets you look up definitions and other information for specific items that are listed alphabetically. This chapter describes how to use the Indexed Information function.

To look up indexed information, follow these steps:

1 Start the application to display the main menu screen. For details, refer to **Software Startup** on page 5.

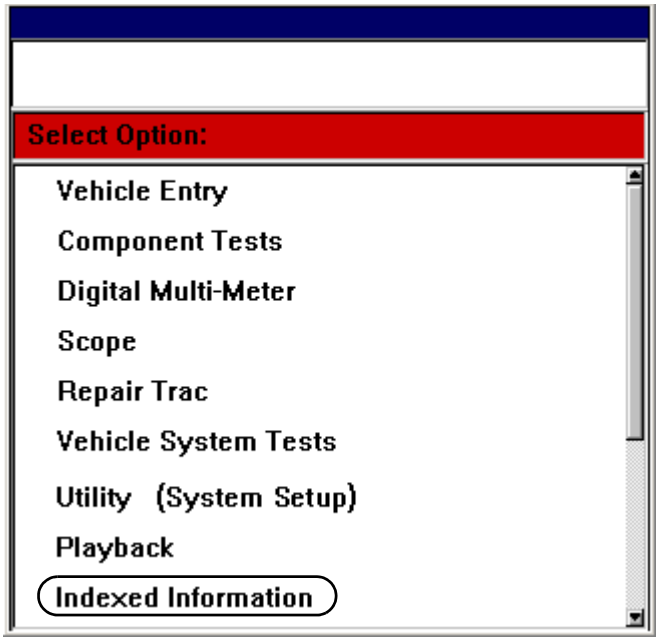

Figure 16.1: Main Menu Screen

2 From the main menu screen, select **Indexed Information**. This displays the letters of the alphabet.

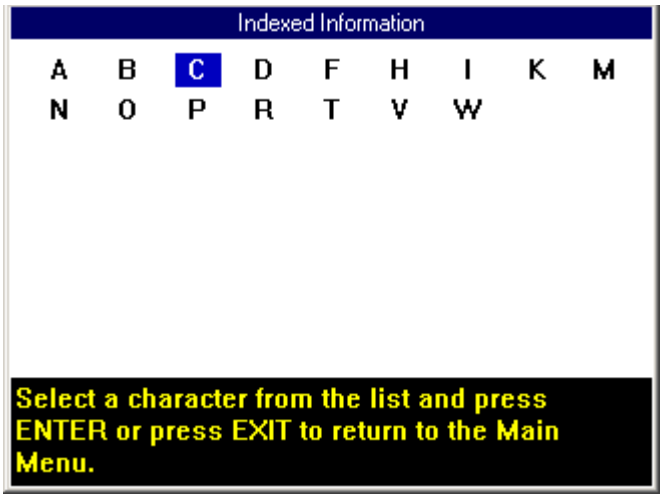

Figure 16.2: Indexed Information Alphabet Letters Screen

3 Use the **Direction** keys to select the first letter for the item to look up and then press the **ENTER** key. This displays an alphabetically listing for the letter.

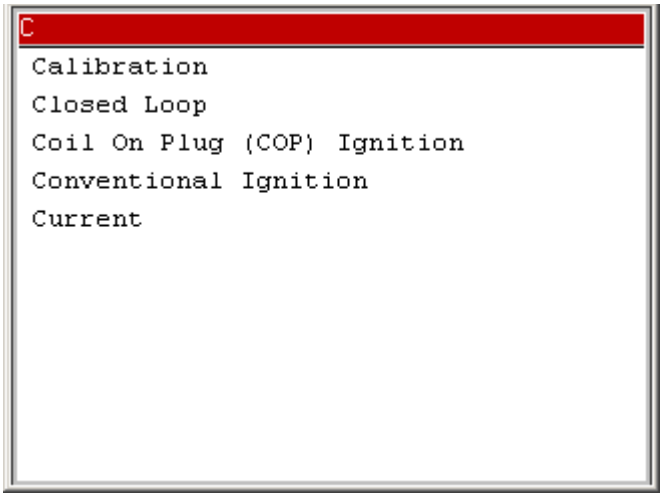

Figure 16.3: Indexed Information Alphabetical Listing

4 **Select the item** to look up and press the **ENTER** key. This displays the information for the item.

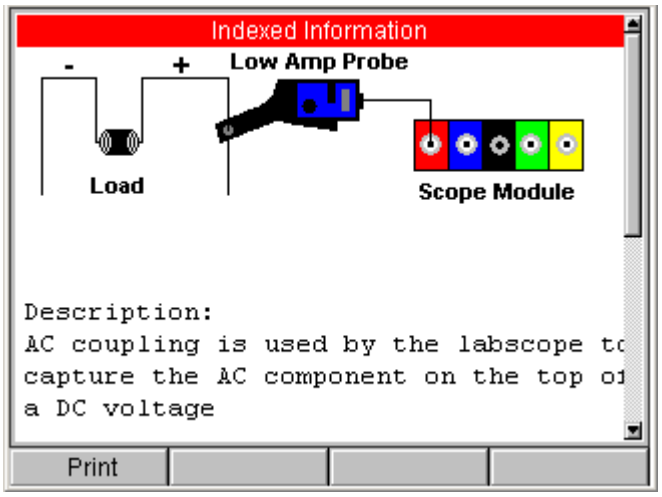

Figure 16.4: Indexed Information Item Information

5 View the information; optionally use the **Print** function key to print the information.

6 When finished, use the **EXIT** key to return to previous screens.

NOTES:

ORDER INFORMATION

Replacement and optional parts can be ordered directly from your SPX authorized tool supplier. Your order should include the following information:

- quantity
- part number
- item description

Technical Service

If you have any questions on the operation of the product, please call (800) 533-6127.

Repair Service

Log on to www.Repairtrack.com for information regarding SPX electronic product repair service.

SPX

655 EISENHOWER DRIVE
OWATONNA, MN 55060-0995 USA

TECH SERVICES	800	533	6127
FAX	800	955	8329
CUSTOMER SERVICE	800	533	6127
FAX	800	283	8665

www.otctools.com

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