

M2 Scope/Meter User Manual



February 2012

EAZ0063L38A Rev. A

Trademarks

Snap-on, ShopStream, and ShopStream Connect, are trademarks of Snap-on Incorporated.

All other marks are trademarks or registered trademarks of their respective holders.

Copyright Information

©2012 Snap-on Incorporated. All rights reserved.

Disclaimer of Warranties and Limitation of Liabilities

The information, specifications and illustrations in this manual are based on the latest information available at the time of printing. While the authors have taken due care in the preparation of this manual, nothing contained herein:

- Modifies or alters in any way the standard terms and conditions of the purchase, lease, or rental agreement under the terms of which the equipment to which this manual relates was acquired.
- Increases in any way the liability to the customer or to third parties.

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

IMPORTANT:

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

Visit our websites at:

<http://diagnostics.snapon.com> (North America)

www1.snapon.com/diagnostics/uk (United Kingdom)

snapontools.com.au (Australia and New Zealand)

For Technical Assistance Call

1-800-424-7226 (North America)

CALL +44 (0) 845 601 4736 (United Kingdom)

E-mail DiagnosicsUKproductsupport@snapon.com (United Kingdom)

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

Safety Information

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

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

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

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

Before using the equipment, always refer to and follow the safety messages and applicable test procedures provided by the manufacturer of the vehicle or equipment being tested. Use the equipment only as described in this manual.

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

Safety Message Conventions

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

DANGER

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

WARNING

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

CAUTION

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

Safety messages contain three different type styles.

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

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

Example:



Risk of unexpected vehicle movement.

- **Block drive wheels before performing a test with engine running.**
A moving vehicle can cause injury.

Important Safety Instructions

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

SAVE THESE INSTRUCTIONS

Contents

Safety Information	iii
Contents	v
Chapter 1: Using This Manual	1
Conventions.....	1
Bold Text.....	1
Notes and Important Messages	1
Procedures.....	2
Chapter 2: Introduction	3
Functional Description	3
Wireless Communication	4
Technical Specifications	4
Power Sources	5
Internal Battery Pack.....	5
AC/DC Power Supply.....	5
Chapter 3: Getting Started	6
Capabilities	7
Leads and Adapters	8
Channel 1 Lead.....	8
Channel 2 Lead.....	8
Common Lead	9
Alligator Clips	9
Low Amp Current Probe (optional).....	9
Chapter 4: Navigation	10
Controls, and Features	10
Rotary Selector Switch.....	11
Soft Keys.....	12
Chapter 5: Operations	13
Volts DC	13
F1 Key, Relative.....	14
F2 Key, Freeze	15
F3 Key and Range Key	15
Min/Max Key	15
S Key, Special Functions	16
Graph Key.....	16
Range	18
Volts AC.....	18
F1 Key.....	19
F2 Key.....	19
F3 Key.....	19
F4 Key.....	19

S Key	19
Min/Max Key	19
Range Key	19
Graph Key	19
Resistance	20
F1 Key	20
F2 Key	21
F3 Key and Range Key	21
F4 Key and S Key	21
Min/Max Key	21
Continuity and Diode Check	21
Auxiliary	22
F1 Key	22
F2 Key	22
F3 Key and Range Key	23
F4 Key	23
S Key	23
Min/Max Key	23
Graph Key	23
Capacitance	23
F1 Key	24
F2 Key	24
F3 Key and Range Key	24
F4 Key, S Key, Min/Max Key, and Graph Key	24
Oscilloscope	24
Display Selections	25
Trigger Selections	26
Preset Selections	27
Special Selections	28
Position Selections	29
Channel Selections	30
Bluetooth Discovery Selection	31
Remote Functions	32
Chapter 6: Pairing Wireless Devices	33
Pairing to a Display Device	33
Wireless Communication	35
Chapter 7: Maintenance	36
Cleaning and Inspecting	36
Replacing the Battery Pack	36
Battery Safety Guidelines	36
Battery Pack Replacement	37
Appendix A: Accessories	39
Index	40

This manual contains tool usage instructions.

Some of the illustrations shown in this manual may contain modules and optional equipment that are not included on your system. Contact your sales representative for availability of other modules and optional equipment.

1.1 Conventions

The following conventions are used.

1.1.1 Bold Text

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

Example:

- Press the **Y/✓** button.

1.1.2 Notes and Important Messages

The following messages are used.

Notes

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

Example:



NOTE:

For additional information refer to...

Important

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

Example:

IMPORTANT:

Do not connect to...

1.1.3 Procedures

An arrow icon indicates a procedure.

Example:

**To change screen views:**

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

This chapter describes the physical characteristics and specifications of the M2 Scope/Meter.

2.1 Functional Description



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

Figure 2-1 Model M2 Scope/Meter

2.1.1 Wireless Communication

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

2.2 Technical Specifications

Display:

Color graphical display

Battery Pack:

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

Dimensions:

Height:

9.125 inches

231.8 mm

Width:

4.25 inches

107.9 mm

Depth:

2.00 inches

50.8 mm

Weight (including battery):

1.9 lbs.

0.86 kg

Agency Approvals:**IEC 61010-1 Over Voltage**

CAT III—1000 VAC/DC

CAT IV—600 VAC/DC

Pollution Degree 2

UL Listed 61010-1:

CAT II 750 VAC, 1000 VDC

CAT III 600 VAC/DC

2.3 Power Sources

The M2 Scope/Meter comes with a rechargeable battery pack, which is already installed in the unit. Simply turn the rotary switch on the unit to a test position and it is ready to use.

2.3.1 Internal Battery Pack

The M2 Scope/Meter is powered from the internal rechargeable battery. An icon in the upper right-hand corner of the display screen indicates the battery state of charge.

2.3.2 AC/DC Power Supply

The AC/DC Power Supply (included) provides power from a wall socket to recharge the battery pack, or to power the unit if the battery pack charge is low.

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

WARNING

Risk of electrical shock.

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

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

CAUTION

Risk of equipment or circuit damage.

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

Improper use can cause equipment or circuit damage.

3.1 Capabilities

The M2 Scope/Meter module functions as a digital multimeter (DMM), graphing multimeter, or 2-channel oscilloscope. The following tables detail the software and hardware capabilities.

Table 3-1 *Multimeter capabilities*

Function	Range	Resolution	Accuracy	Impedance/ Protection
Volts DC	40mV	0.01mV	±(1.0% of reading + 3 digits)	10M Ohm
	400mV	0.1mV		
	4V	0.001V		
	40V	0.01V		
	400V	0.1V	±(1.5% of reading + 3 digits)	
	1000V	1V		
Volts AC	400mV	0.1mV	±(1.5% of reading + 4 digits)	10M Ohm
	4V	0.001V		
	40V	0.01V		
	400V	0.1V	±(2.0% of reading + 4 digits)	
	1000V	1V		
Resistance	40 Ohm	0.01 Ohm	±(0.75% of reading + 5 digits)	600V DC or Peak AC
	400 Ohm	0.1 Ohm	±(0.5% of reading + 3 digits)	
	4k Ohm	0.001k Ohm		
	40k Ohm	0.01k Ohm		
	400k Ohm	0.1k Ohm		
	4M Ohm	0.001M Ohm	±(0.75% of reading + 5 digits)	
	40M Ohm	0.01M Ohm		
Capacitance	40nF	0.01nF	±(3.0% of reading + 15 digits)	600V DC or Peak AC
	400nF	0.1nF		
	4uF	0.001uF		
	40uF	0.01uF		
	400uF	0.1uF		
	4mF	0.001mF	±(5.0% of reading + 15 digits)	
	40mF	0.01mF		
Frequency	40Hz	0.01Hz	±(0.5% of reading + 2 digits)	N/A
	400Hz	0.1Hz		
	4kHz	0.001kHz		
	40kHz	0.01kHz		
	400kHz	0.1kHz		
	2MHz	0.001MHz		
Duty Cycle	0.1 — 99.9%	0.1%	N/A	N/A
Pulse Width	0.1 — 99.9%	0.1%	N/A	N/A
Diode Test	3V*	N/A	Range = 2V	N/A
Continuity	3V*	N/A	Threshold = 0.1%	N/A

* Test voltage.

Table 3-2 *Scope capabilities*

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

3.2 Leads and Adapters

The M2 Scope/Meter uses standard safety banana plugs that are compatible with many accessories. The various leads, clips, and adapters that are supplied with, or available for, the M2 Scope/Meter are explained in this section.

IMPORTANT:

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

3.2.1 Channel 1 Lead



Figure 3-1 *Red Channel 1 Lead*

The shielded red lead with an integrated probe is used for Channel 1 (Figure 3-1). The lead color matches the color of socket 1 on the M2 Scope/Meter unit and of trace 1 on the test screens.

3.2.2 Channel 2 Lead



Figure 3-2 *Green Channel 2 lead*

The shielded green lead (Figure 3-2) with an integrated probe is used for Channel 2. The test lead color matches the color of socket 2 on the M2 Scope/Meter unit, as well as the color of trace 2 on the test screens.

3.2.3 Common Lead



Figure 3-3 Red Channel 4 lead

The black lead (Figure 3-3) with an integrated probe is used when a separate common, or ground, connection is needed. The lead color matches the color of the COM socket on the M2 unit.

3.2.4 Alligator Clips

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



To install an alligator clip:

1. Remove the collar from the probe by threading it counterclockwise off of the tip (Figure 3-4). Store the collar in a safe place while not in use.

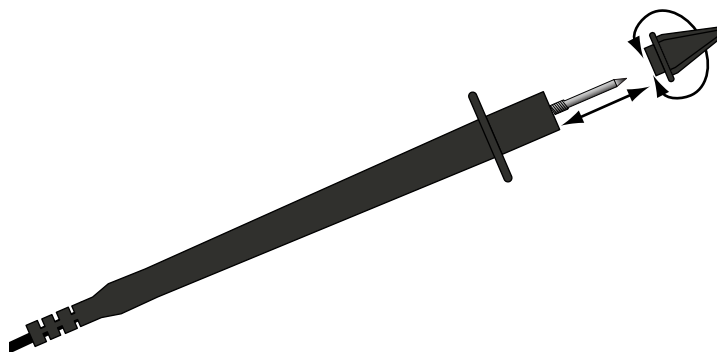


Figure 3-4 Probe collar

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

3.2.5 Low Amp Current Probe (optional)

The optional Low Amp Current Probe provides accurate and reliable non-intrusive testing of ignition coils, fuel injectors, fuel pumps, relays, electric motors, and parasitic draw. Use to measure current from 10 mA to 60 Amps with a resolution of 1 mA.

This chapter discusses how to use the hardware controls and features of the M2 Scope/Meter.

4.1 Controls, and Features

There are two sets of controls for the M2 Scope/Meter:



- 1— **Soft Keys**—select test functions, which vary depending upon the Rotary Switch position
- 2— **Rotary Switch**—establishes the primary operation of the unit

Figure 4-1 M2 Scope/Meter controls










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

4.1.1 Rotary Selector Switch

The M2 Scope/Meter is a combination digital-multimeter (DMM) and waveform viewer, capable of reading volts (AC and DC), resistance (ohms), capacitance (farads), continuity, diode forward voltages, and external auxiliary probes, as well as viewing dynamic voltage graphs (waveforms). The unit can also be used to measure pressure when used in conjunction with the optional transducers (contact your sales representative for details). The Rotary Selector Switch on the front panel determines which measurements are taken.

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

Table 4-1 Rotary switch settings









Function	Icon	Description
Off		Switches power to the M2 Scope/Meter off. The switch should be in this position when the tool is not being used to prevent battery drain.
Volts DC		Measures direct current (DC) voltages within a range of zero to 1000 volts. Also used to measure frequency (hertz), duty cycle (%), pulse width (Pw), and time period (cycle, ms).
Volts AC		Measures alternating current (AC) voltages within a range of zero to 1000 volts. Also used to measure frequency (hertz), duty cycle (%), pulse width (Pw), and time period (cycle, ms).
Resistance		Measures the DC resistance to current in ohms in a range of zero to open circuit (infinite).
Continuity/ Diode Check		Performs dual tests; circuit continuity and diode test (forward drop). The “S” (special function) soft key switches between the two tests.
Auxiliary		Performs three auxiliary tests; current (amperes), pressure/vacuum, and temperature. Use the “S” (special functions) and “Range” soft keys to switch between the tests and output units. Pre-approved sensors must be used to take valid measurements.
Capacitance		Measures capacitance in nanofarad (nF), millifarad (mF), and microfarad (μF).
Oscilloscope (Waveform Viewer)		Configures the M2 Scope/Meter to perform as an oscilloscope, or waveform viewer.
Remote Functions		Configures the M2 Scope/Meter to be operated through a remote Display Device. Readings are only shown on the Display Device screen. The controls on the front panel of the M2 Scope/Meter become inoperative when the rotary switch is in this position.

4.1.2 Soft Keys

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

The table below gives a brief general description of soft key operations, the “Mode” column lists the tests during which the key is active.

Table 4-2 *Soft Key functions*

Name	Key	Description	Mode
F1		A short press switches the displayed value to a relative reading, a long press returns the display to a normal reading.	Volts DC, Volts AC, Resistance, Auxiliary
F2		A short press freezes, or pauses, the data being displayed. A second press returns the display to live data.	All except Continuity and Diode Check
F3		Changes the measurement range when operating in the Volts DC, Volts AC, Resistance, Auxiliary, capacitance, graphing or scope modes.	Volts DC, Volts AC, Resistance, Capacitance
F4		Available only in graph and oscilloscope modes, this soft key is used to change the time base.	Waveform Viewer
S		A short press of the Special Functions key switches between functions (Hz, Pw, etc.), a long press returns to the original setting. Available functions vary by test mode. When in oscilloscope mode, the “S” key is used to select from submenus.	Volts DC, Volts AC, Waveform Viewer
Min/Max		The Min/Max key displays the minimum and maximum sampled signal values along with the current value. A short press activates or resets the readings, a long press cancels.	All except Continuity and Diode Check, Capacitance
Range		Short presses of the Range key switches the precision of the displayed value incrementally. A long press returns the value to Auto ranging.	All
Graph		A short press of the Graph key switches the display from a digital readout to a histogram, or graph. A long press switches the display back to digital.	Volts DC, Volts AC, Auxiliary

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

This chapter details the features available based on the Rotary Switch position:

- “Volts DC” on page 13
- “Volts AC” on page 18
- “Resistance” on page 20
- “Continuity and Diode Check” on page 21
- “Auxiliary” on page 22
- “Capacitance” on page 23
- “Oscilloscope” on page 24
- “Remote Functions” on page 32

5.1 Volts DC

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

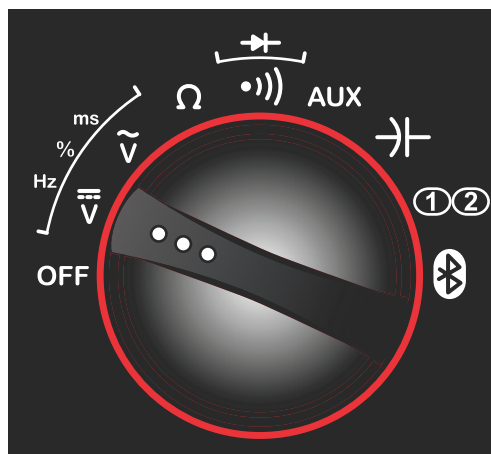


Figure 5-1 Volts DC selected

A typical Volts DC screen with Min/Max active is shown in Figure 5-2. Note the functions of the F1, F2, and F3 soft keys are shown at the bottom of the display screen. The F4 soft key is not operational in the Volts DC mode, although the beeper does sound if the key is pressed.

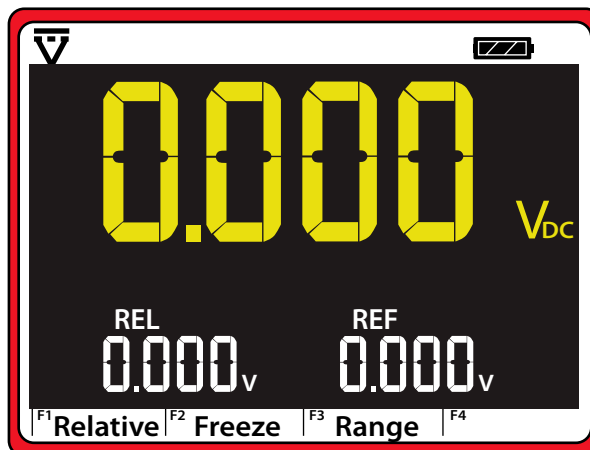


Figure 5-2 Sample Volts DC screen

5.1.1 F1 Key, Relative

The Current value is displayed in large yellow numbers at the top of the screen. The lower numbers (REL, for relative and REF, for reference) shown in Figure 5-2 do not display when you first select the Volts DC function. These lower numbers indicate the Relative function is active.

When F1 is momentarily pressed, relative mode is activated and the DMM takes a “snapshot” of the current reading and holds it on the display as the Reference Value. The “relative” value then shows the difference between the Current value and the Reference value. Additional momentary presses of the F1 key record new snapshots that replace the previous Reference value. Press and hold the F1 key to cancel the relative function.

Alternate F1 Menu

There is a special alternate menu that is available by pressing and holding the F1 key for several seconds while in Volts DC mode (Figure 5-3).

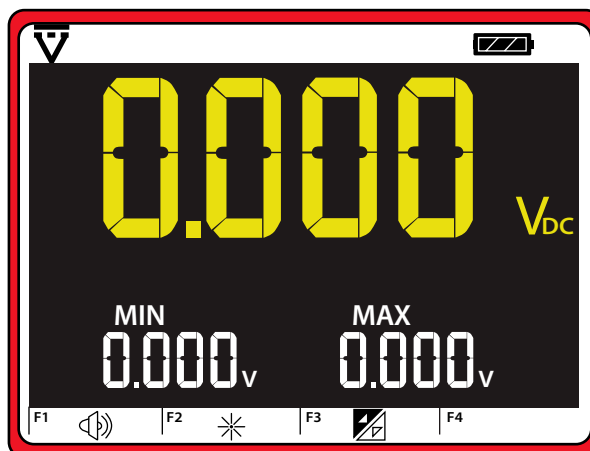


Figure 5-3 Sample alternate F1 menu

This menu allows your to modify three settings:

- F1—beeper functions
- F2—display backlighting
- F3—display screen colors

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

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

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

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

5.1.2 F2 Key, Freeze

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

5.1.3 F3 Key and Range Key

Pressing the F3 and Range keys increases or decreases the measuring range. Measuring ranges vary by which function (Volts DC, Volts AC, Resistance, or Auxiliary) is selected. Momentary, short, presses of the F3 or Range keys incrementally increase or decrease the range. A long press of either key returns the unit to auto-range operation. This function is available in both normal and relative modes.

5.1.4 Min/Max Key

Press the Min/Max key and the display shows both the instantaneous voltage reading and the minimum and maximum voltages that occurred since the last time the key was pressed. See “Sample alternate F1 menu” on page 14.

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

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

5.1.5 S Key, Special Functions

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

1. The screen changes to show the frequency of the test signal.
2. The screen changes to show pulse width of the test signal.

When displaying frequency, the period (abbreviated PRD on the screen) represents the time required for the signal to complete one cycle. Readings are displayed in milliseconds. The Freeze (F2) and Range (F3) soft keys remain active in this mode. Figure 5-4 shows a typical frequency display following a single press of the S Key. Press the S Key a second time and the duty cycle (DTY) reading changes to show the pulse-width (PWD) of the signal in milliseconds.

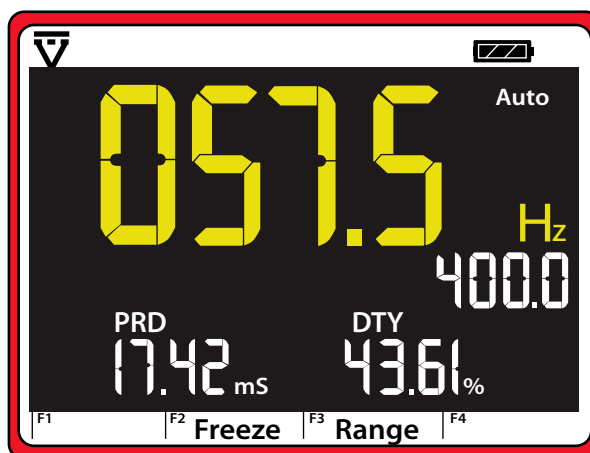


Figure 5-4 Sample Frequency display



NOTE:

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

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

5.1.6 Graph Key

The M2 Scope/Meter can generate a graphical history of a voltage signal over time, which is called a histogram. Pressing the Graph button when operating in Volts DC or Volts AC range causes the display to change from a digital reading to a graphical display. A digital value of the current signal value displays in the upper-right corner of the display while operating in graphing mode.

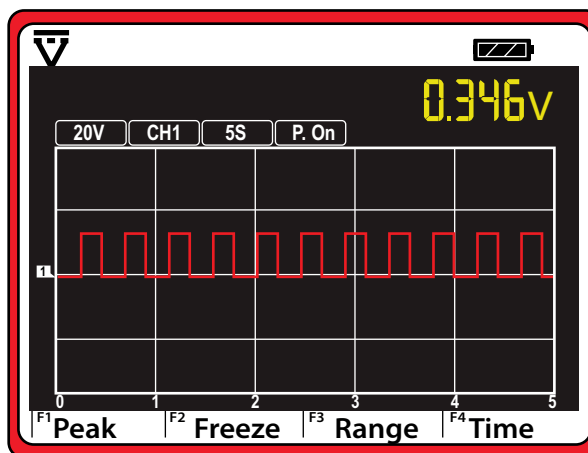


Figure 5-5 Sample Volts DC histogram

Graphing Voltage Measurement Screens

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

- **F1**—switches peak detection on and off
- **F2**—freezes and unfreezes the histogram (pauses and resumes data collection).
- **F3**—incrementally increases the measurement range. The **Range** key incrementally decreases the measurement range. Press and hold either key to return to auto ranging.
- **F4**—incrementally increases the time scale of the histogram. The **Graph** key incrementally decreases the time scale. Press and hold either key to return to auto ranging.

Graphing with Min/Max Function

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

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



To exit graph mode:

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

Graphing Time-Based Measurement Screens

In time-based measurement mode, the M2 Scope/Meter uses a specialized strategy called “cycle-by-cycle” (C-B-C) time-based measurements to capture signal glitches. To do this, the M2 Scope/Meter unit examines each cycle of the signal under test, calculates its frequency, duty

cycle and pulse width, and then generates a graphical history of that measurement (called a histogram). Any significant variation of the signal is visible on the histogram.



To access time-based measurement graphs:

1. Press the **G**raph key.
2. Press the **S** key.

The M2 Scope/Meter is now in time-based measurement mode.

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

There three items displayed on the LCD in the time-based measurement mode:

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

5.1.7 Range

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

5.2 Volts AC



Figure 5-6 Volts AC selected

When sampling AC voltage the soft keys function much the same as for DC voltage. However, there are some differences. Brief explanations are provided below, refer to “Volts DC” on page 13 for more detailed descriptions.

5.2.1 F1 Key

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

5.2.2 F2 Key

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

5.2.3 F3 Key

Short pushes of the F3 key incrementally increases the selected measurement range. The key is active in both the standard Volts AC and histogram modes.

5.2.4 F4 Key

The F4 key is nonfunctional in this mode.

5.2.5 S Key

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

5.2.6 Min/Max Key

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

5.2.7 Range Key

Short pushes of the Range key incrementally decreases the selected measurement range. A long press of the Range key returns to display to the automatic range.

5.2.8 Graph Key

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

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

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

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

5.3 Resistance

This setting allows you to measure the DC resistance to current in ohms. When sampling resistance the soft keys function much the same as for DC or AC voltage. Brief explanations are provided below, refer to “Volts DC” on page 13 for more detailed descriptions.



Figure 5-7 Resistance selected

5.3.1 F1 Key

The F1 key switches between normal and relative readings. A short push of the key resets the reading, a long push opens the alternate menu. The relative reading can be used to compensate for resistance in the test reads by zeroing the meter with the following procedure.



To zero out test lead resistance:

1. Set the Rotary Switch set to the resistance position.
2. Connect the test leads together.
The resistance of the shorted leads displays as the current value on the M2 Scope/Meter.
3. Press the **F1** (Relative) key and the M2 captures the lead resistance as the reference value.

The meter now displays three values; current, relative (REL) and reference (REF). Relative value is internally calculated by subtracting the previously captured reference value from the current resistance measurement. Therefore, the relative value represents the actual resistance of the component or circuit being tested because it eliminates the resistance of the test leads and probes. Compensating for test lead resistance provides a more precise measurement.

5.3.2 F2 Key

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

5.3.3 F3 Key and Range Key

A short push of the F3 or Range key changes the selected measurement range. Each push of the F3 key incrementally increases the value, and each push of the Range key decreases the value.

5.3.4 F4 Key and S Key

The F4 and S Keys are nonfunctional in this mode.

5.3.5 Min/Max Key

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

**NOTE:**

The Min/Max function cannot be engaged when the meter is over range, such as when the test leads are open and not connected to a component or circuit. Connect to a component or circuit before pressing the Min/Max key.

5.4 Continuity and Diode Check

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

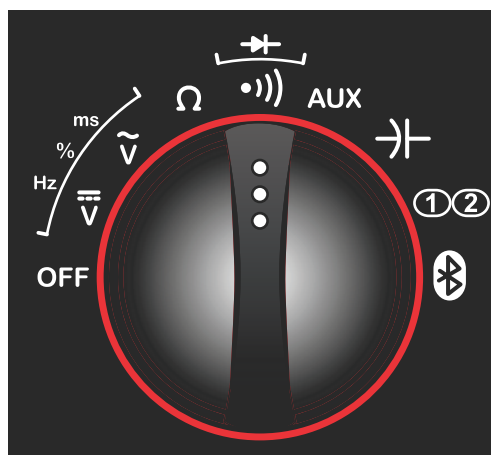


Figure 5-8 Continuity and diode check selected

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

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

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

5.5 Auxiliary

This selection allows you to select between three auxiliary tests:

- Current (amperes)
- Temperature
- Pressure

Approved probes, sensors, and transducers must be used in order to obtain valid measurements.



Figure 5-9 Sample auxiliary selected

Brief explanations of the soft key functions are provided below, refer to “Volts DC” on page 13 for more detailed descriptions.

5.5.1 F1 Key

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

5.5.2 F2 Key

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

5.5.3 F3 Key and Range Key

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

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

5.5.4 F4 Key

The F4 key is nonfunctional in this mode.

5.5.5 S Key

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

5.5.6 Min/Max Key

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

5.5.7 Graph Key

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

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

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

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

5.6 Capacitance

This selection is used to measure capacitance.



Figure 5-10 Sample capacitance selected

5.6.1 F1 Key

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

5.6.2 F2 Key

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

5.6.3 F3 Key and Range Key

The F3 and Range keys select the measurement range.

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

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

5.7 Oscilloscope

The M2 Scope/Meter has the ability to function as a two-channel oscilloscope, or waveform viewer. The viewer becomes active when the rotary switch is turned to the “scope” position.

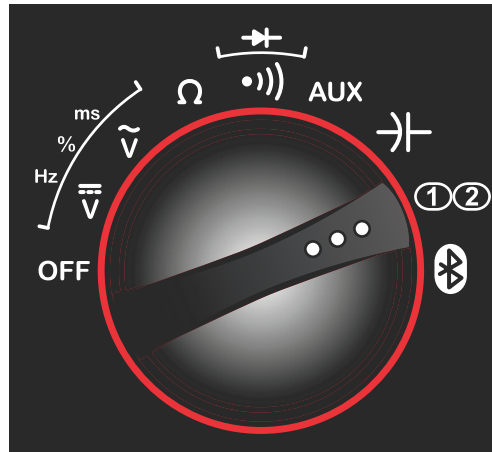


Figure 5-11 Sample scope setting

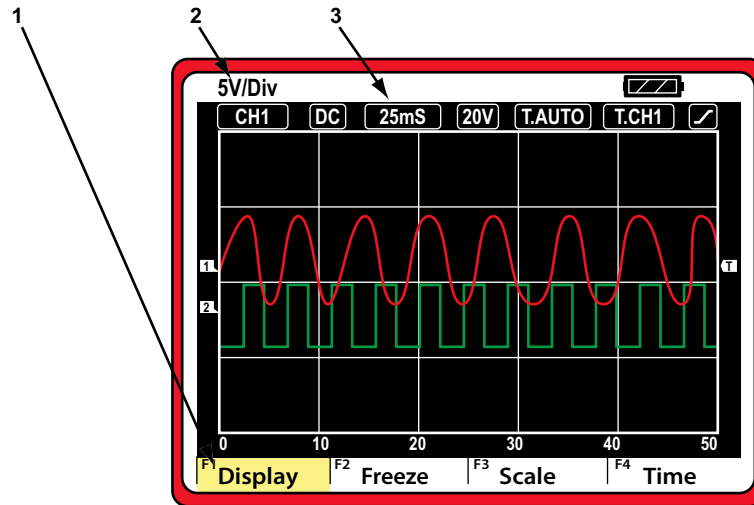
Soft key functions are unique when performing oscilloscope tests. In this mode there are seven available setting ranges for the F2, F3, and F4 keys. Pressing the F1 key scrolls up through the list of settings, and pressing the S key scrolls down through the list. The F1 area on the screen shows which of the six settings is currently active (Figure 5-12). Available scope functions are shown in the table below:

Setting	F1 Key	S Key	F2 Key	F3 Key	F4 Key
Display	Scroll up	Scroll down	Pause	Scale	Time
Trigger			Slope	Level	Channel
Preset A			GCI&S†	LF AC†	HF AC†
Preset B			PCI&S†	LF DS†	HF DS†
Special			Peak	Invert	Coupling
Position			Move Ch1 Trace	Move Ch2 Trace	Not Used
Channel			Display Ch1	Display Ch2	Select Channel
† See page 28 for acronym definitions					

5.7.1 Display Selections

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

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

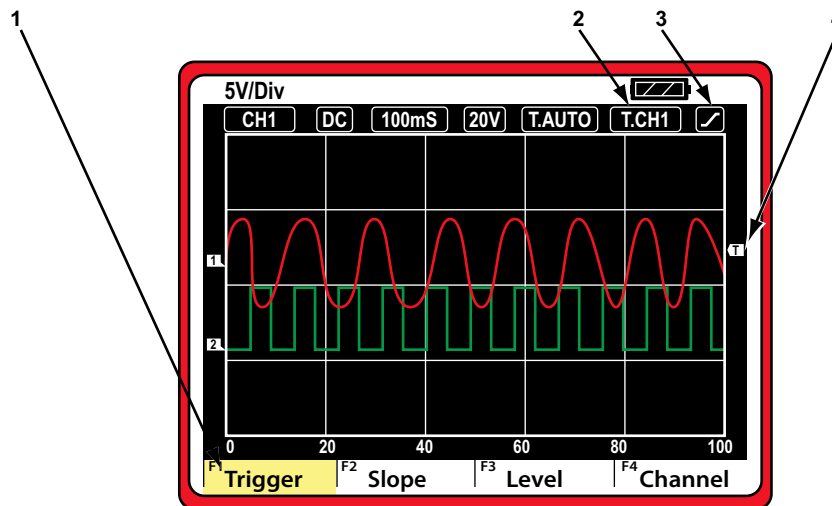


- 1— Mode
- 2— Scale
- 3— Time Base

Figure 5-12 Sample display screen

5.7.2 Trigger Selections

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



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

Figure 5-13 Sample trigger screen

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

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



NOTE:

Triggering is not available when the time base setting is between 1 second and 10 seconds.

5.7.3 Preset Selections

These options allow you to select from already configured scope setups for commonly tested items. Six preset configurations are available; three for Preset A and three for Preset B. These preset conditions are permanent and cannot be erased or modified.

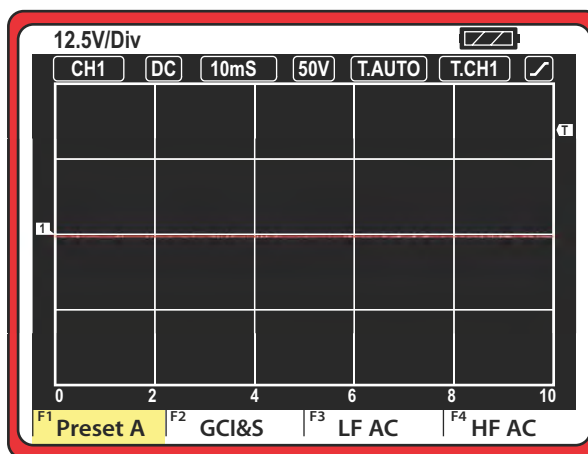


Figure 5-14 Sample preset (Preset A, F2) screen



To select a preset:

1. Use the **F1** or **S** key to navigate to either Preset A or Preset B.
2. Press **F2**, **F3**, or **F4** to load the desired preset.

The selected preset loads and the meter is ready for testing.

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

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

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

Selection	Position	Timebase	Scale	Trigger	Coupling	Slope
Preset A	F2 (GCI&S)	10 mS	50 Volts	8 Volts	DC	Negative
	F3 (LF AC)	50 mS	20 Volts	0 Volt	AC	Positive
	F4 (HF AC)	10 mS	20 Volts	0 Volt	AC	Positive
Preset B	F2 (PCI&S)	10 mS	50 Volts	8 Volt	DC	Positive
	F3 (LF DS)	50 mS	20 Volts	3 Volt	DC	Positive
	F4 (HFDS)	10 mS	20 Volts	3 Volt	DC	Positive

5.7.4 Special Selections

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

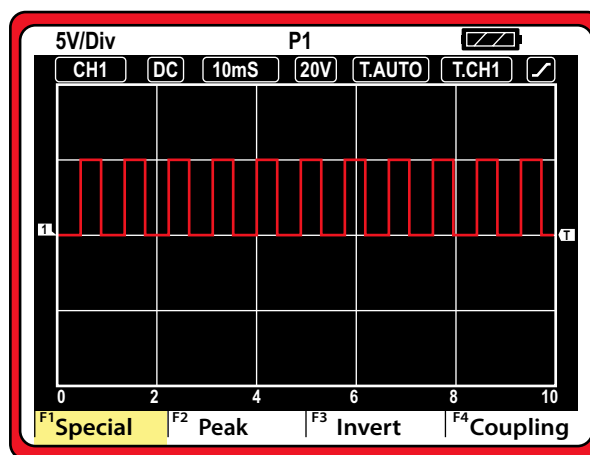


Figure 5-15 Sample special selections screen with peak capture on

Peak

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

Invert

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

Coupling

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

5.7.5 Position Selections

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

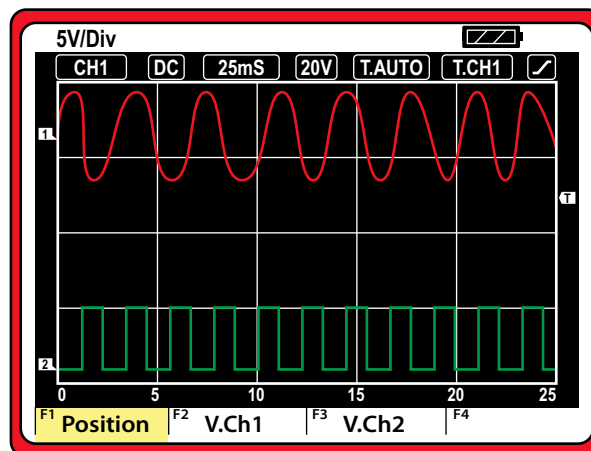


Figure 5-16 Sample screen with both traces repositioned

Channel 1 Trace

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

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

Channel 2 Trace

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

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

5.7.6 Channel Selections

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

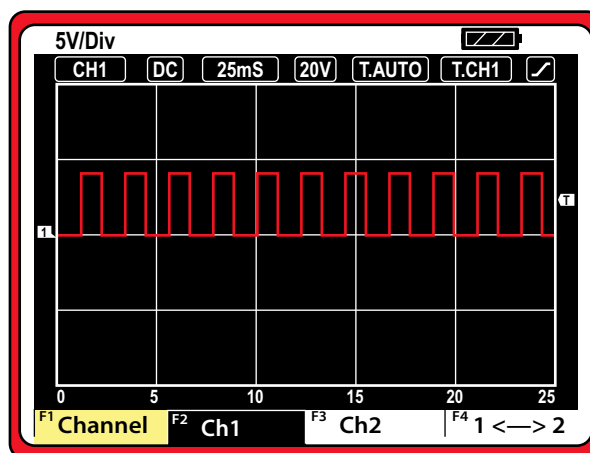


Figure 5-17 Sample screen with channel 1 on and channel 2 off

The F4 key is used to select which channel certain settings and special functions, such as display scale, peak, invert, and coupling, apply to. The currently selected channel is shown in the upper left-hand corner of the screen. Momentarily press F4 to switch channels.

5.7.7 Bluetooth Discovery Selection

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

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



To pair the M2 to a D7 Display Device:

1. Power on the D7 Display Device.
2. Set the M2 Rotary Switch to the oscilloscope position.
3. Press and hold the **F1** key of the M2 to open the alternate menu.

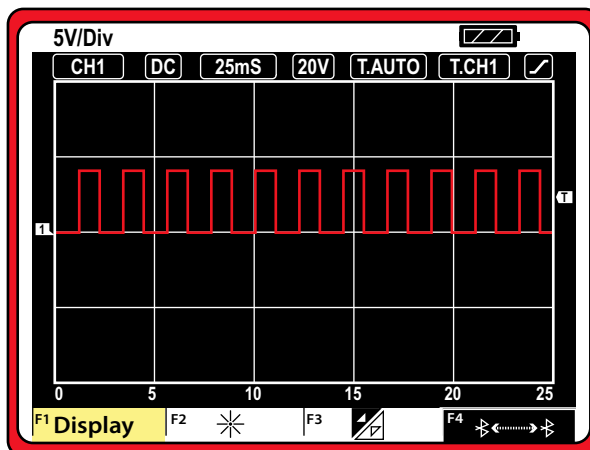


Figure 5-18 Sample Bluetooth Discovery selected

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

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

The F4 field on the screen switches to inverse video (white on black) when the Bluetooth Discovery mode becomes active.
5. With the Bluetooth Discovery mode active, turn the M2 Rotary Switch to the Remote Functions position (Figure 5-19).

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

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

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

5.8 Remote Functions

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

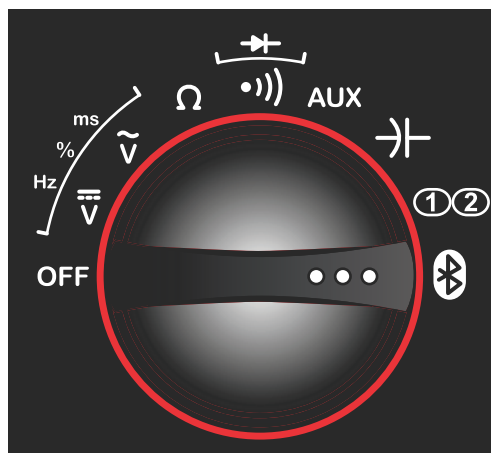


Figure 5-19 *Sample remote functions selected*

If the M2 Scope/Meter has been paired with a display device, it automatically connects to it. Once connected to a display device the front panel keys on the M2 Scope/Meter become inoperative. In addition, the M2 Scope/Meter screen graphic changes from red to blue to indicate when it is connected to a remote device. All controls of the M2 Scope/Meter are transferred to the host computer. Turning the Rotary Switch off of the Remote Functions position returns control to the M2 Scope/Meter and the front panel keys regain their functionality.

The M2 Scope/Meter may be connected wireless to a compatible Display Device, or host computer, so that underhood circuits can be monitored while driving or test results can be viewed on a larger screen. In order to do this, the two wireless devices need to be paired, or synchronized, the first time they are used together.

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

6.1 Pairing to a Display Device

To ensure a successful pairing make sure that the battery packs of both the M2 Scope/Meter and the targeted display device are fully charged. It is highly recommended that both devices be powered by their respective AC/DC power supplies during the pairing operation. The two devices to be paired should also be in close proximity to each other, and in an area that is relatively free of radiofrequency interference.



To pair the M2 Scope/Meter to a Display Device:

1. Power on the Display Device.
2. Set the M2 Scope/Meter Rotary Switch to the oscilloscope position.

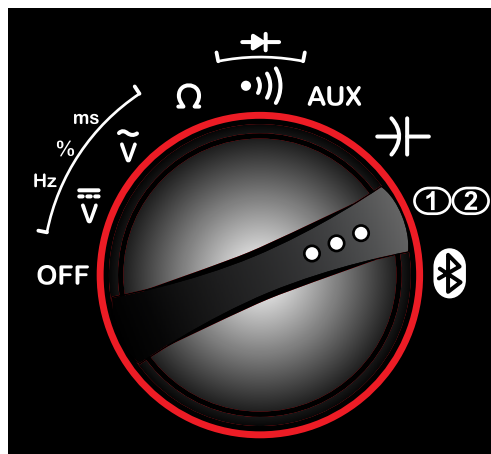


Figure 6-1 Rotary Switch Oscilloscope position

3. Press and hold the **F1** key of the M2 Scope/Meter to open the alternate menu.



NOTE:

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

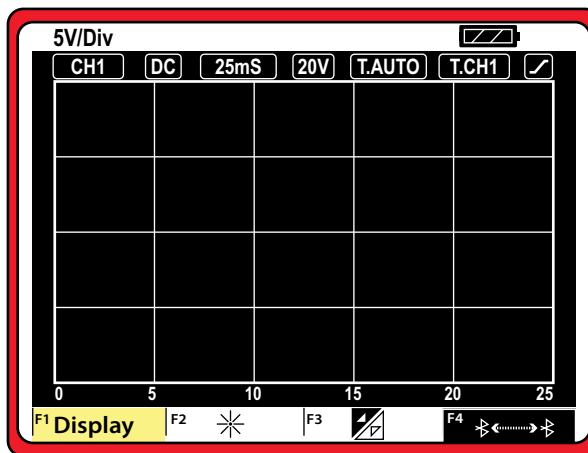


Figure 6-2 Sample Bluetooth Discovery selected

4. Press the **F4** key to activate Bluetooth Discovery.
The F4 field on the screen switches to inverse video (white on black) when the Bluetooth Discovery mode becomes active.
5. With the Bluetooth Discovery active, turn the Rotary Switch to the Remote Functions position.

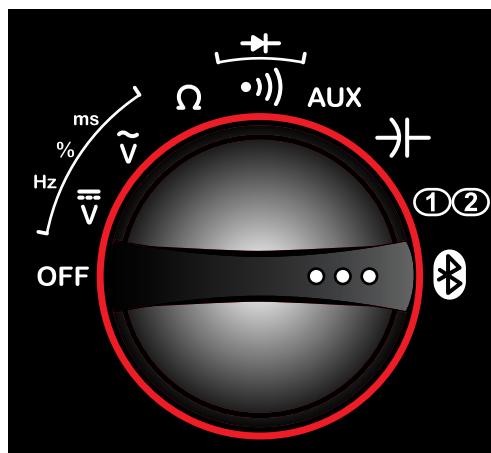


Figure 6-3 Rotary Switch Remote Functions position

The M2 Scope/Meter is now ready to be paired with a display device. If the radio name and the security code of the M2 Scope/Meter are recognized as legitimate by the display device, the two devices automatically pair, bond and connect.

IMPORTANT:

There is no indicator on the M2 Scope/Meter to signify it has been successfully paired. Therefore you must monitor the display device to determine if pairing has completed. Refer to the appropriate display device user manual as needed.

6. After M2 Scope/Meter has been successfully paired, turn the Rotary Switch to the oscilloscope position.
7. Press and hold the **F1** key to open the alternate menu.
8. Press the **F4** key to switch off Bluetooth discovery mode.
The F4 field switches to normal (black on white) when Bluetooth Discovery mode is inactive.

6.2 Wireless Communication

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

Following the initial pairing, simply set the Rotary Switch to the Remote Functions position to transfer data wirelessly from the M2 Scope/Meter to the display device. A “communicating” screen, which can be in one of two states, displays on the M2 Scope/Meter whenever remote functions is selected and the display device is powered on.

A screen with a red graphic image indicates that a wireless link between the two devices has not been established (Figure 6-4).

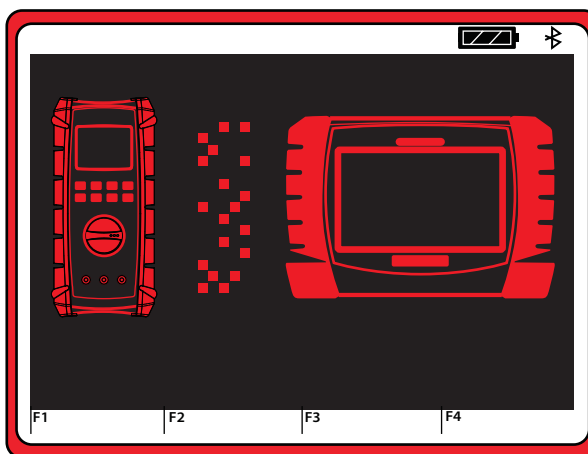


Figure 6-4 Sample “red”, connected but not exchanging data, screen

When the Scope Multimeter is activated on the display device, the M2 screen changes to indicate the two units are communicating. A screen with a blue graphic image indicates the two paired devices are connected and capable of communicating with each other (Figure 6-5).

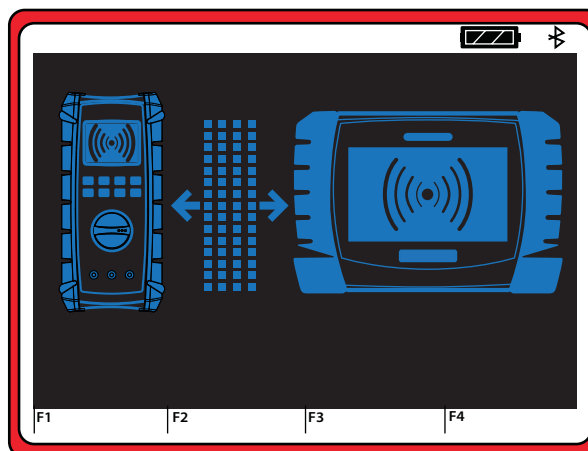


Figure 6-5 Sample “blue”, active communication, screen

7.1 Cleaning and Inspecting

When using the M2 Scope/Meter, make sure to do the following:

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

IMPORTANT:

Do not use any abrasive cleansers or automotive chemicals to clean the unit, cables, or probes.

7.2 Replacing the Battery Pack

IMPORTANT:

Be aware of all applicable safety considerations when replacing, handling, and recycling batteries.

7.2.1 Battery Safety Guidelines

IMPORTANT:

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

Observe the following when using and handling the M2 Scope/Meter battery pack:

- Do not short circuit battery pack terminals.
- Do not immerse in water, or allow water to enter the M2 Scope/Meter or battery pack.
- Do not crush, disassemble, or tamper with the battery pack.
- Do not heat the battery pack to over 100°C (212°F), or dispose of it in a fire.
- Do not expose the battery pack to excessive physical shock or vibration.
- Keep the battery pack out of reach of children.
- Do not use a battery pack that appears to have suffered abuse or damage.
- Charge the battery pack with the supplied charger only.
- Do not use a battery charger that has been modified or damaged.
- Use the battery pack for the specified product only.
- Store the battery pack in a cool, dry, well ventilated area.

NOTE:

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

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

To prolong the life of your battery, power off the unit when not in use.

7.2.2 Battery Pack Replacement

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

IMPORTANT:

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

Replace the battery pack with the exact replacement rechargeable nickel-metal hydride (Ni-MH) type battery only. Do not attempt to use standard (lead/zinc) batteries as they do not provide sufficient power to operate the M2 Scope/Meter, and may leak and damage the tool.

⚠ WARNING

Risk of electric shock.

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

Electric shock can cause injury.

Disposing of the Battery Pack

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

- North America—Rechargeable Battery Recycling Corporation (RBRC) at <http://www.rbrc.org> or <http://www.call2recycle.org>, or call 1(800) 822-8837 (USA)
- United Kingdom—Electrical Waste Recycling Company at <http://www.electricalwaste.com>

Products bearing the WEEE logo (Figure 7-1) are subject to European Union regulations.



Figure 7-1 sample WEEE logo

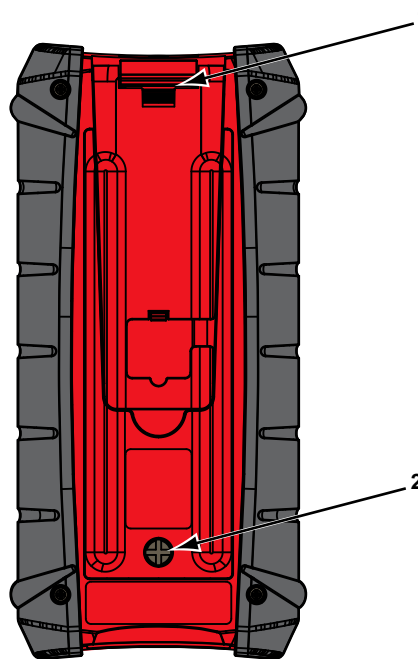
**NOTE:**

Always dispose of materials according to local regulations.

Contact your sales representative for details.

**To replace the battery pack:**

1. Press to release the hanger catch on the back of the M2 Scope/Meter (Figure 7-2), then swing the hanger up (180°) so that it is fully extended.
2. Loosen the captive screw that secures the battery cover (Figure 7-2).
3. Remove the battery cover.



1— Hanger Catch

2— Captive Screw

Figure 7-2 M2 unit battery pack replacement

4. Remove the battery pack from the M2 unit housing to access the electrical connector.
5. Separate the battery pack electrical connector.
6. Connect the new battery pack electrical connector to the M2 Scope/Meter.
7. Fit the battery into the battery compartment.
8. Fit the battery compartment cover.
9. Tighten the captive screw and fold down the hanger.

The following items are available for use with the M2 Scope/Meter.

Description	Part Number
AC/DC Power Supply, 17V, 60W with Output DC Cord	EAK0301L01A1
Battery Pack with Cap Assembly	2-04750A
Test Lead Set (black, green, red) with Alligator Clips	EAK0301L03A
Low Amp Current Probe	EETA308D

Index

- A**
- AC/DC power supply 5
 - Alligator clips 9
- B**
- Battery pack
 - disposal 37
 - recycling 37
 - replacement 36–38
 - specifications 4
 - Bluetooth discovery 31
- C**
- Cables
 - channel 1 8
 - channel 2 8
 - common (GND) 9
 - Capabilities 7
 - Capacitance tests 23–24
 - Cleaning 36
 - Continuity tests 21–23
 - Controls and features 10–12
 - Coupling 29
- D**
- Dimensions, unit 4
 - Diode check 21–23
- F**
- Functional description 3
- G**
- Graphing meter 16–18
- H**
- Histogram 16
- I**
- Important messages 1
 - Invert 29
- L**
- Low Amp Current Probe 9
- M**
- Manual conventions 1
- N**
- Note messages 1
- O**
- Operations 13–32
 - Oscilloscope tests 24–32
- P**
- Peak capture 29
 - Power sources 5
 - Presets 27
- R**
- Remote functions 32
 - Resistance tests 20–21
 - Rotary Selector Switch 11
- S**
- Safety iii–iv
 - Safety information 6
 - Soft Keys 12
 - Specifications 4
- T**
- Test leads 8–9
 - Triggering 26
- V**
- Volts AC tests 18–20
 - Volts DC tests 13–18
- W**
- Waveform viewer 24–32
 - Wireless communication 4