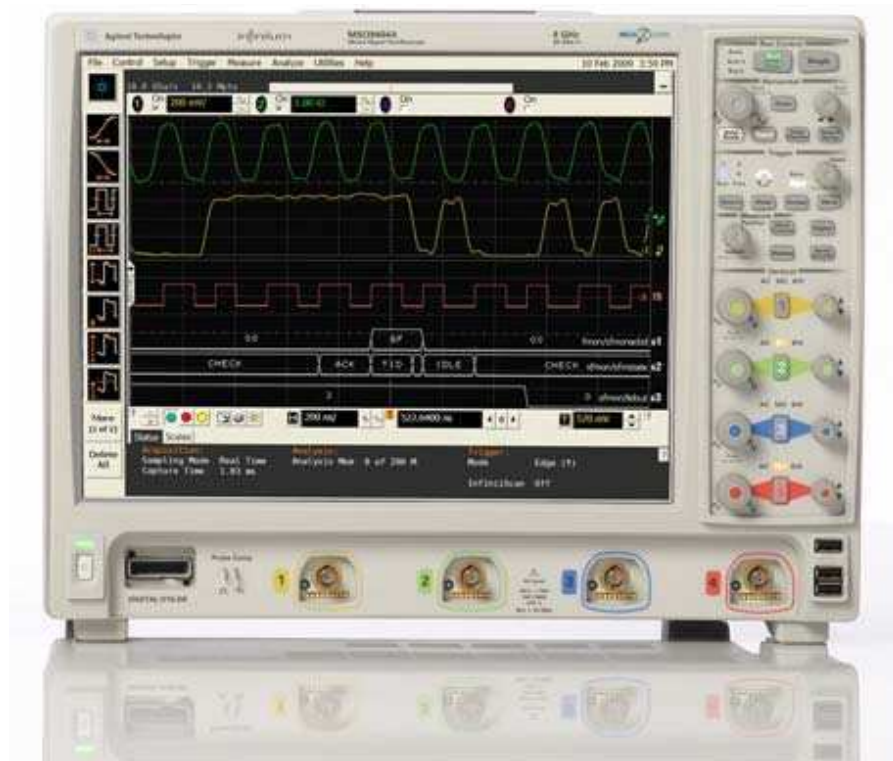




Infiniium 9000 Series Oscilloscope

User's Guide

Publication number 54904-97016
September 2014



NOTICE: This document contains references to Agilent Technologies. Agilent's former Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.



© Keysight Technologies 2014

In This Book

This book provides the information you need to begin using the Infiniium 9000 Series oscilloscope. It contains four chapters:

Chapter 1, “Setting Up the Oscilloscope”, contains inspection, power requirements, air flow, and setup information.

Chapter 2, “Working in Comfort”, contains recommendations for working comfortably and safely while operating the Infiniium oscilloscope.

Chapter 3, “Using the Oscilloscope”, gives an overview of the front panel and the graphical user interface, and tells you how to perform basic operations with the oscilloscope.

Chapter 4, “Accessing the Online Help”, describes the Infiniium oscilloscope application’s online help contents and navigation. The online help describes how to use the Infiniium oscilloscope software in more detail.

For More Information

- For detailed information on how the oscilloscope makes measurements and how to use the oscilloscope, see the Infiniium oscilloscope application’s online help.
- For information on programming the oscilloscope using a computer with a GPIB interface card or LAN interface card, see the *Programmer’s Reference* for your model number oscilloscope found in the Infiniium oscilloscope application’s online help.
- For information on testing and servicing the oscilloscope, see the *Service Guide* manual found in the Infiniium oscilloscope application’s online help.

9000 Series Oscilloscopes -- At a Glance

9000 Series Oscilloscope Models

Model	Bandwidth	Std. Memory (2 ch, 4 ch)
DSO/MSO9064A	600 MHz	40 Mpts, 20 Mpts
DSO/MSO9104A	1 GHz	40 Mpts, 20 Mpts
DSO/MSO9254A	2.5 GHz	40 Mpts, 20 Mpts
DSO/MSO9404A	4 GHz	40 Mpts, 20 Mpts
DSO9024H	250 MHz	100 Mpts, 50 Mpts
DSO9054H	500 MHz	100 Mpts, 50 Mpts
DSO9104H	1 GHz	100 Mpts, 50 Mpts
DSO9204H	2 GHz	100 Mpts, 50 Mpts

DSO9024H, DSO9054H, DSO9104H, and DSO9204H models have up to 12 bits of high resolution.

Ease of use with high performance

The Agilent Technologies Infiniium oscilloscopes combine unprecedented ease-of-use with high-performance digitizing oscilloscope functionality to simplify your design and analysis measurement tasks.

- Traditional oscilloscope front-panel interface provides direct access to the controls needed for most troubleshooting tasks.
- Graphical user interface with menus, windows, dialog boxes, and toolbars provides easy access to dozens of configuration and analysis tools, ensuring you can set up and make the most complex measurements.
- Models with bandwidths from 250 MHz to 4 GHz.

Display shows waveforms and graphical user interface

- Graphical interface allows direct interaction with waveforms, including drag-and-drop positioning and instant waveform zoom.
- Touchscreen display allows oscilloscope operation without an external pointing device.
- Waveforms displayed in color, making correlations easy.
- Current configuration parameters displayed near the waveform display and are color-coded to make identification easy.

9000 Series Oscilloscopes -- At a Glance

- Graphical interface menus and toolbars simplify complex measurement setups.

Horizontal controls set sweep speed and position

- Main sweep speeds from 5 ps/div to 20 s/div.
- Intensified waveforms on main sweep window make it easy to see what will appear in the zoom window.

Acquisition and general controls start and stop the scope and do basic setup

- Run and stop controls for continuous or single acquisitions.
- Clear display before one or more acquisitions.
- Default setup and Autoscale set initial configuration.

Hard disk drive and USB 2.0 port for saving and restoring setups and measurement results

- Store measurement displays for inclusion in reports and test setup guides.
- Store oscilloscope setups to repeat tests another time.
- Hard disk stores oscilloscope operating system.

Trigger setup controls set mode and basic parameters

- Select Edge, Glitch, or Advanced Modes.
- Choose input source and slope.
- Use graphical user interface to simplify configuration of pattern, state, delay, and violation trigger modes.

Vertical controls set attenuation and position

- Input attenuation adjustable from 1 mV/div to 1 V/div.
- Color-coded knobs make it easy to find the controls that affect each waveform.

Marker and quick measurements help measure waveform parameters

- Waveform markers A and B to check voltage or Δ -time at any point on the displayed waveform.

Contents

9000 Series Oscilloscopes -- At a Glance 3

1 Setting Up the Oscilloscope

To inspect package contents 9
To inspect options and accessories 10
Technical Specifications 11
To position for proper airflow 12
To connect power 14
To connect a mouse, keyboard, LAN cable, USB device, and printer 15
To connect oscilloscope probes 17
To tilt the oscilloscope for easier viewing 19
To turn on the oscilloscope 20
To turn off the oscilloscope 21
To verify basic oscilloscope operation 22
Installing application programs on Infiniium 24
Changing Windows Operating System Settings 25
To clean the oscilloscope 26

2 Working in Comfort

About Repetitive Strain Injury 29
Mice and Other Input Devices 30

3 Using the Oscilloscope

Front Panel 34
Acquisition Run Controls 36
Horizontal Controls 36
Trigger Controls 36
Vertical Controls 37
Marker and Measurement Controls 37
To set the oscilloscope to a known starting condition 38
To start and stop waveform acquisition 39
To clear the waveform display 40
To turn an analog channel on or off 41
To turn the digital channels on or off 42
To adjust the analog channel's vertical scale and offset 43
To adjust horizontal scale and horizontal position 44
To magnify a part of the waveform using Zoom 45
To set the oscilloscope to trigger on an edge 46
To use the markers 47
To use the quick measurements 48
To enable or disable the touch screen 49
Graphical User Interface 51
To perform basic user interface operations 58
To select a command from the menu bar 62
To select a command from a context-sensitive menu 63
To start and stop waveform acquisition 66

Contents

To clear the waveform display	67
To print the screen	68
To change waveform brightness	69
To turn a channel on or off	70
To adjust the vertical offset	71
To adjust vertical scaling	73
To access the channel setup	74
To set the horizontal reference point	75
To adjust horizontal scale	76
To adjust horizontal position	77
To access the horizontal setup	78
To zoom on a section of the waveform	79
To move the markers using the graphical interface	81
To make a measurement on a waveform	82
To access the trigger setup	84
To set an edge trigger	85
To set dialog box preferences	86
To recover your Infinium hard disk	87
4 Accessing the Online Help	
To access the online help	91
To access context-sensitive information	94

Setting Up the Oscilloscope

Setting Up the Oscilloscope

This chapter shows you how to set up your Infiniium oscilloscope, connect power and accessories, and verify general operation.

To inspect package contents

- ❑ Inspect the shipping container for damage.

Keep a damaged shipping container or cushioning material until you have inspected the contents of the shipment for completeness and have checked the oscilloscope mechanically and electrically.

- ❑ Inspect the oscilloscope.

- If there is mechanical damage or a defect, or if the oscilloscope does not operate properly or does not pass performance tests, notify your Agilent Technologies Sales Office.
- If the shipping container is damaged, or the cushioning materials show signs of stress, notify the carrier and your Agilent Technologies Sales Office. Keep the shipping materials for the carrier's inspection. The Agilent Technologies Sales Office will arrange for repair or replacement at Agilent's option without waiting for claim settlement.

- ❑ Verify that you received the following items in the Infiniium Oscilloscope packaging.

- Infiniium Oscilloscope
- Mouse
- Touch screen Stylus
- Front Panel Cover
- N2873A 10:1 Divider Passive Probe per Scope Channel
- Channel Flying Lead Set Logic Probe, MSO Cable, and Calibration Fixture (MSO models only)
- Probe Accessory Pouch (mounts on rear of oscilloscope)
- Agilent I/O Libraries Suite 15.0
- Localized Power Cord
- Keyboard

If anything is missing, contact your nearest Agilent Technologies Sales Office. If the shipment was damaged, contact the carrier, then contact the nearest Agilent Technologies Sales Office.

To inspect options and accessories

Verify that you received the options and accessories you ordered and that none were damaged.

If anything is missing, contact your nearest Agilent Technologies Sales Office. If the shipment was damaged, or the cushioning materials show signs of stress, contact the carrier and your Agilent Technologies Sales Office.

For a complete list of options and accessories available for the 9000 Series oscilloscopes, see the Infiniium 9000 Series Oscilloscopes data sheets.

Technical Specifications

The following table contains a partial list of specifications and characteristics for the Keysight Infiniium 9000 oscilloscopes. For a full list, see the data sheets at www.keysight.com/find/9000.

Specifications are valid after a 30-minute warm-up period, and within $\pm 5^{\circ}\text{C}$ from the temperature at which the last self-calibration was performed.

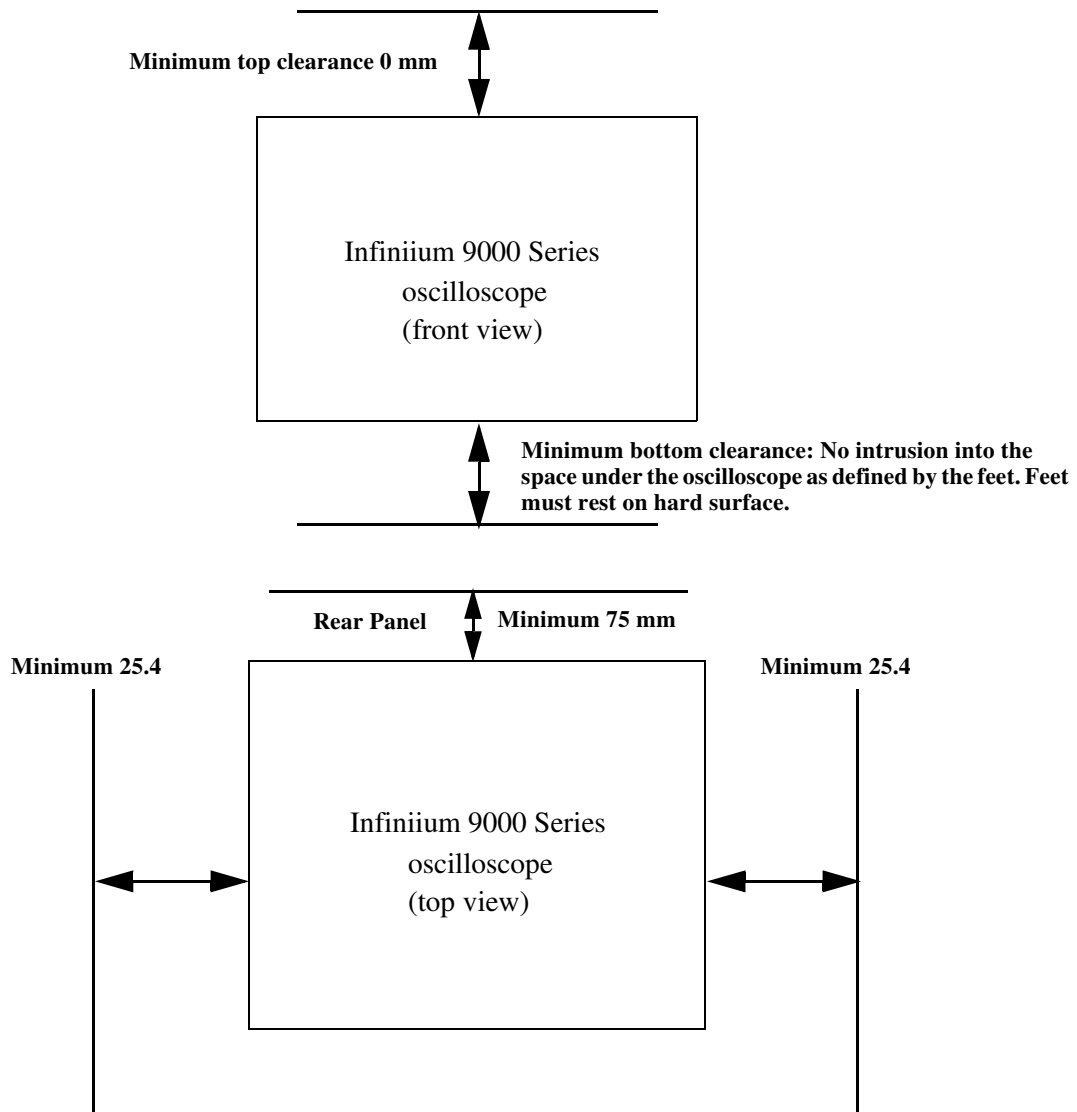
Environment	Indoor use only.
Ambient Temperature	Operating -5°C to $+40^{\circ}\text{C}$ Non-operating -40°C to $+65^{\circ}\text{C}$
Humidity	Operating: up to 95% relative humidity (non-condensing) at $+40^{\circ}\text{C}$ Non-operating: up to 90% relative humidity at $+65^{\circ}\text{C}$
Altitude	Operating: up to 4,000 m (12,000 feet) Non-operating: up to 15,300 meters (50,000 feet)
Installation/Meas. Category	Installation category: II Measurement category: I
Power Requirements	100-120 V, 50/60/400 Hz 100-240 V, 50/60 Hz, 375 W maximum
Voltage Fluctuations	Note that the mains supply voltage fluctuations are not to exceed $\pm 10\%$ of the nominal supply voltage.
Pollution Degree	The Infiniium 9000 Series oscilloscopes may be operated in environments of Pollution Degree 2.
Pollution Degree Definitions	Pollution Degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence. Example: A clean room or climate-controlled office environment. Pollution Degree 2. Normally only dry non-conductive pollution occurs. Occasionally a temporary conductivity caused by condensation may occur. Example: General indoor environment. Pollution Degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected. Example: Sheltered outdoor environment.

To position for proper airflow

CAUTION

Position the oscilloscope where it will have sufficient clearance for airflow around the top, back, and sides (see Figure 1-1). Place the oscilloscope on a hard surface to avoid blocking the airflow underneath the oscilloscope. (For example, a piece of paper or carpet could block the fans and cause the instrument to overheat.)

Figure 1-1



The airflow requirement is 300 cfm
Positioning the Infiniium Oscilloscope with Sufficient Clearance

To connect power

- 1 Position the oscilloscope so that it is not difficult to unplug the power cord.
- 2 Connect the power cord to the side panel of the oscilloscope and then to a suitable ac voltage source (100 to 120 V, 50/60/400 Hz and 100 to 240 V, 50/60 Hz for the 9000 series). The power cord serves as the main disconnecting device. The maximum power dissipation is 375 W.

The oscilloscope power supply automatically adjusts for line input voltages in the range 100 to 240 VAC. Therefore, you do not need to adjust an input line voltage setting. The line cord provided is matched by Agilent Technologies to the country of origin of the order.

You should regularly check the condition of the power cord.



To connect a mouse, keyboard, LAN cable, USB device, and printer

See Figure 1-2 on the next page for the location of the side panel connectors described below.

Mouse The mouse can be plugged into either a USB port or into a PS2 port. There are several USB connectors on the front panel or the side panel of the oscilloscope that can be used. When using the PS2 port, the mouse must be plugged in prior to turning on power to the oscilloscope

Keyboard The keyboard can be plugged into either a USB port or a PS2 port. There are several USB connectors on the front panel or the side panel of the oscilloscope that can be used. When using the PS2 port, the keyboard must be plugged in prior to turning on power to the oscilloscope.

LAN Cable Connect your LAN cable to the RJ-45 connector on the side panel of the oscilloscope.

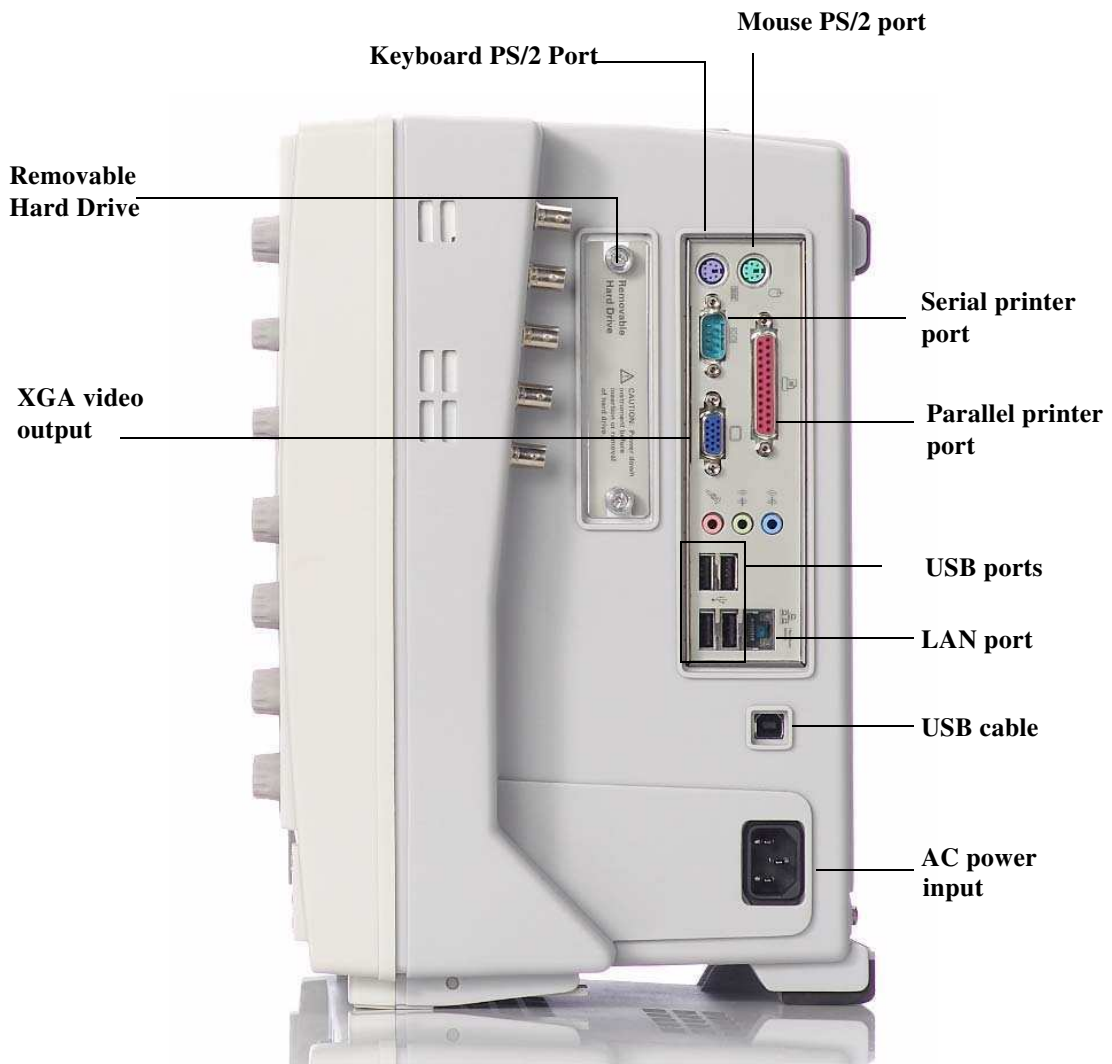
After you have connected to the LAN card, you must set up the network. Before you start to set up your network, you should exit the oscilloscope application.

USB Connectors Side panel USB connectors can be used for any USB devices. There are also three USB connectors in the lower right corner of the front panel.

Printer Cable If you have a parallel (Centronics) printer, you will need a parallel printer cable. Connect the cable to the parallel port on the side panel of the oscilloscope.

If you have a serial printer, you will need a 9-pin to 25-pin serial printer cable. Some printers may require other cable configurations, but the oscilloscope has a 9-pin serial connector. Connect the cable into the RS-232 port.

Figure 1-2

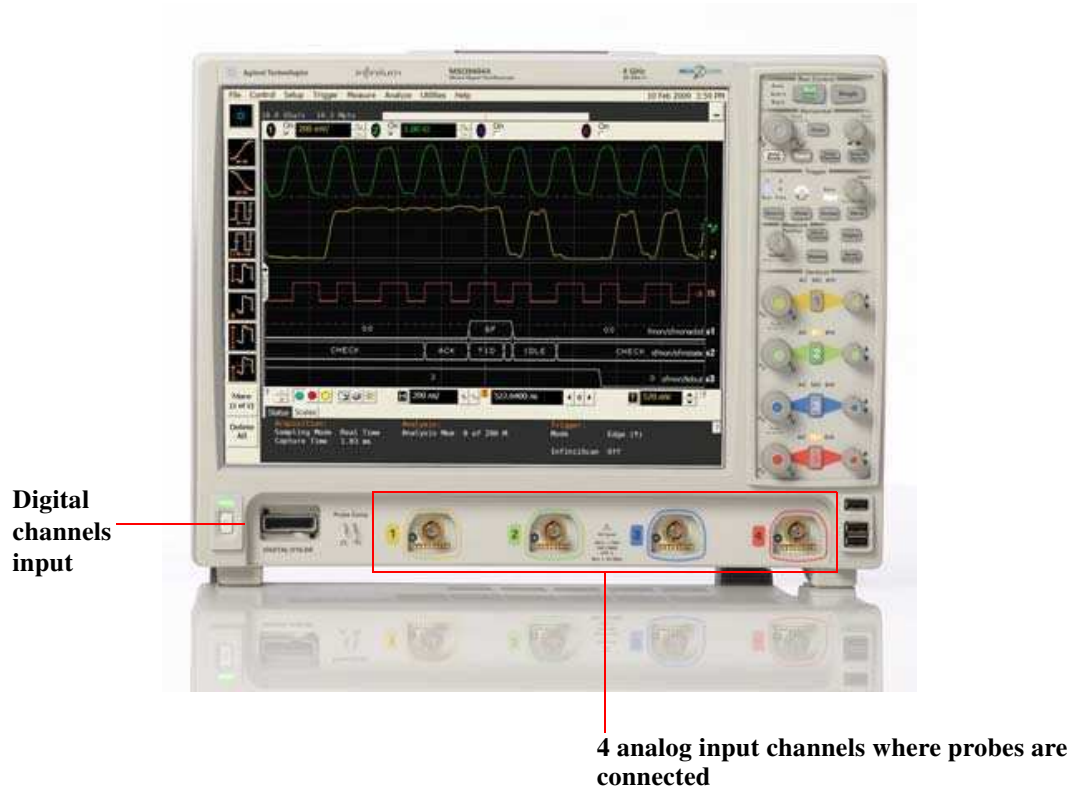


Side Panel

To connect oscilloscope probes

- 1 Attach the probe connector to the desired oscilloscope channel or trigger input using the probe instructions.

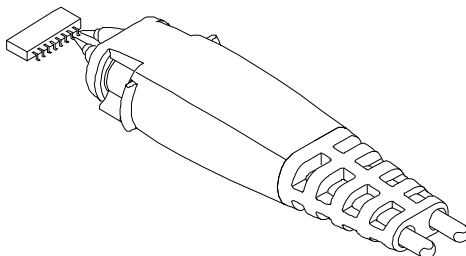
Figure 1-3



Setting Up the Oscilloscope

- 2 Connect the probe to the circuit of interest using the browser or other probing accessories.

Figure 1-4



Probing the Circuit

- 3 Disconnect the probe.

CAUTION

Do not attempt to twist the snap-on probes on or off the oscilloscope's BNC connector. Twisting the probe connector body will damage it.

CAUTION

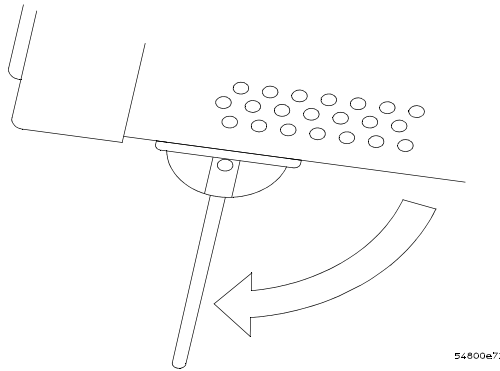


Do not exceed the maximum input voltage rating. The maximum input voltage for the 50 Ω inputs is ± 5 V_{peak}, CAT I and for the 1 M Ω inputs, it is 150 V_{rms} (or dc), CAT I, ± 250 V (dc + ac) in ac coupling.

To tilt the oscilloscope for easier viewing

- 1 Lift up the front of the oscilloscope, grasp one of the plastic feet on either side, and pull it down and forward until it latches into place. Repeat for the other foot.

Figure 1-5



Latching the Oscilloscope Front Feet

To turn on the oscilloscope

The first time you turn on the oscilloscope, you will need to have a mouse connected. The mouse is needed to accept the Microsoft end-user license agreement for the Windows 7 operating system.

- 1 Press the power switch in the lower left corner of the oscilloscope front panel.

Figure 1-6



Turning on the Oscilloscope

After a short initialization period, the oscilloscope display appears. The oscilloscope is ready to use.

- 2 You can connect and disconnect probes and BNC cables while the oscilloscope is turned on.

To turn off the oscilloscope

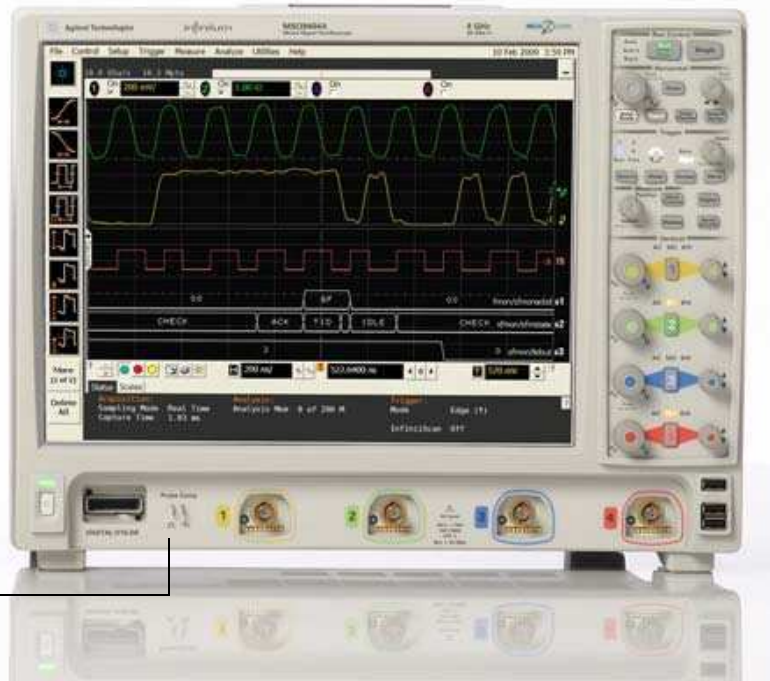
- 1** Press the power switch at the lower left corner of the oscilloscope front panel. The oscilloscope will go through a normal Windows operating system shutdown process.

To verify basic oscilloscope operation

- 1 Connect one end of the passive probe cable channel 1.
- 2 Connect the other end of the passive probe cable to the front panel probe comp connector with the square wave label.

Figure 1-7

Front panel
connector
with square
wave label



Verifying Basic Oscilloscope Operation

- 3 Press the **[Default Setup]** key on the front panel.
The display will pause momentarily while the oscilloscope is configured to its default settings.
- 4 Press the **[Auto Scale]** key on the front panel.

The display will pause momentarily while the oscilloscope adjusts the sweep speed and vertical scale. You should then see a square wave with peak-to-peak amplitude of approximately 5 divisions and about four cycles on screen. If you do not see the waveform, ensure your power source is adequate, the oscilloscope is properly powered-on, and the probe is connected securely to the front panel connector.

- 5** Move the mouse around the mouse surface and verify that the on-screen pointer follows the mouse movement.
- 6** Touch the pointer of the touch screen stylus to the surface of the screen and move it around while verifying that the pointer follows the movement.

Installing application programs on Infiniium

Infiniium is an open Windows operating system, which allows you to install your own application software. Agilent has verified that the following applications are compatible with the Infiniium oscilloscope application.

- Agilent Vector Signal Analysis
- Agilent VEE Pro
- Microsoft Office 2003, 2007, 2010
- MathWorks MATLAB
- Mathsoft MathCad 2001i
- McAfee VirusScan
- Symantec Norton AntiVirus

Before installing any software, you should exit the oscilloscope application.

If you install an application other than those which Agilent has tested, it is possible that it could break the oscilloscope application. This would potentially require you to recover the oscilloscope hard drive using the hard drive's hidden recovery partition.

Changing Windows Operating System Settings

Before changing any Windows operating system settings outside of the oscilloscope application you should exit the oscilloscope application.

Many Windows operating system settings can be changed to suit your own personal preferences. However, some operating system settings should not be changed because doing so would interfere with the proper operation of the oscilloscope.

- Do not change the Power Options.
- Do not change the System Properties Hardware Tab settings.
- Do not change the Regional and Language Options Advanced Tab settings.
- Do not remove Fonts.
- Display Settings:
 - Do not change the screen resolution or the color quality from Highest (32 bit).
 - Do not change the Font size to Extra Large.
 - Do not use a Menu font size greater than 14 points.
- Do not use the Administrative Tools to enable or disable Internet Information Services (Web Server). Use the Infiniium Web Control dialog box to enable or disable the Web Server.
- Do not delete or modify the Infiniium Administrator user account.

To clean the oscilloscope

Clean the oscilloscope with a soft cloth dampened with a mild soap and water solution.

CAUTION

Do not use too much liquid in cleaning the oscilloscope. Water can enter the Infiniium front panel, damaging sensitive electronic components.

Working in Comfort

To optimize your comfort and productivity, it is important that you set up your work area correctly and use your Infiniium oscilloscope properly. With that in mind, we have developed some setup and use recommendations for you to follow based on established ergonomic principles.

Improper and prolonged use of keyboards and input devices are among those tasks that have been associated with repetitive strain injury (RSI) to soft tissues in the hands and arms. If you experience discomfort or pain while using the oscilloscope, discontinue use immediately and consult your physician as soon as possible. For more information on RSI, read the “*About Repetitive Strain Injury*” section, next.

Please study the recommendations offered here in this chapter. Included there are references to relevant parts of international standards, regulations, and guidelines, such as ISO 9241 and the European Community Display Screen Equipment directive. You may also consult your employer’s human resources department or other relevant departments for guidance specific to your company.

About Repetitive Strain Injury

Because your comfort and safety are our primary concern, we strongly recommend that you use the Infinium oscilloscope in accordance with established ergonomic principles and recommendations. Scientific literature suggests that there may be a relationship between injury to soft tissues—especially in the hands and arms—and prolonged improper use of keyboards or other equipment requiring repeated motions of the hands and forearms. This literature also suggests that there are many other risk factors that may increase the chance of such injury, commonly called Repetitive Strain Injury.

What is RSI?

Repetitive Strain Injury (RSI—also known as cumulative trauma disorder or repetitive motion injury) is a type of injury where soft tissues in the body, such as muscles, nerves, or tendons, become irritated or inflamed. RSI has been a reported problem for those who perform repetitive tasks such as assembly line work, meatpacking, sewing, playing musical instruments, and computer work. RSI also has been observed in those who frequently engage in activities such as carpentry, knitting, housework, gardening, tennis, windsurfing and lifting children.

What causes RSI?

The specific causes of RSI have not been established. Nevertheless, the incidence of RSI has been associated with a variety of risk factors, including:

- Too many uninterrupted repetitions of an activity or motion.
- Performing an activity in an awkward or unnatural posture.
- Maintaining static posture for prolonged periods.
- Failing to take frequent short breaks.
- Other environmental and psychosocial factors.

In addition, there have been reports associating the occurrence of RSI with the use of keyboards, mice, and other input devices. Also, certain medical conditions, such as rheumatoid arthritis, obesity and diabetes, may predispose some people to this type of injury.

What if I experience discomfort?

If you are experiencing any discomfort, seek professional medical advice immediately. Typically, the earlier a problem is diagnosed and treated, the easier it is to resolve.

Mice and Other Input Devices

Various aspects of using mice and other input devices may increase your risk of discomfort or injury. Observing the following recommendations may reduce that risk.

- Try to keep your hand, wrist, and forearm in a neutral position while using your mouse or other input device.
- If you use your thumb to rotate the ball on a trackball or spaceball, keep it in a relaxed, natural shape, and maintain a neutral posture in your hand, wrist, and forearm.
- Hold the mouse gently by draping your fingers over it. Keep your hand relaxed and fingers loose. Do not grip the mouse tightly.
- It takes very little pressure or force from your fingers to activate the buttons or scroll wheel on your mouse, scrolling mouse, trackball, or other input device. Using too much force can place unnecessary stress on the tendons and muscles in your hands, wrists, and forearms.
- If you are using a scrolling mouse, be sure to keep your fingers and hand in a relaxed, neutral position when activating the scroll wheel. Also, this type of mouse features software that can minimize the number of mouse movements or button clicks.
- When using a mouse, trackball, or other input device, position it as close to the keyboard as possible, and keep it at the same level as you do not have to stretch while using it.
- Be sure to keep your mouse and trackball clean. Regular removal of accumulated dust and dirt helps ensure proper tracking and reduces unnecessary hand and wrist motions.

Using the Oscilloscope

Using the Oscilloscope

The topics covered in this chapter are very basic controls. For more detailed explanations of controls not found in this chapter, consult the built-in information system loaded on your oscilloscope (Help > Contents).

The Infiniium Oscilloscope is designed to be easy to use.

- The familiar front-panel oscilloscope interface with knobs and keys is optimized for the most common kinds of troubleshooting tasks and basic measurements. See “Using the Front Panel”.
- The Infiniium oscilloscope application’s graphical interface with menus, windows, dialog boxes, and toolbars provides easy logical access to dozens of configuration and analysis tools, making it easy for you to set up and make the most complex measurements. See “Using the Graphical Interface”.
- The Infiniium oscilloscope application also provides online help, which gives detailed information on using the oscilloscope. See “Accessing the Online Help”.

Using the Front Panel

The Infiniium 9000 oscilloscope front panel gives you direct access to the functions needed to perform the most common measurements, using a traditional oscilloscope interface. Knobs and keys let you directly set vertical and horizontal parameters. In addition, the front panel has a set of LED (Light-Emitting Diode) indicators; by using these and the display, you see the oscilloscope's configuration at a glance.

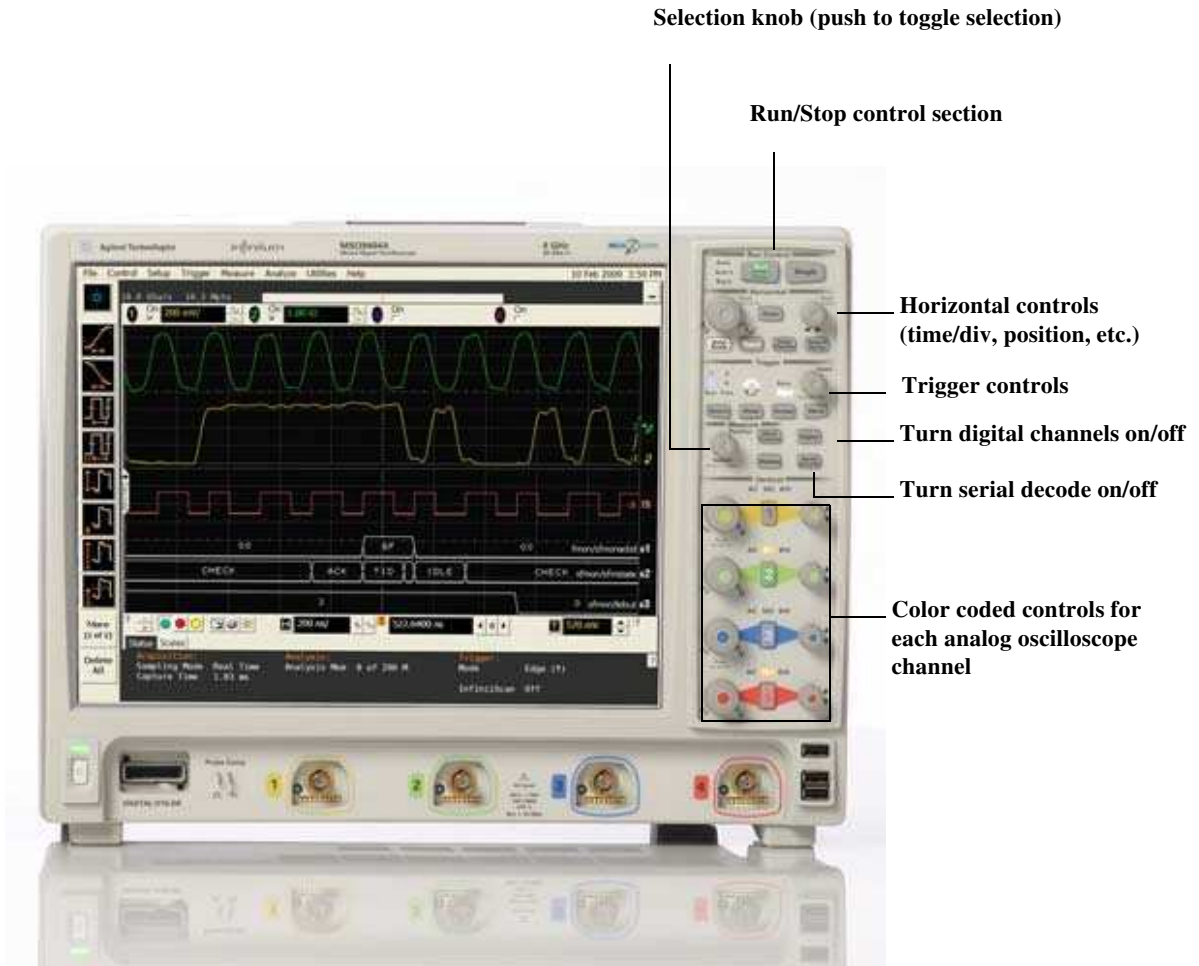
You can also push many of the front panel knobs to activate various modes such as vernier scaling (fine scaling).

The oscilloscope uses color consistently throughout the front panel and user interface. For example, the color of the knob for channel 1 is the same color as the waveform for channel 1. All configuration items and values related to channel 1 are displayed in the same color.

Front Panel

Figure 3-1 shows a typical Infiniium 9000 Series oscilloscope front panel.

Figure 3-1



Infiniium Oscilloscope Front Panel

Using the front panel, you can configure the oscilloscope for most troubleshooting tasks. The control categories are:

- Run controls
- Horizontal controls
- Trigger controls
- Vertical controls
- Marker and Measurement controls

Acquisition Run Controls

Using the acquisition run controls, you control whether the oscilloscope is running or stopped. You can also put the oscilloscope into Single mode where only one acquisition is acquired before the oscilloscope stops.

Horizontal Controls

Using the horizontal controls, you configure the oscilloscope's horizontal scale (time per division) and horizontal position of the waveform. You can also view a magnified section of the waveform using the Zoom window, which uses software to expand part of the acquisition memory.

Several other keys in this section do not pertain directly to horizontal controls. For example, the [**Autoscale**] key allows you to reset the oscilloscope to its default setup and automatically configure the oscilloscope for the current input signals. Also, the [**Clear Display**] key erases the waveforms from the display and resets such things as measurement statistics and averaging. The [**Touch**] key enables or disables the touch screen. The [**Default Setup**] key returns the oscilloscope to a known state.

Trigger Controls

Using the trigger controls, you set the conditions on which the oscilloscope will trigger and acquire an input signal. You can set up a variety of trigger conditions. Edge and advanced triggers can be selected from the front panel, and the parameters for edge triggering can be set up here as well. The advanced trigger parameters must be set up using the graphical interface.

Trigger configuration settings you make using the graphical interface are reflected in the front-panel status indicators, and will remain set unless you change them (either using the front panel or the graphical interface) or press the [**Default Setup**] key. See “Using the Graphical Interface” for information on accessing the graphical interface.

Vertical Controls

Using the vertical controls, you set the vertical scaling (volts per division) and vertical offset. You can also turn the display on or off for a particular channel.

Additionally, this section has a set of LEDs per channel that tell you what the input impedance is for the channel, what the coupling is for the channel, and whether or not Bandwidth Limit is enabled.

Marker and Measurement Controls

Using the marker and measurement controls, you control two sets of markers within the oscilloscope graticule. You use markers to make more accurate measurements of waveform events than you could make visually. Both time and voltage differences between the markers are updated continuously on the screen. By default, the markers track the source waveform. Voltage measurements from the markers are the value of the waveform at the time set with the marker position control.

The [**Multi Purpose**] key can be customized in the GUI to perform a variety of operations (under Utilities > Customize Multipurpose). Pressing this key will then carry out the operation you specify.

To set the oscilloscope to a known starting condition

- Press the **[Default Setup]** key.
You can set up the oscilloscope for many different kinds of complex measurements. To easily reset the oscilloscope to a known measurement configuration, use the **[Default Setup]** key.
If you use the **[Default Setup]** key, you can select Control > Undo Default Setup to return the oscilloscope to its original configuration.

Save the Current Oscilloscope Configuration

Before using [Default Setup], you may want to save the current oscilloscope configuration for later use. See the online help (described in chapter 4) for instructions on saving and recalling setups, and for information on the exact configuration that is set when you press [Default Setup].

To start and stop waveform acquisition

The **[Run/Stop]** key is green when the oscilloscope is acquiring data, and red when it is stopped.

- To start a waveform acquisition, press the **[Run/Stop]** key.
The oscilloscope begins acquiring data. When it receives a trigger signal, it finishes acquiring data, updates the display, then starts another acquisition cycle if it is in triggered (Trig'd) or auto trigger (Auto) mode.
- To stop waveform acquisition, press the **[Run/Stop]** key.
The oscilloscope stops acquiring data. Whatever data was last acquired remains on the screen.
- To make a single acquisition, press the **[Single]** key.
The **[Single]** key is lit yellow while the acquisition takes place. When the single acquisition is complete, the **[Single]** key is unlit and the **[Run/Stop]** key turns red.

To clear the waveform display

- Press the [**Clear Display**] key.
The oscilloscope clears the waveform display. If the oscilloscope is in Run mode and is receiving triggers, it will update the display as it collects new waveform data. Clearing the waveform display also resets averaging, infinite persistence, color grade persistence, histogram, mask testing, and measurement statistics.

To turn an analog channel on or off

- To turn an analog channel on, press the channel number key in the Vertical section until it is illuminated. To turn it off, press the channel number key again.

If you are not using a particular analog channel, you can turn it off. This simplifies the waveform display and also increases the display update rate. While an analog channel is turned off, data acquisition continues for that analog channel. Thus, you can still use the analog channel as a source for functions.

Using an Analog Channel as External Trigger

Any analog channel can be used as a trigger source. If you need an external trigger but do not need all analog channels, you can use an analog channel as an external trigger without displaying it by turning the analog channel display off.

To turn the digital channels on or off

- To turn the digital channels on, press the **[Digital]** key on the front panel. To turn them off, press the key again.

To adjust the analog channel's vertical scale and offset

- To make the waveform bigger, turn the vertical scale knob clockwise. To make it smaller, turn the knob counter-clockwise.
The vertical scale knob is the larger of the two knobs for a channel. It is marked with a set of sine wave symbols. Decreasing the vertical scale makes the waveform bigger. There are fewer volts displayed per division. Increasing the vertical scale makes the waveform smaller. There are more volts displayed per division.
- To move the waveform toward the top of the display, turn the vertical offset knob clockwise. To move it toward the bottom of the display, turn the knob counter-clockwise.
The vertical offset knob is the smaller of the two knobs for a channel. It is marked with a set of arrows.

To adjust horizontal scale and horizontal position

- To stretch the waveform horizontally, turn the horizontal scale knob clockwise. To shrink it horizontally, turn the knob counter-clockwise.
The horizontal scale knob is the larger of the two horizontal control knobs. It is marked with a set of sine wave symbols. Stretching the waveform means there are fewer seconds displayed per division. Shrinking the waveform means there are more seconds displayed per division.
- To move the waveform to the right, turn the horizontal position knob clockwise. To move the waveform to the left, turn the horizontal position knob counter-clockwise.
Moving the waveform to the right shows more of the pre-trigger data (data acquired before the trigger event). Moving the waveform to the left shows more of the post-trigger data (data acquired after the trigger event).
The horizontal position knob is the smaller of the two horizontal control knobs. It is marked with a set of arrows. There is a detent programmed into the software so there is a momentary pause at zero while you are turning the knob. Continuing to turn the knob will move the horizontal position through zero.

To magnify a part of the waveform using Zoom

- To turn on zoom, press the [**Zoom**] key. To turn it off, press the [**Zoom**] key again. The waveform display area splits into two regions. The top one is the main timebase. The bottom is the zoomed timebase, which represents a software expansion of the acquired waveform data. A section of the waveform in the main sweep window is highlighted to indicate the part shown in the delayed sweep window. The horizontal scale and horizontal position controls now change how the waveform is shown in the zoom window. The horizontal scale will change the amount of magnification, while the position will change the part of the waveform in the main window that is shown in the zoomed window.

To set the oscilloscope to trigger on an edge

- 1** Press and release the [**Source**] key until the desired source LED is illuminated.
You can choose any of the channels, the Aux, or Line as the source for an edge trigger.
- 2** Press the [**Slope**] key until the desired slope LED is illuminated.
You can have an edge trigger on a rising or falling edge.
- 3** Press the [**Sweep**] key until the Trig'd LED is illuminated.
The oscilloscope will wait for the edge before initiating a sweep.
- 4** Turn the [**Level**] knob to adjust the voltage level at which the oscilloscope will trigger.

To use the markers

Markers make it easier to make precise measurements because the marker measurement readouts show exact voltage and time positions for the markers. The measurements are based on actual waveform data from the acquisition system, not on approximations based on the display position, so you can be sure that the values are highly accurate.

- To select the type of marker mode that you want to use, press the **[Markers]** key and select the mode in the Markers Setup dialog box that appears.
- To turn on Marker A, press the Position knob until the marker that you want to move appears in the pop-up dialog box.
Marker A has a solid line pattern on the waveform display. It is associated with the first available source on the display.
- To turn on Marker B, press the Position knob until the marker that you want to move appears in the pop-up dialog box.
Marker B has a dashed line pattern on the waveform display. It is associated with the first available source on the display.
- To move a marker, turn the Position knob. In Measurement Marker mode, the marker position cannot be changed.

To use the quick measurements

The action taken when the **[Multi Purpose]** key is pressed depends on the feature selected in the Customize Multipurpose dialog box. The default feature is QuickMeas (quick measurements), which is described as follows.

- To turn on the quick measurement display, press the **[Multi Purpose]** key.
The five preset measurements defined in the Quick Measurement configuration are enabled and results are displayed on the screen for the first waveform source. The default measurements are: V_{p-p} , Period, Frequency, Rise time, and Fall time.
- To measure parameters for another waveform, press the **[Multi Purpose]** key until that waveform is the one shown in the measurement readout.
Continuing to press the **[Multi Purpose]** key cycles through each of the waveforms available.
- To turn off the quick measurement display, press and release the **[Multi Purpose]** key until the measurements are turned off.
The measurement results disappear from the screen.

See the Infiniium application's online help (described in Chapter 4) for information on how to configure the quick measurement capability, using the Customize Measurement feature of the graphical interface.

To enable or disable the touch screen

- To enable or disable the touch screen, press the front panel **[Touch]** key.

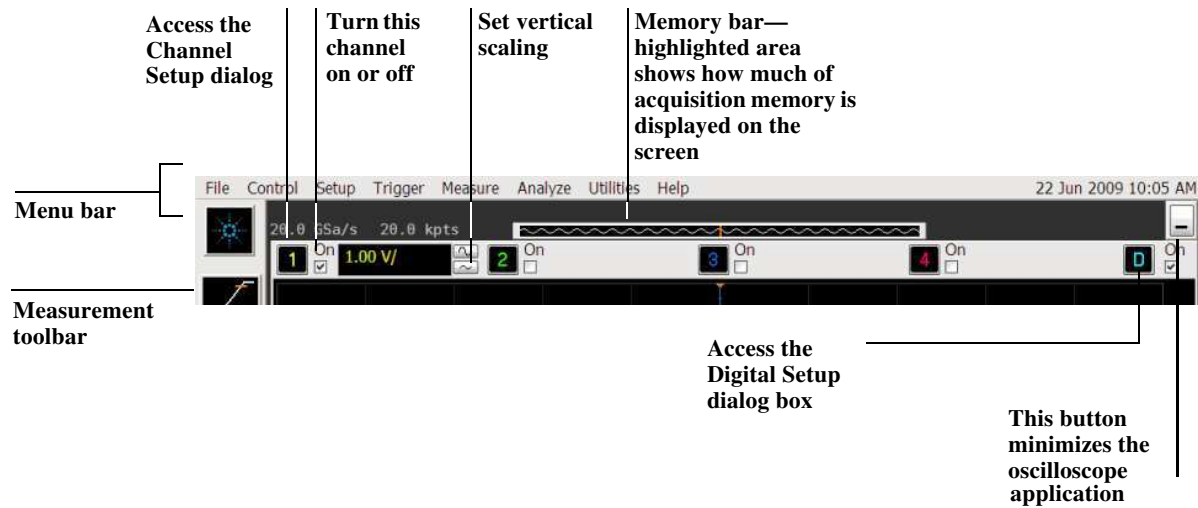
Using the Graphical Interface

With the graphical interface for the Infiniium Oscilloscope, you can access all the configuration and measurement features of the oscilloscope through an easy-to-use system of menus, tool bars, dialog boxes, icons, and buttons.

Graphical User Interface

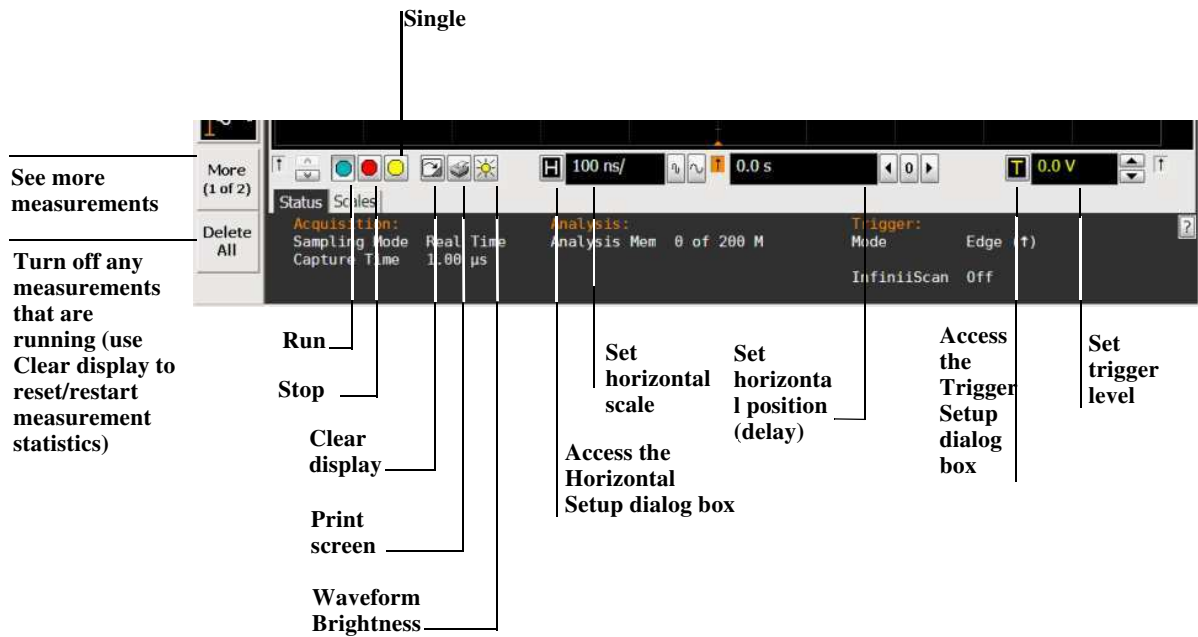
The graphical interface looks like the following two figures.

Figure 3-2



Infiniium Oscilloscope Top of Display

Figure 3-3



Infiniium Oscilloscope Bottom of Display

To make it easy to see which controls affect each waveform, the oscilloscope uses color consistently throughout the graphical interface. These colors match the ones used on the front panel channel inputs. For example, the color of the waveform for channel 1 matches the color for that channel. If channel 1 is the trigger signal, all of the trigger configuration items, including the trigger level reference icon (at the right side of the waveform display area), will match that color. The buttons associated with that channel, vertical scaling and offset settings, ground reference indicator, and measurements done on that channel also have the same color.

All changes made to the front panel settings are reflected in the graphical user interface, and changes made using the graphical interface are reflected in the front panel where applicable. Use whichever interface is easiest for you in a particular measurement situation. For example, it might be easiest to set a coarse vertical scale using the knobs, then fine-tune the setting using the graphical user interface.

The graphical interface is arranged so that the most common functions affecting the waveform display are located around the edge of the waveform viewing area. These include the measurement toolbar, horizontal and trigger toolbar, and vertical toolbar.

Measurement Toolbar

The measurement toolbar contains icons representing the most commonly used automatic measurements built into the oscilloscope.

Drag and Drop Measurements By dragging one of the measurement icons to a waveform in the waveform display area, you can make that measurement on the waveform. As you drag a measurement icon around the screen, the icon outline changes color to match the color of the closest waveform. This makes it easy to see which waveform will be measured when you drop the icon. For those measurements that are done on waveform features, the measurement is made at the feature closest to the location where you dropped the icon. For example, you might want to measure the rise time of the fifth rising edge; dropping the rise time measurement icon at that edge will cause the measurement to be made on that edge.

You can also make a measurement by simply clicking the icon on the measurement toolbar, then selecting the source to be measured in the dialog box that appears. When you start a measurement this way, any measurements on waveform-specific features will measure the feature closest to the horizontal reference indicator.

Each waveform can have multiple simultaneous measurements and the measurements can all be of the same type, if desired. For example, you can have three pulse width measurements on different parts of the same waveform.

Geometric Measurement Indicators For each measurement currently running, a geometric indicator at the measurement location on the waveform corresponds to an identical indicator in the measurement results readout. This makes it easy for you to verify that the readout shows results for the correct waveform and the correct feature on that waveform. See figure 3-25 for an example.

Tool Tips To find out what a particular measurement tool does, move the mouse pointer over it for a moment. A small pop-up window will appear that describes the measurement.

Other Measurement Features More measurements are available than will fit on a single toolbar. Click the More (1 of 2) or More (2 of 2) icons to see other measurements. Clicking Delete All will remove all selected measurements from the waveform display area.

Tab Display Area

The tab display area is located beneath the waveform viewing area.

Figure 3-4

Minimize and maximize tabs buttons



Tab Display Area

The display area shows information and statistics for the particular tab that is selected. The type of markers that are shown in the waveform viewing area depend on the tab that you have selected. The selected tab has an orange border to reflect the type of markers being displayed. For example, when the Histogram tab is selected, the markers are histogram markers and are used to define the histogram window.

Waveform Display Area

The waveform display area shows the waveforms, and optionally, the results of your measurements. Several display options, including a grid, are available and can be configured using the graphical interface.

Waveform Manipulation When using the graphical interface, two features are available that can simplify your work with waveforms:

- **Direct Manipulation**—you can use the mouse to click and drag waveforms to new vertical positions, which changes the vertical offset, or to new horizontal positions, which changes the horizontal position or delay value.
- **Zoom**—you can click and drag a rectangular area on the display, then click the Waveform Zoom menu item to zoom on that section of displayed waveforms. The oscilloscope does this in one of two ways. If acquisition is stopped, the magnification is done by the oscilloscope software. If acquisition is running, the oscilloscope automatically adjusts the vertical scaling and offset and the horizontal

scale and position to present the zoomed section of the waveforms. See “To zoom on a section of the waveform”.

Avoid Overdriving Vertical Input Amplifiers

When zooming on a waveform with the oscilloscope running, be careful to keep the signal within the screen vertically to avoid overdriving the vertical input amplifiers. Overdriving causes waveform distortion and erroneous measurement results.

Ground Reference Indicators A small symbol is shown at the right side of the waveform display area for each waveform that is on, including channels, waveform memories, and functions. This symbol represents the ground reference point for each channel; it moves when you change the vertical offset. You can also drag this symbol up and down using the mouse or touch screen; doing so automatically changes the vertical offset for that waveform.

Menu Control and Menus

The display looks like figure 3-2 and figure 3-3, including a menu bar, measurement toolbar (if enabled), and graphical controls for vertical, horizontal, trigger, and acquisition.

You can use the menu bar for most oscilloscope configuration functions. *Context-sensitive* menus, which pop up to provide a selection of commands within particular regions of the user interface, are available in the following regions:

- Memory bar
- Waveform display area
- Measurement toolbar
- Horizontal and acquisition controls

You display a context-sensitive menu by clicking the right mouse button with the pointer in one of these regions. For more information on context-sensitive menus, see “To select a command from a context-sensitive menu” on page 3-63.

Vertical Settings and Controls The top of the waveform display area includes the vertical settings and controls. All channels are shown with the corresponding vertical scaling settings in volts per division. Each has a checkbox allowing you to turn that channel on or off, and a set of controls allowing you to change the vertical scaling. Clicking directly on the vertical scaling value displays a pop-up numeric keypad allowing you to set a precise vertical scale.

Horizontal and Trigger Toolbar

At the bottom of the waveform display area is the horizontal and trigger toolbar. This includes the run/stop controls, the horizontal controls, and the trigger controls.

Run/Stop Control See figure 3-11. At the left side of the Horizontal and Trigger toolbar bar are six icons:

- The leftmost is a blue-green octagon. Clicking this starts an acquisition. (Same as pressing the **[Run]** key on the front panel.)
- The next control is a red octagon. Clicking this stops acquisition. (Same as pressing the **[Stop]** key on the front panel.)
- The next control is a yellow octagon. Clicking this starts a single acquisition. (Same as pressing the **[Single]** key on the front panel.)
- The next control is a small windshield wiper. Clicking this clears acquired waveform data from the display. (Same as pressing the **[Clear Display]** key on the front panel.)
- The next control is a printer. Clicking prints the screen to the default printer.
- The rightmost control is the waveform brightness control.

Horizontal settings and controls The middle of the Horizontal and Trigger toolbar contains the horizontal settings and controls. Leftmost is a button, labeled with an “H.” Clicking this displays the horizontal setup dialog box.

Next is the current horizontal scale. Clicking this displays a pop-up numeric keypad so you can set a particular horizontal scale. Or, you can click the two icons to the right of the horizontal scale setting to cycle through the preset speeds. The left icon shrinks the waveform, which decreases the horizontal scale and increases the time per division. The right icon stretches the waveform, which increases the horizontal scale and decreases the time per division.

Next is the horizontal position (delay) setting. Clicking this displays a pop-up numeric keypad that lets you set a particular position. Or, you can use the three icons to the right. The left arrow moves the waveform to the left, the center “0” resets the delay to zero, and the right arrow moves the waveform to the right.

Across the toolbar are three vertical arrows. These are the left, center, and right horizontal reference indicators. Clicking on one of these arrows moves the horizontal position to the respective horizontal reference position on the display—left, center, or right. Assuming the horizontal position is at zero:

- Left means the information on the display is all post-trigger.
- Center means the information to the left of center is pretrigger; to the right is post-trigger.
- Right means the information on the display is pretrigger.

The horizontal position value represents the time relative to the trigger at the respective horizontal reference. When you change the horizontal scale, the waveforms expand and contract about this reference position.

Trigger settings and controls The right side of the Horizontal and Trigger

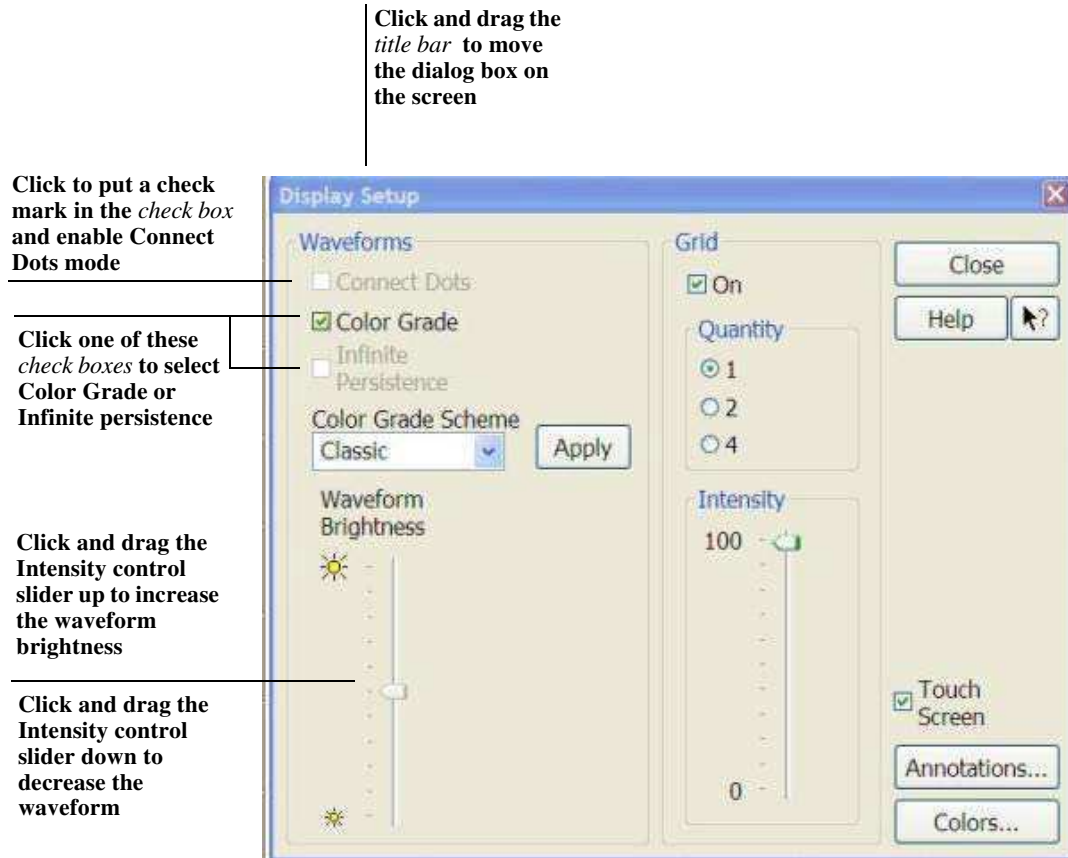
toolbar contains the trigger settings and controls. These will vary depending on the current trigger configuration, which can be set using the front panel and the graphical interface. Advanced trigger configuration items are available only through the graphical interface. You can click on the button labeled with a “T” to bring up the trigger setup dialog box.

When the scope is set for edge trigger on a particular channel, the trigger level setting is shown. You can click it to display a pop-up numeric keypad that lets you set a particular trigger level. You can also click the up and down arrows to the right of the setting to increase or decrease the trigger level, respectively. You can also click the trigger reference indicator at the right side of the display and drag it up or down to change the trigger level.

To perform basic user interface operations

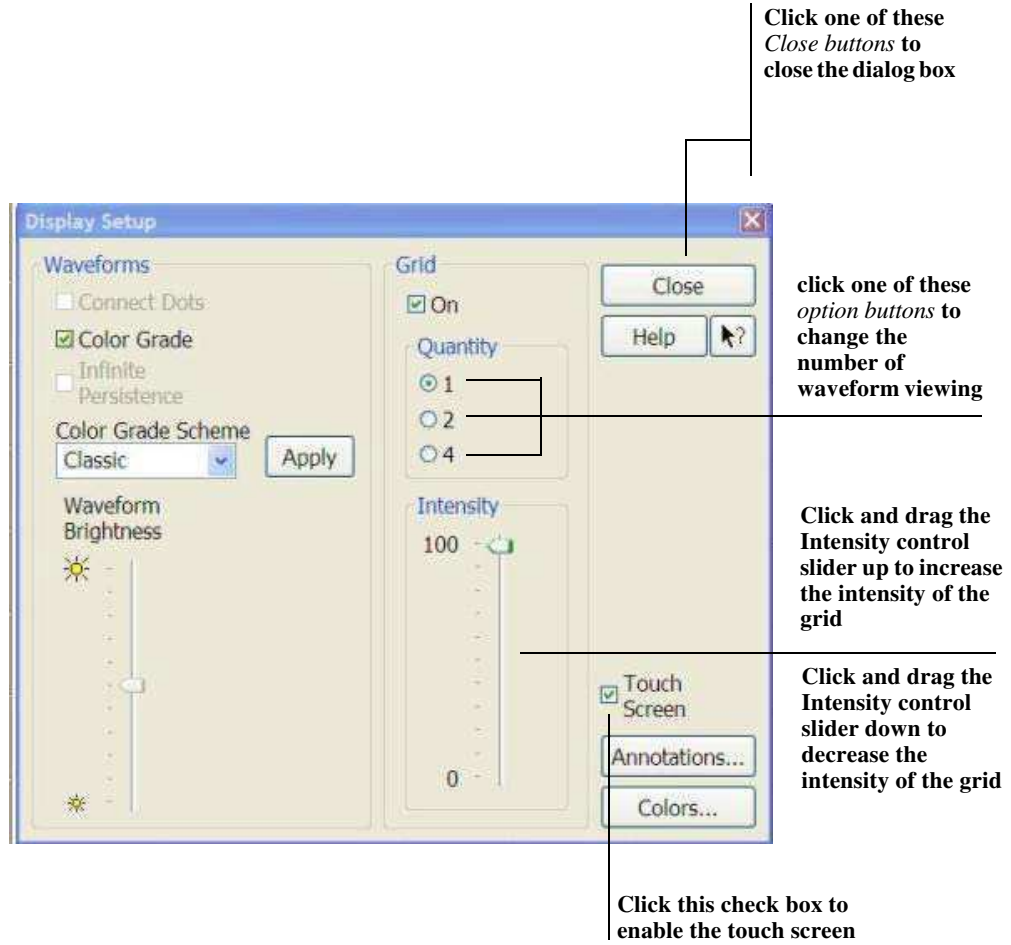
- To move the pointer on the screen, move the mouse or touch the screen with the stylus and move it.
- To *click* an item in the graphical interface, point at that item with the pointer, then press and release the left mouse button or touch screen.
- To *right-click* an item in the graphical interface, point at that item with the mouse pointer, then press and release the right mouse button. The right mouse button capability is not available using the touch screen stylus.
Use the right-click operation to access context-sensitive menus. See “To select a command from a context-sensitive menu”.
- To use an *option button*, click to select the desired item.
Option buttons appear in many different dialog boxes in the oscilloscope graphical interface. See the Persistence option buttons in figure 3-5. You can choose only one option at a time.
- To use a *check box*, click with the pointer in the box.
A check mark in the box indicates that item is selected. See the Color Grade check box in figure 3-5. To clear the selection, click with the pointer in the box.
- To use a *drop-down list box*, click the arrow at the right side of the box. Then click on the desired choice to highlight it.
See the Multipurpose selection list box in figure 3-7.
- To use a *spin box*, click the up arrow to increase the value displayed in the box, and the down arrow to decrease it.
See the Suffix spin box in figure 3-7.
- To move a *dialog box*, press and hold the left mouse button or touch screen stylus with the pointer in the *title bar*, drag the box to a new position on the screen, then release.
- To close a *dialog box*, click the “X” symbol in the upper right corner of the box, or click **Close** in the box.

Figure 3-5



Dialog Box Interface Elements

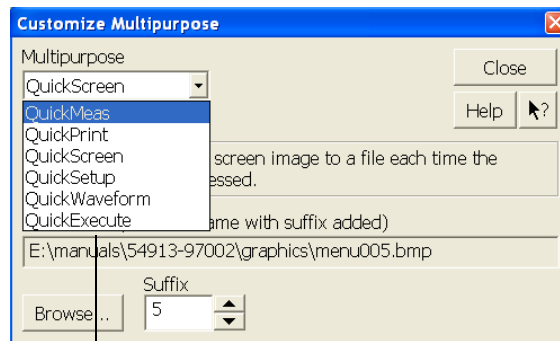
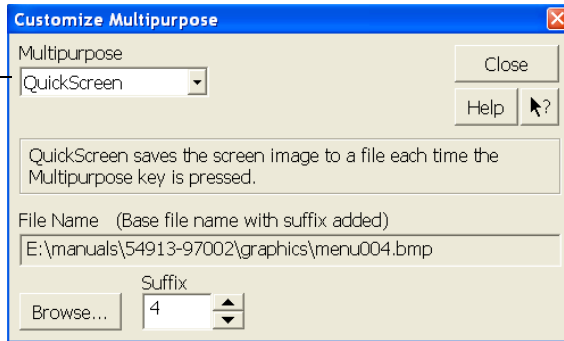
Figure 3-6



Dialog Box Interface Elements

Figure 3-7

Click the arrow in a drop-down list box...



...to see the options you can choose

Dialog Box with a Drop-Down List Box

To select a command from the menu bar

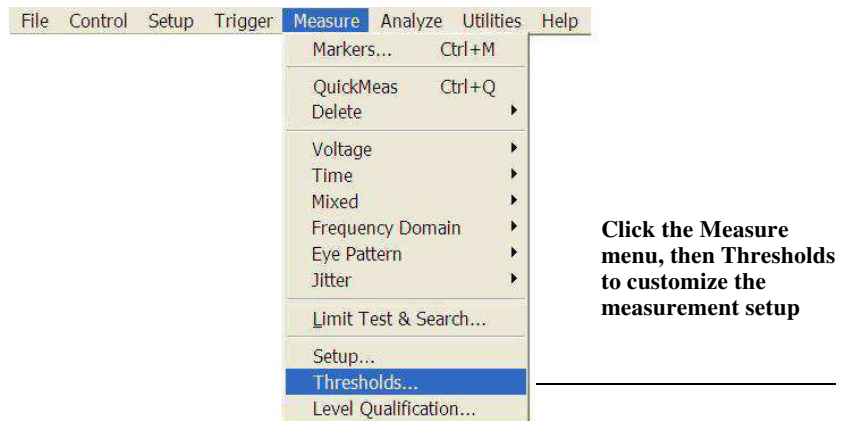
- 1 Click a menu bar item.
- 2 Move the pointer to the desired menu item.
- 3 Click the mouse button or touch screen.

The desired command is executed, or a dialog box is presented for you to configure the oscilloscope.

If you continue to hold the mouse button after step 1, release the button in step 3 to execute the command.

Some menus have submenus. These are indicated by an arrow at the right side of the command. When you move the pointer to one of these menu commands, the submenu automatically appears. You can then move the pointer to the desired command on that submenu and click the mouse button or touch screen to execute the command.

Figure 3-8



Selecting a Command from the Menu Bar

To select a command from a context-sensitive menu

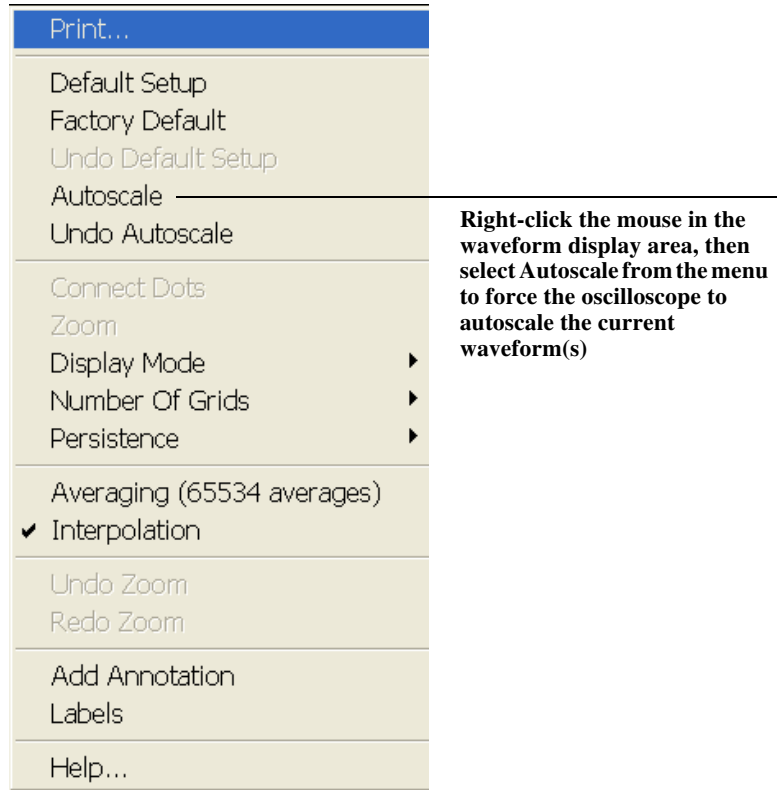
- 1** Move the mouse pointer to a particular area of the display in which you want to change the oscilloscope configuration.

Context-sensitive menus provide quick access to commands and configuration items that relate only to the context of the particular graphical interface item in which they are found. They are available in the following display areas: memory bar, measurement toolbar, waveform display area, and horizontal settings and controls.

- 2** Click the right mouse button. Right click is not available using the touch screen stylus.
- 3** Move the pointer to the desired menu item.
- 4** Click the left or right mouse button.

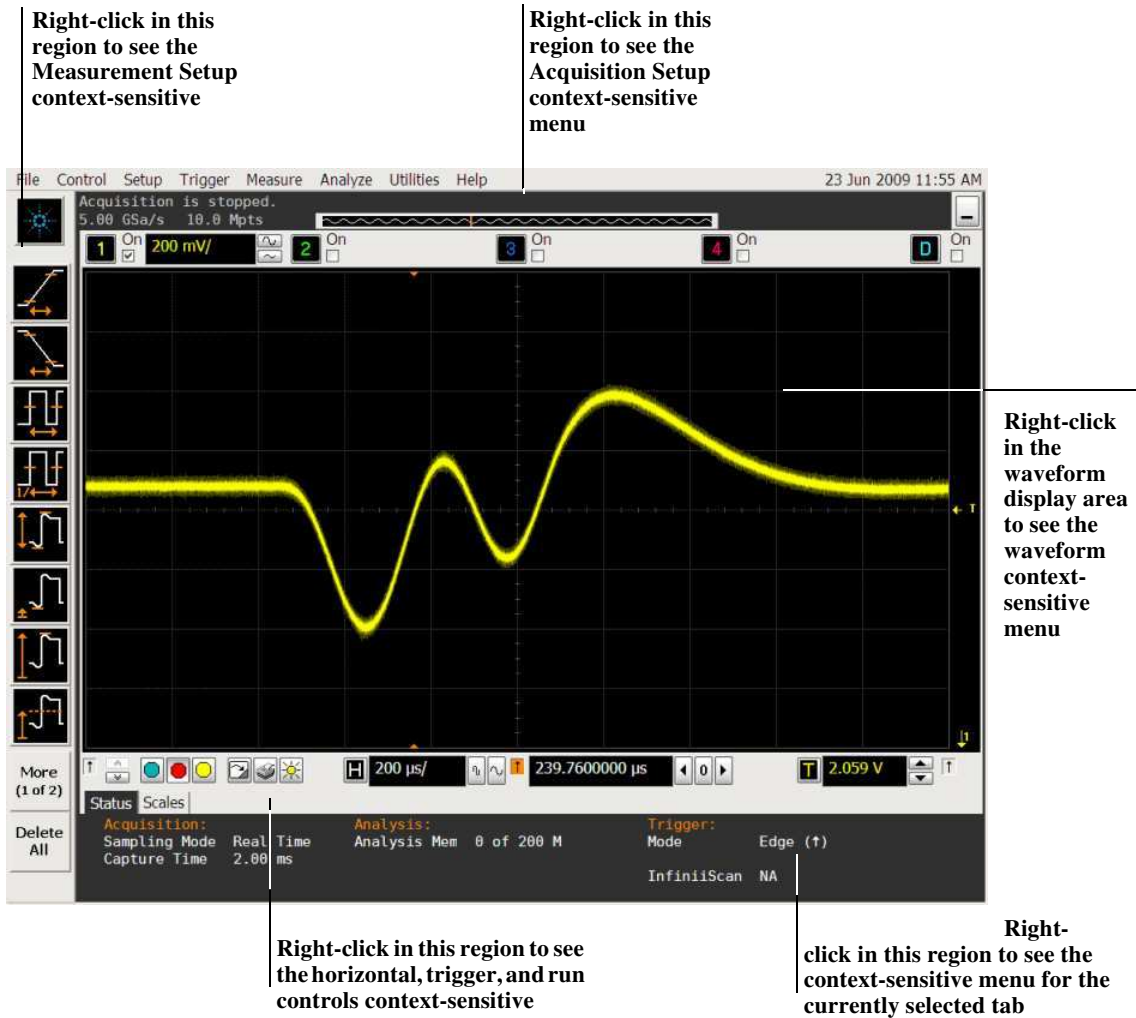
If you continue to hold the mouse button after step 2, release the button in step 4 to execute the command.

Figure 3-9



Selecting a Command from a Context-Sensitive Menu

Figure 3-10



Location of Context-Sensitive Menus

To start and stop waveform acquisition

- To start waveform acquisition, click the start button at the bottom of the waveform display area.
- To stop waveform acquisition, click the stop button at the bottom of the waveform display area.

See figure 3-11.

You can still use the **[Run/Stop]** key on the front panel. However, if you are performing many graphical interface operations, it is easier to start and stop the oscilloscope using the buttons in the interface, so you do not have to remove your hand from the mouse or the stylus away from the touch screen.

Figure 3-11



To clear the waveform display

- Click the clear display button at the bottom of the waveform display.
See figure 3-12.

You can still use the [**Clear Display**] key on the front panel while the graphical interface is enabled.

Clearing the display removes all displayed waveform data in preparation for another acquisition. It also resets all automatic measurements and measurement statistics.

Figure 3-12



**Click this button
to clear the
waveform display**

Clearing the Display

To print the screen

- Click the print button at the bottom of the waveform display. See figure 3-13. Infiniium prints the screen to the default printer according to the configuration that you have selected in the Windows Control Panel.

Figure 3-13



Click this button
to print the screen

Printing the Screen

To change waveform brightness

- Click the waveform brightness button at the bottom of the waveform display. See figure 3-14.

Figure 3-14



Click this button to change the waveform brightness

Changing Waveform Brightness

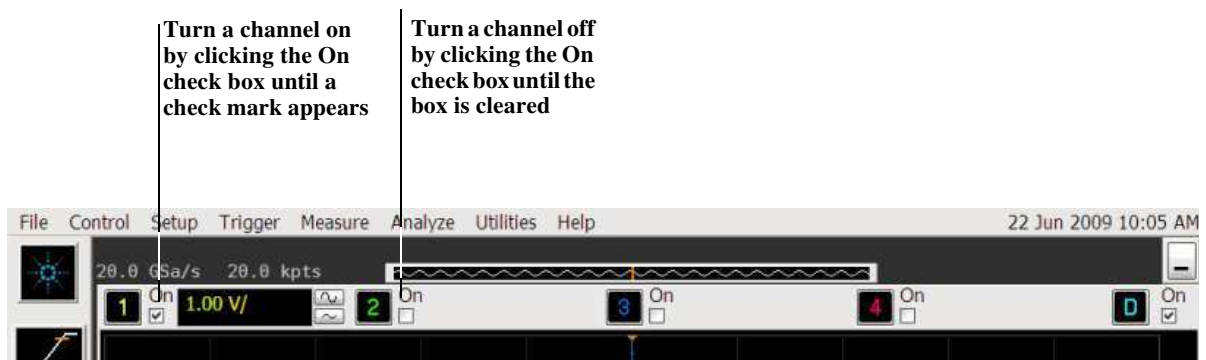
To turn a channel on or off

- To turn a channel on, click the check box next to the channel number so that a check mark appears in the box. To turn a channel off, click the check box again to clear it. See figure 3-15.

If you are not using a channel, you can turn it off. This simplifies the waveform display and also increases the display update rate. When you turn off a channel, the current vertical scaling factor and vertical scale buttons for that channel disappear. They re-appear when you turn the channel on.

You can also turn a channel on or off by using the Channel Setup dialog box, or by using the front panel key for that channel.

Figure 3-15



Turning a Channel On or Off

To adjust the vertical offset

- Click and hold the left mouse button or touch screen stylus on the waveform you want to move, then drag the pointer up or down to move the waveform to the desired offset. Release when finished.
or
- Click and hold the left mouse button or touch screen stylus on the ground reference indicator for the waveform you want to move, then drag the pointer to move the waveform to the desired offset. Release when finished.
or
- Click the channel button in the vertical toolbar, then set the vertical offset using the spin box control in the Channel Setup dialog box.

If you leave the mouse pointer on the waveform (without clicking), the pointer changes into crossed arrows as a visual indicator that you can drag the waveform when you click and hold. If you move the crossed arrow pointer up or down, the interface constrains the movement vertically and adjusts vertical offset only. If you initially move the crossed arrow pointer left or right, the interface constrains the movement horizontally and changes the horizontal position setting only.

You can also adjust the vertical offset through the Channel Setup dialog box. See “To access the channel setup”.



Figure 3-16

Click to access the Channel Setup dialog box, then set vertical offset using the spin box or numeric keypad...



...or click the ground reference indicator and drag it up or down to change the vertical offset...

...or click the waveform and drag it up or down to do the same thing.

Adjusting Vertical Offset

To adjust vertical scaling

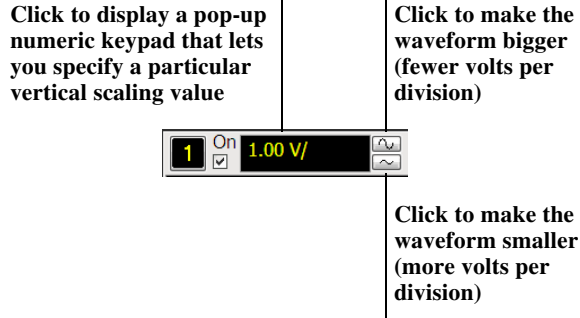
- To make the waveform bigger, click the larger waveform button next to the channel number near the top of the display. To make the waveform smaller, click the smaller waveform button.

See figure 3-17. The number of volts per division decreases.

The number of volts per division increases. The current setting in volts per division is shown next to the waveform buttons for the channel. Notice that the setting is color-coded to match the waveform color for easy recognition.

You can also adjust the vertical scaling by clicking on the current setting, which is shown next to the waveform buttons for the channel. This displays a pop-up numeric keypad that allows you to set an exact value for the scaling. Or, you can adjust the vertical scaling through the Channel Setup dialog box. See “To access the channel setup”.

Figure 3-17



Adjusting Vertical Scaling

To access the channel setup

- Click the channel number button at the top of the waveform display.
or
- Select the desired channel from the Setup menu.
With the channel setup dialog box, you can set the vertical scaling, offset, input coupling, and input impedance. It also lets you specify the characteristics of the probe, using the Probes button. You can set attenuation ratio, attenuation units, and measurement units for the probe, or perform a probe calibration.
For Agilent Technologies probes that are compatible with the AutoProbe Interface, the oscilloscope will automatically set these characteristics (except for skew) after identifying the probe when it is connected to the channel input.

Figure 3-18

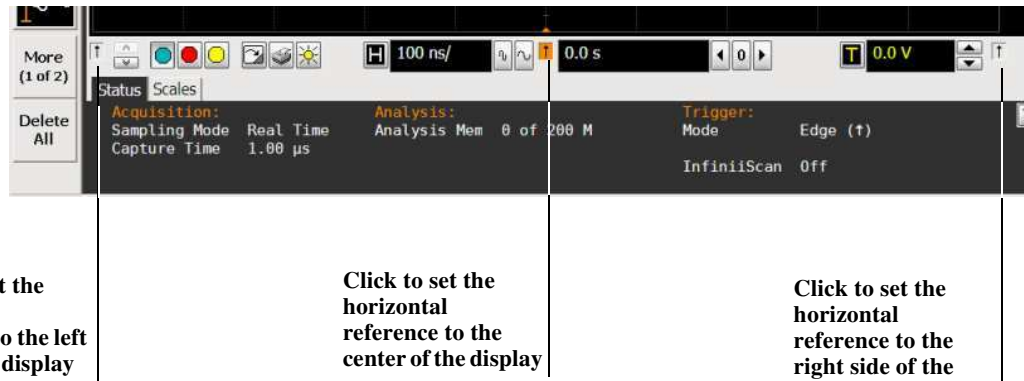


Accessing the Channel Setup

To set the horizontal reference point

- Click one of the arrows at the bottom of the waveform display. The selected horizontal reference is highlighted. The vertical arrows at the bottom of the display correspond to the left, center, and right horizontal reference points. This is the position of the trigger if the horizontal position is set to zero delay. A non-zero horizontal position value is the time relative to the trigger event at the selected horizontal reference point.

Figure 3-19



Horizontal Reference Points



To adjust horizontal scale

- To stretch the waveform horizontally, click the larger waveform button next to the horizontal scale setting at the bottom of the waveform display. To shrink the waveform horizontally, click the smaller waveform button.

See figure 3-20. The oscilloscope decreases or increases the number of seconds per division based on your selection.

You can also adjust the horizontal scale by clicking the current setting. This displays a pop-up numeric keypad that allows you to set an exact value for the horizontal scale. Or, you can adjust the horizontal scale through the Horizontal Setup dialog box. See “To access the horizontal setup”.

Figure 3-20



Click here to display the Horizontal Setup dialog box

Click here to set the horizontal scale directly through a pop-up numeric

Click to shrink the waveform (more seconds per division)

Click to stretch the waveform (fewer seconds per division)

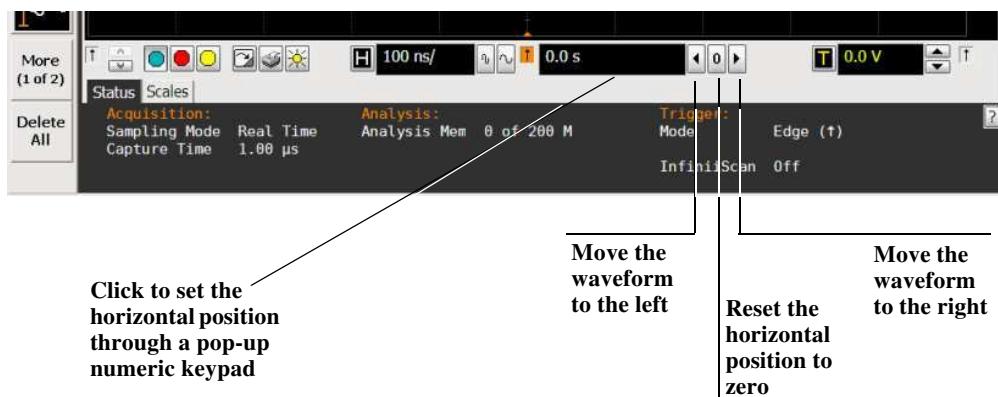
Adjusting Horizontal Scale

To adjust horizontal position

The *horizontal position* is the time relative to the trigger at the highlighted horizontal reference point.

- To zero the horizontal position, click the 0 button next to the position value at the bottom of the waveform display. This will position the trigger event at the highlighted horizontal reference point.
- To move the waveform to the right or left, click the right or left arrow next to the position value at the bottom of the waveform display. Or, click and hold the mouse button on the desired waveform and drag the waveform to the right or left. Release the mouse button when the waveform is in the desired position. Clicking and dragging a waveform changes the horizontal position for all channels and functions on the display, but not that of waveform memories. You can also adjust the horizontal position through the Horizontal Setup dialog box.

Figure 3-21



Adjusting Horizontal Position

To access the horizontal setup

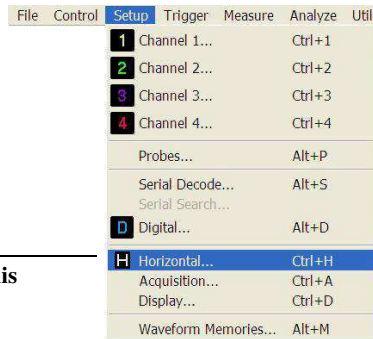
- Click the horizontal setup button at the bottom of the waveform display.
or
- Select Horizontal from the Setup menu.
See figure 3-22.

Using the Horizontal Setup menu, you can set scale, position, and the horizontal reference. You can also set up the delayed time base window, which uses software expansion to present a magnified view of an area of the waveform. See the Infiniium oscilloscope application's online help (described in chapter 4) for details.

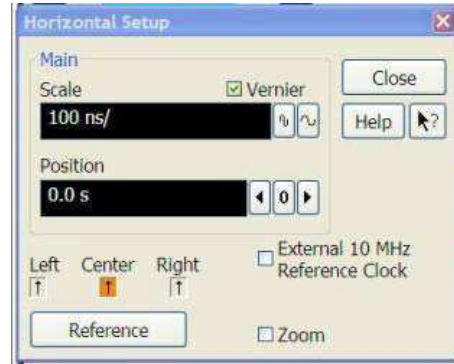
Figure 3-22



Click this button...



...or select this menu item...



...to access the Horizontal Setup dialog box.

Accessing the Horizontal Setup

To zoom on a section of the waveform

- 1 Click and hold the left mouse button or touch screen stylus in a blank space within the waveform display area, then drag the pointer to draw a rectangle around the areas of interest on the waveform(s) then release.
- 2 Click the Waveform Zoom menu item.

How the zoom takes place depends on whether acquisition is running or stopped. If running, the oscilloscope adjusts vertical scale, vertical offset, horizontal scale, and horizontal position as necessary to best rescale the area you defined in step 1. If stopped, the oscilloscope does a software magnification of the waveform.

In either case, a small dialog box appears in the corner of the screen, with an “Undo” button; by clicking this button, you will undo the zoom and return the oscilloscope to its previous settings.

Avoid Overdriving the Vertical Input Amplifiers

When the oscilloscope is running, the input waveform can overdrive the vertical input amplifiers if you expand the vertical excessively. The result is distortion of the waveform. Ensure that you select a region that will keep all of the waveform on the screen vertically.

Figure 3-23



Click and hold the mouse button, drag to create a selection rectangle, then click the Waveform Zoom menu item to zoom the display on the waveforms inside the rectangle.

Zooming on a Section of the Waveform

To move the markers using the graphical interface

- 1 Turn on the markers.
You can use the [Markers] key on the front panel, or select Markers from the Measure menu.
- 2 Click and hold the left mouse button or touch screen stylus while the mouse pointer is on one of the markers, then drag the marker to the position you want on the waveform, then release.
Clicking and dragging a marker makes it easy to quickly move the marker to the desired waveform event. You can use the front-panel Measure Position knob for fine adjustment, or select the Markers command from the Measure menu and set the marker position precisely. See the online help for details.

Figure 3-24



To move a marker, click the left mouse button or touch screen stylus with the pointer on the marker, drag the marker to the new position, then release

Moving the Markers

To make a measurement on a waveform

- Click and hold the mouse button or touch screen stylus on a measurement icon, then drag the icon to the waveform event you want to measure then release.
or
- Click a measurement icon, then specify which source you want to measure in the dialog box that is displayed.

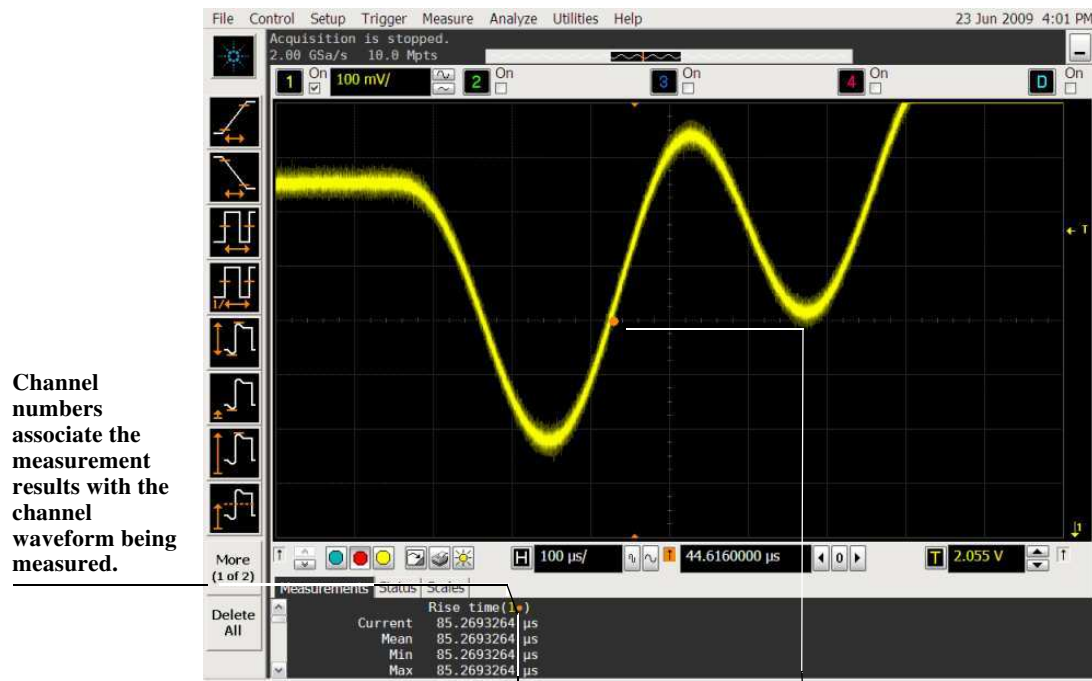
For measurements on waveform features, such as those that involve waveform edges, if you click the measurement icon and specify a source, the measurement defaults to using the feature closest to the horizontal reference point. When you make the measurement using drag-and-drop, the measurement uses the waveform feature closest to the point where you drop the icon.

Only the most commonly used measurements are available on the toolbar. Others are available by selecting them from the Measure menu. A few specialized measurements are available only through the remote programming command set. See the *Programmer's Reference*.

When you drag and drop a measurement icon on a waveform, notice that the icon outline changes color to match the color of each waveform it touches. This lets you easily see which waveform will be measured when you release. Also, the measurement results are also displayed in color to make it easy to see which waveform source is being measured.

For edge-sensitive measurements, when you drop the measurement icon on a waveform, a geometric icon appears in the waveform marker color. This icon shows exactly where the measurement is being made. The icon is also displayed next to the measurement results readout to associate the readout with the waveform and feature being measured. See figure 3-25. This feature helps you distinguish measurement results from each other when you make multiple measurements on the same waveform, but at different waveform features. For example, a series of rise time measurements on several different edges of the same waveform all have unique geometric icons to show each measurement's location.

Figure 3-25



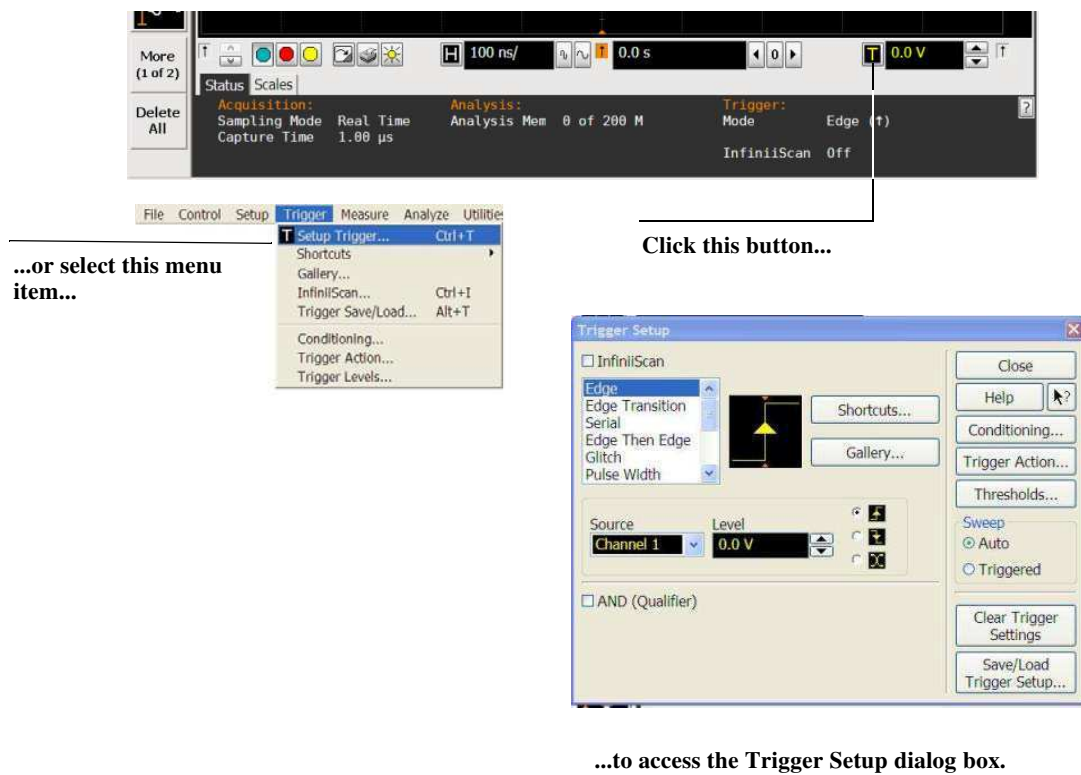
Waveform Measurements

To access the trigger setup

- Click the trigger setup button at the bottom of the waveform display.
or
- Select Trigger from the Setup menu.

The trigger setup dialog box lets you select any of the different modes of triggering supported by the oscilloscope—Edge, Glitch, or Advanced, with choices under Advanced of Pattern, State, Delay by Time, Delay by Events, or Violation. You can set the parameters and conditions for each of those trigger modes.

Figure 3-26



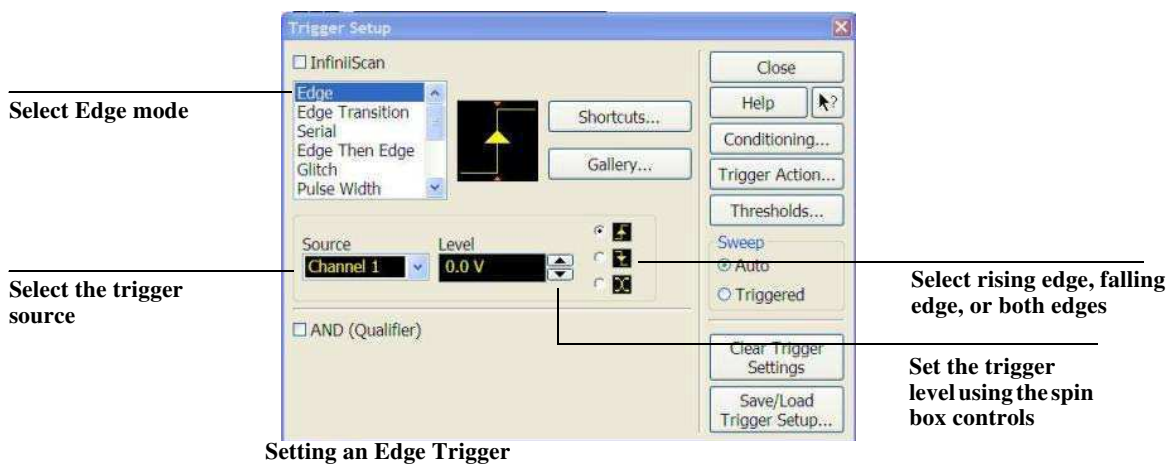
Accessing the Trigger Setup dialog box

To set an edge trigger

- 1 Click the trigger setup button at the bottom of the waveform display. The Trigger Setup dialog box appears. See “To access the trigger setup.”
- 2 Click Edge.
- 3 Click the source you want to use for the trigger signal.
- 4 Click to select the rising edge, falling edge, or both edges for the trigger source.
- 5 Set the trigger level using the spin box.

You can also click the trigger level setting to display a pop-up numeric keypad, where you can enter the trigger level directly.

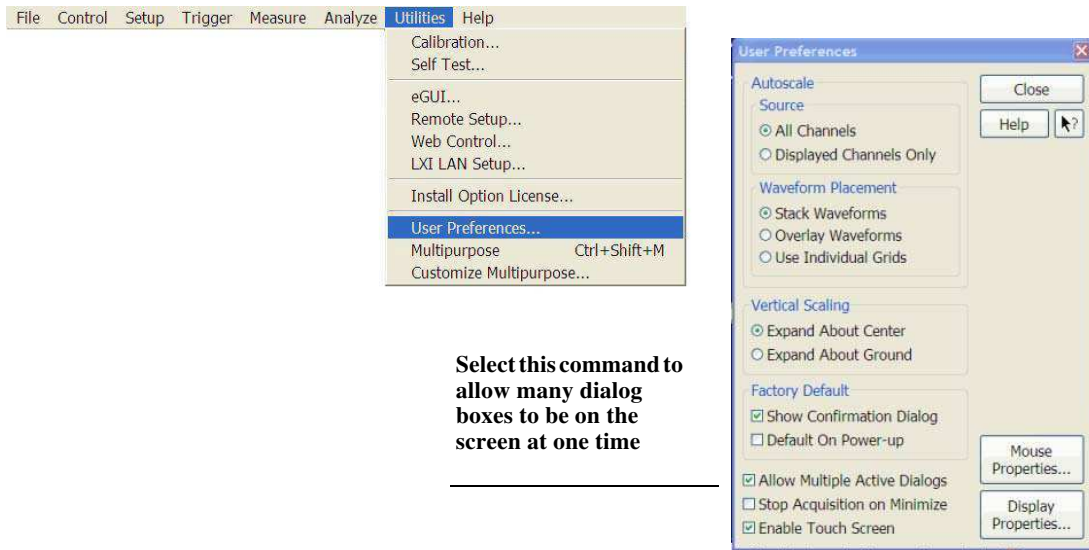
Figure 3-27



To set dialog box preferences

- To allow multiple dialog boxes on the screen at a time, select Utilities > User Preferences. Then select Allow Multiple Active Dialogs in the User Preferences dialog box. You can also right-click in most open dialog boxes and check the Multiple Active Dialogs selection. Normally, the oscilloscope displays only one dialog box at a time, and you must close that dialog box before opening another. With Allow Multiple Active Dialogs, you can change several different aspects of the oscilloscope configuration simultaneously.

Figure 3-28



Setting Dialog Box Options

To recover your Infiniium hard disk

The Infiniium hard disk recovery system is contained in a hidden partition on the Infiniium hard disk. If you have to use the recovery system, the Infiniium hard disk is returned to the condition it was in when it left the factory. Before recovering the Infiniium hard disk, use the following procedure to return the Infiniium to normal operation.

- 1 Turn off the Infiniium.
- 2 Turn on the Infiniium. If the oscilloscope does not successfully restart then try recycling the power again.
- 3 After the Windows 7 load screen disappears, press and release the Infiniium **[Default Setup]** key on the front panel. If the oscilloscope still does not successfully restart, follow the instructions for recovering the hard drive.

Infiniium Hard Drive Recovery

Use the following instructions to recover your Infiniium hard drive.

- 1 Turn off the Infiniium.
- 2 Connect the keyboard to the keyboard connector on the rear panel of the oscilloscope.
- 3 Connect the mouse to the mouse connector on the rear panel of the oscilloscope.
- 4 Turn on the Infiniium.
- 5 When you see the message **press F2 to boot the Infiniium Recovery System**, press **[F2]** and follow the on-screen instructions.
- 6 Once the recovery process is finished and the oscilloscope is running, check in the About Infiniium dialog box under installed options to see if all of the options you ordered are installed. If the options are not installed, install them using the license keys provided on the oscilloscope option license certificates you received or on the rear panel of the oscilloscope.

Accessing the Online Help

Accessing the Online Help

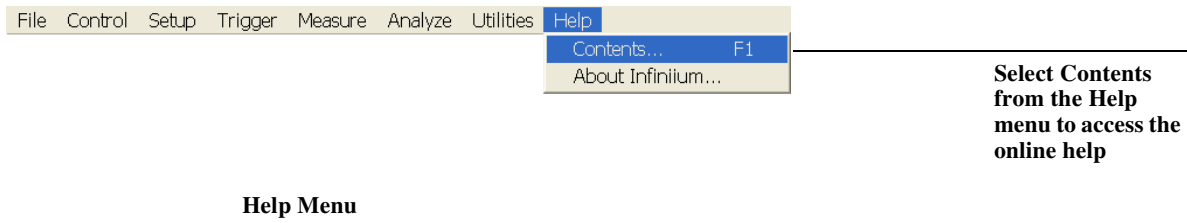
Most of the documentation for using the Infiniium oscilloscope is included in its online help.

The online help is accessible from the menu bar and from dialog boxes. This chapter explains how to use the help to find the information you need to use the oscilloscope effectively.

To access the online help

- Select Contents from the Help menu.
The Contents page for the oscilloscope online help is displayed.

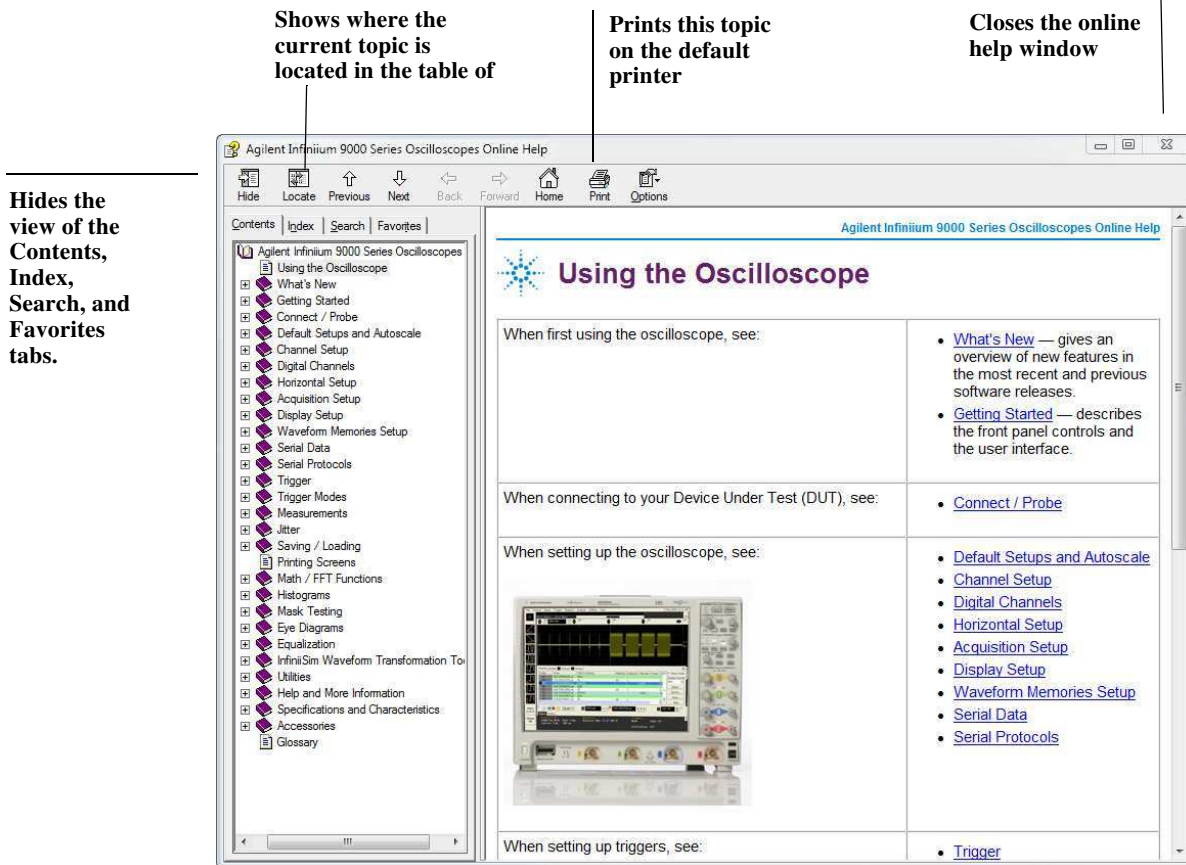
Figure 4-1



Viewing the Online Help Window

The online help provides several ways for you to find the information you need. The *Contents* topic, shown below, is the first method for finding information. It appears when you access the online help from the Help menu.

Figure 4-2



Contents Topic Page

Viewing the Online Help Window

The online help window always stays on top of the interface display, so you can refer to it while working with the oscilloscope. You can move the window around the screen or resize it to make it easier to use.

The *Index* tab is the second method of finding information. You can type in a keyword and search the index for that keyword, or scroll through the list to find a topic.

The *Search* tab is the third method of finding information. You can enter a keyword and if that word exists in the online help, a list of topics containing the keyword is shown. Because the search engine lists every topic that mentions the search word, you may find that certain searches generate many results. To make searching more efficient, first try searching only topic titles (you can enable this by checking the Search Titles Only box at the bottom of the Search pane). Then you might also use quotation marks so the help finds words only in a given order. For example, a search for *sample rate* will list every topic that contains either the word *sample* or the word *rate*. However, a search for “*sample rate*” returns only topics containing the phrase *sample rate*.

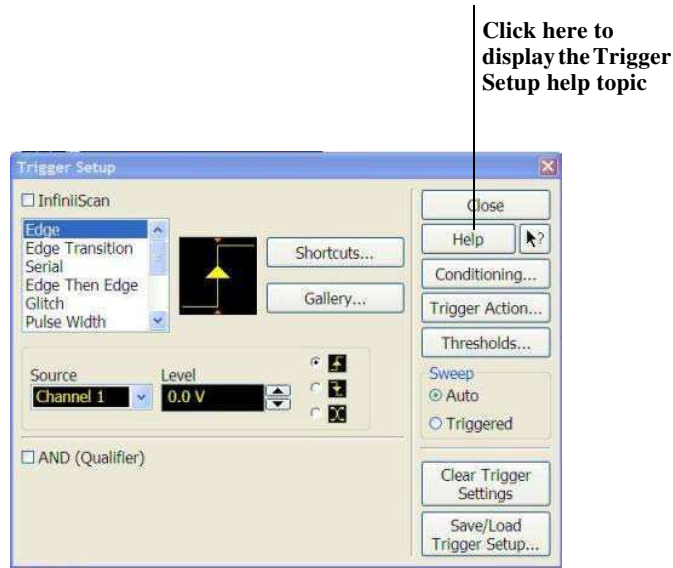
Another useful feature is the Favorites tab. To access this tab press the arrow button next to the tabs selection area (see screen shot on previous page for this location) to display the Favorites tab. When you are on a topic you want to save to the Favorites tab, simply click on the Add button at the bottom of the pane. This enables you to build up your own mini-help system of topics you use frequently.

Hyperlinks throughout the online help allow you to reach the information you need. Most hyperlinks will be in blue underlined text, but some hyperlinks also have buttons (many of the reference topics) or tabs (in setup guide topics). You can find out whether a particular item has a hyperlink by pointing to it; if it is a hyperlink, the pointer will change to a hand icon. Clicking once will follow the hyperlink to display a new topic with the relevant information.

To access context-sensitive information

To see overview information for items in a dialog box, click the Help button in that dialog box.

Figure 4-3



Help Button for Context-Sensitive Help

Index

A

- access methods 4-92
- accessing
 - index 4-92
 - online help 4-90, 4-91
 - trigger setup 3-84
- accessories
 - and options 1-10
 - supplied 1-9
- accurate measurements using markers 3-47
- acquisition
 - clearing display before 3-67
 - controls 3-36
 - running and stopping 3-36
 - starting and stopping 3-39, 3-56, 3-66
- active dialog boxes
 - allowing multiple 3-86
- adjusting
 - horizontal position 3-54, 3-77
 - sweep speed 3-44, 3-76
 - vertical offset 3-43, 3-54, 3-55, 3-71, 3-72
 - vertical scaling 3-43, 3-55, 3-73
- advanced trigger 3-36
 - configuration 3-56
 - mode 3-84
- airflow requirements 1-14
- application software 1-24
- associating measurement results with waveforms 3-82, 3-83
- Autoprobe interface 3-74
- Autoscale 1-22, 3-36

B

- backlight 1-20
- behavior of online help windows 4-93
- BNC connectors 1-18
- buttons 3-33
 - as hyperlink 4-93
 - channel setup 3-51, 3-52, 3-74
 - clear display 3-52
 - graphical interface mode 3-51, 3-52
 - help 4-94
 - horizontal setup 3-51, 3-52, 3-78
 - run 3-51, 3-52
 - stop 3-51, 3-52
 - trigger setup 3-51, 3-52, 3-84, 3-85

C

- cables
 - printer 1-15
- calibration
 - output 1-22
- cautions
 - cleaning 1-26
 - disconnecting probes 1-18
- center horizontal reference 3-56, 3-75
- Centronics printers, see parallel printers
- Channel keys 3-41
- channel setup
 - accessing 3-74
 - button 3-51, 3-52, 3-74
- channels
 - displayed 3-55
 - turning on or off 3-41, 3-55, 3-70
- check box 3-58, 3-59, 3-60
- checking the oscilloscope 1-9
- choosing
 - commands 3-63
- cleaning the oscilloscope 1-26, 1-1
- clear display 3-36
 - button 3-52
- Clear Display key 3-40
- clearance requirements 1-14
- clearing measurements 3-54
- clearing the display 3-40, 3-56, 3-67
- click 3-58
- closing
 - dialog boxes 3-58, 3-59, 3-60
- color
 - use of 3-33, 3-52
 - use of in interface 3-82
- command menus 3-51, 3-52
- commands
 - selecting 3-62, 3-63
- conditions
 - trigger 3-84
- configuration
 - Autoscale 3-36
 - channel 3-74
 - default 1-22, 3-36, 3-38
 - dialog boxes 3-86
 - edge trigger 3-46
 - horizontal 3-56, 3-78
 - through menus 3-55
 - trigger 3-36, 3-56, 3-84, 3-85

configuring

- quick measurements 3-48
- connecting
 - LAN card 1-15
 - pointing device 1-17
 - power 1-14
 - printers 1-15
 - probes 1-18
- constraints on waveform movement 3-71
- contents
 - of oscilloscope package 1-9
 - online help 4-91
- contents topic 4-92
- context-sensitive 4-94
 - information 4-94
 - menus 3-55, 3-63, 3-65
- controls
 - acquisition 3-36
 - horizontal 3-36
 - marker and measurement 3-37
 - trigger 3-36
 - vertical 3-37
- coupling
 - trigger input 3-46
 - vertical input 3-37
- Coupling key 3-46
- customizing display layout 3-82
- cycling
 - markers through channels 3-47
 - measurements through channels 3-48

D

- default setup 1-22, 3-36
- Default Setup key 3-38
- Delayed key 3-45
- delayed sweep 3-78
- delayed time base 3-36
- dialog boxes 3-58, 3-59, 3-60
 - information on 4-94
 - preferences for 3-86
- direct manipulation of waveforms 3-71, 3-77
- Disk
 - Hard Disk Recovery 3-87
- display
 - clearing 3-36, 3-40, 3-56, 3-67
- display area
 - waveforms 3-54

-
- display layout
 - customizing 3-82
 - display of channels 3-55
 - display update rate
 - increasing 3-41, 3-70
 - drag-and-drop measurements 3-53, 3-82
 - drag-and-drop waveforms 3-54, 3-71, 3-77
 - drop-down list box 3-58, 3-61
- E**
- edge trigger 3-36
 - mode 3-84, 3-85
 - setting 3-46
 - erasing the display 3-40, 3-67
 - external trigger setup button 3-51, 3-52
- F**
- feet
 - using 1-19
 - finding information 4-90, 4-92
 - front panel 3-35, 3-37
 - connections 1-18
 - interface 3-32, 3-33
 - using with graphical interface 3-52
- G**
- geometric measurement indicators 3-53
 - glitch trigger 3-36
 - mode 3-84
 - graphical interface 3-32
 - arrangement of 3-53
 - mode 3-51, 3-52
 - pointing device for 1-17
 - using with front panel 3-52
 - graticule 3-37
 - grid 3-54
 - ground reference indicator 3-55, 3-71
- H**
- Hard Disk
 - Recovery 3-87
 - help
 - button 4-94
 - horizontal
 - adjusting position 3-44
 - adjusting sweep speed 3-44
 - controls 3-36
 - zoom 3-45
 - horizontal and trigger toolbar 3-55
 - horizontal position 3-36, 3-78
 - adjusting 3-44, 3-54, 3-56, 3-77
 - in zoom 3-45
 - setting 3-51, 3-52
 - with respect to horizontal reference 3-75
 - horizontal reference 3-78
 - indicators 3-56
 - setting 3-75
 - horizontal setup 3-56
 - accessing 3-78
 - button 3-51, 3-52, 3-78
 - horizontal sweep speed 3-51, 3-52, 3-56
 - adjusting 3-76
 - hyperlinks 4-93
- I**
- icons
 - dragging to waveform 3-53
 - learning functions of 3-53
 - measurement 3-51, 3-52, 3-53, 3-82, 3-83
 - impedance
 - input 3-37
 - increasing display update rate 3-41, 3-70
 - index
 - accessing 4-92
 - indicators
 - ground reference 3-55, 3-71
 - horizontal reference 3-56
 - measurement 3-53
 - trigger level reference 3-57
 - information
 - methods for accessing 4-92
 - on dialog boxes 4-94
 - input
 - coupling 3-37, 3-74
 - impedance 3-37, 3-74
 - inspecting the oscilloscope 1-9
 - Installing
 - Application software 1-24
 - instrument, see oscilloscope
 - interface elements
 - information on 4-94
- K**
- keys 3-33
 - Arrow 3-47
 - Channel 3-41
 - Clear Display 3-40
 - Coupling 3-46
 - Default Setup 3-38
 - Delayed 3-45
 - marker 3-37
 - Marker A 3-47
 - Marker B 3-47
 - Mode 3-46
 - QuickMeas 3-48
 - Run 3-39
 - Slope 3-46
 - Source 3-46
 - Stop 3-39
 - Sweep 3-46
 - knobs 3-33
 - color of 3-52
 - horizontal position 3-44
 - sweep speed 3-44
 - vertical offset 3-43
 - vertical scaling 3-43
- L**
- LAN card 1-15
 - learning functions of icons 3-53
 - LED indicators 3-33
 - left horizontal reference 3-56, 3-75
 - level
 - trigger 3-46, 3-57, 3-85
 - line voltage 1-14
 - location of trigger 3-56
- M**
- magnifying
 - a section of the waveform 3-45
 - waveforms 3-36, 3-79, 3-80
 - main sweep 3-45
 - making
 - measurements 3-82
 - oscilloscope easier to view 1-19
 - quick measurements 3-48
 - waveform bigger or smaller 3-43, 3-73
 - manipulating waveforms 3-54, 3-71
 - manuals 1-9, 1-10
 - Marker A key 3-47
-

-
- marker and measurement controls 3-37
 - marker arrow keys 3-37
 - Marker B key 3-47
 - markers 3-37
 - and measurements 3-82
 - moving 3-81
 - positioning 3-47
 - turning on or off 3-47
 - measurement icons 3-51, 3-52, 3-53, 3-83
 - measurement indicators
 - geometric 3-53
 - measurement results
 - associating with waveform 3-82, 3-83
 - measurement toolbar 3-51, 3-52, 3-53, 3-82, 3-83
 - measurements 3-37, 3-54, 3-82, 3-83
 - and markers 3-82
 - drag and drop 3-53
 - Quick 3-48
 - reset 3-67
 - using markers 3-47, 3-81
 - menu bar 3-51, 3-52, 3-55, 3-62
 - menus 3-62
 - context-sensitive 3-55, 3-63, 3-65
 - methods for accessing information 4-92
 - Mode key 3-46
 - modes
 - edge trigger 3-85
 - graphical interface 3-51, 3-52
 - trigger 3-84
 - mouse
 - click 3-58
 - connecting 1-17
 - moving 3-58
 - right-click 3-58, 3-63
 - verifying 1-22
 - moving
 - dialog boxes 3-58, 3-59, 3-60
 - markers 3-47, 3-81
 - mouse 3-58
 - waveform horizontally 3-44, 3-77
 - waveform vertically 3-43
 - multiple active dialog boxes 3-86
- N**
- notes
 - dialog boxes 3-86
 - information system access 4-91
- online help access 4-94
 - online help windows 4-93
 - overdriving vertical amplifiers 3-79
 - screen saver 1-20
 - zooming 3-55
- O**
- obtaining information within a particular context 4-94
 - offset
 - adjusting vertical 3-43, 3-71, 3-72
 - vertical 3-37
 - online help 4-90, 4-91
 - windows 4-93
 - opaque dialog boxes 3-86
 - opening the online help 4-91
 - operation
 - verifying 1-22
 - option button 3-58, 3-59, 3-60
 - options
 - and accessories 1-10
 - display 3-54
 - oscilloscope
 - cleaning 1-26
 - inspecting 1-9
 - resetting 3-38
 - using 3-32
 - oscilloscope feet 1-19
 - oscilloscope front panel 3-33, 3-35, 3-37
 - oscilloscope graticule 3-37
 - oscilloscope operation
 - verifying 1-22
 - oscilloscope probes, see probes
 - overdriving vertical amplifiers 3-55, 3-79
 - overvoltage category 1-11
- P**
- package contents 1-9
 - parallel printers 1-15
 - parameters
 - trigger 3-84
 - pointer
 - moving 3-58
 - pointing device
 - connecting 1-17
 - verifying operation 1-22
 - pollution degree 1-11
 - pollution degree, definitions 1-11
- Q**
- position
 - adjusting horizontal 3-44, 3-56, 3-77
 - adjusting vertical 3-43
 - horizontal 3-51, 3-52, 3-78
 - positioning markers 3-47
 - power
 - applying 1-20
 - connecting 1-14
 - requirements 1-14
 - turning off 1-21
 - preferences for dialog boxes 3-86
 - preset measurements 3-48
 - printer
 - cables 1-15
 - printers
 - connecting 1-15
 - probes 1-10
 - connecting 1-17, 1-18
 - setting characteristics of 3-74
 - probing a circuit 1-18
- R**
- quick measurements 3-48
 - QuickMeas key 3-48
- R**
- Recovery Disks 3-87
 - reducing screen clutter 3-86
 - reference
 - horizontal 3-75
 - Repetitive Strain Injury
 - Description 2-29
 - Using the Mouse 2-30
 - reset
 - measurements and statistics 3-67
 - oscilloscope 3-38
 - right horizontal reference 3-56, 3-75
 - right-click 3-58, 3-63
 - RJ-45 connector 1-15
 - LAN card 1-15
 - RSI
 - Description 2-29
 - Using the Mouse 2-30
 - run 3-66
 - button 3-52
 - Run key 3-39
 - run/stop
 - controls 3-56
-

-
- running acquisition 3-36
 - S**
 - scaling
 - adjusting vertical 3-43, 3-73
 - vertical 3-37, 3-51, 3-52
 - screen saver 1-20
 - seconds per division
 - adjusting 3-44
 - in zoom 3-45
 - setting 3-76
 - seconds per division setting 3-51, 3-52
 - selecting
 - commands 3-62, 3-63
 - waveform features for measurement 3-53
 - serial printers 1-15
 - set up trigger 3-36
 - setting
 - dialog box preferences 3-86
 - edge trigger 3-46
 - horizontal reference 3-75
 - sweep speed 3-76
 - trigger position 3-75
 - setup
 - channel 3-74
 - default 1-22, 3-36, 3-38
 - dialog boxes 3-86
 - horizontal 3-56, 3-78
 - trigger 3-56, 3-84, 3-85
 - side panel connections 1-15
 - slope
 - trigger 3-46, 3-85
 - Slope key 3-46
 - software magnification of waveforms 3-79
 - source
 - trigger 3-46, 3-85
 - Source key 3-46
 - spin box 3-58, 3-59, 3-60
 - standard accessories 1-9
 - starting and stopping acquisition 3-39, 3-66
 - statistics
 - reset 3-67
 - status indicators
 - trigger 3-36
 - Stop
 - key 3-39
 - stop 3-66
 - button 3-51, 3-52
 - stopping acquisition 3-36
 - stretching and shrinking the waveform 3-44, 3-56, 3-76
 - submenus 3-62, 3-63
 - sweep
 - key 3-46
 - triggered 3-46, 3-85
 - sweep speed 3-36, 3-56, 3-78
 - adjusting 3-44, 3-76
 - horizontal 3-51, 3-52
 - in zoom 3-45
 - T**
 - Tab display area 3-54
 - tabs
 - as hyperlink 4-93
 - tilting the oscilloscope 1-19
 - time base
 - adjusting 3-76
 - see also horizontal
 - time measurements 3-37
 - title bar 3-58, 3-59, 3-60
 - tool tips 3-53
 - toolbars 3-55
 - horizontal and trigger 3-55
 - measurement 3-51, 3-52, 3-53, 3-82, 3-83
 - vertical 3-55
 - topics
 - contents 4-92
 - Touch Screen
 - Enable and Disable 3-49
 - touchpad
 - connecting 1-17
 - tracking waveforms
 - using markers 3-47
 - translucent dialog boxes 3-86
 - transparent dialog boxes 3-86
 - trigger
 - controls 3-36
 - input coupling 3-46
 - level 3-46, 3-57, 3-85
 - level reference indicator 3-57
 - location 3-56
 - parameters, where set up 3-36
 - position 3-75
 - setting edge 3-46
 - setup 3-56, 3-84, 3-85
 - setup button 3-51, 3-52, 3-84, 3-85
 - slope 3-46, 3-85
 - source 3-46, 3-85
 - status indicators 3-36
 - triggered sweep 3-46, 3-85
 - turning channels on or off 3-41, 3-55, 3-70
 - turning markers on and off 3-47
 - U**
 - undo
 - default setup 3-38
 - use of color in interface 3-33, 3-82
 - user interface
 - front panel 3-33, 3-35, 3-37
 - use of color 3-33, 3-52
 - user interface elements 4-94
 - using
 - markers 3-47
 - oscilloscope 3-32
 - V**
 - verifying basic operation 1-22
 - vertical amplifiers
 - overdriving 3-79
 - vertical controls 3-37
 - vertical inputs
 - overdriving 3-55
 - vertical offset 3-37, 3-74
 - adjusting 3-43, 3-54, 3-55, 3-71, 3-72
 - vertical scaling 3-37, 3-51, 3-52, 3-74
 - adjusting 3-43, 3-55, 3-73
 - vertical settings 3-55
 - vertical toolbar 3-55
 - voltage measurements 3-37
 - volts per division
 - adjusting 3-43, 3-73
 - W**
 - waveform
 - magnifying 3-36, 3-45
 - stretching and shrinking 3-44
 - waveform display area 3-54
 - waveform features
 - measurements on 3-82
 - moving markers to 3-81
 - selecting for measurement 3-53
 - waveforms
-

- acquiring 3-39, 3-66
- adjusting horizontal position 3-77
- associating with measurement results 3-82, 3-83
- drag and drop 3-71, 3-77
- drag-and-drop measurements on 3-82
- dragging measurement icons to 3-53
- making bigger or smaller 3-73
- making quick measurements 3-48
- manipulating 3-54
- matching to measurement results 3-53
- measuring using markers 3-47
- stretching and shrinking 3-56, 3-76
- tracking with markers 3-37
- turning off 3-41
- zooming on 3-55, 3-79, 3-80

window

- delayed sweep 3-45

Window system settings 1-25

windows

- online help 4-93

working with dialog boxes 3-86

Z

- zoom 3-45
- zooming on waveforms 3-55, 3-79, 3-80

Safety Notices

This apparatus has been designed and tested in accordance with IEC Publication 1010, Safety Requirements for Measuring Apparatus, and has been supplied in a safe condition. This is a Safety Class I instrument (provided with terminal for protective earthing). Before applying power, verify that the correct safety precautions are taken (see the following warnings). In addition, note the external markings on the instrument that are described under "Safety Symbols."

Warnings

- Before turning on the instrument, you must connect the protective earth terminal of the instrument to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. You must not negate the protective action by using an extension cord (power cable) without a protective conductor (grounding). Grounding one conductor of a two-conductor outlet is not sufficient protection.
- Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuse-holders. To do so could cause a shock or fire hazard.
- If you energize this instrument by an auto transformer (for voltage reduction or mains isolation), the common terminal must be connected to the earth terminal of the power source.

- Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.

- Service instructions are for trained service personnel. To avoid dangerous electric shock, do not perform any service unless qualified to do so. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

- Do not install substitute parts or perform any unauthorized modification to the instrument.

- Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.

- Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

- Do not use the instrument in a manner not specified by the manufacturer.

For technical assistance, please contact Agilent Technologies Technical Support. You can find the Technical Support phone number for your specific country on www.agilent.com.

To clean the instrument
If the instrument requires cleaning: (1) Remove power from the instrument. (2) Clean the external surfaces of the instrument with a soft cloth dampened with a mixture of mild detergent and water. (3) Make sure that the instrument is completely dry before reconnecting it to a power source.

Safety Symbols



Instruction manual symbol: the product is marked with this symbol when it is necessary for you to refer to the instruction manual in order to protect against damage to the product.



Hazardous voltage symbol.



Earth terminal symbol: Used to indicate a circuit common connected to grounded chassis.

Keysight Technologies Inc.
1900 Garden of the Gods Road
Colorado Springs, CO 80907 USA

Notices

© Agilent Technologies, Inc.
2012

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number
54904-97008, November 2012

Print History
54904-97008, November 2012
54904-97006, October 2009
54904-97001, June 2009

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Document Warranty

The material contained in this document is provided “as is,” and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

Trademark

Acknowledgements

Windows and MS Windows are U.S. registered trademarks of Microsoft Corporation.

MATLAB is a U.S. registered trademark of MathWorks.

Mathcad is a U.S. registered trademark of Mathsoft.