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Help Volume

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Infinium Time Correlation Fixture

The Infiniium Time Correlation Fixture



The Agilent Technologies E5850A Time Correlation Fixture automates and simplifies the tedious process of setting up an oscilloscope and a logic analyzer to cross-trigger and make time-correlated measurements. It works with Agilent 167XX Logic Analysis Systems (with 1655X and/or 167XX analysis modules), and Agilent Infiniium 548XX oscilloscopes.

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The Infinium Time Correlation
Fixture

Overview

The Agilent Technologies E5850A Time Correlation Fixture automates and simplifies the tedious process of setting up an oscilloscope and a logic analyzer to cross-trigger and make time-correlated measurements. It measures skew between the two instruments and configures them for cross-triggering. It is compatible with Agilent 167XX Logic Analysis Systems (with 1655X and/or 167XX analysis modules) and Agilent Infiniium 548XX oscilloscopes.

The Agilent E5850A is comprised of a Time Correlation Fixture and software to automate the correlation tasks. The Agilent E5850A produces mixed displays of correlated logic analysis and oscilloscope waveforms and coordinates marker moves between the Logic Analysis System and the Infiniium 548XX.

The software, which runs on the Agilent 167XX Logic Analysis System, accomplishes its tasks by sending commands to the Agilent Infiniium 548XX Oscilloscope via LAN.

Next step: “Installing the Software” on page 47

Connecting the Fixture

To perform time correlated measurements, the Agilent E5850A time correlation fixture must be connected to the Agilent 16700-series logic analysis system and the Agilent Infiniium 548XX oscilloscope.

Follow these steps to connect the time correlation fixture to the logic analysis system and the oscilloscope.

1. “Connect the LAN” on page 10
2. “Connect the BNC cables” on page 14
3. “Connect the Oscilloscope Probe” on page 19
4. “Connect the Analyzer” on page 20
5. “Connect the Power Supply” on page 21

The BNC cables and the power supply must remain connected to the time correlation fixture when you are performing a time correlated measurement.

NOTE:

Remember that the skew is affected by cable lengths, probe types, the instruments themselves and the particular slot an analysis module is in. If you change any of these you will need to run auto deskew again. To re-run auto deskew, select the *Time Correlate with Infiniium Oscilloscope* button from the system window, then select *Run Auto Deskew*.

Connect the LAN

The Agilent E5850A Time Correlation Fixture software uses a network connection between the 548XX Infiniium oscilloscope and the 16700-series logic analysis system to produce time correlated measurements. The instruments may be connected on a local area network (LAN), or connected point-to-point with a cross-over cable (which is supplied with the E5850A time correlation fixture).

You may connect only one oscilloscope to the system for time correlated measurements. The system does not support the connection of two or more oscilloscopes at once.

Point-to-Point Connection Setup

Configuring the point-to-point connection (see page 11)

LAN Connection Setup

Configuring the logic analyzer LAN setup (see the *Agilent Technologies 16700A/B-Series Logic Analysis System* help volume)

For instructions on making the LAN connection to the Infiniium 548XX oscilloscope, choose *File -> Network -> Getting Started* from the Infiniium main menu.

Next step: “Connect the BNC cables” on page 14

Point-to-point Networking

If you don't typically network your 167XX Logic Analysis System or 548XX Infiniium oscilloscope, it may be most convenient to set up a point-to-point connection between the instruments.

LAN Crossover Cable To do this you will need a crossover LAN cable (such as Agilent part number 5061-7342, included with the E5850A). A LAN crossover cable is often called a "blue cable", because often times the cable is blue or the ends of the cable are marked in blue. Crossover cables also come in colors other than blue.

You can also identify a crossover cable by looking at the connectors. They are usually clear and you can see the colored wires connected to each contact. On a crossover cable the two ends will be wired differently from one another. Simply connect one end of the crossover cable to the network interface on your 167XX Logic Analysis System and the other end to the network interface on your 548XX Infiniium oscilloscope.

Configure the Networking Software You will need to configure the networking software on both instruments.

Configure the 167XX Networking Software

On the 167XX Logic Analysis System, select the System Administration icon from the toolbar. In the dialog that pops up, select *Network Setup...* In the Network Setup dialog, select or enter the following:

Networking?	Standard
Hostname	logic
Int. Address(IP)	192.0.2.232
Gateway name	(leave it blank)
Gateway IP	(leave it blank)
Subnet Mask	255.255.255.0

Chapter 1: The Infinium Time Correlation Fixture Point-to-point Networking

Once these values are all entered, select the *OK* button at the bottom left of the dialog. This may cause a reboot, depending on the prior configuration of the networking software. If a reboot does occur, return to this dialog using the System Administration icon and *Network Setup...* button. Then select the *Name Resolver...* button. In the Name Resolution Dialog that pops up, Name Resolution by *Host Table* should be selected. In the input box below the *Host Table* label, enter:

192.0.2.231 infinium

Then select the *Add* button. Select the *OK* buttons on the Name Resolution and Network Setup dialogs. Now, when you use the E5850A software, you can enter either "192.0.2.231" or "infinium" as the *Infinium Host Name or IP* in either the Setup Assistant or the E5850A main dialog.

Configure the Infinium Networking Software

To configure the networking software on the 548XX Infinium, enable the graphical interface by selecting the mouse icon in the upper right corner. Select *File->Network->Properties*. Make sure the following components are installed:

Client for Microsoft Networks
LAN Card
NetBEUI
TCP/IP

After the components are all installed, select *TCP/IP* and then the *Properties* button. Select or enter the following:

IP Address Tab
Specify an IP address

IP Address 192.0.2.231
Subnet Mask 255.255.255.0

WINS Configuration Tab
Disable WINS Resolution

Gateway Tab

Remove any installed gateways

DNS Configuration Tab

Disable DNS

Select *OK* in the *TCP/IP Properties* dialog and the *Network* dialog. This may cause a reboot, depending on the prior configuration of the networking software.

Test the Configuration When the Infinium is ready you can test the configuration by selecting *Ping...* from the Networking Tab of the 167XX Logic Analysis System. Enter "infinium" in the text box of the Ping dialog and select *OK*. A window will open and display messages like the following:
64 bytes from 192.0.2.231: icmp_seq=0. time=0. ms

If you see no error messages, close the Ping window. Your point-to-point connection is now established.

Next step: "Connect the BNC cables" on page 14

Connect the BNC cables

BNC cable connections depend on which Infiniium oscilloscope model you have.

For instructions for connecting BNC cables select the appropriate link below.

To see your Infiniium oscilloscope model number, select *Help->About Infiniium* from the Infiniium oscilloscope menu bar.

54810A, 54820A
[Click here \(see page 15\)](#)

54815A, 54825A, 54835A, 54845A, 54846A
[Click here \(see page 17\)](#)

54830B
[Click Here \(see page 16\)](#)

54831B, 54832B
[Click Here \(see page 18\)](#)

BNC Connection Instructions

**Infiniium
Oscilloscope Models
54810A, 54820A**

Connect BNC cables between the following BNC connectors:

1. *Port Out* on the logic analyzer and *Ext Trig* on the oscilloscope.
2. *Aux Out* on the E5850A fixture and *Aux Out* on the oscilloscope.
3. *Port In* on the E5850A fixture and *Port In* on the logic analyzer.

Next step: “Connect the Oscilloscope Probe” on page 19

BNC Connection Instructions

**Infiniium
Oscilloscope Model
54830B**

Connect BNC cables between the following BNC connectors:

1. *Port Out* on the logic analyzer and *Ext Trig* on the oscilloscope.
2. *TTL Trig Out* on the oscilloscope and *Port In* on the logic analyzer.

Note: It is not necessary to connect BNC cables to the E5850A time correlation fixture.

Next step: “Connect the Oscilloscope Probe” on page 19

BNC Connection Instructions

**Infiniium
Oscilloscope Models
54815A, 54825A,
54835A, 54845A,
54846A**

Connect BNC cables between the following BNC connectors:

1. *Port Out* on the logic analyzer and *Aux Trig In* on the oscilloscope.
2. *Aux Out* on the E5850A fixture and *Aux Out* on the oscilloscope.
3. *Port In* on the E5850A fixture and *Port In* on the logic analyzer.

Next step: “Connect the Oscilloscope Probe” on page 19

BNC Connection Instructions

**Infiniium
Oscilloscope Models
54831B, 54832B**

Connect BNC cables between the following BNC connectors:

1. *Port Out* on the logic analyzer and *Aux Trig In* on the oscilloscope.
2. *TTL Trig Out* on the oscilloscope and *Port In* on the logic analyzer.

Note: It is not necessary to connect BNC cables to the E5850A time correlation fixture.

Next step: “Connect the Oscilloscope Probe” on page 19

Connect the Oscilloscope Probe

NOTE:

It is important to use the same probe for the automatic deskew process as you use to make your target system measurements. This provides the best possible deskew accuracy. All connections must include a ground connection.

Connect the Agilent Infiniium 548XX oscilloscope channel 1 probe to *any* point labeled *CAL* on the front of the E5850A Time Correlation Fixture. Any point labeled *CAL* is equivalent to any other point labeled *CAL*.

For example:

- If you are using a grabber probe to make target system measurements, connect the grabber probe to the cal terminal on the front of the time correlation fixture. Then connect the ground lead.
- If you are using a twin lead probe to make target system measurements, connect the twin lead probe to the Time Correlation Fixture. Then connect the ground lead.
- If you are using a sharp-tip probe to make target system measurements, connect the sharp tip probe to the CAL terminal on the front of the Time Correlation Fixture. Then connect the ground lead.

Next step: “Connect the Analyzer” on page 20

Connect the Analyzer

NOTE:

It is important to use the same probes for the automatic deskew process as you use to make your target system measurements. This provides the best possible deskew accuracy. All connections must include a ground connection.

There are two ways to connect to the *CAL* signals on the time correlation fixture:

- Using flying leads
- Using high-density connectors (MICTOR or Samtec)

Flying leads

Connect pod 2, channel 0 of the logic analyzer you are using to any point labeled *CAL* on the front of the Time Correlation Fixture. If you are using multiple cards, use pod 2 of the master card. Include a ground connection.

High-density connectors

- If you are using a MICTOR connector on your target system, use the MICTOR receptacle on the top of the Time Correlation Fixture, which includes the *CAL* connection. Be sure to connect pod 2 of the logic analyzer to the even receptacle of the MICTOR high-density adapter cable. You can use a terminated or an unterminated high-density adapter cable.
- If you are using Samtec connectors on your target system, use the Samtec receptacle on the top of the Time Correlation Fixture, which includes the *CAL* connection.

Next step: “Connect the Power Supply” on page 21

Connect the Power Supply

Connect the power supply to the Time Correlation Fixture as follows:

- Connect the AC power cable to the AC/DC adapter

WARNING: Shock hazard. Use only the 0950-2546 power supply and cord.

CAUTION: Equipment damage. Use only the 0950-2546 power supply and cord.

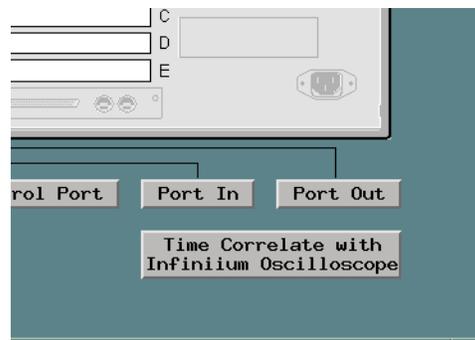
- Connect the DC power cable from the AC/DC adapter to the jack on the back of the Time Correlation Fixture.

Next step: “Configuring the Software” on page 22

Configuring the Software

The time correlation setup assistant

The time correlation setup assistant will help you configure the E5850A software for most applications. To access this setup assistant, open the *System* window and select the *Time Correlate with Infiniium Oscilloscope* button in the lower right corner.



Note that running the time correlation setup assistant or the auto deskew will overwrite the current intermodule bus setup. If you have created a unique intermodule bus setup, you may want to save the configuration so you can return to it later. If you need to use your unique intermodule bus setup with the time correlation tool, you will need to set up the time correlation tool first, then recreate your intermodule bus setup.

Advanced users may want to refer to the procedure “Setting Up the Infiniium Time Correlation Tool in the Workspace” on page 49 instead.

Running the time correlation setup assistant

Selecting the *Time Correlate with Infiniium Oscilloscope* button will run the time correlation setup assistant only if the Infiniium tool is not present in the system workspace. If an Infiniium tool is in the System Workspace and the button is selected, the Infiniium time correlation setup window will be displayed. If you want to re-run the time correlation setup assistant, click on the *System Workspace* icon in the main System window and delete the Infiniium tools by right-clicking on them and selecting delete. Then click on the *Time Correlate with Infiniium Oscilloscope* button in the main System window.

For more information, see:

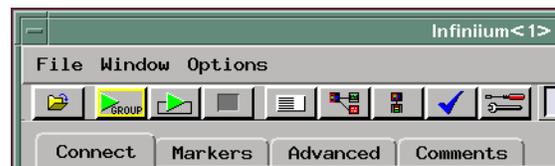
- “Infiniium Host Name” on page 29
- “Trigger Direction” on page 27
- “Analyzer Selection” on page 28

When you've made your choices, select the *Next -->* button to proceed. This will display a screen with instructions for connecting the 167XX logic analysis system and the Infiniium 548XX to the E5850A time correlation fixture. Make all the connections. Then, when you select the *Done* button, the software will add the Infiniium tool to the Workspace, set up the intermodule bus, and *Run Auto Deskew...* The skew between the Infiniium and the logic analyzer will be measured (in both directions) and the system will be prepared to make a measurement.

If you need to customize the setup, click on the appropriate tab(s) in the Infiniium<1> window. See “Advanced Software Features” on page 24.

Next step: “Making a Measurement” on page 25

Advanced Software Features



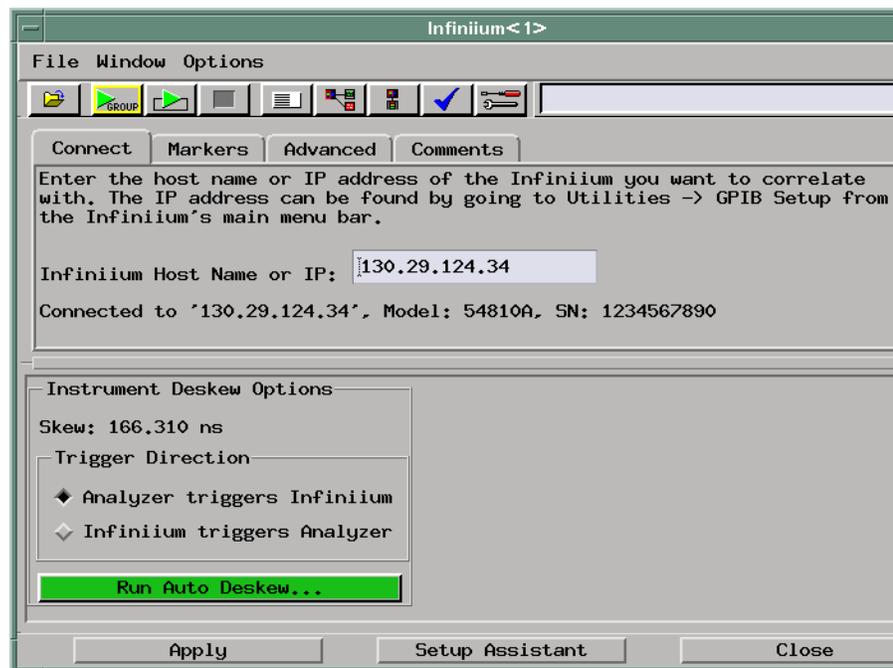
If you need to change the default configuration that the time correlation setup assistant has created, click on the appropriate tab in the Infinium<1> window of the logic analysis system and make your changes. Be aware that changing the configuration may cause the time correlation software to stop working. If this happens, you can use the time correlation setup assistant to re-configure the software for correct operation. See “Re-running the Setup Assistant” on page 53.

Software Configuration

- “Connect Tab” on page 30
- “Markers Tab and Coordinated Marker Moves” on page 31
- “Advanced Tab” on page 34
- “Comments Tab” on page 37

Next step: “Making a Measurement” on page 25

Making a Measurement



When the calibration is complete the Infiniium Time Correlation window will be displayed (titled Infiniium<1>), and you may proceed with your measurements as follows:

- Disconnect the oscilloscope probe and the logic analyzer leads from the E5850A
- Connect the oscilloscope probe and the logic analyzer leads to your target system
- Do not disconnect the BNC cables
- Press the Run button on the logic analyzer front panel
- Select *Window* in the menu bar at the top of the logic analyzer screen

Chapter 1: The Infiniium Time Correlation Fixture

Making a Measurement

- Select the logic analyzer you are using (A, B, or C, etc.)
- Select the Waveform pop-out list to view your measurement results

A note about trigger setups

Analyzer Triggers Infiniium

When the software is configured for *Analyzer triggers Infiniium* you can set any trigger condition you desire in the logic analyzer. However, do not change the Infiniium's trigger setup. See also “General Triggering Problems” on page 55.

Infiniium Triggers Analyzer

When the software is configured for *Infiniium triggers Analyzer* you may set any trigger condition you desire in the Infiniium. However, do not change the logic analyzer's trigger setup. See also “General Triggering Problems” on page 55.

Trigger Direction

You can select the trigger direction in the Setup Assistant. Note that the Setup Assistant will measure skew in both directions so selecting a trigger direction at this point is just a convenience for your planned initial usage. The trigger direction can be changed later if you wish.

Back to “Configuring the Software” on page 22

Analyzer Selection

If your 167XX contains more than one analysis module that can be time correlated with Infiniium 548XX, a list will be presented. Select the analyzer you wish to correlate with.

Back to “Configuring the Software” on page 22

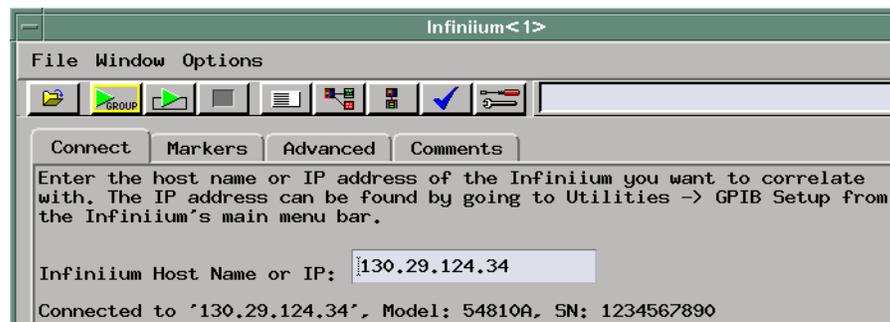
Infiniium Host Name

Enter the *Host Name or IP Address* of the Infiniium 548XX you will be using for making time correlated measurements. To find the Infiniium's IP address, choose *Utilities -> GPIB Setup...* from the Infiniium main menu and enter the number shown in the *LAN Interface* box. Include only the numbers and decimal points, not the brackets or text. For example: 130.29.124.34

Note that the time correlation setup assistant or auto deskew must be re-run if the Infiniium's IP address is changed.

Back to “Configuring the Software” on page 22

Connect Tab



If a connection has already been established with the Infiniium, the Connect tab will display the Infiniium's IP address, model number, and serial number.

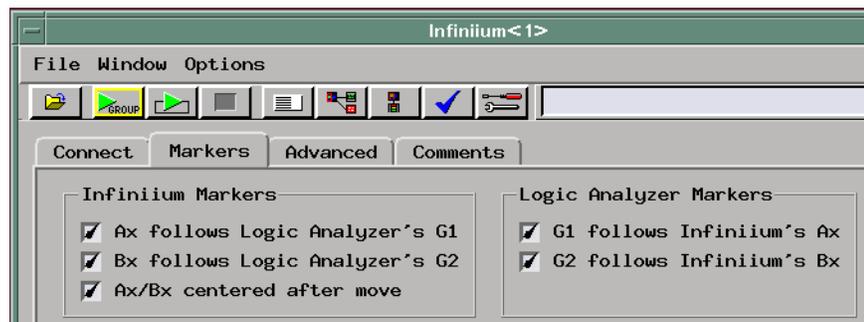
To establish a LAN connection to the Infiniium, enter the Infiniium's IP address in the *Infiniium Host Name or IP* box. Then press the Enter key on your keyboard or select the "Apply" button in the lower left corner of the "Infiniium<1>" window. Either of these actions will initiate an attempt to establish a LAN connection with the Infiniium.

If the software fails to make a network connection to the Infiniium you specify, a red error box will be displayed. Check the address you entered and the network setup on both the logic analysis system and the Infiniium.

If you change the Infiniium's IP address the deskew calibration must be re-run.

Back to "Advanced Software Features" on page 24

Markers Tab and Coordinated Marker Moves



Marker moves can be coordinated between the Logic Analysis System and the Infinium. Markers are coordinated in time relative to the trigger taking the measured skew into account. The options for marker features are displayed under the *Markers* tab. By default all options are enabled.

On the Logic Analysis System the two global markers called G1 and G2 are time coordinated among all Display Windows that are displaying measurements from a given Run Group. On the Infinium there are two X-Axis (time) markers called Ax and Bx. Marker moves may be coordinated between G1 and Ax or between G2 and Bx. The option to coordinate between G1 and Bx or between G2 and Ax is not available.

Coordinated marker moves are useful for quickly identifying a given point in the trace on the separate Logic Analysis System and Infinium displays. Even though all the waveforms are displayed on the Logic Analysis System the Infinium generally provides a higher resolution display of the analog waveforms and has measurement capabilities not present in the Logic Analysis System Waveform display.

Infinium Markers

Ax follows Logic Analyzer's G1 When you move the G1 marker in the Logic Analysis System Waveform display a command is sent to the Infinium to position the Ax marker at the same point in time.

Chapter 1: The Infiniium Time Correlation Fixture

Markers Tab and Coordinated Marker Moves

Bx follows Logic Analyzer's G2 When you move the G2 marker in the Logic Analysis System Waveform display a command is sent to the Infiniium to position the Bx marker at the same point in time.

Ax/Bx centered after move After either Ax or Bx are moved, the Infiniium display is centered on the marker that was just moved. This is most useful in conjunction with "Infiniium Ax follows G1" or "Infiniium Bx follows G2". In that case when you move the global marker in the Logic Analysis System Waveform display, the Infiniium marker is moved and the Infiniium display is centered on the new position of the marker.

If you are using a pointing device such as a mouse or track ball to move markers on the Infiniium, you should turn off the "Ax/Bx centered after move" option. This option interacts with mouse moves in sometimes confusing ways. This option works well with the marker move buttons on the Infiniium front panel.

If you are using Measurement Markers on the Infiniium you should turn all these options off since they will interfere with Measurement Marker operation.

Logic Analyzer Markers

G1 follows Infiniium's Ax When you move the Ax marker on Infiniium the G1 marker in the Logic Analysis Waveform display is moved to the same point in time.

G2 follows Infiniium's Bx When you move the Bx marker on Infiniium the G2 marker in the Logic Analysis Waveform display is moved to the same point in time.

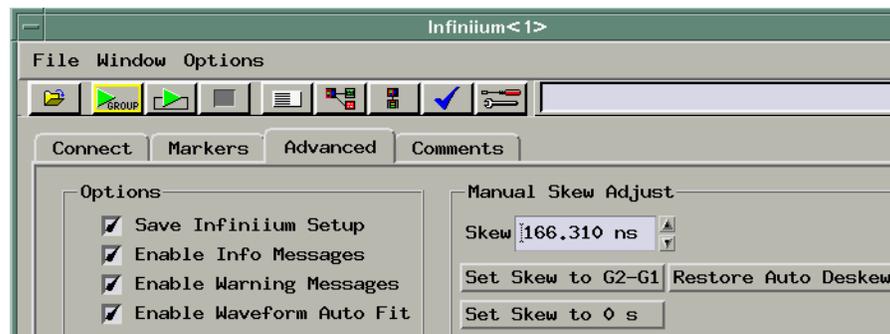
Coordinated Marker Implementation Note

Markers, and in particular marker moves, are not identically implemented in the 167XX Logic Analysis System and the Infiniium oscilloscope. In the 167XX Logic Analysis System the new marker position is sent to all tools that are displaying a correlated measurement when the move completes. Moving a 167XX marker will cause a move of an Infiniium marker only when the move is complete. The Infiniium doesn't have this same facility, so the 167XX polls the Infiniium for its marker positions, updating the 167XX markers as the

Infinium markers move.

Back to “Advanced Software Features” on page 24

Advanced Tab



Save Infiniium Setup

When the *Save Infiniium Setup* box is checked, the Infiniium setup will be saved with the logic analyzer configuration when you save the logic analyzer configuration.

Enable Info Messages/Enable Warning Messages

Warning messages and information messages will be displayed by the Time Correlation Fixture software. These messages may be helpful the first few times you use the E5850A, but may become a nuisance after you are familiar with its operation. These messages can be turned off by deselecting the *Enable Info Messages* and/or *Enable Warning Messages* options. These options are saved when you save a logic analyzer configuration.

Setting these options affects only the current instance of the Time Correlation Fixture software. The messages will appear again when the Time Correlation Fixture software is restarted.

Enable Waveform Auto Fit

Enabled by default. Resizes (usually increases height of) imported Infiniium waveforms in 167XX logic analysis system Waveform display for easy viewing. Makes the tallest imported waveform fill the allocated

height. Retains proportional heights between imported waveforms.

Entering a Manual Skew Adjustment

You can use the *Manual Skew Adjust* to manually change the measured skew and apply that new skew to displays. Since there is some uncertainty in all measurements, you may wish to use this option to create a more visually pleasing or comprehensible display. You can use the arrow buttons to increment or decrement the skew in 1 nsec increments, or you can type in a new skew value with up to picosecond resolution. Changes made here apply only to the currently selected Trigger Direction. The other measured value is not affected. Press the *Apply* button in the lower left corner to apply the new skew to current data. The new value will be used on future measurements also. To restore the originally measured skew, press the *Restore Auto Deskew* button. This applies only to the currently selected Trigger Direction.

Manually Adjusting the Skew Using the Global Markers

You may also set the skew using the global markers G1 and G2 on the 167XX. To do this, first press the *Set Skew to 0s* button. This will reset the skew to zero. Press the *Apply* button in the lower left corner of the *Infiniium<1>* window to apply the new skew to current data.

Next, open the Waveform window at the output of the Infiniium tool to view the non-correlated data. (Select the Workspace icon , then double-click the Waveform window.) You can manually deskew if you have a common signal that was probed with both an analysis channel and a scope channel. Move the G2 marker to the dual-probed edge on the analysis channel. Move the G1 marker to the dual-probed edge on the scope channel. The difference in time between these two markers is the skew between instruments for that edge.

Go back to the Infiniium Advanced Tab and press *Set Skew to G2-G1*. The time between the markers will be displayed. Press the *Apply* button in the lower left corner to apply the new skew to current data. Open the Waveform window again and the edge will be correlated between instruments.

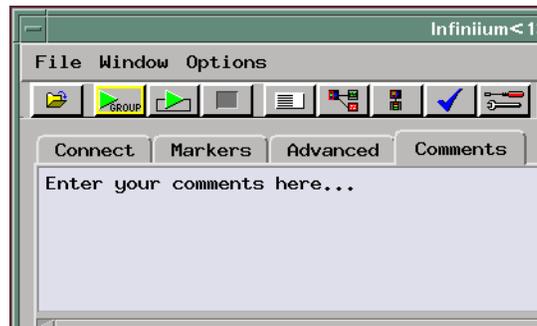
[Chapter 1: The Infinium Time Correlation Fixture](#)
Advanced Tab

See Also

“What do the skew numbers mean?” on page 46

Back to “Advanced Software Features” on page 24

Comments Tab



The Comments Tab is a text edit area where you can place comments to remind you of what the current setup was used for, results you measured, etc. These comments are saved when you save the configuration. Many other tools such as Waveform and Listing also have comments tabs where you can document specific displays.

Back to “Advanced Software Features” on page 24

Infiniium IP Address

The Time Correlation fixture software requires the Infiniium host name or IP address. To find the Infiniium host name or IP address:

1. *On the Infiniium Oscilloscope, select Utilities-> GPIB Setup...*
2. The Infiniium Address is shown in the *LAN Interface* portion of the window. Ignore the brackets and text, and use only the numbers (such as 123.45.678.90). Enter that string from the Infiniium 548XX in the Setup Assistant.
3. If you use a host name instead of a web address, enter it instead of the IP address.

NOTE:

If this string is not entered correctly or if someone changes the Infiniium's IP address, the 167XX will not be able to communicate with the Infiniium 548XX. If the string happens to correspond to some other Infiniium 548XX on the network, the 167XX may find and connect to that Infiniium 548XX, giving the appearance that you are correctly connected when you in fact are not. If you enter a string that does not correspond to any device on your network, the software may appear to hang for up to several minutes while it searches for the device. Only one connection from a 167XX to a given Infiniium 548XX can be supported. Making multiple connections to a single Infiniium 548XX will in most cases cause all the connections to hang.

Reference

The following information helps explain how the time correlation fixture works.

- “How the Auto Deskew Operation Works” on page 40
- “Calibration” on page 44
- “Uncertainty” on page 45
- “What do the skew numbers mean?” on page 46

How the Auto Deskew Operation Works

Propagation Delays

The 167XX and the Infiniium 548XX are able to drive a signal out of their chassis when a trigger condition occurs. These signals are Port Out on the 167XX and Aux Out (or Ext Trig Out) on the Infiniium 548XX. They are also able to arm and/or trigger on the receipt of an external signal. These signals are Port In on the 167XX and Aux Trig In on the Infiniium 548XX. On both instruments there is a propagation time between when a trigger event occurs and when its output signal is driven, and a propagation delay between when an input signal occurs and when the instrument actually triggers. There will also be propagation time in the cable between the instruments. We call the sum of all these propagation times the "skew" between the instruments.

Trigger points are different

For example, you can simply connect a 50 ohm cable from the 167XX Port Out to the Infiniium 548XX Aux Trig In. Set a trigger condition of your choice on the 167XX, set the Infiniium 548XX to Edge trigger on Aux Trig In at 1.0 V. Run the Infiniium 548XX, run the 167XX. After the 167XX triggers, the Infiniium 548XX will trigger. Both instruments will identify their trigger point. Unfortunately, because of the skew, these trigger points will not represent the same point in time. Unless the signal(s) being probed have unique identifying patterns, it may be very difficult or impossible to tell which edge(s) on one instrument correspond to which edge(s) on the other instrument.

The objective

The point of the Auto Deskew operation is to measure the skew between the instruments, remember the results of those measurements, and take those results into account when displaying subsequent measurements so that time correlated displays and marker moves can be created.

Setup matters

It is important to be aware that the skew measurement is specific to

the setup used for the measurement. The skew will change for different models of analysis modules and different Infiniium models. It will vary using the same model of an analysis module in a different slot of the 167XX chassis. It will vary based on the type and length of scope probe used. It will vary among the various probing options available for analysis modules such as flying leads, MICTOR connectors, Samtec connectors, etc. For the best possible time correlation you must perform the Auto Deskew operation with the same probing you will later use for measurements on your device under test.

The Cal signal

The skew is measured by probing the Cal signal on the E5850A with both Pod 2, Channel 0 of the analysis module and Channel 1 of the Infiniium 548XX. The Cal signal itself is a low frequency oscillator (approx. 62 kHz, approx. 16 usec period). Since the period of this oscillator is at least two decimal orders of magnitude greater than the skew between the instruments, we know that the edge nearest the trigger is the same edge on both instruments. It is critically important that the instrument that is to receive the external trigger signal is running, armed and waiting before the driving instrument sends the trigger signal. If that is not the case, the instruments could very well be looking at different edges of the oscillator. During the Auto Deskew operation and during subsequent regular single or repetitive runs, the E5850A ensures that the instruments are always armed and run in the correct sequence.

Analyzer triggers Infiniium

To measure skew in the Analyzer Triggers Infiniium direction the E5850 software will setup both the analysis module and the Infiniium. The analyzer will be placed in Timing Mode at its highest sample rate (shortest sample period). Labels will be defined for the "DeskewEdge" (the Cal signal) and "TriggerSense" signals which are provided by the E5850A Time Correlation Fixture. The analyzer will be configured to trigger on the rising edge of the "DeskewEdge" signal. The Inter-Module Bus (IMB) will be configured to drive Port Out from the analysis module you selected. The Infiniium will be configured to trigger on its Aux Trig In line and Channel 1 will be turned on and configured to measure the "DeskewEdge" signal from the Time

Chapter 1: The Infiniium Time Correlation Fixture

How the Auto Deskew Operation Works

Correlation Fixture. It will be set up for Single Sweep, Real Time Sampling Mode at its maximum Sampling Rate and maximum Memory Depth.

Measuring the skew

The skew is measured by first running the Infiniium, after it is armed the analyzer is run. The analyzer triggers on the next edge of "DeskewEdge", drives Port Out to the Infiniium which then triggers. The software retrieves the captured Channel 1 waveform from the Infiniium and measures the time from the trigger point to the rising edge on that waveform. The rising edge will occur earlier in time than the trigger. This time is the skew.

An average is used

The measurement is repeated several times and the average is taken to be the skew. The reason for taking the average of multiple measurements is the fact that the analyzer is sampling the "DeskewEdge" signal at a regular interval. The edge may actually occur near the beginning or near the end of the analyzer's sample period. The Infiniium is also sampling at a regular interval, generally at a much higher frequency (shorter period). Because of the different and asynchronous sampling between the two instruments a skew of +/- one analyzer sample period can occur in any single measurement.

Infiniium triggers analyzer

Measuring skew in the Infiniium Triggers Analyzer direction is very similar to the Analyzer Triggers Infiniium direction. The Infiniium is set up to trigger on a rising edge on Channel 1 and drive Aux Out (TTL Trig Out) to the Logic Analysis System Port In. The analysis module is configured to trigger on Port In. When the measurement is run, the analysis module is run first so it is armed and waiting for the Aux Out/Port In signal from the Infiniium. The Infiniium is then run, it triggers and drives the trigger signal to the Logic Analysis System which then triggers and fills analysis memory. Note that Infiniiums which have a "TTL Trig Out" port can drive the logic analyzer's Port In input directly, while Infiniiums which have "Aux Out" ports must be routed through the E5850A for buffering. The skew is then measured as the time between when the rising edge occurred and the trigger occurred in the

Logic Analysis System. The measurement is run several times and an average is taken.

The setup is ready

The analyzer pod and scope probe may now be disconnected from the Time Correlation Fixture and used to probe the device under test. The analyzer trigger and IMB setup should not be changed, they are setup to receive the trigger signal from the Infiniium and this is required for correlation. The Infiniium trigger may be setup for whatever condition you are looking for in the device under test. Remember that only Single Sweep, Real Time acquisition can be meaningfully correlated with a logic analyzer. After the analysis module triggers and fills its analysis memory the waveforms captured by the Infiniium will automatically be imported into the Logic Analysis System and be displayed and time correlated in the Waveform window.

Calibration

The time correlation fixture measures the skew during the Auto Deskew operation. The software uses the skew factor in all subsequent runs.

After you have run Auto Deskew, you can remove the channel connections from the front of the E5850A time correlation fixture. All of your oscilloscope and logic analysis channels are available for probing your device under test when the calibration is complete.

Remember that the skew is affected by cable lengths, probe types, the instruments themselves and the particular slot an analysis module is in. If you change any of these you will need to perform the deskew operation again.

Uncertainty

Since the analyzer samples signals at intervals of one duration and the scope will usually sample at intervals of an entirely different duration and signals can actually transition at any point in time with any possible relation to the sample period(s), there will always be some uncertainty about when the signal actually transitioned versus when the analyzer noticed the transition.

Another source of uncertainty is the circuit used by the intermodule bus (IMB) to cross-correlate the times of trigger events from different modules. This circuitry has a resolution of 2 ns.

The uncertainty will always be at least +/- one timing analyzer sample period plus 2 ns IMB uncertainty.

During the Auto Deskew operation the maximum and minimum skew are measured. If the maximum measured skew is outside the expected range, it can indicate that one or more of the connections to the Time Correlation Fixture were not made or were made incorrectly. A warning dialog will appear, suggesting that you check all the connections and run Auto Deskew again.

What do the skew numbers mean?

The skew (which is displayed above the Trigger Direction box) is the average trigger delay that is introduced external to the Logic Analyzer. The portion of the total skew that is internal to the 167XX Logic Analysis System is compensated for internally on a per-run basis. This internally measured skew is added to the constant skew that is displayed to compute the total skew. The total skew is added to the trigger time for the Infiniium, thereby time correlating its trigger position with the trigger position of the analyzer.

The skew number will be positive when the Analyzer triggers Infiniium. This has the effect of moving the Infiniium trigger to the right in the Waveform window. When the Analyzer triggers the Infiniium, a delay occurs between the time when the Analyzer sees the trigger condition and when the Port Out signal arrives at the Infiniium Aux Trig In. This means the Infiniium will trigger at a later time than the analyzer, so its waveforms must be moved to the right in order for them to line up with Analyzer waveforms.

The skew number will be negative when the Infiniium triggers the Analyzer. This has the effect of moving the Infiniium trigger to the left in the Waveform window. When the Infiniium triggers the Analyzer, a delay occurs between the time when the Infiniium sees the trigger condition and when the Aux Out signal arrives at the 167XX Port In. This means that the Infiniium will trigger at an earlier time than the analyzer, so its waveforms must be moved to the left in order for them to line up with Analyzer waveforms.

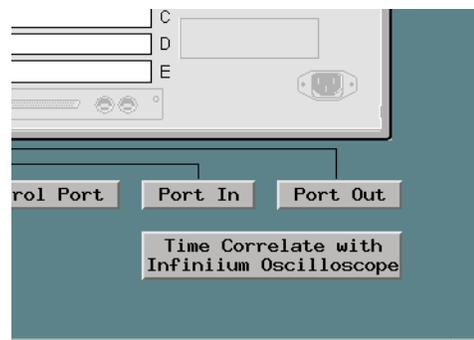
In the Advanced Tab you can use the Manual Skew Adjust to change the fixed part of the total skew computation. This allows you to move the Infiniium waveforms to the right (larger numbers) or left (smaller numbers). This feature can be used to remove constant skew that was not measured during the Auto Deskew. If you use different probing accessories when you probe your Device Under Test than when you ran the Auto Deskew, you will be causing additional constant skew. This is one example of where Manual Skew Adjust can be useful.

Installing the Software

Software for the E5850A may be installed on any Agilent 167XX Logic Analysis System.

Is the Infiniium Time Correlation Software Installed?

If the Infiniium Time Correlation software is installed, a button will be present in the lower right corner of the system window titled *Time Correlate with Infiniium Oscilloscope*. This button appears under the *Port In* and *Port Out* buttons as shown below.



You can install the software now, but in order to use the time correlation software you must connect the E5850A Time Correlation Fixture too.

To install the software:

1. Obtain a CD-ROM labeled *Agilent 16700 Series Logic Analysis System Software*, version A.02.20.00 or later.
2. Insert the CD-ROM in the CD drive.
3. Open the *System Administration* tool.
4. Select the *Software Install* tab.
5. Select the *Install...* button.

Chapter 1: The Infiniium Time Correlation Fixture

Installing the Software

6. In the Software Install window, select *CD-ROM*.
7. Select *Apply*.
8. Double-click *AUXILIARY_SW*.
9. Select *E5850A*.
10. Select *Details...* or *Options...* if you wish.
11. Select *Apply* in the Software Install window.
12. Select *Install*.
13. Installing this tool will cause your session to exit.
14. Select *Continue*.

When the installation is complete you will need to start a session. The *Time Correlate with Infiniium Oscilloscope* button will be present in the lower right corner of the System window in the new session.

Next step: “Connecting the Fixture” on page 9

Setting Up the Infiniium Time Correlation Tool in the Workspace

Overview

Using the Setup Assistant is probably the easiest way for a novice user to set up the E5850A time correlation fixture and configure the software. But it is not the only way. If you regularly use the Workspace to set up measurement systems, you may find the procedure below to be a convenient way for you to set up the E5850A.

Set up the Workspace **Ensure Analysis Module is on the Workspace**

First open the Workspace on the Agilent 167XX Logic Analysis System. If the analysis module you wish to use is not already on the workspace, find its icon on the left side of the Workspace display under "Instrument" and drag it onto the workspace.

Drop the Infiniium Icon onto the Analysis Module Icon

Scroll the icon display down until you find the "Utilities" icons. Drag the "Infiniium" icon onto the workspace and drop it onto the analysis module icon that is already on the workspace. A line connecting the two icons will appear.

Drop the Waveform Icon onto the Infiniium Icon

Scroll the icon display back up until you find the "Display" icons. Drag the "Waveform" icon onto the workspace and drop it onto the "Infiniium" icon you previously dragged onto the workspace. A line connecting the two icons will appear.

This is the basic setup you will use whenever you want to correlate the Logic Analysis System with Infiniium. You can also drag and drop a Listing display on the "Infiniium" icon if you wish.

Chapter 1: The Infiniium Time Correlation Fixture

Setting Up the Infiniium Time Correlation Tool in the Workspace

Establish LAN Connection

Open the "Infiniium" tool display by right clicking on the icon and selecting "Display" from the drop down menu. In the display there will be a row of tabs near the top of the display. Select the left-most tab labeled "Connect". Enter the host name or IP address of the Infiniium you want to correlate with. Press the "Enter" key or select the "Apply" button in the lower left corner of the display. The Logic Analysis System will attempt to make a LAN connection to the Infiniium you specified. If it fails, a red error message will appear to the right of the input box where you entered the host name. If you get an error message check the network setup on both the Logic Analysis System and the Infiniium, check the host name, try again.

Connect the Fixture and Run Auto Deskew

Once the network connection is established you are ready to measure the skew between the instruments. Connect the E5850A Time Correlation Fixture as described in "Connecting the Fixture" on page 9, then press the green "Run Auto Deskew..." button. The skew will be measured in both directions. When the auto deskew process is complete you may disconnect the analysis pod and scope probe from the Time Correlation Fixture, connect them to your device under test, and begin making your measurements.

Loading & Saving Configurations

You can save the configuration you set up on the Logic Analysis System using the *File->Save Configuration...* menu item which is available on every display in the Logic Analysis System.

When you save a configuration that includes the E5850A, all of the skews you measured will be saved along with the host name of the Infiniium. The Infiniium setup will also be saved in the 167XX Logic Analysis System's configuration file. Infiniium oscilloscope data is not saved in the logic analysis system's configuration file.

When the configuration is loaded at a later time, the Logic Analysis System will automatically connect to the Infiniium and restore the setup that was saved. Of course, if the Infiniium is not available on the network when the configuration is loaded this automatic connection and setup will fail.

If the Infiniium is a shared resource and is likely to be moved to another location, this option can have undesired effects. If the Infiniium is on the network with the same Host Name or IP Address, the saved configuration will be loaded into that Infiniium, possibly changing a setup that someone else has created.

Also, the system will probably hang if two logic analysis systems attempt to connect to one Infiniium oscilloscope.

Connection to multiple Infiniium oscilloscopes at a time from one logic analysis system is not supported.

See Also

- Loading and Saving Configuration Files (see the *Agilent Technologies 16700A/B-Series Logic Analysis System* help volume)

Troubleshooting

Troubleshooting Information - E5850A Infinium Time Correlation Fixture

Error Messages

Infinium LAN error (see page 38)
Infinium comm failed (see page 38)

General Troubleshooting

LAN problems (see page 65)
Unexpected or inconsistent results (see page 61)
How do I re-run the setup assistant (see page 53)
Marker moves back when I change its position (see page 63)
My Intermodule Bus (IMB) setup has changed (see page 64)

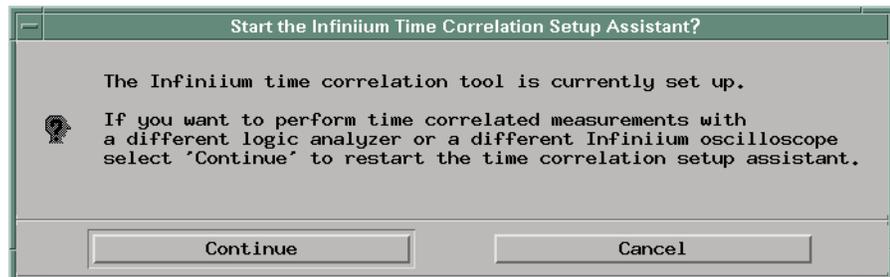
Measurement Hangs (see page 54)
General Triggering Problems (see page 55)
Pressing the Run button on the Infinium does not run the analyzer (see page 58)
The Infinium didn't trigger when I pressed Run on the Analyzer (see page 59)

Re-running the Setup Assistant

You can re-run the time correlation setup assistant to:

- choose a different logic analyzer
- choose a different Infiniium
- enter a new LAN address for the Infiniium
- change the trigger direction
- re-measure the skew between instruments
- return the setup to a known condition

To re-run the time correlation setup assistant, click on the *Setup Assistant* button at the bottom of the *Infiniium<1>* window. This will bring up the following dialog:



Select *Continue* to re-run the time correlation setup assistant.

Measurement Hangs

Measurement hangs when I change seconds/div or Volts/div on the Infiniium during a Group Run.

Changing the seconds/div on the Infiniium and especially changing to a very long sweep time (i.e. 20 s/div) can cause the scope to take a very long time to trigger and fill acquisition memory. This can make it appear that the measurement is hung. Changing the V/div on a channel such that the signal on that channel is clipped can have a similar effect.

Rather than changing Infiniium s/div or V/div during a Group Run, we suggest that you set up the Infiniium for your measurement before starting the Group Run. You can use the Infiniium as a stand-alone scope while it is connected to the 167XX logic analysis system by the E5850A hardware and software when a Group Run is *not* underway. You can probe your device under test with the Infiniium, run auto sweep or triggered sweep measurements to find your signals, and set up s/div, V/div, offsets, etc.

When you are ready to make a coordinated measurement, use Group Run on the 167XX Logic Analysis System to start the measurement. The E5850A software will stop the Infiniium, place it in single sweep mode, set memory depth to maximum, etc. The coordinated measurement will then be run. When the measurement is complete the waveforms captured by the Infiniium will be imported into the 167XX and time correlated.

General Triggering Problems

Analyzer Triggers Infiniium

When the software is configured for *Analyzer triggers Infiniium*, the Infiniium will be configured to trigger on a rising edge of Aux Trig In at 1.0 V. If you change the Infiniium trigger, the software will automatically restore the Infiniium's trigger condition to trigger on the rising edge of Aux Trig In at 1.0 V the next time you run the logic analyzer. You may set any trigger condition you desire in the analyzer, since you are using it to trigger the Infiniium.

Infiniium Triggers Analyzer

When the software is configured for *Infiniium triggers Analyzer*, the analyzer will be configured to trigger on any pattern after being armed by Port In. If you change the analyzer trigger you will not be able to correctly time correlate the instruments. You may set any trigger condition you desire in the Infiniium, since you are using it to trigger the analyzer.

Why isn't the red trigger marker where I expect?

Whenever you are using the E5850A you are performing a multiple instrument measurement. Measurements from each instrument are time correlated, but each instrument retains its actual trigger point. In a multiple instrument measurement only one of those trigger points can be indicated by the red trigger marker in the Waveform window.

In the Waveform window you can select *Options->Reference trigger..* This will pop up a dialog showing the names of the instruments that are included in the display. Select one of the instruments to see its trigger. The default name for the E5850A will be "Infiniium<1>". When you have selected *Infiniium triggers Analyzer*, you could select "Infiniium<1>" to see where the Infiniium triggered and how analyzer data correlates with that trigger.

Check Cable Connections

The four BNC cables must remain connected between the logic

Chapter 1: The Infiniium Time Correlation Fixture

General Triggering Problems

analyzer, the time correlation fixture, and the oscilloscope whenever you are using the time correlation feature.

Check Probe Connections

Also, be sure you are using the correct logic analyzer cables. Trace them from the analyzer card to the E5850A fixture or target system. And be sure you are using the correct oscilloscope probe. Follow it from the instrument to the E5850A fixture or the target system.

Use Grounds

Your connections to the front of the time correlation fixture must include grounds. For example, you should connect the oscilloscope probe ground clip to the ground terminal on the E5850A fixture. Ground leads for each logic analyzer pod, and preferably each logic analyzer channel should be connected to a ground terminal on the E5850A fixture too.

Don't Change the Setup

In the *Infiniium triggers Analyzer* mode, the analyzer trigger and intermodule bus setup should not be changed. They are configured to receive the trigger signal from the Infiniium as required for time correlation. If you need to re-run the setup assistant, click here for instructions on “Re-running the Setup Assistant” on page 53. In the *Analyzer triggers Infiniium* mode, you can change the logic analyzer trigger setup as desired for a particular measurement.

Infiniium Must be in the Correct Mode

Note that only Single Sweep, Real Time acquisition can be meaningfully correlated with a logic analyzer. Meaningful correlation may not be possible if the oscilloscope is set to sample in Equivalent Time, or if the oscilloscope sweep is set to Sweep or Triggered Sweep.

Ensure no one else is using the Infiniium

If someone else is using the Infiniium oscilloscope either from the front panel or via the LAN, the logic analysis system will not be able to correctly control the Infiniium.

The logic analysis system must be in Group Run mode

The Run button on the logic analysis system's System window will say *GROUP* when the system is in group run mode.  If you have changed the setup and the run button no longer says *GROUP*, you can re-run auto deskew or see “Re-running the Setup Assistant” on page 53 to restore the logic analyzer to group run mode.

See Also “Troubleshooting” on page 52

The logic analyzer didn't trigger

The Infiniium's Run button does not run the analyzer

Pressing the Run button on the Infiniium will never cause the 167XX analyzer to run and can not be used to start a correlated measurement. The Run button on the Infiniium will only run the Infiniium.

Use the group run button  on the logic analysis system to make your time correlated measurement, whether you've set the Infiniium to trigger the analyzer or the analyzer to trigger the Infiniium.

A correlated measurement can only be made by setting up the E5850A software on the 167XX and running Auto Deskew. After that, the 167XX logic analysis system's Run button will cause the 167XX and Infiniium to both be started in the correct order and a correlated measurement will be made. The 167XX logic analysis system must be in *Group Run* mode.

See Also

“General Triggering Problems” on page 55
“The Infiniium didn't trigger” on page 59

The Infiniium didn't trigger

The logic analyzer didn't run the oscilloscope

Are the analyzer and the oscilloscope on the LAN?

Ensure that the logic analysis system is connected to the oscilloscope via the LAN.

See “Connect the LAN” on page 10.

Ensure that the Infiniium's IP address has not been changed

If it has been changed, you will need to re-run the time correlation setup assistant.

See “Re-running the Setup Assistant” on page 53.

Ensure you are the only user

Someone else may be using the Infiniium oscilloscope over the LAN. Ensure that you are the only user of the oscilloscope. You may need to contact your system administrator for help in determining whether you are the only one using the oscilloscope.

The logic analysis system must be in Group Run mode

The Run button on the logic analysis system's System window will say

GROUP when the system is in group run mode. 

Time correlation setup assistant sets up the intermodule bus

The Time Correlation Setup Assistant configures the intermodule bus for time correlated measurements. If you change the intermodule bus (IMB) setup, the time correlated measurements won't work. See “Re-running the Setup Assistant” on page 53.

Running Auto Deskew sets up the Intermodule Bus

Running Auto Deskew sets up the Intermodule Bus to enable triggering

Chapter 1: The Infiniium Time Correlation Fixture

The Infiniium didn't trigger

between the Infiniium and the analyzer you are using. When the auto deskew is complete, you may not remove the analyzer you used for deskew from Group Run. If you do, you will need to run auto deskew again.

Adding other instruments to the group

You may add other instruments to the group. They may be armed directly from group run or from the analyzer you used for the deskew process. Instruments that are added to Group Run will be automatically correlated with the analyzer that you used for deskewing with the Infiniium.

Trigger direction setting modifies intermodule bus configuration

The "Analyzer triggers Infiniium" and "Infiniium triggers Analyzer" buttons in the E5850A window will modify the intermodule bus setup as appropriate for the trigger direction.

Unexpected or Inconsistent Results

If you are experiencing unexpected or inconsistent deskew results, check the following items.

Check Cable Connections

Your connections to the front of the time correlation fixture must include grounds. For example, you should connect the oscilloscope probe ground clip to the ground terminal on the E5850A fixture. Ground leads for each logic analyzer pod, and preferably each logic analyzer channel should be connected to a ground terminal on the E5850A fixture too.

Check Probe Connections

Also, be sure you are using the correct logic analyzer cables. Trace them from the analyzer card to the E5850A fixture or target system. And be sure you are using the correct oscilloscope probe. Follow it from the instrument to the E5850A fixture or the target system.

Don't Change the Setup

If the trigger direction is set to *Infiniium triggers Analyzer* the logic analyzer trigger and intermodule bus setup should not be changed after running the time correlation setup assistant. They are configured to receive the trigger signal from the Infiniium as required for time correlation. If you need to re-run the setup assistant, click here for instructions on “Re-running the Setup Assistant” on page 53.

Infiniium Must be in the Correct Mode

Note that only Single Sweep, Real Time acquisition can be meaningfully correlated with a logic analyzer. Meaningful correlation may not be possible if the oscilloscope is set to sample in Equivalent Time, or if the oscilloscope sweep is set to Auto Sweep or Triggered Sweep.

Ensure no one else is using the Infiniium

If someone else is using the Infiniium oscilloscope either from the front

Chapter 1: The Infinium Time Correlation Fixture
Unexpected or Inconsistent Results

panel or via the LAN, the logic analysis system will not be able to correctly control the Infinium.

Marker snaps back when I move it

Markers, and in particular marker moves, are not identically implemented in the 167XX Logic Analysis System and the Infiniium oscilloscope.

Infiniium marker snaps back

When *G1 follows Ax*, *G2 follows Bx* are enabled and *Ax follows G1*, *Bx follows G2* are disabled, moving G1 or G2 will not produce a permanent marker move because the Infiniium will move the marker back.

In the 167XX Logic Analysis System the new marker position is sent to all tools that are displaying a correlated measurement when the move completes. Moving a 167XX marker will cause a move of an Infiniium marker only when the move is complete (when you're done dragging and dropping the marker).

The Infiniium doesn't have this same facility, so the 167XX polls the Infiniium for its marker positions, updating the 167XX markers as the Infiniium markers move. Infiniium marker moves are updated continuously rather than at the end of a marker move.

See also “Markers Tab and Coordinated Marker Moves” on page 31.

My IMB setup has changed

Running Auto Deskew, whether through the time correlation setup assistant or using the *Run Auto Deskew* button, will reconfigure the intermodule bus. If you need to use a unique IMB setup, run Auto Deskew and then reconfigure the intermodule bus. You may want to save your configuration so it can be used at a later time.

LAN Problems

If you see an "Infiniium LAN error" message:

- Check the LAN connections to the Infiniium and the logic analysis system.
- Check with your LAN administrator to ensure that the LAN is currently functioning.* In the Connect Tab of the E5850A software on the 167XX make sure the correct IP address is entered in the "Infiniium Host Name or IP" field and press "Apply" in the lower left corner.
- If the system still fails to connect, open the System Administration window. Select the Networking tab. Select the Ping... button. Enter the IP address of the Infiniium, then select OK. If errors are reported, ask your LAN administrator to help you establish networking on the 167XX and Infiniium. If Ping does not report any errors, the problem may be in the Standard Instrument Control Library that both instruments use to communicate over LAN. Cycle power on both instruments. If problems persist, contact Agilent Technologies for technical support.

Only one logic analysis system may connect to the Infiniium via the LAN

If two logic analysis systems try to connect to the same Infiniium, the network will probably hang. Connection to multiple Infiniium oscilloscopes from one logic analysis system is not supported.

See also

The note in "Infiniium IP Address" on page 38.

Chapter 1: The Infinium Time Correlation Fixture
LAN Problems

Glossary

absolute Denotes the time period or count of states between a captured state and the trigger state. An absolute count of -10 indicates the state was captured ten states before the trigger state was captured.

acquisition Denotes one complete cycle of data gathering by a measurement module. For example, if you are using an analyzer with 128K memory depth, one complete acquisition will capture and store 128K states in acquisition memory.

analysis probe A probe connected to a microprocessor or standard bus in the device under test. An analysis probe provides an interface between the signals of the microprocessor or standard bus and the inputs of the logic analyzer. Also called a *preprocessor*.

analyzer 1 In a logic analyzer with two *machines*, refers to the machine that is on by default. The default name is *Analyzer<N>*, where N is the slot letter.

analyzer 2 In a logic analyzer with two *machines*, refers to the machine that is off by default. The default name is *Analyzer<N2>*, where N is the slot letter.

arming An instrument tool must be

armed before it can search for its trigger condition. Typically, instruments are armed immediately when *Run* or *Group Run* is selected. You can set up one instrument to arm another using the *Intermodule Window*. In these setups, the second instrument cannot search for its trigger condition until it receives the arming signal from the first instrument. In some analyzer instruments, you can set up one analyzer *machine* to arm the other analyzer machine in the *Trigger Window*.

asterisk (*) See *edge terms*, *glitch*, and *labels*.

bits Bits represent the physical logic analyzer channels. A bit is a *channel* that has or can be assigned to a *label*. A bit is also a position in a label.

card This refers to a single instrument intended for use in the Agilent Technologies 16700A/B-series mainframes. One card fills one slot in the mainframe. A module may comprise a single card or multiple cards cabled together.

channel The entire signal path from the probe tip, through the cable and module, up to the label grouping.

click When using a mouse as the

Glossary

pointing device, to click an item, position the cursor over the item. Then quickly press and release the *left mouse button*.

clock channel A logic analyzer *channel* that can be used to carry the clock signal. When it is not needed for clock signals, it can be used as a *data channel*, except in the Agilent Technologies 16517A.

context record A context record is a small segment of analyzer memory that stores an event of interest along with the states that immediately preceded it and the states that immediately followed it.

context store If your analyzer can perform context store measurements, you will see a button labeled *Context Store* under the Trigger tab. Typical context store measurements are used to capture writes to a variable or calls to a subroutine, along with the activity preceding and following the events. A context store measurement divides analyzer memory into a series of context records. If you have a 64K analyzer memory and select a 16-state context, the analyzer memory is divided into 4K 16-state context records. If you have a 64K analyzer memory and select a 64-state context, the analyzer memory will be

divided into 1K 64-state records.

count The count function records periods of time or numbers of state transactions between states stored in memory. You can set up the analyzer count function to count occurrences of a selected event during the trace, such as counting how many times a variable is read between each of the writes to the variable. The analyzer can also be set up to count elapsed time, such as counting the time spent executing within a particular function during a run of your target program.

cross triggering Using intermodule capabilities to have measurement modules trigger each other. For example, you can have an external instrument arm a logic analyzer, which subsequently triggers an oscilloscope when it finds the trigger state.

data channel A *channel* that carries data. Data channels cannot be used to clock logic analyzers.

data field A data field in the pattern generator is the data value associated with a single label within a particular data vector.

data set A data set is made up of all labels and data stored in memory of any single analyzer machine or

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instrument tool. Multiple data sets can be displayed together when sourced into a single display tool. The Filter tool is used to pass on partial data sets to analysis or display tools.

debug mode See *monitor*.

delay The delay function sets the horizontal position of the waveform on the screen for the oscilloscope and timing analyzer. Delay time is measured from the trigger point in seconds or states.

demo mode An emulation control session which is not connected to a real target system. All windows can be viewed, but the data displayed is simulated. To start demo mode, select *Start User Session* from the Emulation Control Interface and enter the demo name in the *Processor Probe LAN Name* field. Select the *Help* button in the *Start User Session* window for details.

deskewing To cancel or nullify the effects of differences between two different internal delay paths for a signal. Deskewing is normally done by routing a single test signal to the inputs of two different modules, then adjusting the Intermodule Skew so that both modules recognize the signal at the same time.

device under test The system under test, which contains the circuitry you are probing. Also known as a *target system*.

don't care For *terms*, a "don't care" means that the state of the signal (high or low) is not relevant to the measurement. The analyzer ignores the state of this signal when determining whether a match occurs on an input label. "Don't care" signals are still sampled and their values can be displayed with the rest of the data. Don't cares are represented by the *X* character in numeric values and the dot (.) in timing edge specifications.

dot (.) See *edge terms*, *glitch*, *labels*, and *don't care*.

double-click When using a mouse as the pointing device, to double-click an item, position the cursor over the item, and then quickly press and release the *left mouse button* twice.

drag and drop Using a Mouse: Position the cursor over the item, and then press and hold the *left mouse button*. While holding the left mouse button down, move the mouse to drag the item to a new location. When the item is positioned where you want it, release the mouse button.

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Using the Touchscreen:
Position your finger over the item, then press and hold finger to the screen. While holding the finger down, slide the finger along the screen dragging the item to a new location. When the item is positioned where you want it, release your finger.

edge mode In an oscilloscope, this is the trigger mode that causes a trigger based on a single channel edge, either rising or falling.

edge terms Logic analyzer trigger resources that allow detection of transitions on a signal. An edge term can be set to detect a rising edge, falling edge, or either edge. Some logic analyzers can also detect no edge or a *glitch* on an input signal. Edges are specified by selecting arrows. The dot (.) ignores the bit. The asterisk (*) specifies a glitch on the bit.

emulation module A module within the logic analysis system mainframe that provides an emulation connection to the debug port of a microprocessor. An E5901A emulation module is used with a target interface module (TIM) or an analysis probe. An E5901B emulation module is used with an E5900A emulation probe.

emulation probe The stand-alone equivalent of an *emulation module*. Most of the tasks which can be performed using an emulation module can also be performed using an emulation probe connected to your logic analysis system via a LAN.

emulator An *emulation module* or an *emulation probe*.

Ethernet address See *link-level address*.

events Events are the things you are looking for in your target system. In the logic analyzer interface, they take a single line. Examples of events are *Label1 = XX* and *Timer 1 > 400 ns*.

filter expression The filter expression is the logical *OR* combination of all of the filter terms. States in your data that match the filter expression can be filtered out or passed through the Pattern Filter.

filter term A variable that you define in order to specify which states to filter out or pass through. Filter terms are logically *OR*'ed together to create the filter expression.

Format The selections under the logic analyzer *Format* tab tell the

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logic analyzer what data you want to collect, such as which channels represent buses (labels) and what logic threshold your signals use.

frame The Agilent Technologies or 16700A/B-series logic analysis system mainframe. See also *logic analysis system*.

gateway address An IP address entered in integer dot notation. The default gateway address is 0.0.0.0, which allows all connections on the local network or subnet. If connections are to be made across networks or subnets, this address must be set to the address of the gateway machine.

glitch A glitch occurs when two or more transitions cross the logic threshold between consecutive timing analyzer samples. You can specify glitch detection by choosing the asterisk (*) for *edge terms* under the timing analyzer Trigger tab.

grouped event A grouped event is a list of *events* that you have grouped, and optionally named. It can be reused in other trigger sequence levels. Only available in Agilent Technologies 16715A or higher logic analyzers.

held value A value that is held until

the next sample. A held value can exist in multiple data sets.

immediate mode In an oscilloscope, the trigger mode that does not require a specific trigger condition such as an edge or a pattern. Use immediate mode when the oscilloscope is armed by another instrument.

interconnect cable Short name for *module/probe interconnect cable*.

intermodule bus The intermodule bus (IMB) is a bus in the frame that allows the measurement modules to communicate with each other. Using the IMB, you can set up one instrument to *arm* another. Data acquired by instruments using the IMB is time-correlated.

intermodule Intermodule is a term used when multiple instrument tools are connected together for the purpose of one instrument arming another. In such a configuration, an arming tree is developed and the group run function is designated to start all instrument tools. Multiple instrument configurations are done in the Intermodule window.

internet address Also called Internet Protocol address or IP address. A 32-bit network address. It

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is usually represented as decimal numbers separated by periods; for example, 192.35.12.6. Ask your LAN administrator if you need an internet address.

labels Labels are used to group and identify logic analyzer channels. A label consists of a name and an associated bit or group of bits. Labels are created in the Format tab.

line numbers A line number (Line #s) is a special use of *symbols*. Line numbers represent lines in your source file, typically lines that have no unique symbols defined to represent them.

link-level address Also referred to as the Ethernet address, this is the unique address of the LAN interface. This value is set at the factory and cannot be changed. The link-level address of a particular piece of equipment is often printed on a label above the LAN connector. An example of a link-level address in hexadecimal: 0800090012AB.

local session A local session is when you run the logic analysis system using the local display connected to the product hardware.

logic analysis system The Agilent Technologies 16700A/B-series

mainframes, and all tools designed to work with it. Usually used to mean the specific system and tools you are working with right now.

machine Some logic analyzers allow you to set up two measurements at the same time. Each measurement is handled by a different machine. This is represented in the Workspace window by two icons, differentiated by a *1* and a *2* in the upper right-hand corner of the icon. Logic analyzer resources such as pods and trigger terms cannot be shared by the machines.

markers Markers are the green and yellow lines in the display that are labeled *x*, *o*, *G1*, and *G2*. Use them to measure time intervals or sample intervals. Markers are assigned to patterns in order to find patterns or track sequences of states in the data. The *x* and *o* markers are local to the immediate display, while *G1* and *G2* are global between time correlated displays.

master card In a module, the master card controls the data acquisition or output. The logic analysis system references the module by the slot in which the master card is plugged. For example, a 5-card Agilent Technologies 16555D would be referred to as *Slot C*:

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machine because the master card is in slot C of the mainframe. The other cards of the module are called *expansion cards*.

menu bar The menu bar is located at the top of all windows. Use it to select *File* operations, tool or system *Options*, and tool or system level *Help*.

message bar The message bar displays mouse button functions for the window area or field directly beneath the mouse cursor. Use the mouse and message bar together to prompt yourself to functions and shortcuts.

module/probe interconnect cable

The module/probe interconnect cable connects an E5901B emulation module to an E5900B emulation probe. It provides power and a serial connection. A LAN connection is also required to use the emulation probe.

module An instrument that uses a single timebase in its operation. Modules can have from one to five cards functioning as a single instrument. When a module has more than one card, system window will show the instrument icon in the slot of the *master card*.

monitor When using the Emulation Control Interface, running the monitor means the processor is in debug mode (that is, executing the debug exception) instead of executing the user program.

panning The action of moving the waveform along the timebase by varying the delay value in the Delay field. This action allows you to control the portion of acquisition memory that will be displayed on the screen.

pattern mode In an oscilloscope, the trigger mode that allows you to set the oscilloscope to trigger on a specified combination of input signal levels.

pattern terms Logic analyzer resources that represent single states to be found on labeled sets of bits; for example, an address on the address bus or a status on the status lines.

period (.) See *edge terms*, *glitch*, *labels*, and *don't care*.

pod pair A group of two pods containing 16 channels each, used to physically connect data and clock signals from the unit under test to the analyzer. Pods are assigned by pairs in the analyzer interface. The number of pod pairs available is determined

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by the channel width of the instrument.

pod See *pod pair*

point To point to an item, move the mouse cursor over the item, or position your finger over the item.

preprocessor See *analysis probe*.

primary branch The primary branch is indicated in the *Trigger sequence step* dialog box as either the *Then find* or *Trigger on* selection. The destination of the primary branch is always the next state in the sequence, except for the Agilent Technologies 16517A. The primary branch has an optional occurrence count field that can be used to count a number of occurrences of the branch condition. See also *secondary branch*.

probe A device to connect the various instruments of the logic analysis system to the target system. There are many types of probes and the one you should use depends on the instrument and your data requirements. As a verb, "to probe" means to attach a probe to the target system.

processor probe See *emulation probe*.

range terms Logic analyzer resources that represent ranges of values to be found on labeled sets of bits. For example, range terms could identify a range of addresses to be found on the address bus or a range of data values to be found on the data bus. In the trigger sequence, range terms are considered to be true when any value within the range occurs.

relative Denotes time period or count of states between the current state and the previous state.

remote display A remote display is a display other than the one connected to the product hardware. Remote displays must be identified to the network through an address location.

remote session A remote session is when you run the logic analyzer using a display that is located away from the product hardware.

right-click When using a mouse for a pointing device, to right-click an item, position the cursor over the item, and then quickly press and release the *right mouse button*.

sample A data sample is a portion of a *data set*, sometimes just one point. When an instrument samples the target system, it is taking a single

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measurement as part of its data acquisition cycle.

Sampling Use the selections under the logic analyzer Sampling tab to tell the logic analyzer how you want to make measurements, such as State vs. Timing.

secondary branch The secondary branch is indicated in the *Trigger sequence step* dialog box as the *Else on* selection. The destination of the secondary branch can be specified as any other active sequence state. See also *primary branch*.

session A session begins when you start a *local session* or *remote session* from the session manager, and ends when you select *Exit* from the main window. Exiting a session returns all tools to their initial configurations.

skew Skew is the difference in channel delays between measurement channels. Typically, skew between modules is caused by differences in designs of measurement channels, and differences in characteristics of the electronic components within those channels. You should adjust measurement modules to eliminate as much skew as possible so that it does not affect the accuracy of your

measurements.

state measurement In a state measurement, the logic analyzer is clocked by a signal from the system under test. Each time the clock signal becomes valid, the analyzer samples data from the system under test. Since the analyzer is clocked by the system, state measurements are *synchronous* with the test system.

store qualification Store qualification is only available in a *state measurement*, not *timing measurements*. Store qualification allows you to specify the type of information (all samples, no samples, or selected states) to be stored in memory. Use store qualification to prevent memory from being filled with unwanted activity such as no-ops or wait-loops. To set up store qualification, use the *While storing* field in a logic analyzer trigger sequence dialog.

subnet mask A subnet mask blocks out part of an IP address so that the networking software can determine whether the destination host is on a local or remote network. It is usually represented as decimal numbers separated by periods; for example, 255.255.255.0. Ask your LAN administrator if you need a the subnet mask for your network.

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symbols Symbols represent patterns and ranges of values found on labeled sets of bits. Two kinds of symbols are available:

- Object file symbols - Symbols from your source code, and symbols generated by your compiler. Object file symbols may represent global variables, functions, labels, and source line numbers.
- User-defined symbols - Symbols you create.

Symbols can be used as *pattern* and *range* terms for:

- Searches in the listing display.
- Triggering in logic analyzers and in the source correlation trigger setup.
- Qualifying data in the filter tool and system performance analysis tool set.

system administrator The system administrator is a person who manages your system, taking care of such tasks as adding peripheral devices, adding new users, and doing system backup. In general, the system administrator is the person you go to with questions about implementing your software.

target system The system under test, which contains the microprocessor you are probing.

terms Terms are variables that can be used in trigger sequences. A term can be a single value on a label or set of labels, any value within a range of values on a label or set of labels, or a glitch or edge transition on bits within a label or set of labels.

TIM A TIM (Target Interface Module) makes connections between the cable from the emulation module or emulation probe and the cable to the debug port on the system under test.

time-correlated Time correlated measurements are measurements involving more than one instrument in which all instruments have a common time or trigger reference.

timer terms Logic analyzer resources that are used to measure the time the trigger sequence remains within one sequence step, or a set of sequence steps. Timers can be used to detect when a condition lasts too long or not long enough. They can be used to measure pulse duration, or duration of a wait loop. A single timer term can be used to delay trigger until a period of time after detection of a significant event.

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timing measurement In a timing measurement, the logic analyzer samples data at regular intervals according to a clock signal internal to the timing analyzer. Since the analyzer is clocked by a signal that is not related to the system under test, timing measurements capture traces of electrical activity over time. These measurements are *asynchronous* with the test system.

tool icon Tool icons that appear in the workspace are representations of the hardware and software tools selected from the toolbox. If they are placed directly over a current measurement, the tools automatically connect to that measurement. If they are placed on an open area of the main window, you must connect them to a measurement using the mouse.

toolbox The Toolbox is located on the left side of the main window. It is used to display the available hardware and software tools. As you add new tools to your system, their icons will appear in the Toolbox.

tools A tool is a stand-alone piece of functionality. A tool can be an instrument that acquires data, a display for viewing data, or a post-processing analysis helper. Tools are represented as icons in the main window of the interface.

trace See *acquisition*.

trigger sequence A trigger sequence is a sequence of events that you specify. The logic analyzer compares this sequence with the samples it is collecting to determine when to *trigger*.

trigger specification A trigger specification is a set of conditions that must be true before the instrument triggers.

trigger Trigger is an event that occurs immediately after the instrument recognizes a match between the incoming data and the trigger specification. Once trigger occurs, the instrument completes its *acquisition*, including any store qualification that may be specified.

workspace The workspace is the large area under the message bar and to the right of the toolbox. The workspace is where you place the different instrument, display, and analysis tools. Once in the workspace, the tool icons graphically represent a complete picture of the measurements.

zooming In the oscilloscope or timing analyzer, to expand and contract the waveform along the time base by varying the value in the s/Div

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field. This action allows you to select specific portions of a particular waveform in acquisition memory that will be displayed on the screen. You can view any portion of the waveform record in acquisition memory.

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