User's Guide

Emulation for Motorola MPC8240 and MPC8260 PowerQUICC II

# Motorola MPC8240 and MPC8260 Emulation—At a Glance

This manual describes how to set up several Agilent Technologies emulation products: an emulation probe, an emulation module, and an emulation migration.

These emulators provide a low-cost way to debug embedded software for Motorola MPC8240 and MPC8260 microprocessors. The emulator lets you use the target processor's built-in background debugging features, including run control and access to registers and memory. A high-level source debugger can use the emulator to debug code running on the target system.

The emulator can be controlled by a debugger on a host computer or by the Emulation Control Interface on an Agilent Technologies 16600A/700A-series logic analysis system.
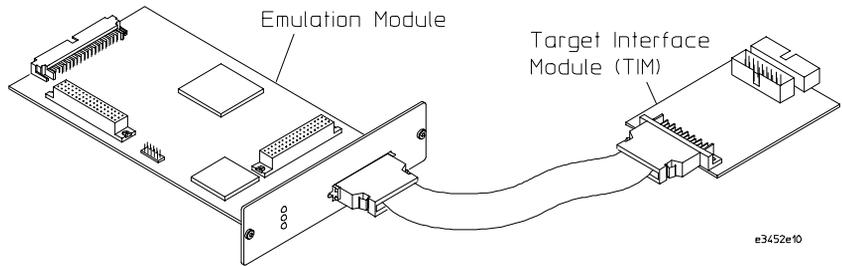
Emulation Probe

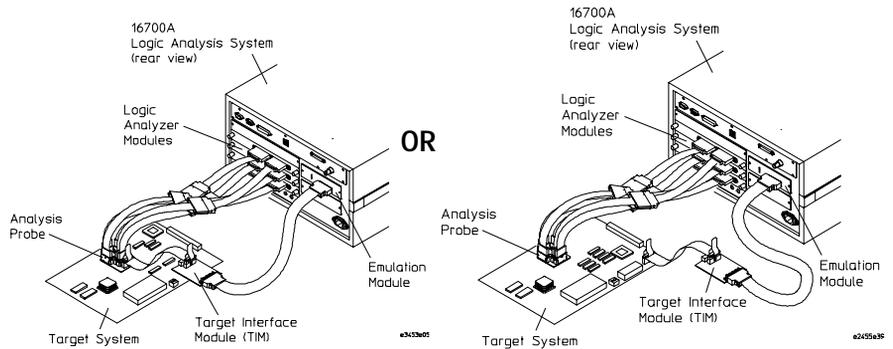The emulation probe is a stand-alone emulator.
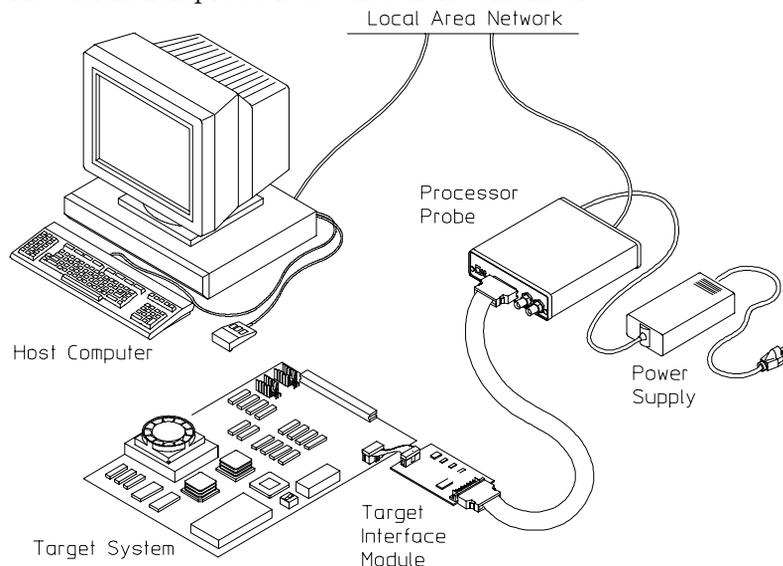
e3458e02

Emulation Module

The emulation module plugs into your Agilent Technologies 16600A/700A-series logic analysis system frame.

You can connect the emulation module a debug port on the target system or analysis probe through the provided target interface module (TIM).

Emulation Migration

The emulation migration includes a target interface module and firmware. Use the emulation migration if you already have an emulation probe or an emulation module for another processor.

In This Book

This book documents the following products:

Emulation Probe		
Processor supported	**Product ordered**	**Includes**
MPC8240	Agilent Technologies E5900A Option #100	Agilent Technologies 16610A emulation probe, target interface module (TIM)
MPC8260	Agilent Technologies E5900A Option #100	Agilent Technologies 16610A emulation probe, target interface module (TIM)
Emulation Module		
Processor supported	**Product ordered**	**Includes**
MPC8240	Agilent Technologies E5901A Option #100	Agilent Technologies 16610A emulation module, target interface module (TIM)
MPC8260	Agilent Technologies E5901A Option #100	Agilent Technologies 16610A emulation module, target interface module (TIM)
Emulation Migration		
Processor supported	**Product ordered**	**Includes**
MPC8240	Agilent Technologies E5902A Option #100	Target interface module (TIM)
MPC8260	Agilent Technologies E5902A Option #100	Target interface module (TIM)

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Motorola MPC8240 and MPC8260 Emulation—At a Glance

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Overview

This chapter describes:

- Setup flowchart

- Equipment used with the emulation probe

- Connection sequences for the emulation probe

- Equipment used with the emulation module

- Additional information sources

Setup Flowchart

```
┌──────────────────┐      ┌──────────────────┐      ┌──────────────────┐
│ Emulation module │      │ Emulation        │      │ Emulation probe  │
│ E5901A           │      │ migration E5902A │      │ E5900A           │
└──────────────────┘      └──────────────────┘      └──────────────────┘
```

Emulation module E5901A

Install emulation module (if necessary)

Emulation migration E5902A

Migrating a module or a probe?

— Module — Probe —

Emulation probe E5900A

Connect power supply

Connect to LAN

Install software on logic analysis system

Update emulator firmware

Connection type?

Target Interface Module — Analysis Probe

Connect emulator

Connect emulator to target interface module

Connect target interface module to target

Connect emulation module to analysis probe.
See solution or analysis probe manual.

Installation done. Begin making measurements.

E3497F01.VSD

Emulation Probe

Equipment supplied

- An emulation probe.

- A 12V power supply for the emulation probe.

- A power cord.

- A target interface module (TIM) circuit board.

- An emulation probe loopback test board (Agilent part number E3496-66502).

- A 50-pin ribbon cable (connects the emulation probe to the target interface module).

- A 16-pin ribbon cable (connects the target interface module to your target system).

- Firmware for the emulation probe on 3.5-inch disks.

- This User's Guide.

Emulation Probe

Power Supply

TIM

Power Cable

16-pin Cable

50-Pin Ribbon Cable

Loopback Test Board

e3453e02

Software
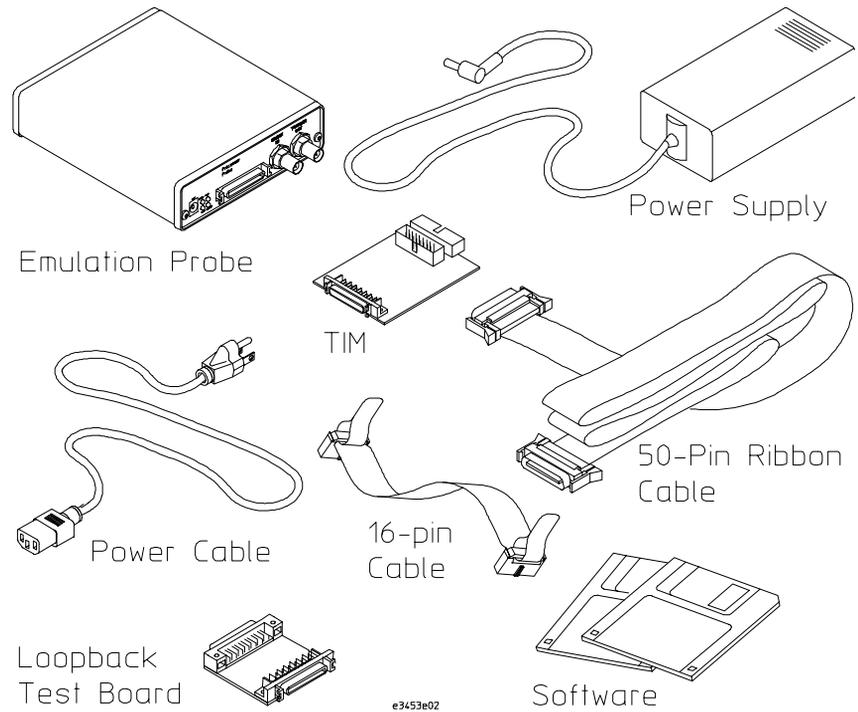
Equipment Supplied with the Emulation Probe

Minimum equipment required

The following equipment is required to use the emulation probe:

- A method for connecting the emulator to the target system. You can use an Agilent Technologies analysis probe or you can design a debug port connector on the target system. The target system must meet the criteria on page 63.

- A host computer, such as a PC or workstation. You can also connect the emulation probe to an Agilent Technologies 16600A or 16700A logic analysis system.

- A LAN (local area network) to connect the emulation probe to the host computer.

- A user interface on the host computer, such as a high-level source debugger or the logic analysis system's Emulation Control Interface.

To connect the emulation probe to a power source

The emulation probe does not have an On/Off switch. To turn the emulation probe on or off, plug or unplug it from the power supply.

The emulation probe is shipped from the factory with a power supply and cord appropriate for your country. If the cord you received is not appropriate for your electrical power outlet type, contact your Agilent Technologies sales and service office.

WARNING: Use only the supplied Agilent Technologies power supply and cord. Failure to use the proper power supply could result in electric shock.

CAUTION: Use only the supplied Agilent Technologies power supply and cord. Failure to use the proper power supply could result in equipment damage.

1 Connect the power cord to the power supply and to a socket outlet.

e3493e06
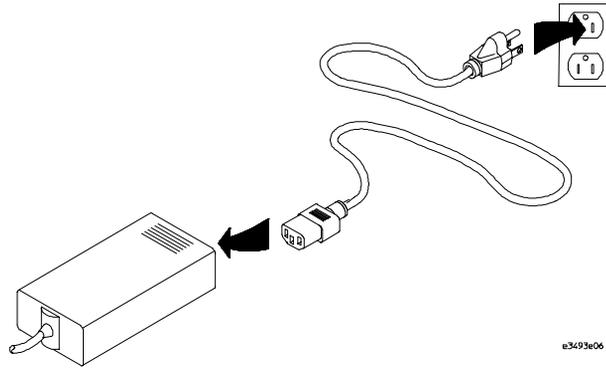
2 Connect the 12V power cord to the back of the emulation probe.

e3493e07
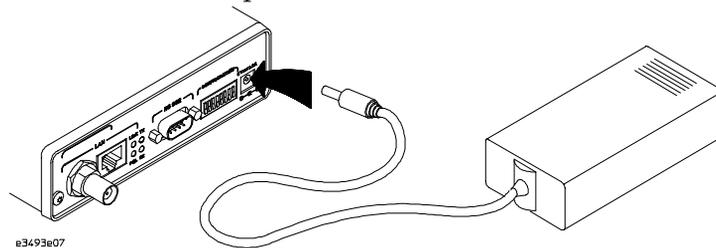
The power light on the target side of the emulation probe will be light. The emulation probe does not have an On/Off switch.

To power on the system

With all components connected, power on your system as follows:

1 Logic analyzer, if you are using one.

2 Emulation probe.

3 Your target system.

To power off the system

Power off your system as follows:

1 Your target system.

2 Emulation probe.

3 Logic analyzer, if you are using one.

Connection Sequence

Disconnect power from the target system, emulation probe, and logic analyzer before you make or break connections.

1 Connect the emulation probe to a LAN (page 28).

2 Connect the emulation probe to your target system (page 57).

3 Configure the emulation probe (page 70).

Emulation Module

This section lists equipment supplied with the emulation module and lists the minimum equipment required to use the emulation module.

Equipment supplied

The equipment supplied with your emulation module includes:

- An Agilent Technologies 16610A emulation module. If you ordered an emulation module as part of your Agilent Technologies 16600A or 16700A logic analysis system, it is already installed in the frame.

- A target interface module (TIM) circuit board.

- An emulation module loopback test board (Agilent part number E3496-66502).

- Firmware for the emulation module and/or updated software for the Emulation Control Interface on a CD-ROM.

- A 50-pin ribbon cable for connecting the emulation module to the target interface module or the Agilent Technologies E2480A analysis probe.

- A 16-pin ribbon cable for connecting the target interface module to the target system.

- Torx T-8, T-10 and T-15 screwdrivers.

- This User's Guide.
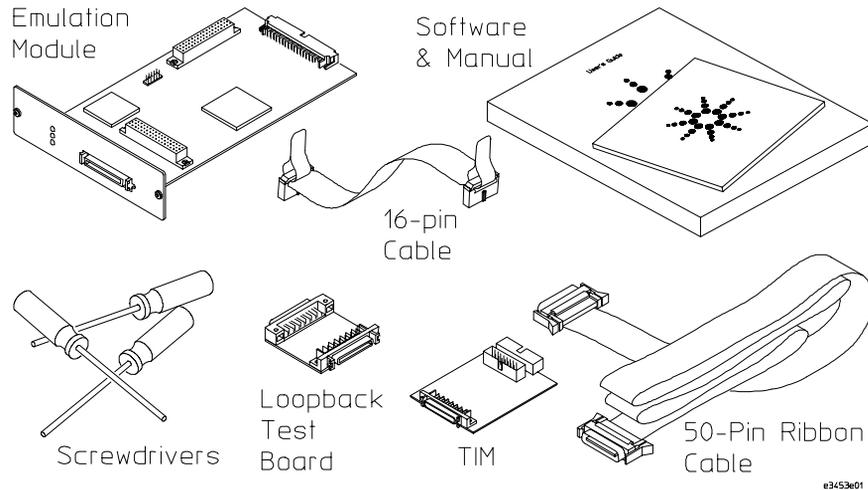
Equipment Supplied with the Emulation Module

Minimum equipment required

The following equipment is required to use the emulation module:

A method for connecting to the target system. The Agilent
Technologies analysis probe provides a debug port connector.
You can also design a debug port connector on the target
system (see "Designing a MPC8240 or MPC8260 Target
System" on page 63).

- An Agilent Technologies 16600A or 16700A logic analysis system.

- A user interface, such as a high-level source debugger or the logic analysis
  system's Emulation Control Interface.

Emulation Migration

This section lists equipment supplied with the emulation migration and lists the minimum equipment required to use the emulation migration.

Equipment supplied

The equipment supplied with your emulation migration includes:

• A target interface module (TIM) circuit board.

• Firmware for the emulation module and/or updated software for the Emulation Control Interface on a CD-ROM.

• A 16-pin ribbon cable for connecting the target interface module to the target system.

• This User's Guide.
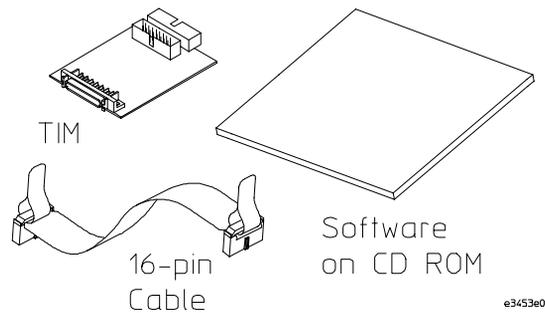
Minimum equipment required

The following equipment is required to use the emulation migration:

- An emulation module or emulation probe.

- A 50-pin data cable (supplied with the emulation module or probe).

- A method for connecting to the target system. An Agilent Technologies analysis probe provides a debug port connector. You can also design a debug port connector on the target system.

- A host computer such as a PC, a workstation, or an Agilent Technologies 16600A or 16700A logic analysis system.

- A user interface, such as a high-level source debugger or the logic analysis system's Emulation Control Interface.

Additional Information Sources

Additional or updated information can be found in the following places:

Newer editions of this manual may be available. Contact your local Agilent Technologies representative.

If you have an analysis probe, the instructions for connecting the probe to your target microprocessor are in the analysis probe documentation. The ***Solutions User's Guide*** for your microprocessor provides information on using the analysis probe and emulation module together.

Application notes may be available from your local Agilent Technologies representative or on the World Wide Web at:

http://www.agilent.com/find/logicanalyzer

If you have an Agilent Technologies 16600A or 16700A logic analysis system, the **online help** for the Emulation Control Interface has additional information on using the emulator.

The **measurement examples** include valuable tips for making emulation and analysis measurements. You can find the measurement examples under the system help in your Agilent Technologies 16600A/700A logic analysis system.

2

Connecting the Emulation Probe
to a LAN

You can connect your PC, workstation, or logic analysis system to the emulation probe via a serial or LAN connection.

Serial connection

A serial connection allows you to complete all of the performance verification tests and set LAN parameters. Other use of the serial port is not supported.

LAN connection

A LAN connection will allow you to make your measurements quickly and easily. A few of the performance verification tests cannot be run over a LAN.

Recommended connection

Use a LAN connection for routine use, and a serial connection for LAN configuration and for troubleshooting.

Setting Up a LAN Connection to a PC or Workstation

The emulation probe has two LAN connectors:

- A BNC connector that can be directly connected to an IEEE 802.3 Type 10BASE2 cable (ThinLAN). When using this connector, the emulation probe provides the functional equivalent of a Medium Attachment Unit (MAU) for ThinLAN.

- An IEEE 802.3 Type 10BASE-T (StarLAN) connector.
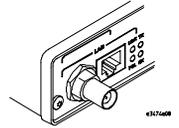
Use either the 10BASE2 or the 10BASE-T connector. Do not use both. The emulation probe will not work with both connected at the same time.

You must assign an IP address (Internet address) to the emulation probe before it can operate on the LAN. You can also set other network parameters such as a gateway address. The IP address and other network parameters are stored in nonvolatile memory within the emulation probe.

The emulation probe automatically sets a subnet mask based on the subnet mask used by other devices on the network.

You can configure LAN parameters in any of the following ways:

- Using the built-in terminal interface over a serial connection. This is the most reliable method.

- Using BOOTP, which is part of the HP-UX, SunOS, and Solaris operating systems.

To obtain an IP address

1 Obtain the following information from your local network administrator or system administrator:

- An IP address for the emulation probe.

  You can also use a "LAN name" for the emulation probe, but you must configure it using the integer dot notation (such as 127.0.0.1).

- The gateway address.

  The gateway address is an IP address and is 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 to workstations on other networks or subnets, this address must be set to the address of the gateway machine.

2 Find out whether port numbers 6470 and 6471 are already in use on your network and if that use constitutes a conflict.

The host computer interfaces communicate with the emulation probe through two TCP service ports. The default base port number is 6470. The second port has the next higher number (default 6471).

In almost all cases, the default numbers (6470, 6471) can be used without change. If necessary the default numbers can be changed if they conflict with some other product on your network.

To change the port numbers, see page 32. If you have already set the IP address, you can use a telnet connection instead of a serial connection to connect to the emulation probe.

3 Write down the link-level address of the emulation probe.

You will need this address if you use BOOTP to set the IP address.

The link-level address (LLA) is printed on a label above the LAN connectors on the emulation probe. This address is configured in each emulation probe shipped from the factory and cannot be changed.

IP Address of Emulation probe　　　　　　　　_____

LAN Name of Emulation Probe　　　　　　　　_____

Gateway Address　　　　　　　　_____

Link-Level Address of Emulation Probe

_____

To configure LAN parameters using the built-in terminal interface

1 Set configuration switches S1 through S4 to ON, and set the other switches as appropriate for your serial interface.

Switch settings are printed on the bottom of the emulation probe. If you will use a baud rate of 9600 baud, set the switches like this:
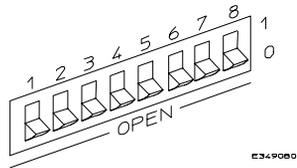
2 Connect an ASCII terminal (or terminal emulator) to the emulation probe's RS-232 port with a 9-pin RS-232 cable.

Complete instructions for setting up a serial connection begin on page 41.

3 Plug in the emulation probe's power cord. Press the terminal's <RETURN> key a couple times. You should see a prompt such as "p>", "?>", or "R>".

At this point, you are communicating with the emulation probe's built-in terminal interface.

4 Display the current LAN configuration values by entering the lan command:

```
R>
lan lan is disabled
lan -i 0.0.0.0
lan -g 0.0.0.0
lan -p 6470
Ethernet Address : 08000903212f
```

The "lan -i" line shows the current IP address (IP address) of the emulation probe.

The Ethernet address, also known as the link level address, is preassigned at the factory, and is printed on a label above the LAN connectors.

5 Enter the following command:

```
lan -i > [-g >] [-p >]
```

The lan command parameters are:

-i <internet>   The IP address which you obtained from your network administrator.

-g <gateway>   The gateway address. Setting the gateway address allows access outside your local network or subnet.

-p <port>   This changes the base TCP service port number.

The default numbers (6470, 6471) can be changed if they conflict with some other product on your network. TCP service port numbers must be greater than 1024. If you change the base port, the new value must also be entered in the /etc/services file on the host computer. For example, you could modify the line:

```
64700     6470/tcp
```

The IP address and any other LAN parameters you change are stored in nonvolatile memory and will take effect the next time the emulation probe is powered off and back on again.

6 Disconnect the power cord from the emulation probe,

and connect the emulation probe to your network.

This connection can be made by using either the 10BASE-T connector or the 10BASE2 (BNC) connector on the emulation probe. Do not use both connectors at the same time.

7 Set the configuration switches to indicate the type of connection that is to be made.

Switch S1 must be set to OFF, indicating that a LAN connection is being made.

Switch S5 should be ON if you are connecting to the BNC connector:

E3490B01
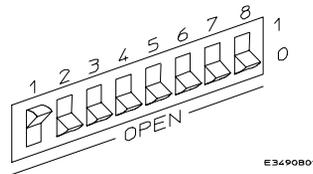
Switch S5 should be OFF if you are connecting to the 10BASE-T connector:

E3490B02
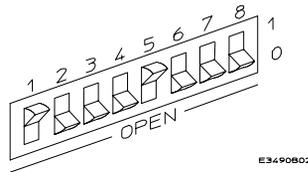
Set all other switches to ON.

8 Connect the power cord to the emulation probe.

9 Verify your emulation probe is now active and on the network. See "To verify LAN communications" on page 39.

Once you have set a valid IP address, you can use the telnet utility to connect to the emulation probe, and use the lan command to change LAN parameters.

Example

To assign an IP address of 192.6.94.2 to the emulation probe, enter the following command:

```
R>lan -i 192.6.94.2
```

Now, cycle power on the emulation probe so that the new address will take effect.

See Also   Page 139, if you have problems verifying LAN communication.

To configure LAN parameters using BOOTP

Use this method only on a workstation which is running bootpd, the BOOTP daemon.

1 Make sure that BOOTP is enabled on your host computer.

If the following commands yield the results shown below, the BOOTP protocol is enabled:

```
$ grep bootp /etc/services
bootps   67/udp
bootpc   68/udp
$ grep bootp /etc/inetd.conf
bootps  dgram  udp  wait   root  /etc/bootpd   bootpd
```

If the commands did not yield the results shown, you must either add BOOTP support to your workstation or use a different method to configure the emulation probe LAN parameters.

2 Add an entry to the host BOOTP database file, /etc/bootptab.

Example

```
# Global template for options common to all Agilent
64700
# emulators and Emulation Probes.
# Use a different gateway addresses if necessary.
64700.global:\
     :gw=0.0.0.0:\
     :vm=auto:\
     :hn:\
     :bs=auto:\
     :ht=ether

# Specific emulator entry specifying hardware
address
# (link-level address) and ip address.
probe.example.com:\
     :tc=64700.global:\
     :ha=080009090B0E:\
     :ip=192.6.29.31
```

In this example, the "ha=080009090B0E" identifies the link-level address of the emulation probe. The "ip=192.6.29.31" specifies the IP address that is assigned to the emulation probe. The node name is "probe.example.com".

---

3 Connect the emulation probe to your network.

This connection can be made by using either LAN connector on the emulation probe.

4 Set the configuration switches to indicate the type of connection that is to be made.

Switch S1 must be set to OFF, indicating that a LAN connection is being made.

Switch S6 must be set to OFF to enable BOOTP mode.

Switch S5 should be set to OFF if you are connecting to the BNC connector

E3490B04
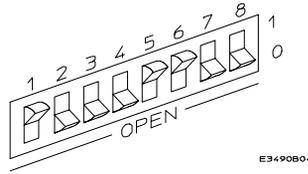
Switch S5 should be set to ON if you are connecting to the 10BASE-T connector.

E3490B03
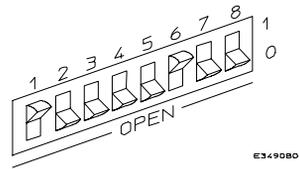
Set all other switches to ON.

5 Connect the power cord to the emulation probe.

6 Verify that the power light stays on after 10 seconds.

The IP address will be stored in EEPROM.

7 Set switch S6 back to ON.

Do this so that the emulation probe does not request its IP address each time power is cycled. The IP address is stored in EEPROM, so BOOTP does not need to be run again. Leaving this switch on will result in slower performance, increased LAN traffic, and even failure to power up (if the BOOTP server becomes inactive).

8 Verify your emulation probe is now active and on the network. See "To verify LAN communications" on page 39.

See Also   For additional information about using bootpd, refer to the bootpd (1M) man page.

To set the 10BASE-T configuration switches

Set switches S7 and S8 to ON unless one of the following conditions is true:

- If the LAN cable exceeds the standard length, set switch S7 to OFF.

  The emulation probe has a switch-selectable, twisted-pair receiver threshold. With switch S7 set to OFF, the twisted-pair receiver threshold is lowered by 4.5 dB. This should allow you to use cable lengths of up to about 200 meters. If you use a long cable, you should consult with your LAN cabling installer to ensure that:

    - The device at the other end of the cable has long cable capability, and

    - The cable is high-grade, low-crosstalk cable with crosstalk attenuation of greater than 27.5 dB.

  When switch S7 is set to ON, the LAN port operates at standard 10BASE-T levels. A maximum of 100 meters of UTP cable can be used.

- If your network doesn't support Link Beat integrity checking or if the emulation probe is connected to a non 10BASE-T network (such as StarLAN) set this switch to LINK BEAT OFF (0 or OPEN).

  In normal mode (switch S8 set to ON), a link integrity pulse is transmitted every 15 milliseconds in the absence of transmitted data. It expects to receive a similar pulse from the remote MAU. This is the standard link integrity test for 10BASE-T networks. If your network doesn't support the Link Beat integrity checking or if the emulation probe is used on a non 10BASE-T network (such as StarLAN) set this switch to LINK BEAT OFF (OFF).

NOTE: Setting switch S8 to OFF when Link Beat integrity checking is required by your network will cause the remote MAU to disable communications.

To verify LAN communications

1 Verify your emulation probe is now active and on the network by issuing a telnet to the IP address.

This connection will give you access to the emulation probe's built-in terminal interface.

2 To view the LAN parameters, enter the lan command at the terminal interface prompt.

3 To exit from this telnet session, type <CTRL>D at the prompt.

The best way to change the emulation probe's IP address, once it has already been set, is to telnet to the emulation probe and use the terminal interface lan command to make the change. Remember, after making your changes, you must cycle power or enter a terminal interface init -p command before the changes take effect. Doing this will break the connection and end the telnet session.

If You Have Problems   "If you have problems with the emulator, your first task is to determine the source of the problem. Problems may originate in any of the following places:" on page 120.

Example

```
$ telnet 192.35.12.6
R>lan
lan is enabled
lan -i 192.35.12.6
lan -g 0.0.0.0
lan -p 6470
Ethernet Address : 08000F090B30
```

Setting Up a Serial Connection

To set up a serial connection to an emulation probe, you will need to:

- Set the serial configuration switches

- Connect a serial cable between the host computer and the emulation probe

- Verify communications

Serial connections on a workstation

If you are using a UNIX workstation as the host computer, you need to use a serial device file. If a serial device file does not already exist on your host, you need to create one. Once it exists, you need to ensure that it has the appropriate permissions so that you can access it. See the system documentation for your workstation for help with setting up a serial device.

Serial connections on a PC

Serial connections are supported on PCs. You must use hardware handshaking if you will use the serial connection for anything other than setting LAN parameters.

If you are using a PC as the host computer, you do not need to set up any special files.

To set the serial configuration switches

1 Set switch S1 to ON (RS-232).

2 Set switches S2-S4 to ON.

3 Set switch S5 to ON (HW HANDSHAKE ON) if your serial interface uses the DSR:CTS/RTS lines for flow control. Set S5 to OFF (HW HANDSHAKE OFF) if your serial interface uses software flow control (XON/XOFF).

If your serial interface supports hardware handshaking, you should use it (set switch S5 to ON). Hardware handshaking will make the serial connection much more reliable.

4 Set switches S6-S8 for the baud rate you will use. These switch settings are listed on the bottom of the emulation probe.

The higher baud rates may not work reliably with all hosts and user interfaces. Make sure the baud rate you choose is supported by your host and user interface.

Example

To use a baud rate of 9600 baud, set the switches as follows:
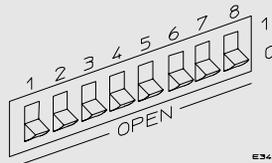
To connect a serial cable

CAUTION: Use a grounded, shielded cable. If the cable is not shielded, or if the cable is not grounded at the serial controller, the emulation probe may be damaged by electrostatic discharge.

Connect an RS-232C modem cable from the host computer to the emulation probe. Use a 9-pin cable with one-to-one pin connections.

If you want to build your own RS-232 cable, follow the pinout shown in the following figure:

```
5  ⃝
        ⃝   9
4  ⃝
        ⃝   8
3  ⃝
        ⃝   7
2  ⃝
        ⃝   6
1  ⃝

       E3490B08
```
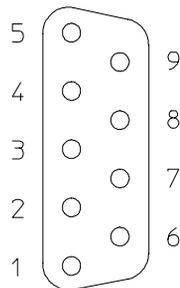
Serial Cable Pinout

Pin Number	Signal	Signal Description
1	DCD	Data Carrier Detect (not used)
2	TD	Transmit Data (data coming from Agilent Technologies emulation probe)
3	RD	Receive Data (data going to Agilent Technologies emulation probe)
4	DTR	Data Terminal Ready (not used)
5	GND	Signal Ground
6	DSR	Data Set Ready (Output from Agilent Technologies emulation probe)
7	RTS	Request to Send (Input to Agilent Technologies emulation probe)
8	CTS	Clear to Send (connected to pin 6)
9	RING	Ring Indicator (not used)

To verify serial communications

1 Start a terminal emulator program on the host computer.

If you are using a PC, the Terminal application in Microsoft Windows will work fine.

If you are using a UNIX workstation, you can use a terminal emulator such as cu or kermit.

2 Plug the power cord into the emulation probe.

When the emulation probe powers up, it sends a message (similar to the one that follows) to the serial port and then displays a prompt:

```
     Copyright (c) Agilent Technologies 1987
All Rights Reserved.  Reproduction, adaptation, or translation without
prior written permission is prohibited, except as allowed under
copyright laws.
   E3499B Series Emulation System
   Version:   A.07.56 28Sep98
   Location:  Generics

   E3453A Motorola MPC8200 Embedded PowerPC Emulator
   Version:   A.01.00 18Feb99
R>
```

The version numbers may be different for your emulation probe.

3 Press the Return or Enter key a few times.

You should see a prompt such as "p>", "R>", or "?>".

For information about the commands you can use, enter ? or help at the prompt.

See Also   "If you have problems with the emulator, your first task is to determine the source of the problem. Problems may originate in any of the following places:" on page 120.

3

Installing the Emulation Module

This chapter shows you how to install an emulation module in your Agilent Technologies 16600A/700A-series logic analysis system.

If your emulation module is already installed in your logic analysis system frame, you may skip this chapter.

CAUTION:
These 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.

Electrostatic discharge can damage electronic components. Use grounded wrist straps and mats when you handle modules.

To install the emulation module in a 16700A-series logic analysis system or a 16701A expansion frame

You will need T-10 and T-15 Torx screw drivers.

1 Turn off the logic analysis system and REMOVE THE POWER CORD.

Remove any other cables (including mouse or video monitor cables).

2 Turn the logic analysis system frame upside-down.

3 Remove the bottom cover.
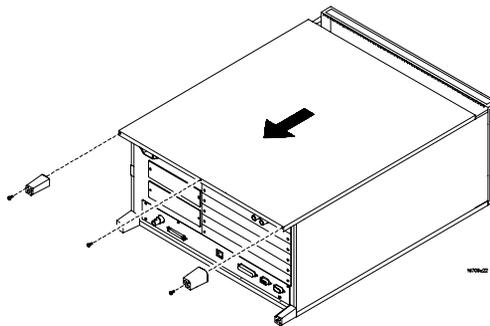
4 Remove the slot cover.

You may use either slot.
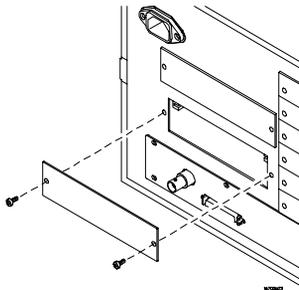
5 Install the emulation module.
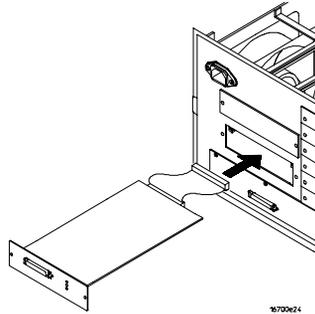
6 Connect the cable and re-install the screws.

You may connect the cable to either of the two connectors. If you have two emulation modules, note that many debuggers will work only with the "first" module: the one toward the top of the frame ("Slot 1"), plugged into the connector nearest the back of the frame.
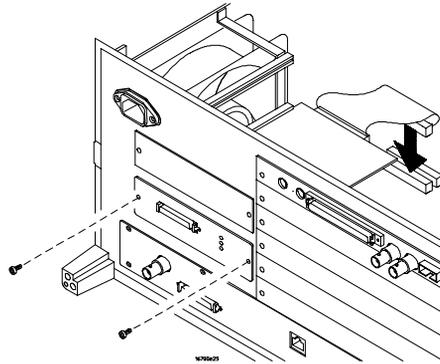
7 Reinstall the bottom cover, then turn the frame right-side-up.

8 Plug in the power cord, reconnect the other cables, and turn on the logic analysis system.

The new emulation module will be shown in the system window.

To install the emulation module in a 16600A-series logic analysis system

You will need T-8, T-10, and T-15 Torx screw drivers (supplied with the modules).

1 Turn off the logic analysis system and REMOVE THE POWER CORD.

Remove any other cables (such as probes, mouse, or video monitor).

2 Slide the cover back.
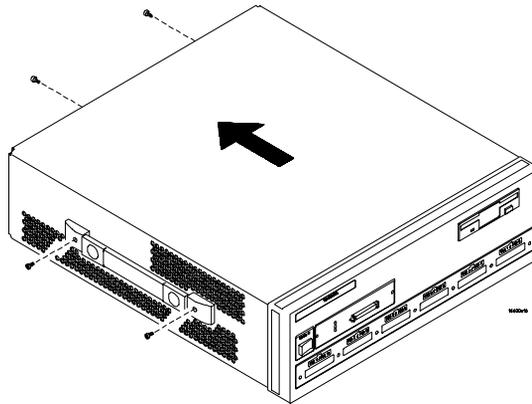
3 Remove the slot cover.
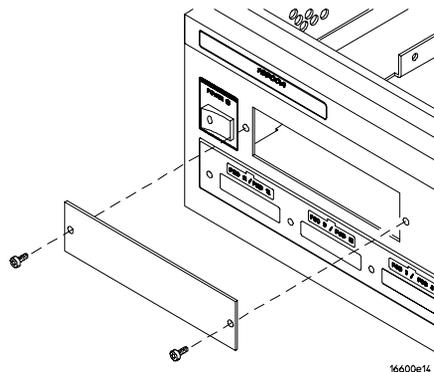
4 Install the emulation module.

5 Connect the cable and re-install the screws.
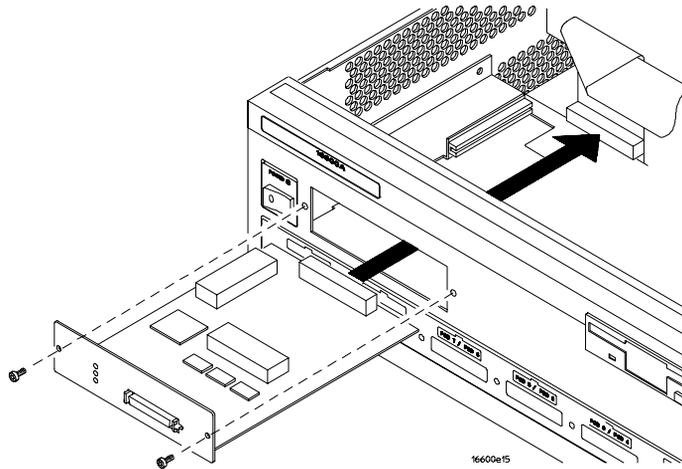
6 Reinstall the cover.

Tighten the screws snugly (2 N-m or 18 inch-pounds).

7 Plug in the power cord, reconnect the other cables, and turn on the logic analysis system.

The new emulation module will be shown in the system window.

4

Installing Software on a 16600A/700A

This chapter explains how to install the software you will need for your analysis probe or emulation solution.

Installing and loading

Installing the software will copy the files to the hard disk of your logic analysis system. Later, you will need to **load** some of the files into the appropriate hardware module.

Logic analysis system or logic analyzer frame

Install

Load

CD-ROM or flexible disk

Hard Disk

Logic analyzer or emulation module
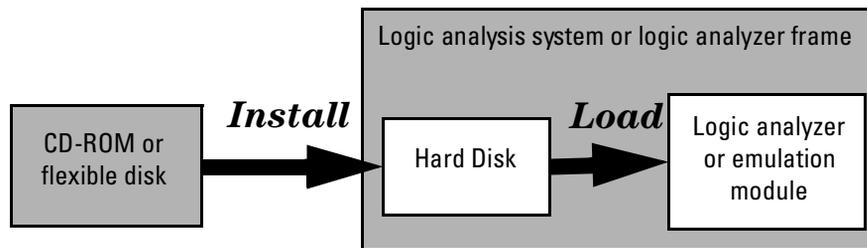
What needs to be installed

Agilent Technologies 16600A/700A-series logic analysis systems

If you ordered an emulation solution with your logic analysis system, the software was installed at the factory.

The following files are installed when you install a processor support package from the CD-ROM:

- Logic analysis system configuration files

- Inverse assembler (automatically loaded with the configuration files)

- Personality files for the Setup Assistant

- Emulation module firmware (for emulation solutions)

- Emulation Control Interface (for emulation solutions)

The Agilent Technologies B4620B Source Correlation Tool Set is installed with the logic analysis system's operating system.

To install the software from CD-ROM (16600A/700A)

Installing a processor support package from a CD-ROM will take just a few minutes. If the processor support package requires an update to the Agilent Technologies 16600A/700A logic analysis system operating system, installation may take approximately 15 minutes.

If the CD-ROM drive is not connected, see the instructions printed on the CD-ROM package.

1 Turn on the CD-ROM drive first and then turn on the logic analysis system.

2 Insert the CD-ROM in the drive.

3 Click the **System Admin** icon.

4 Click **Install...** .

Change the media type to "CD-ROM" if necessary.

5 Click **Apply**.

6 From the list of types of packages, select "PROC-SUPPORT."

A list of the available processor support packages will be displayed.

7 Click on the "MPC82XX" package.

If you are unsure if this is the correct package, click Details for information on what the package contains.

8 Click **Install...** .

The dialog box will display "Progress: completed successfully" when the installation is complete.

9 Click **Close**.

The configuration files are stored in /logic/configs/hp/
processor. The inverse assemblers are stored in /logic/ia.

See Also   The instructions printed on the CD-ROM package for a summary of the
installation instructions.

The online help for more information on installing, licensing, and
removing software.

To list software packages which are installed (16600A/700A)

In the System Administration Tools window, click **List...** .

5

Connecting and Configuring the
Emulator

This chapter shows you how to connect the emulator to the target system and how to configure the emulator and target.

Here is a summary of the steps for connecting and configuring the emulator:

1 Make sure the target system is designed to work properly with the emulator. (page 63)

2 Install the emulation module in your logic analysis system, if necessary. (page 45)

3 Connect the emulator to your target system using the 16-pin cable and the TIM or an analysis probe. (page 66)

4 Update the firmware of the emulator, if necessary. (page 107)

5 Verify communication between the emulator and the target. (page 69)

6 Configure the emulator. (page 70)

7 Test the connection between the emulator and the target. (page 81)

8 Connect a debugger to the emulator, if applicable. (page 83.)

See Also   Chapter 6, "Using the Emulator with a Debugger," beginning on page 83 for information on configuration with a debugger, and on configuring LAN port numbers.

Using the Emulation Control Interface

The Emulation Control Interface in your Agilent Technologies 16600A/700A-series logic analysis system allows you to control an emulator (an emulation module or an emulation probe).

As you set up the emulator, you will use the Emulation Control Interface to:

- Update firmware (which reloads or changes the processor-specific personality of the emulator).

- Change the LAN port assignment (rarely necessary).

- Run performance verification tests on the emulator.

The Emulation Control Interface allows you to:

- Run, break, reset, and step the target processor.

- Set and clear breakpoints.

- Read and write registers.

- Read and write memory.

- Read and write I/O memory.

- View memory in mnemonic form.

- Read and write the emulator configuration.

- Download programs (in Motorola S-Record or Intel Hex format) to the target system RAM or ROM.

- View emulator status and errors.

- Write and play back emulator command script files.

If you have an emulation probe, this interface also allows you to configure the LAN address of the emulation probe.

Using the logic analysis system's intermodule bus does not require the Emulation Control Interface to be running. If the emulation module icon is in the Intermodule window, then it will be able to send and receive signals. Therefore if you are using a debugger, you can use an

analyzer to cause a break.

Using a debugger with the Emulation Control Interface is not recommended because:

- The interfaces can get out of synchronization when commands are issued from both interfaces. This causes windows to be out-of-date and can cause confusion.

- Most debuggers cannot tolerate another interface issuing commands and may not start properly if another interface is running.

See Also   All of the Emulation Control Interface windows provide online help with a **Help** button or a **Help→On this window** menu selection. Refer to the online help for complete details about how to use a particular window.

To start the Emulation Control Interface from the main System window (emulation module)

1 In the System window, click the emulation module icon.

2 Select **Start Session...**.
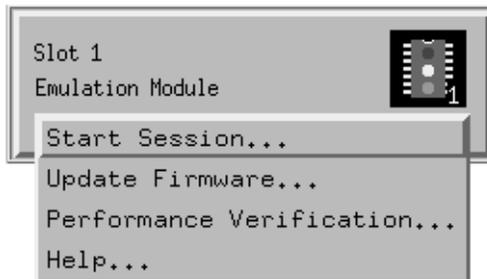
To start the Emulation Control Interface from the Workspace window (emulation module)

1 Open the Workspace window.

2 Drag the Emulator icon onto the workspace.

3 Right-click on the Emulator icon, then select **Start Session...**.
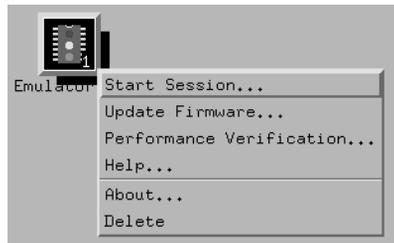
To start the Emulation Control Interface from the Workspace window for an emulation probe

If you have a stand-alone emulation probe connected to the logic analysis system via LAN, use the Emulation Probe icon instead of the Emulator icon.

1 Open the Workspace window.

2 Drag the Emulation Probe icon onto the workspace.

3 Right-click on the Emulation Probe icon, then select **Start Session...**.
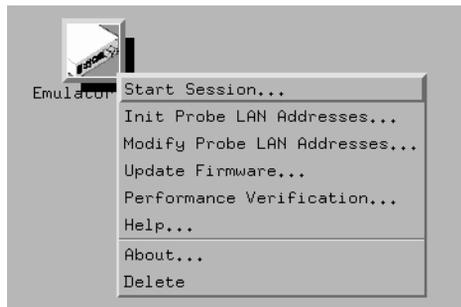
4 In the Session window, enter the IP address or LAN name of the emulation probe, then click **Start Session**.

Designing a MPC8240 or MPC8260 Target System

Debug Port Connection

A 2x8 0.1 inch center BERG-style connector is required to connect the emulation probe to the MPC8260 PowerQUICC II JTAG interface or the MPC8240 JTAG interface. The header should be placed as close to the microprocessor as possible to ensure signal integrity. TDO, TDI, TCK, TMS, and $\overline{\text{TRST}}$ should have signal traces less than three inches between the JTAG connector and the microprocessor. If these signals are connected to other nodes, it is required that they connect in a daisy chain between the JTAG debug connector and the MPC8260 PowerQUICC II or the MPC8240. These signals are sensitive to cross-talk and cannot be routed next to active signals such as clocks.

The TDI, TCK, TMS, and $\overline{\text{TRST}}$ signals must not be actively driven by the target system when the debug port is being used.

The Agilent Technologies emulation probe/module adds about 40pF to all target system signals routed to the debug connector. This added capacitance may reduce the rise time of the $\overline{\text{HRESET}}$ and $\overline{\text{SRESET}}$ signals beyond the processor specifications. If so, the target may need to increase the pull-up current on these signal lines.

When the 'rst' command on the probe/module is used, $\overline{\text{HRESET}}$ is held low for approximately 300ms.

Reset Signals for the MPC8240

The $\overline{\text{SRESET}}$, $\overline{\text{HRESET}}$ signals from the JTAG connector may be logically ORed with their respective signals on the target system. The MPC8240 has two hard resets, HRST_CPU and HRST_CTRL. $\overline{\text{HRESET}}$ from the debug connector must be routed to the HRST_CPU reset logic and optionally routed to the HRST_CTRL reset logic depending on system requirements.

The emulation probe/module drives $\overline{\text{SRESET}}$ and $\overline{\text{HRESET}}$ with open-drain drivers using 2.7 Kohm pullups to VDD. The target system designer may take advantage of these open-drain drivers by wire-ORing $\overline{\text{SRESET}}$ and/or $\overline{\text{HRESET}}$ to open-drain drivers on the target system. It is not necessary to use a wire-OR configuration, but reset status messages can only be generated by the probe/module when using the wire-ORed configuration.

The $\overline{\text{TRST}}$ signal from the JTAG connector must be logically ORed with $\overline{\text{TRST}}$ on the target system. $\overline{\text{TRST}}$ is actively driven by the probe/module and cannot be wire-ORed.

Reset Signals for the MPC8260

$\overline{\text{SRESET}}$ and $\overline{\text{HRESET}}$ from the debug connector must be ORed with the respective $\overline{\text{SRESET}}$ and $\overline{\text{HRESET}}$ signals on the target system. They they can be logically ORed or wire-ORed on the target system. The emulation probe/module drives $\overline{\text{SRESET}}$ and $\overline{\text{HRESET}}$ with open-drain drivers using 2.7 Kohm pullups to VDD.

It is not necessary to use a wire-OR configuration, but reset status messages can only be generated by the probe/module when using the wire-ORed configuration.

The $\overline{\text{TRST}}$ signal from the JTAG connector must be logically ORed with $\overline{\text{TRST}}$ on the target system. $\overline{\text{TRST}}$ is actively driven by the probe/module and cannot be wire-ORed.

JTAG Connector Pinout and Electrical Information
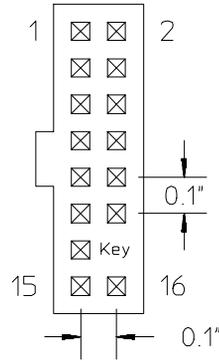
Pin	Signal	Resistor
1	TDO	
2	NC	
3	TDI	1 Kohm pull-down
4	#TRST	10 Kohm pull-up
5	NC	
6	+3.3V	1 Kohm series
7	TCK	10 Kohm pull-up
8	NC	
9	TMS	10 Kohm pull-up
10	NC	
11	#SRESET	10 Kohm pull-up
12	NC	
13	#HRESET	10 Kohm pull-up
14	KEY	
15	#CHKSTP	10 Kohm pull-up
16	GND	

e3494b01

To test the emulator

If this is the first time that you have used the emulator, you should run the built-in performance verification test before you connect to a target system. Refer to page 141 for information on performance verification.

Connecting the Emulator to the Target System

Choose one of the following methods for connecting the emulator to a target system.

- Directly through a debug port connector on the target board.
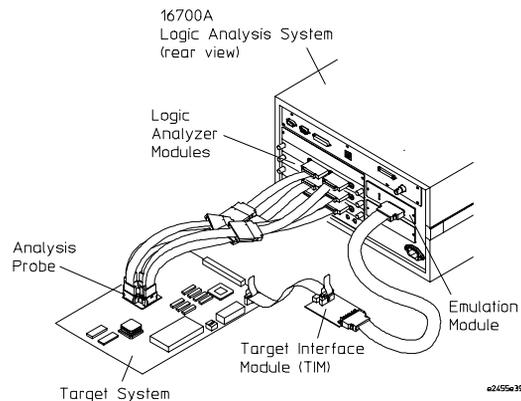
- Through an Agilent Technologies analysis probe, which provides a direct connection to the debug port pins.
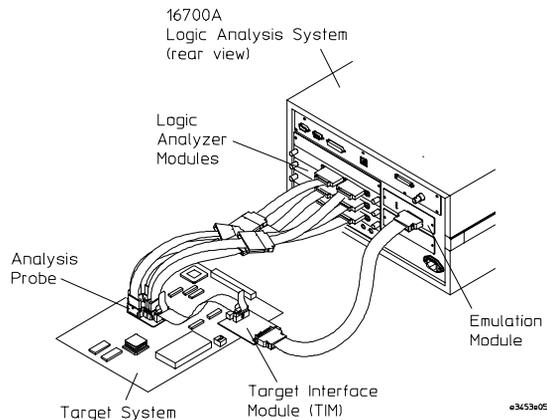
After you have connected the emulator to your target system, you may need to update the firmware in the emulator.

For information on designing a debug port on your target board, see page 63.

For a list of the parts supplied with the emulator, see page 21.

To connect to a target system using a 16-pin debug port

The emulator can be connected to a target system through a 16-pin debug port (JTAG connector).

The emulator should be connected to the target system using the 16-conductor cable assembly provided.

In order to connect the emulator to the microcontroller, a 16-pin male 2x8 header connector must be available on the target system.

1 Remove power from the target system and the emulator.

2 Plug one end of the 50-pin cable into the emulator.
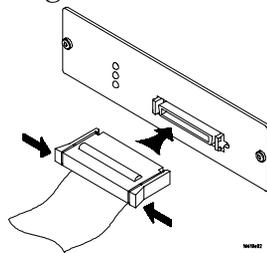
3 Plug the other end of the 50-pin cable into the target interface module.

4 Plug one end of the 16-pin cable into the target interface module.

5 Plug the other end of the 16-pin cable into the target system.

Orient the red wire away from pin 1 of the connector and towards the key pin. See the drawing on page 65.

CAUTION: Be careful to orient the connector as described above. If the connector is rotated, your target system or the emulator may be damaged.

6 Turn on the power to the logic analysis system, then turn on the power to the target system.

To connect to a target system using an analysis probe

1 Remove power from the target system.

2 Plug one end of the 16-pin cable into the emulator. The connectors are keyed.
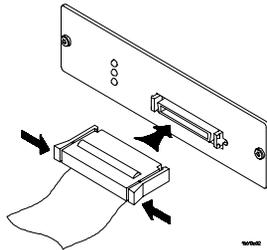
3 Plug the other end of the 16-pin cable into the connector on the analysis probe.

To verify communication between the emulator and target system

1 Turn on the target system.

2 Start the Emulation Control Interface.

If the electrical connections are correct, and if the emulator firmware and analysis probe or TIM match your target processor, the Run Control window should be displayed:
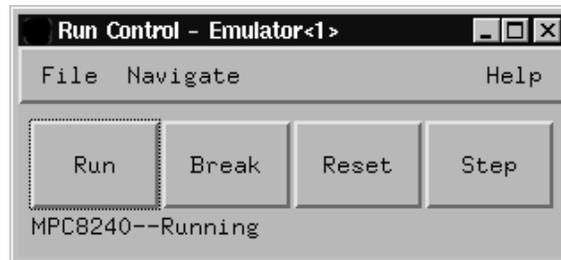
Configuring the Emulator

The emulator has several user-configurable options. These options may be customized for specific target systems and saved in configuration files for future use.

> The easiest way to configure the emulator is through the Emulation Control Interface in an Agilent Technologies 16600A or 16700A logic analysis system.

If you use the Emulation Control Interface, please refer to the online help in the Configuration window for information on each of the configuration options.

Other ways to configure the emulator are by using:

- the emulator's built-in terminal interface
- your debugger, if it provides an "emulator configuration" window which can be used with this Agilent Technologies emulator

To configure using the Emulation Control Interface

The easiest way to configure the emulator is to use the Emulation Control Interface.

1 Start an Emulation Control Interface session.

In the system window, click the Emulation Control Interface icon, and then select **Start Session...**.

2 Open a Configuration window.

Select **Configuration...** from the Emulation Control Interface icon or from the Navigate menu in any Emulation Control Interface window.
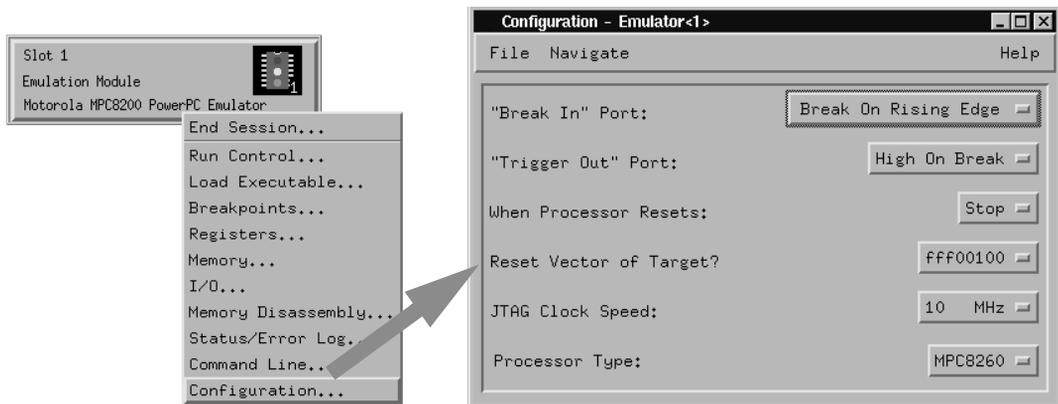
3 Set the configuration options, as needed.

Configuration changes will take effect when you close the configuration window or when you move the mouse pointer outside the window.

4 Save the configuration settings.

To save the configuration settings, open the File Manager window and click **Save...**.

See Also   **Help→Help** on this window in the Configuration window for

information on each of the configuration options.

Help in the Emulation Control Interface menu for help on starting an Emulation Control session.

To configure using the built-in commands

If you are unable to configure the emulator with the Emulation Control Interface or a debugger interface, you can configure the emulator using the built-in "terminal interface" commands.

1 Connect a telnet session to the emulator over the LAN.

For example, on a UNIX system, for an emulation module in Slot 1 enter:

```
telnet LAN_address 6472
```

2 Enter **cf** to see the current configuration settings.

3 Use the **cf** command to change the configuration settings.

See Also   Enter **help cf** for help on the configuration commands.

For information on connecting using telnet, and for information on other built-in commands, see page 125.

Example

To see a complete list of configuration items, type **help cf**. This
command displays:

```
M>help cf

  cf - display or set emulation configuration

    cf                  - display current settings for all config items
    cf <item>           - display current setting for specified <item>
    cf <item>=<value> - set new <value> for specified <item>
    cf <item> <item>=<value> <item> - set and display can be combined

  help cf <item>     - display long help for specified <item>


  --- VALID CONFIGURATION <item> NAMES ---
    proc     - Set type of processor
    reset    - Run or stop after reset
    vector   - Reset vector address
    rrt      - Set restriction to real time runs
    breakin  - BNC break in control
    trigout  - Trigger out control
    speed    - Set JTAG Clock Divisor

M>
```

To configure using a debugger

Because the Agilent Technologies emulator can be used with several
third-party debuggers, specific details for sending the configuration
commands from the debugger to the emulator cannot be given here.
However, all debuggers should provide a way of directly entering
terminal mode commands to the emulator. Ideally, you would create a
file that contains the modified configuration entries to be sent to the
emulator at the beginning of each debugger session.

See Also   Information about specific debuggers in Chapter 6, "Using the
Emulator with a Debugger," beginning on page 83.

Your debugger manual.

To configure the processor type

Processor type configuration

Value	Emulation module configured for	Built-in command
MPC8260	Motorola MPC8260 (ver. 1.0)	cf proc=MPC8260
MPC8240	Motorola MPC8240 (ver. 1.0)	cf proc=MPC8240

The cfsave -s command will store the processor type configuration in the emulation module's flash memory. The cfsave -r command will restore this configuration.

To configure reset operation

The reset configuration item controls what kind of reset is performed and what state the processor will be in after the reset.

Reset configuration

Value	Effect of a reset from the emulation module	Built-in command
run	Issuing the rst command will hard reset the processor, reset the JTAG interface, and allow the processor to run. (Default)	cf reset=run
stop	Issuing the rst command will hard reset the processor, reset the JTAG interface, and cause the processor to stop at the reset exception vector 0xfff00100 or 0x00000100. The address used is determined by the config item 'vector'.	cf reset=stop

To configure reset vector address

The reset vector address configuration item specifies which reset vector the target hardware is using. This value does not set the reset vector. This is done by the hardware.

Vector address configuration

Value	Emulation module configured for	Built-in command
fff00100	Default	cf vector=fff00100
00000100		cf vector=00000100

To configure restriction to real-time runs

This option enables or disables restriction to real-time runs implemented for all commands other than "rst", "b", "s" and "r".

Real-time runs configuration

Value	Emulation module configured for	Built-in command
no	If the processor is running user code, a request for a register or memory display will put the processor in monitor mode, read the requested register(s), then restore the processor to running user code. (Default)	cf rrt=no
yes	If the processor is running user code, a request for a memory or register display will return: !ERROR 647! Restricted to Real Time	cf rrt=yes

If your debugger allows displaying or modifying memory or registers while the processor is running, you must set rrt=no in order to use that feature.

To configure the BNC Break In control

BNC Break In control configuration

Value	Emulation module configured for	Built-in command
rising	Causes the 'break in' input to halt the processor on a rising edge (Default).	cf breakin=rising
falling	Breaks the processor on a falling edge.	cf breakin=falling
off		cf breakin=off

To configure the Trigger Out BNC (Emulation Probe Only)

With an emulation module, this configuration item is always set to the default setting and cannot be changed with a cf command. The Intermodule window of the logic analysis system must be used instead.

Trigger out configuration

Value	The Trigger Out BNC will	Built-in command
fixhigh	Always be high	cf trigout=fixhigh
fixlow	Always be low	cf trigout=fixlow
monhigh	Go high when the processor is running in background (Default)	cf trigout=monhigh
monlow	Go low when the processor is running in background	cf trigout=monlow

To configure the JTAG clock speed (communication speed)

The Agilent Technologies emulation module needs to be configured to communicate at a rate which is compatible with your target processor. The JTAG clock speed is independent of processor clock speed.

The base JTAG clock frequency is 10MHz. This configuration item selects the division factor for the clock.

Processor clock speed configuration

Value	Processor clock (CLKIN) is at least	Built-in command
1	10 MHz (default)	cf speed=1
2	5 MHz	cf speed=2
3	2.5 MHz	cf speed=3
4	1.25 MHz	cf speed=4
5	625 KHz	cf speed=5

Configuration registers (MPC8260 Only)

Configuration registers are emulation probe copies of particular registers and are used as described below. These registers may be read/written by using the 'reg' command.

cf_immr

The cf_immr register is used by the probe to determine the location of the internal memory map and to read/write the IMMR memory mapped register.

Do not modify the IMMR by using a direct memory access. This will cause the cf_immr register to be out of sync with the real IMMR causing the emulation probe to lose track of the IMMR location.

Reading the cf_immr checks to see if the processor memory map has moved. If the cf_immr is does not reflect the actual IMMR, then an error is generated stating that the memory map has moved and its location is unknown.

To recover from the condition when the cf_immr does not match the actual IMMR, either update the cf_immr with the correct value (reg cf_immr=xxxxxxxx) or set the cf_immr to the reset value and issue the probe reset command (rst).

A write to the cf_immr causes a write to the real IMMR if its location is known. Writing to the cf_immr changes the cf_immr contents and also changes the memory mapped IMMR contents. Once again an error is generated if the memory map has moved and cannot be located.

Before resetting the target or issuing the probe reset command (rst), the cf_immr register must be set to the reset value as defined by the reset configuration word. If after reset user code changes the IMMR value, then the cf_immr copy must also be updated.

The default value for cf_immr is 0x0f000000 when the emulation probe is powered on or when the 'init -c' command is issued.

cf_sypcr

The cf_sypcr register is used to disable the watchdog timer after a probe reset command (rst) is issued. Since the SYPCR is a write once register, direct writes to the SYPCR register have no effect while using the probe.

If a value other than the default is desired, then the cf_sypcr register must be set (reg cf_sypcr=xxxxxxxx) and the SYPCR will be updated on the next probe reset command (rst). The probe can only disable the watchdog timer if the 'rst' command is used. Pressing the target reset button will not disable the timer. The default value is 0xffffffc3.

Cache support

This version of the firmware does not support the cpu running with cache on. Targets must not enable cache.

Break

If the following error occurs, the processor is in an unstable state and should be reset via a hard reset or a power-on reset. The 'rst' command may not be able to bring the processor into a known state.

```
!ERROR  145! Unable to soft stop - freezing the processor
clocks
```

Software Breakpoints

The number of software breakpoints is unlimited but they cannot be used with ROM or FLASH memory. Software breakpoints cannot be used to debug exceptions. Do not modify the IABR register while software breakpoints are enabled.

It is recommended that only -t (temporary) or -p (permanent) breakpoints be used by a debugger. If neither option is given, the breakpoint acts much like a temporary breakpoint except that when the breakpoint is hit, it is disabled but remains in the breakpoint list. A temporary breakpoint is removed from the breakpoint list when hit.

NOTE: For software breakpoints, the break conditions set are dependent on the value of the MSR(IP) bit value. When software breakpoints are enabled, the value of this bit determines the break condition. If user code or debuggers change this value after software breakpoints have been enabled, software breakpoints will not work. The work around for this is to set a hardware breakpoint to an instruction after the code that changes the MSR(IP), then after hitting the hardware breakpoint, disable hardware breakpoints and enable software breakpoints.

Hardware Breakpoints

One hardware breakpoint is available. Since using software breakpoints requires the use of the hardware breakpoint, both types of breakpoints cannot be used at the same time. Enable hardware breakponts using 'bc -e hwbp'. Set a hardware breakpoint using 'bp -h <-p | -t> <address>. Use either the -p or -t option when setting the hardware breakpoints.

Testing the emulator and target system

After you have connected and configured the emulator, you should perform some simple tests to verify that everything is working.

See Also   Chapter 10, "Troubleshooting the Emulator," beginning on page 120, for information on testing the emulator hardware.

To test memory accesses

1 Start the Emulation Control Interface and configure the emulator and target memory system.

2 Open the Memory window.

3 Write individual locations or fill blocks of memory with patterns of your choosing.

The access size is the size of memory access that will be used to write or read the memory values.

4 Use the Memory I/O window to stimulate I/O locations by reading and writing individual memory locations.

To test with a running program

To more fully test your target, you can load simple programs and
execute them.

1 Compile or assemble a small program and store it in a Motorola S-
Record or Intel Hex file.

2 Use the Load Executable window to download the program into
RAM or flash memory.

3 Use the Breakpoints window to set breakpoints. Use the
Registers window to initialize register values.

The new register or breakpoint values are sent to the processor when
you press the Enter key or when you move the cursor out of the
selected register field.

4 In the Run Control window, click Run.

5 Use the Memory Mnemonic window to view the program and use
the Memory window to view any output which has been written
to memory.

6

Using the Emulator with a Debugger

Several prominent companies design and sell state-of-the-art source debuggers which work with the Agilent Technologies emulation module and emulation probe.

Benefits of using a debugger

The debugger will enable you to control the execution of your processor from the familiar environment of your debugger. Using a debugger lets you step through your code at the source-code level.

With a debugger connection, you can set breakpoints, single-step through source code, examine variables, and modify source code variables from the debugger interface. The debugger can also be used to download executable code to your target system.

Using a debugger to connect to the emulator allows the entire design team to have a consistent interface from software development to hardware/software integration.

Debugger interfaces must be ordered directly from the debugger vendor.

Compatibility with other logic analysis system tools

You can use your logic analysis system to collect and analyze trace data while you use your debugger. If you are using an X windows workstation or a PC with an X terminal emulator, you can display the logic analyzer windows right next to your debugger.

Here is an example of what the display on your PC or workstation might look like:
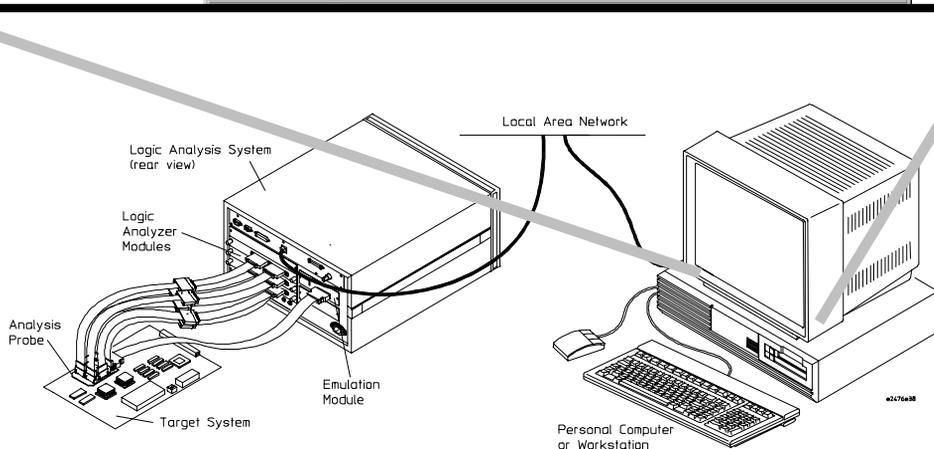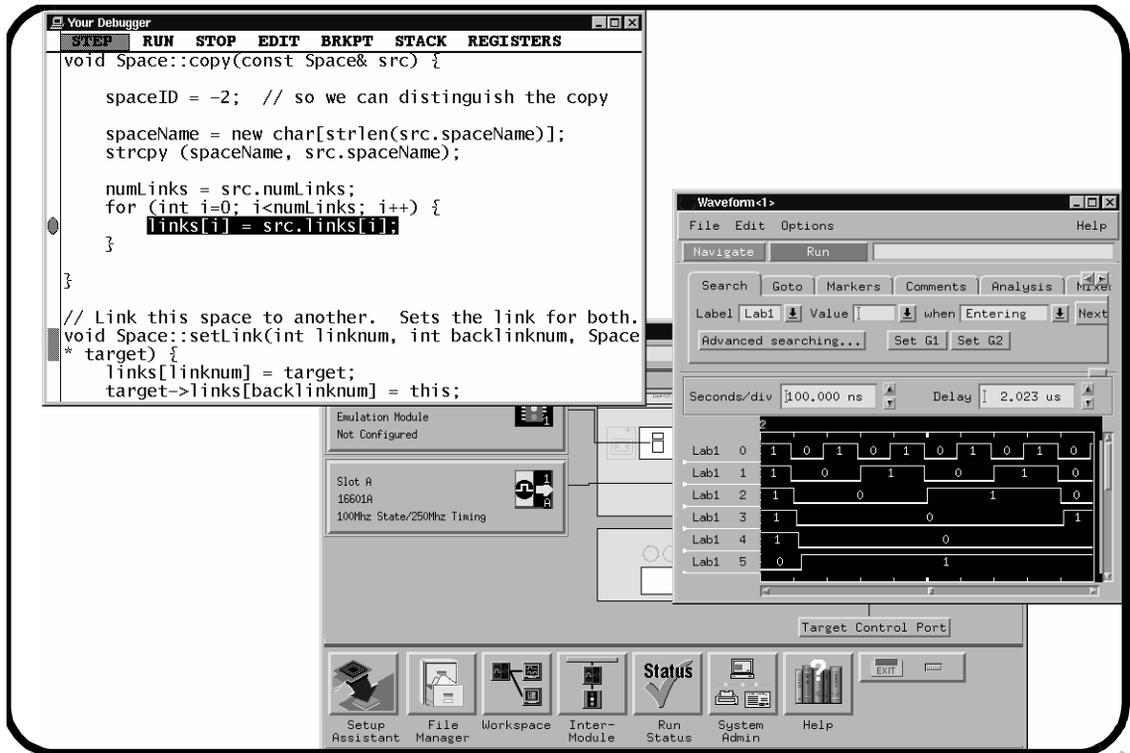
Minimum requirements

To use a debugger with the emulator, you will need:

- A debugger which is compatible with the emulator

- A LAN connection to the PC or workstation that is running the debugger

- X windows or an X terminal emulator, such as Reflection X on a PC. This is required only if you wish to have the logic analysis system user interface displayed on your PC or workstation screen, along with the debugger.

Is your debugger compatible with the emulator?

Ask your debugger vendor whether the debugger can be used with an Agilent Technologies emulation module or Agilent Technologies emulation probe (also known as a "processor probe" or "software probe").

LAN connection

You will use a LAN connection to allow the debugger to communicate with the emulator.

Compatibility with the Emulation Control Interface

Do not use the logic analysis system's Emulation Control Interface and your debugger at the same time.

Setting Up Debugger Software

The instructions in this manual assume that your PC or workstation is already connected to the LAN, and that you have already installed the debugger software according to the debugger vendor's documentation.

To use your debugger with the emulator, follow these general steps:

- Connect the emulator to your target system (see page 66).

- Connect the emulator or logic analysis system to the LAN (page 88).

- Export the logic analysis system's display to your PC or workstation (page 91).

- Configure the emulator (page 70).

- Begin using your debugger.

If you use the Emulation Control Interface to configure the emulator, remember to end the Emulation Control Interface session before you start the debugger.

CAUTION: Do not use the Emulation Control Interface at the same time as a debugger. The Emulation Control Interface and debuggers do not keep track of commands issued by other tools. If you use both at the same time, the tools may display incorrect information about the state of the processor, possibly resulting in lost data.

See Also   Refer to the documentation for your debugger for more information on connecting the debugger to the emulator.

To connect the logic analysis system to the LAN

Information on setting up a LAN connection is provided in the online help or installation manual for your logic analysis system.

Your debugger will require some information about the LAN connection before it can connect to the emulator. This information may include:

- IP address (Internet address) or LAN name of the logic analysis system.

- Gateway address of the logic analysis system.

- Port number of the emulator.

Port numbers for emulators

Port number	Use for
Debugger connections	
6470	Slot 1 (First emulator in an Agilent Technologies 16600A/700A-series logic analysis system)
6474	Slot 2 (Second emulator in an Agilent Technologies 16700A-series system)
6478	Slot 3 (Third emulator in an expansion frame)
6482	Slot 4 (Fourth emulator in an expansion frame)
Telnet connections	
6472	Slot 1 (First emulator)
6476	Slot 2 (Second emulator)
6480	Slot 3 (Third emulator)
6484	Slot 4 (Fourth emulator)

Write the information here for future reference:

IP Address of Logic Analysis System   _____

LAN Name of Logic Analysis System   _____

Gateway Address   _____

Port Number of Emulator   _____

To change the port number of an emulation module

Some debuggers do not provide a means to specify a port number. In that case, the debugger will always connect to port 6470 (the first emulator). If you need to connect to another module, or if the port number of the first module has been changed, you must change the port number to be 6470.

To view or change the port number:

1 Click on the emulation module icon in the system window of the logic analysis system, then select **Update Firmware**.

2 Select **Modify Lan Port...**

3 If necessary, enter the new port number in the **Lan Port Address** field.

The new port number must be greater than 1024 and must not already be assigned to another emulator.

To verify communication with the emulator

1 Telnet to the IP address.

For example, on a UNIX system, enter "telnet *<IP_address>* 6472".
This connection will give you access to the emulator's built-in terminal
interface. You should see a prompt, such as "M>".

2 At the prompt, type:

ver

You should then see information about the emulator and firmware
version.

3 To exit from this telnet session, type <CTRL>D at the prompt.

See Also   The online help or manual for your logic analysis system, for
information on physically connecting the system to the LAN and
configuring LAN parameters.

To export the logic analysis system's display to a workstation

By exporting the logic analyzer's display, you can see and use the logic analysis system's windows on the screen of your workstation. To do this, you must have telnet software and X window installed on your computer.

1 On the workstation, add the host name of the logic analysis system to the list of systems allowed to make connections:

```
xhost +<IP_address>
```

2 Use **telnet** to connect to the logic analysis system.

```
telnet <IP_address>
```

3 Log in as "logic".

The logic analysis system will open a Session Manager window on your display.

4 In the Session Manager, click **Start Session on This Display**.

Example

On a UNIX workstation, you could use the following commands to export the display of a logic analysis system named "mylogic":

```
$ xhost +mylogic
$ telnet mylogic
Trying...
Connected to mylogic.mycompany.com.
Escape character is '^]'.
Local flow control on
Telnet TERMINAL-SPEED option ON

Agilent Technologies Logic Analysis System

Please Log in as: logic [displayname:0]

login: logic
Connection closed by foreign host.
```

To export the logic analysis system's display to a PC

By exporting the logic analyzer's display, you can see and use the logic analysis system's windows on the screen of your PC. To do this, you must have telnet software and an X terminal emulator installed on your computer. The following instructions use the Reflection X emulator from WRQ, running on Windows 95, as an example.

1 On the PC, start the X terminal emulator software.

To start Reflection X, click the Reflection X Client Startup icon.

2 Start a telnet connection to the logic analysis system.

Log in as "logic".

For Reflection X, enter the following values in the Reflection X Client Startup dialog:

a In the Host field, enter the LAN name or IP address of the logic analysis system.

b In the User Name field, enter "logic".

c Leave the Password field blank.

d Leave the Command field blank.

e Click **Run** to start the connection.

The logic analysis system will open a Session Manager window on your display.

3 In the Session Manager window, click **Start Session on This Display**.

7

Using the Analysis Probe and
Emulation Module Together

This chapter describes how to use an analysis probe, an emulation module, and other features of your Agilent Technologies 16600A or 16700A logic analysis system to gain insight into your target system.

What are some of the tools I can use?

You can use a combination of all of the following tools to control and measure the behavior of your target system:

- Your analysis probe, to acquire data from the processor bus while it is running full-speed.

- Your emulation module, to control the execution of your target processor and to examine the state of the processor and of the target system.

- The Emulation Control Interface, to control and configure the emulation module, and to display or change target registers and memory.

- Display tools including the Listing tool, Chart tool, and System Performance Analyzer tool to make sense of the data collected using the analysis probe.

- Your debugger, to control your target system using the emulation module. Do not use the debugger at the same time as the Emulation Control Interface.

- The Agilent Technologies B4620B Source Correlation Tool Set, to relate the analysis trace to your high-level source code.

Which assembly-level listing should I use?

Several windows display assembly language instructions. Be careful to use to the correct window for your purposes:

- The Listing tool shows processor states that were captured during a "Run" of the logic analyzer. Those states are disassembled and displayed in the Listing window.

- The Emulation Control Interface shows the disassembled contents of a section of memory in the Memory Disassembly window.

- Your debugger shows your program as it was actually assembled, and (if it supports the emulation module) shows which line of assembly code corresponds to the value of the program counter on your target system.

Which source-level listing should I use?

Different tools display source code for different uses:

- The Source Viewer window allows you to follow how the processor executed code as the analyzer captured a trace. Use the Source Viewer to set analyzer triggers. The Source Viewer window is available only if you have licensed the Agilent Technologies B4620B Source Correlation Tool Set.

- Your debugger shows which line of code corresponds to the current value of the program counter on your target system. Use your debugger to set breakpoints.

Where can I find practical examples of measurements?

The Measurement Examples section in the online help contains examples of measurements which will save you time throughout the phases of system development: hardware turn-on, firmware development, software development, and system integration.

A few of the many things you can learn from the measurement examples are:

- How to find glitches.

- How to find NULL pointer de-references.

- How to profile system performance.

To find the measurement examples, click on the Help icon in the logic analysis system window, then click on "Measurement Examples."

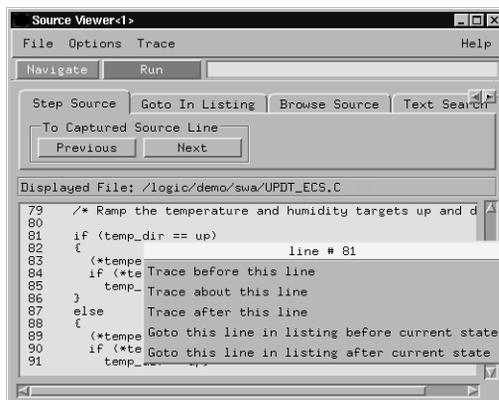# Triggering the Emulation Module from the Analyzer

You can trigger the emulation module from the logic analyzer using either the Source Viewer window or the Intermodule window. If you are using the Agilent Technologies B4620B Source Correlation Tool Set, using the Source Viewer window is the easiest method.

To stop the processor when the logic analyzer triggers on a line of source code (Source Viewer window)

If you have the Agilent Technologies B4620B Source Correlation Tool Set, you can easily stop the processor when a particular line of code is reached.

1 In the Source window, click on the line of source code where you want to set the trigger, then select **Trace about this line**.

The logic analyzer trigger is now set.

2 Select **Trace→Enable - Break Emulator On Trigger**.

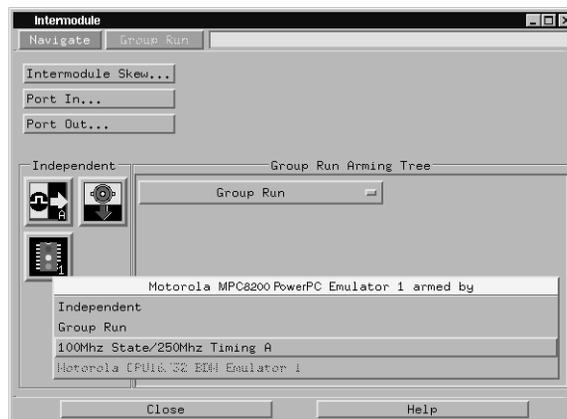The emulation module is now set to halt the processor after receiving a trigger from the logic analyzer.

To disable the processor stop on trigger, select **Trace→Disable - Break Emulator On Trigger**.

3 Click **Group Run** in the Source window (or other logic analyzer window).

4 If your target system is not already running, click **Run** in the emulation Run Control window to start your target.

To stop the processor when the logic analyzer triggers (Intermodule window)

Use the Intermodule window if you do not have the Agilent Technologies B4620B Source Correlation Tool Set or if you need to use a more sophisticated trigger than is possible in the Source Viewer window.

1 Create a logic analyzer trigger.

2 In the Intermodule window, click the emulation module icon, then select the analyzer which is intended to trigger it.

The emulation module is now set to stop the processor when the logic analyzer triggers.

3 Click **Group Run** in the Source window (or other logic analyzer window).

4 If your target system is not already running, click **Run** in the emulation Run Control window to start your target.

See Also   See the online help for your logic analysis system for more information on setting triggers.

To minimize the "skid" effect

There is a finite amount of time between when the logic analyzer triggers, and when the processor actually stops. During this time, the processor will continue to execute instructions. This latency is referred to as the skid effect.

To minimize the skid effect:

1 In the Emulation Control Interface, open the Configuration window.

2 Set the JTAG clock speed to the maximum value which your target can support.

The amount of skid will depend on the processor's execution speed and whether code is executing from the cache. See page 74 for information on how to configure the JTAG clock speed.

To stop the analyzer and view a measurement

- To view an analysis measurement you may have to click Stop after the trigger occurs.

When the target processor stops it may cause the analyzer qualified clock to stop. Therefore most intermodule measurements will have to be stopped to see the measurement.

Example

An intermodule measurement has been set up where the analyzer is triggering the emulation module. The following sequence could occur:

1. The analyzer triggers.

2. The trigger ("Break In") is sent to the emulation module.

3. The emulation module stops the user program which is running on the target processor. The processor enters a background debug monitor.

4. Because the processor has stopped, the analyzer stops receiving a qualified clock signal.

5. If the trigger position is "End", the measurement will be completed.

   If the trigger position is not "End", the analyzer may continue waiting for more states.

6. The user clicks Stop in a logic analyzer window, which tells the logic analyzer to stop waiting, and to display the trace.

Tracing Until the Processor Halts

If you are using a state analyzer, you can begin a trace, run the processor, then manually end the trace when the processor has halted.

To halt the processor, you can set a breakpoint using the Emulation Control Interface or a debugger.

Some possible uses for this measurement are:

- To store and display processor bus activity leading up to a system crash.
- To capture processor activity before a breakpoint.
- To determine why a function is being called. To do this, you could set a breakpoint at the start of the function then use this measurement to see how the function is getting called.

This kind of measurement is easier than setting up an intermodule measurement trigger.

To capture a trace before the processor halts

1 Set the logic analyzer to trigger on **nostate**.

2 Set the trigger point (position) to **End**.

3 In a logic analyzer window, click **Run**.

4 In the Emulation Control Interface or debugger click **Run**.

5 When the emulation module halts click **Stop** in the logic analyzer window to complete the measurement.

This is the recommended method to do state analysis of the processor bus when the processor halts.

If you need to capture the interaction of another bus when the processor halts or you need to make a timing or oscilloscope measurement you will need to trigger the logic analyzer from the emulation module (described in the next section).

Triggering the Logic Analyzer from the Emulation Module

You can create an intermodule measurement which will allow the emulation module to trigger another module such as a timing analyzer or oscilloscope.

If you are only using a state analyzer to capture the processor bus then it will be much simpler to use "Tracing until processor halts" as described on page 100.

Before you trigger a logic analyzer (or another module) from the emulation module, you should understand a few things about the emulation module trigger:

The emulation module trigger signal

The trigger signal coming from the emulation module is an "In Background Debug Monitor" ("In Monitor") signal. This may cause confusion because a variety of conditions could cause this signal and falsely trigger your analyzer.

The "In Monitor" trigger signal can be caused by:

- The most common method to generate the signal is to click **Run** and then click **Break** in the Emulation Control Interface. Going from "Run" (Running User Program) to "Break" ("In Monitor") generates the trigger signal.

- Another method to generate the "In Monitor" signal is to click **Reset** and then click **Break**. Going from the reset state of the processor to the "In Monitor" state will generate the signal.

- In addition, an "In Monitor" signal is generated any time a debugger or other user interface reads a register, reads memory, sets breakpoints or steps. Care must be taken to not falsely trigger the logic analyzers listening to the "In Monitor" signal.

Group Run

The intermodule bus signals can still be active even without a Group Run.

The following setups can operate independently of Group Run:

• Port In connected to an emulation module

• Emulation modules connected in series

• Emulation module connected to Port Out

Here are some examples:

• If "Group Run" is armed from "Port In" and an emulation module is connected to Group Run, then any "Port In" signal will cause the emulation module to go into monitor. The Group Run button does not have to be pressed for this to operate.

• If two emulation modules are connected together so that one triggers another, then the first one going into monitor will cause the second one to go into monitor.

• If an emulation module is connected to Port Out, then the state of the emulation module will be sent out the Port Out without regard to "Group Run".

The current emulation module state (Running or In Monitor) should be monitored closely when they are part of a Group Run measurement so that valid measurements are obtained.

Group Run into an emulation module does not mean that the Group Run will Run the emulation module.

The emulation module Run, Break, Step, and Reset are independent of the Group Run of the Analyzers.

For example, suppose you have the following IMB measurement set up:

Clicking the **Group Run** button (at the very top of the Intermodule window or a logic analyzer window) will start the analyzer running. The analyzer will then wait for an arm signal. Now when the emulation module transitions into "Monitor" from "Running" (or from "Reset"), it will send the arm signal to the analyzer. If the emulation module is "In Monitor" when you click **Group Run**, you will then have to go to the emulation module or your debugger interface and manually start it running.

Debuggers can cause triggers

Emulation module user interfaces may introduce additional states into your analysis measurement and in some cases falsely trigger your analysis measurement.

When a debugger causes your target to break into monitor it will typically read memory around the program stack and around the current program counter. This will generate additional states which appear in the listing.

You can often distinguish these additional states because the time tags will be in the ms and ms range. You can use the time tag information to determine when the processor went into monitor. Typically the time between states will be in the nanoseconds while the processor is running and will be in the ms and ms range when the debugger has halted the processor and is reading memory.

Not also that some debugger commands may cause the processor to break temporarily to read registers and memory. These states that the debugger introduces will also show up in you trace listing.

If you define a trigger on some state and the debugger happens to read the same state, then you may falsely trigger your analyzer measurement. In summary, when you are making an analysis measurement be aware that the debugger could be impacting your measurement.

To trigger the analyzer when the processor halts

Remember: if you are only using a state analyzer to capture the processor bus then it will be much simpler to use "Tracing until processor halts" as described on page 100.

1 Set the logic analyzer to trigger on **anystate**.

2 Set the trigger point to **center** or **end**.

3 In the Intermodule window, click on the logic analyzer you want to trigger and select the emulation module.

The logic analyzer is now set to trigger on a processor halt.

4 Click **Group Run** to start the analyzer(s).

5 Click Run in the Emulation Control Interface or use your debugger to start the target processor running.

Clicking **Group Run** will *not* start the emulation module. The emulation module run, break, step, and reset are independent of the Group Run of the analyzers.

6 Wait for the Run Control window in the Emulation Control Interface or the status display in your debugger to show that the processor has stopped.

The logic analyzer will store states up until the processor stops, but may continue running.

You may or may not see a "slow clock" error message. In fact, if you are

using a state analyzer on the processor bus the status may never change upon receiving the emulation module trigger (analysis arm). This occurs because the qualified processor clock needed to switch the state analyzer to the next state is stopped. For example, the state analyzer before the arm event may have a status of "Occurrences Remaining in Level 1: 1" and after the arm event it may have the same status of "Occurrences Remaining in Level 1: 1".

7 If necessary, in the logic analyzer window, click **Stop** to complete the measurement.

If you are using a timing analyzer or oscilloscope the measurement should complete automatically when the processor halts. If you are using a state logic analyzer, click **Stop** if needed to complete the measurement.

To trigger the analyzer when the processor reaches a breakpoint

This measurement is exactly like the previous one, but with the one additional complexity of setting breakpoints. Be aware that setting breakpoints may cause a false trigger and that the breakpoints set may not be valid after a reset.

Remember: if you are only using a state analyzer to capture the processor bus then it will be much simpler to use "Tracing until processor halts" as described on page 100.

1 Set the logic analyzer to trigger on **anystate**.

2 Set the trigger point to **center** or **end**.

3 In the Intermodule window, click on the logic analyzer you want to trigger and select the emulation module.

The logic analyzer is now set to trigger on a processor halt.

4 Set the breakpoint.

If you are going to run the emulation module from Reset you must do a **Reset** followed by **Break** to properly set the breakpoints. The Reset will clear all on-chip hardware breakpoint registers. The Break command will then reinitialize the breakpoint registers. If you are using software breakpoints which insert an illegal instruction into your program at the breakpoint location you will not need to do the Reset, Break sequence. Instead you must take care to properly insert your software breakpoint in your RAM program location.

5 Click **Group Run** to start the analyzer(s).

6 Click **Run** in the Emulation Control Interface or use your debugger to start the target processor running.

Clicking **Group Run** will *not* start the emulation module. The emulation module run, break, step, reset are independent of the Group Run of the analyzers.

7 Wait for the Run Control window in the Emulation Control Interface or the status display in your debugger to show that the processor has stopped.

The logic analyzer will store states up until the processor stops, but may continue running.

You may or may not see a "slow clock" error message. In fact, if you are using a state analyzer on the processor bus the status may never change upon receiving the emulation module trigger (analysis arm). This occurs because the qualified processor clock needed to switch the state analyzer to the next state is stopped. For example, the state analyzer before the arm event may have a status of "Occurrences Remaining in Level 1: 1" and after the arm event it may have the same status of "Occurrences Remaining in Level 1: 1"

8 If necessary, in the logic analyzer window, click **Stop** to complete the measurement.

If you are using a timing analyzer or oscilloscope the measurement should complete automatically when the processor halts. If you are using a state logic analyzer, click **Stop** if needed to complete the measurement.

8

Updating Firmware

Firmware gives your emulator a "personality" for a particular processor or processor family.

After you have connected the emulator to your target system, you may need to update the firmware to give it the right personality for your processor.

You must update the firmware if:

- You have an emulation module which was not shipped already installed in the logic analysis system.

- You need to change the personality of the emulator for a new processor.

- You have an updated version of the firmware from Agilent Technologies.

The procedure for updating firmware for an emulation probe is different from the procedure for updating firmware for an emulation module.

Emulation Probe Firmware

To display current firmware version information

- Use `telnet` or a terminal emulator to access the built-in "terminal interface" and use the `ver` command to view the version information for firmware currently in the emulation probe.

To update firmware for an emulation probe

To update the firmware, you must have access to the World Wide Web and a PC or a workstation connected to your emulation probe.

1 Download the new firmware from the following World Wide Web site:

http://www.agilent.com/find/emulator

The firmware will be in the "Technical Support Information" section of this web site.

2 Follow the instructions on the web site for installing the firmware.

If Agilent Technologies sends you firmware on a floppy disk, install the firmware from the floppy disk. The README file on the floppy disk contains instructions for installing the firmware using a PC or workstation.

Emulation Module Firmware

Always update firmware by installing a processor support package. This will ensure that the version of the Emulation Control Interface software is compatible the version of the emulator firmware.

To display current firmware version information

1 In the Update Firmware window, click **Display Current Version**.

There are usually two firmware version numbers: one for "Generics" and one for the personality of your processor.

To update firmware for an emulation module using the Emulation Control Interface

1 End any run control sessions which may be running.

2 In the Workspace window, remove any Emulator icons from the workspace.

3 Install the processor support package from the CD-ROM, if necessary.

4 In the system window, click the emulation module and select
Update Firmware.
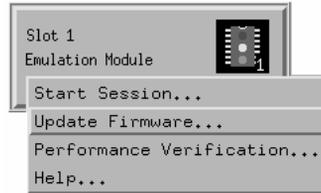
5 In the Update Firmware window, select the firmware to load into
the emulation module.

6 Click **Update Firmware**.

In about 20 seconds, the firmware will be installed and the screen will
update to show the current firmware version.

See also   "Installing Software" beginning on page 52 for instructions on
how to install the processor support package from the CD-
ROM.

To update firmware for an emulation module using the Setup Assistant

The Setup Assistant is an online tool for connecting and configuring your logic analysis system for microprocessor and bus analysis. The Setup Assistant is available on the Agilent Technologies 16600A and 16700A-series logic analysis systems.

This menu-driven tool will guide you through the connection procedures for connecting the logic analyzer to an analysis probe, an emulation module, or other supported equipment. It will also guide you through connecting an analysis probe to the target system.

Do not use the Setup Assistant to connect an emulation probe if you already have an emulation module installed.

1 Install the processor support package from the CD-ROM.

2 Start the Setup Assistant by clicking its icon in the system window.
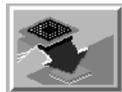
3 Follow the instructions displayed by the Setup Assistant.

See also   Page page 52 for instructions on how to install a the processor support package from the CD-ROM.

9

Specifications and Characteristics

Emulation module and emulation probe— operating characteristics

The following operating characteristics are not specifications, but are typical operating characteristics for the Agilent Technologies 16610A emulation module, emulation probe, and MPC8240 or MPC8260 target interface module.

Operating Characteristics

Microprocessor Compatibility	Motorola MPC8240 or MPC8260 PowerQUICC II Embedded PowerPC microprocessors.
Environmental Characteristics (Temperature, Altitude, Humidity)	The Agilent Technologies 16610A emulation module meets the environmental characteristics of the logic analysis system in which it is installed. For indoor use only.

Emulation probe electrical characteristics

BNC, labeled TRIGGER OUT

Output Drive. Logic high level with 50-ohm load >= 2.0 V. Logic low level with 50-ohm load <= 0.4 V. Output function is selectable, see the configuration section (page 70).

BNC, labeled BREAK IN

Input. Edge-triggered TTL level input (active high), 20 pf, with 2K ohms to ground in parallel. Maximum input: 5V above V_{CC}; 5 V below ground. Input function is selectable, see the configuration section (page 81).

Communications

Serial Port. 9-pin female type D subminiature connector. RS-232 DCE to 115.2 kbaud.

10BASE-T LAN Port. RJ-45 connector. IEEE 802.3 10BASE-T (StarLAN).

10BASE 2 LAN Port. 50-ohm BNC connector. IEEE 802.3 10BASE2 (ThinLAN). When using this connector, the Agilent Technologies emulator provides the functional equivalent of a Medium Attachment Unit (MAU) for ThinLAN.

Accessory Power Out

12 V, 3.0A, center negative

Power Supply

Input. 100-240 V, 9.75 A, 50/60 Hz, IEC 320 connector.

Output. 12 V, 3.3 A

Emulation Probe and Emulation Module Electrical Characteristics

Maximum Ratings			
Characteristics for the MPC8200 emulation module	**Symbol**	**Min**	**Max**
TDO, $\overline{\text{CHECKSTOP}}$	Vih	2.0 V	5.5 V
	Vil		0.8 V
	Ii		+/-1 uA
	Cin		15 pF
TDI, TCK, TMS, $\overline{\text{TRST}}$[1]	Voh @ Ioh = -32 mA	2.0 V	2.8 V
	Vol @ Iol = 64 mA; Vcc = 4.5 V		0.55 V
TDI, TMS, $\overline{\text{TRST}}$	Co		25 pF
TCK	Co		45 pF
+3.3 V Power Sense[2]	Vih	2.0 V	5.3 V
	Vil	-0.3 V	0.8 V
$\overline{\text{SRESET}}$, $\overline{\text{HRESET}}$[3]	Vol @ Iol = 12 mA		0.5 V
	Co		25 pF
[1]These signals must not be actively driven by the target system when the debug port is being used. [2]Poser Sense is used only to determine target powered status. The emulation module does not draw power from this source. [3]Open drain outputs, pulled up to a generated voltage equivalent to the Power Sense voltage with a 2.61 Kohm pullup resistor.			

Emulation probe environmental characteristics

Temperature   Operating, +0 C to +40 C (+32 to +104 F); nonoperating, -40 to +60 C (-40 to +140 F).

Altitude   Operating/nonoperating 4600 m (15 000 ft).

Relative Humidity   15% to 95%.

For indoor use only.

Emulation module environmental characteristics

The Agilent Technologies 16610A emulation module meets the environmental characteristics of the logic analysis system in which it is installed.

For indoor use only.

10

Troubleshooting the Emulator

If you have problems with the emulator, your first task is to determine the source of the problem. Problems may originate in any of the following places:

- The connection between the emulator and your debugger

- The emulation module or emulation probe itself

- The connection between the emulator and the target interface module

- The connection between the target interface module and the target system

- The target system

You can use several means to determine the source of the problem:

- The troubleshooting guide on the next page

- The status lights on the emulator

- The emulator "performance verification" tests

- The emulator's built-in commands

Troubleshooting Guide

Common problems and what to do about them

Symptom	What to do	See also
Commands from the Emulation Control Interface or debugger have no effect	1 Verify LAN communication.	page 39
	2 Check that you are using the correct firmware.	
	3 Use the Emulation Control Interface or a telnet connection to try a few built-in commands. If this works, your debugger may not be configured properly. If this does not work, continue with the steps for the next symptom....	page 125
Emulator built-in commands do not work	1 Check that the emulator has been properly configured for your target system.	page 70
	2 Run the emulator performance verification tests.	page 141
	3 If the performance verification tests pass, then there is an electrical problem with the connection to the target processor OR the target system may not have been designed according to "Designing a Target System."	page 63 page 129
"Slow or missing clock" message after a logic analyzer run	Check that the target system is running user code or is in reset. (This message can appear if the processor is in background mode.)	
"Slow clock" message in the Emulation Control Interface	Check that the clock rate is properly configured.	page 74
Some commands fail	Check the "restrict to real-time runs" configuration	page 76
Host computer reports LAN connection problems	Follow the checklists in this chapter.	page 144 page 139

Status Lights

Emulation Module Status Lights

The emulation module uses status lights to communicate various modes and error conditions.

The following table gives more information about the meaning of the power and target status lights.

❍ = LED is off
● = LED is on
✳ = Not applicable (LED is off or on)

Power/Target Status Lights

Pwr/Target LEDs	Meaning
❍ Reset ❍ Break ❍ Run	No target system power, or emulation module is not connected to the target system
● Reset ❍ Break ❍ Run	Target system is in a reset state
❍ Reset ● Break ❍ Run	The target processor is in Debug Mode
❍ Reset ❍ Break ● Run	The target processor is executing user code
❍ Reset ● Break ● Run	Only boot firmware is good (other firmware has been corrupted)

Emulation Probe Status Lights

The following illustration shows the status lights on both sides of the emulation probe and what they mean:

Lit when the power suply is properly connected to the emulation probe

Lit when the target processor is running in debug mode
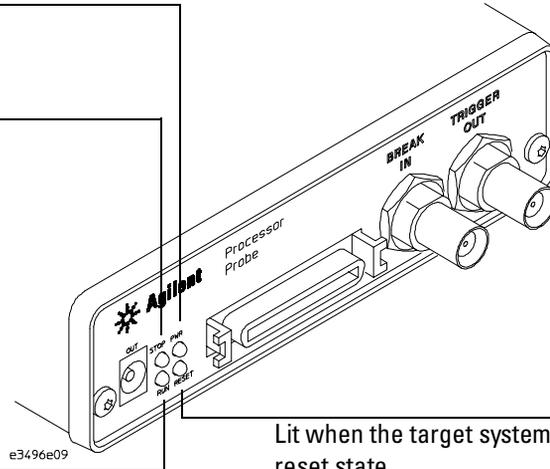
Lit when the target system is in a reset state

Lit when the target processor is running in normal (user program) mode

Lit when LAN data is being transmitted

Lit when 10BASE-T connection has a good link; not used for 10BASE2
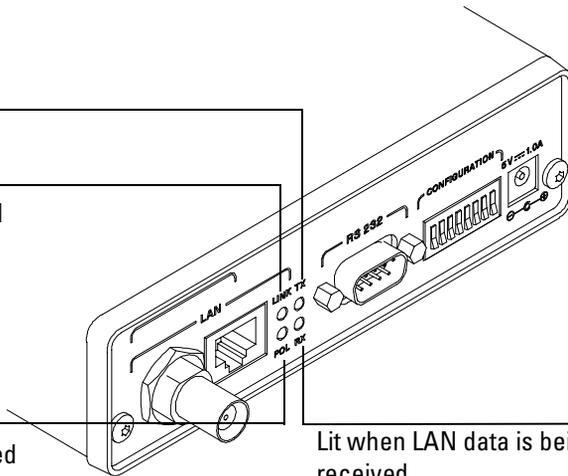
Lit when the polarity on the receive twisted pair is reversed for a 10BASE-T connection

Lit when LAN data is being received

Emulation Probe Status Lights

The emulation probe uses status lights to communicate various modes and error conditions.

The following table gives more information about the meaning of the power and target status lights.

❍ = LED is off
● = LED is on
✳ = Not applicable (LED is off or on)

Power/Target Status Lights

Pwr/Target LEDs	Meaning
❍ ❍ ❍ ❍	Emulation probe is not connected to power supply
❍ ● ❍ ❍	No target system power, or emulation probe is not connected to the target system
❍ ● ❍ ●	Target system is in a reset state
● ● ❍ ❍	The target processor is in Debug Mode
❍ ● ● ❍	The target processor is executing user code
● ● ● ❍	Only boot firmware is good (other firmware has been corrupted)

Emulator Built-in Commands

The emulator has some built-in commands (sometimes called the "terminal interface") which you can use for troubleshooting.

You can enter the built-in commands using:

- A telnet (LAN) connection

- The Command Line window in the Emulation Control Interface

- A "debugger command" window in your debugger

- A serial connection (emulation probe only; see page 41)

To telnet to the emulation module

You can establish a telnet connection to the emulation module if:

- A host computer and the logic analysis system are both connected to a local-area network (LAN), and

- The host computer has the telnet program (often part of the operating system or an internet software package).

To establish a telnet connection:

1 Find out the port number of the emulation module.

The default port number of the first emulation module in an Agilent Technologies 16600A/700A series logic analysis system is 6472. The default port of a second module in an 16600A-series system is 6476. The default port numbers of a third and fourth module in an expansion frame are 6480 and 6484. These port numbers can be changed, but that is rarely necessary.

2 Find out the LAN address or LAN name of the logic analysis system.

3 Start the telnet program.

If the LAN name of the logic analysis system is "test2" and you have only one emulation module installed, the command might look like this:

```
telnet test2 6472
```

4 If you do not see a prompt, press the <Return> key a few times.

To exit from this telnet session, type <CTRL>D at the prompt.

To telnet to the emulation probe

You can establish a telnet connection to the emulation probe if:

- A host computer and the probe are both connected to a local-area network (LAN), and

- The host computer has the telnet program (often part of the operating system or an internet software package).

To establish a telnet connection:

1 Find out the LAN address or LAN name of the emulation probe.

2 Start the telnet program.

If the LAN name of the emulation probe is "test2", the command might look like this:

```
telnet test2
```

3 If you do not see a prompt, press the <Return> key a few times.

To exit from this telnet session, type <CTRL>D at the prompt.

To use the built-in commands

Here are a few commonly used built-in commands:

Useful built-in commands

b	Break—go into the background monitor state
cf	Configuration—read or write configuration options
help	Help—display online help for built-in commands
init	Initialize—**init -c** re-initializes everything in the emulator except for the LAN software; **init -p** is the equivalent of cycling power (it will break LAN connections)
lan	configure LAN address (emulation probes only)
m	Memory—read or write memory
reg	Register—read or write a register
mtest	Memory test—test target memory system
r	Run—start running user code
rep	Repeat—repeat a command or group of commands
rst	Reset—reset the target processor (the emulator will wait for you to press the target's RESET button)
s	Step—do a low-level single step
ver	Version—display the product number and firmware version of the emulator

The prompt indicates the status of the emulator:

Emulator prompts

U	Running user program
M	Running in background monitor
p	No target power
R	Emulation reset
r	Target reset
c	Checkstop
?	Unknown state

Examples

To set register r0, then view r0 to verify that is was set, enter:

```
U>rst
M>b
M>reg r0=1234abcd
M>reg r0
  reg r0=1234abcdf
```

To break execution then step a single instruction, enter:

```
U>b
M>s
 PC=fff00108
M>
```

To determine what firmware version is installed in the emulator, enter:

```
M>ver
```

See Also

Use the **help** command for more information on these and other commands. Note that some of commands listed in the help screens are generic commands for Agilent Technologies emulators and may not be available for your product.

If you are writing your own debugger, contact Agilent Technologies for more information.

Problems with the Target System

What to check first

Verify that the cf options are correct for your target.

1 Try some basic built-in commands using the Command Line window or a telnet connection:

```
U>rst
U>
```

This should reset the target and display a "U>" prompt if 'cf reset=run'.

```
U>rst
M>
```

This should reset the target and display an "M>" prompt if 'cf reset=stop'.

```
M>vads
```

If you are using the Motorola MPC8260 VADS evaluation target, this command will configure the memory system.

```
M>m 0..=abcd1234
M>m 0..
  00000000 abcd1234 abcd1234 abcd1234 abcd1234
  00000010 abcd1234 abcd1234 abcd1234 abcd1234
  00000020 abcd1234 abcd1234 abcd1234 abcd1234
  00000030 abcd1234 abcd1234 abcd1234 abcd1234
  00000040 abcd1234 abcd1234 abcd1234 abcd1234
  00000050 abcd1234 abcd1234 abcd1234 abcd1234
  00000060 abcd1234 abcd1234 abcd1234 abcd1234
  00000070 abcd1234 abcd1234 abcd1234 abcd1234
M>
```

This should display memory values starting at address 0.

```
M>s
```

This should execute one instruction at the current program counter.

If any of these commands don't work, there may be a problem with the design of your target system, a problem with the revision of the processor you are using, or a problem with the configuration of the emulation module.

2 Check that the emulation module firmware matches your processor. To do this, enter:

M>ver

To check the debug port connector signals

• Check for the following logic levels on the target debug port. The signal names are for the MPC8200.

Levels with the emulation module not connected:

Header Pin	Signal Name	Level
3	TDI	Low
4	$\overline{\text{TRST}}$	High
6	+POWER	VDD
7	TCK	High
9	TMS	High
11	$\overline{\text{SRESET}}$	High
13	$\overline{\text{HRESET}}$	High
15	$\overline{\text{CHECKSTOP}}$	High
16	GND	Low

Levels with the emulation module connected:

Header Pin	Signal Name	I/O
1	TDO	Toggle with "es" command
3	TDI	Toggle with "es" command
4	$\overline{\text{TRST}}$	Low pulse with "rst" command
6	+POWER	VDD
7	TCK	10+ MHz clock (default)
9	TMS	Low, pulse with "es" command
11	$\overline{\text{SRESET}}$	High, pulse low with "rst" command
13	$\overline{\text{HRESET}}$	High, pulse low with "rst" command
15	$\overline{\text{CHECKSTOP}}$	High
16	GND	Low

To interpret the initial prompt

The initial prompt can be used to diagnose several common problems. To get the most information from the prompt, follow this procedure:

1 Connect the emulation module to your target system.

2 Set the default configuration settings. Enter:

```
M>init -c
```

If you are using the MPC8240, also enter:

```
M>cf proc=MPC8240
```

You can enter this command at any prompt. The emulation module will respond with the same information as printed by the "ver" command.

If the response is "!ERROR 905! Driver firmware is incompatible with ID of attached device"	Make sure the target interface module is connected to the cable of the emulation module, then try the "init -c" command again.
If the initial prompt is "p>"	Check pin 6 on header, 3.3V (VDD).
If the initial prompt is "M>"	The processor entered debug mode without the help of the emulation module. Is another debugger connected?
If the initial prompt is "c>"	Processor is checkstopped. Something caused a machine exception before the emulation module connected or $\overline{\text{CHECKSTOP}}$ is being pulled or held low.
If the initial prompt is "?>"	A bad status code (0xXX) was received from the processor. Valid status is 0x01 or 0x05. Any other status indicates a bad scan of the instruction register. Check TCK, TDO, TDI, TMS, and $\overline{\text{TRST}}$ signals. Check the firmware revision.
If the initial prompt is "U>"	Processor is running and the emulation module is scanning the instruction register correctly.

Now you can do some more tests:

3 Enter the reset command:

```
U>rst
U>
```

If the prompt after rst is "?>"	A bad status code (0xXX) was received from the processor. Valid status is 0x01, any other status indicates bad scan of the instriction register or failure of the reset signals. Verify TCK, TDO, TDI, TMS, and $\overline{\text{TRST}}$ are all changing state on an $\overline{\text{HRESET}}$.
If the rst command fails	Set "cf reset=stop" (no external bus cycles used in this mode), then enter the "rst" command again:

```
*>cf reset=stop
*>rst
M>
```

You can enter these commands at any prompt, shown here as "*>".

- If the prompt is "M>" with no error messages, all scans worked. We have control as long as we don't try to run code.

- If an error message is displayed, verify that $\overline{\text{HRESET}}$ and $\overline{\text{SRESET}}$ are being driven.

- If the prompt is "c>", there was bad scanning of the data scan chain. Check processor mask revision.

- If the prompt is "U>", the processor failed to stop soft or hard. Check reset lines, mask revision, processor type and firmware version.

If the prompt after rst is "U>"	The $\overline{\text{HRESET}}$ and $\overline{\text{SRESET}}$ lines are working.

Continue with more tests:

4 Enter the break command:

```
U>b
M>
```

If the prompt after b is "M>" with error messages	If you see: "!ERROR 145! Unable to soft stop - freezing the processor clocks" the processor is hard stopped. Check the mask revision, processor type, and firmware version. If all of these look good, the target may not be terminating cycles (pending external bus cycles). Successive run ("r") and step ("s") commands will fail. The processor may have fetched an invalid instruction.
	Check the value of the PC (IAR):

	`M>reg PC`
	`  reg PC= xxxxxxxx`
	`M>`

	If the value is fff00100, the processor had a problem accessing the boot ROM and crashed during boot.
	Processor and/or board level reset is required to recover from "freezing processor clocks" -- register and memory commands should still work.
If the prompt after b is "M>" with no error messages	Everything is still working correctly.

If you can get to the "M>" prompt, continue with more tests:

5 At the "M>" prompt , check register and memory access:

```
M>reg r0=12345678
M>reg r0
  reg r0=12345678
M>
```

If the returned value is equal to the written value, then the VDD level of

the chip is probably correct.

Now enter:

```
M>m -d4 -a4 0=11111111,22222222,33333333,44444444
M>m -d4 -a4 0..
   00000000 11111111 22222222 33333333 44444444
   00000010 00000000 00000000 00000000 00000000
   00000020 00000000 00000000 00000000 00000000
   00000030 00000000 00000000 00000000 00000000
   00000040 00000000 00000000 00000000 00000000
   00000050 00000000 00000000 00000000 00000000
   00000060 00000000 00000000 00000000 00000000
   00000070 00000000 00000000 00000000 00000000

If the target memory system is configured, this should
write abcd1234 to memory starting at 0 and then read back
the same values.

M>
```

- Returned value is equal to the written value implies that memory is working.

- Returned value is not equal to the written value implies that memory control may not be initialized. Try to initialize by:

```
M>cf reset=run;rst;w 5
   #waiting for 5 seconds...
U>b
M>
```

- Repeat above memory test.

- Check memory access size using the mo command:

```
M>mo
```

- Check access size matches target memory -a0. The default access size -a0 is the 64-bit access.

```
M>mo -d4 -a0
```

- Repeat above memory test.

6 At the "M>" prompt , check the processor's revision level:

For example:

```
M> reg pvr
   reg pvr=xxxxxxxx
M>
```

At the time of this release both 8240 and 8260 the pvr part number 00910101 or 00810101.

If you see memory-related problems

1 Enter:

```
M>m -d4 -a4 0=11111111,22222222,33333333,44444444
M>m -d4 -a4 0..
   00000000 11111111 02222222 33333333 44444444
   00000010 00000000 00000000 00000000 00000000
   00000020 00000000 00000000 00000000 00000000
   00000030 00000000 00000000 00000000 00000000
   00000040 00000000 00000000 00000000 00000000
   00000050 00000000 00000000 00000000 00000000
   00000060 00000000 00000000 00000000 00000000
   00000070 00000000 00000000 00000000 00000000
M>
```

- RAM must be at address 0.

- Read value not equal to the written value implies that the memory controller is not setup correctly.

2 Hand load a little program:

```
start: addi r1,1 - 0x38210001
       nop        - 0x60000000
       nop        - 0x60000000
       bra start - 0x4bfffff4
```

The opcode 0x4bfffff4 is a branch to a relative offset, so this program can be placed at any start address.

```
M>reg r1=0
M>m -a2 -d2 10000=3821,1,6000,0,6000,0,4bff,fff4
M>r 10000
U>reg r1
  reg r1=00034567 # or some number
U>reg r1
  reg r1=00102333 # or some number
U>
```

This program will loop forever, incrementing r1. This is a good test program to load once a memory system is up to make sure the microprocessor can run code out of memory.

If running from reset causes problems

Running from reset may cause some problems once background is entered. To ensure proper operation, the DER register must have bits 31,30,29,28 set (0x0000000f), and the SYPCR register must have the 'Disable watchdog freeze' bit set (0x00000080).

If you see the "!ASYNC_STAT 173!" error message

If after a break, the following error arises:

```
!ASYNC_STAT 173! MSR.RI bit not set - Break may not be
recoverable
```

This indicates that the MSR.RI bit is not set, implying that a non-maskable break was needed, and the interrupt may not be recoverable. If this occurs while breaking out of regular code, then the MSR.RI bit

was not set in the boot code. This can be fixed by 'ORing' in 0x00000002 into the SRR1 register and resuming the run.

If you see the "!ERROR 145!" error message

If the following error arises:

```
!ERROR  145! Unable to soft stop - freezing the processor
clocks
```

The processor is in an unstable state and should be reset via a hard reset or a power-on reset. The 'rst' command may not be able to bring the processor into a known state.

Other error messages

The following is a list of unique error messages that may be encountered for this product.

- !ERROR 644! Could not update IMMR register
- !ERROR 644! cf_immr does not match actual IMMR
- !ERROR 644! Unable to modify SYPCR register

Refer to "Configuration registers" on page 81

- !ERROR 644! Register <reg> does not match its shadow segment register

To synchronize the segment register with its shadow register, write a value to the segment register. For example: m>reg sr0=0.

Problems with the LAN Interface (Emulation Module Only)

If LAN communication does not work

If you cannot verify the connection, or if the commands are not accepted by the emulation module:

❏ Make sure that you wait for the power-on self test to complete before connecting.

❏ Make sure that the LAN cable is connected. Watch the LAN LED's on the back of the logic analysis system to see whether the system is seeing LAN activity. Refer to your LAN documentation for testing connectivity.

❏ Check that the host computer or debugger was configured with the correct LAN address. If the logic analysis system is on a different subnet than the host computer, check that the gateway address is correct.

❏ Make sure that the logic analysis system's IP address is set up correctly.

❏ Refer to the online help in the logic analysis system for more information.

If it takes a long time to connect to the network

❏ Check the subnet masks on the other LAN devices connected to your network. All of the devices should be configured to use the same subnet mask.

Subnet mask error messages do not indicate a major problem. You can continue using the emulation module.

The subnet mask is set in the logic analysis system's System Admin window. If it then detects other subnet masks, it will generate error messages.

If there are many subnet masks in use on the local subnet, the logic analysis system may take a very long time to connect to the network after it is turned on.

Problems with the Emulation Module

Occasionally you may suspect a hardware problem with the emulation module or target interface module. The procedures in this section describe how to test the hardware, and if a problem is found, how to repair or replace the broken component.

To run the built-in performance verification test using the logic analysis system (Emulation Module Only)

1 End any Emulation Control Interface or debugger sessions.

2 Disconnect the 50-pin cable from the emulation module, and plug the loopback test board (Agilent part number E3496-66502) into the emulation module.

16610e04
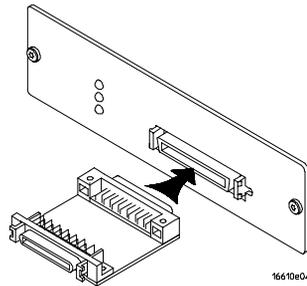
3 In the system window, click the emulation module and select **Performance Verification**.

4 Click **Start PV**.

The results will appear onscreen.

To run complete performance verification tests using a telnet connection (Emulation Module Only)

1 Disconnect the 50-pin cable from the emulation module, and plug the loopback test board (Agilent part number E3496-66502) directly into the emulation module. Do not plug anything into the other end of the loopback test board.

On a good system, the RESET LED will light and the BKG and USER LEDs will be out.

2 telnet to the emulation module.

3 Enter the pv 1 command.

See Also Options available for the "pv" command are explained in the help screen displayed by typing "help pv" or "? pv" at the prompt. Note, however, that some of the options listed may not apply to your emulation module.

Examples

If you are using a UNIX system, to telnet to a logic analysis system named "mylogic", enter:

```
telnet mylogic 6472
```

Here are some examples of ways to use the pv command.

To execute both tests one time:

```
pv 1
```

To execute test 2 with maximum debug output repeatedly until a ^C is entered:

```
pv -t2 -v9 0
```

To execute tests 3, 4, and 5 only for 2 cycles:

```
pv -t3-5 2
```

The results on a good system with the loopback test board
connected, are as follows:

```
M>pv 1

 Testing: E3499B Series Emulation System
  Test  1: Powerup PV Results                      Passed!
  Test  2: Target Probe Feedback Test              Passed!
  Test  3: Boundary Scan Master Test               Passed!
  Test  4: I2C Test                                Passed!
  Test  5: Data Lines Test                         Passed!
Number of tests: 1           Number of failures: 0

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prior
written permission is prohibited, except as allowed under copyright laws.

  E3499B Series Emulation System
     Version:   A.07.56 28Sep98
     Location:  Generics

  E3453A Motorola MPC8200 Embedded PowerPC Emulator
     Version:   A.01.00 18Feb99

M>
```

If a performance verification test fails

❏ Details of the failure can be obtained through using a -v option ("verbose"
level) of 2 or more.

❏ Check that the loopback test board is connected.

❏ If the problem persists, contact Agilent Technologies for assistance.

Problems with the LAN Interface (Emulation Probe Only)

If you cannot verify LAN communication

If you cannot verify connection using the procedure in "To verify LAN communication", or if the commands are not accepted by the emulation probe:

❑ Make sure that you have connected the emulation probe to the proper power source and that the power light is lit.

❑ Make sure that you wait for the power-on self test to complete before connecting.

❑ Make sure that the LAN cable is connected. Watch the LAN LED's to see whether the emulation probe is seeing LAN activity. Refer to your LAN documentation for testing connectivity.

❑ Make sure that only one of the LAN ports is connected.

❑ Make sure the emulation probe communication configuration switches are set correctly. Unplug the emulation probe power cord, then plug it in again to make sure the switch settings are read correctly by the emulation probe.

❑ Check that the Emulation Control Interface or debugger was configured with the correct LAN address. If the emulation probe is on a different subnet than the host computer, check that the gateway address is correct.

❑ Make sure that the emulation probe's IP address is set up correctly. Use the RS-232 port to verify this that the IP address is set up correctly. When you are connected to the RS-232 port, run performance verification on the emulation probe's LAN interface with the "pv" command.

❑ It's also possible for there to be a problem with the emulation probe firmware while the LAN interface is still up and running. In this case, you must reboot the emulation probe by disconnecting power to the emulation probe and reconnecting it again.

❏ Use a serial connection to run the LAN performance verification
tests (see page 141).

If you have LAN connection problems

❏ If the emulation probe does not accept commands from the
Agilent Technologies 16600A/700A:
1. Check that switch S1 is "0" (attached to LAN, not RS-232).
2. Check that switch S5 is in the correct position for your LAN interface
(either 10BASE2 or 10BASE-T).
(Remember: if you change any switch settings, the changes do not take
effect until you cycle power.)

❏ If the emulation probe still does not respond, you need to verify the IP
address and gateway mask of the emulation probe. To do this, connect the
emulation probe to a terminal or terminal emulator (see page 41),
change the switch settings so it is connected to RS-232, and enter
the "lan" command. The output looks something like this:

```
lan -i 15.5.24.116
lan -g 15.5.23.1
lan -p 6470
Ethernet Address : 08000909BAC1
```

"lan -i" shows the internet address is 15.5.24.116 in this case. If the
Internet address (IP) is not what you expect, you can change it with
the 'lan -i >' command.

"lan -g" shows the gateway address. Make sure it is the address of your
gateway if you are connecting from another subnet, or 0.0.0.0 if you are
connecting from the local subnet.

"lan -p" shows the port is 6470.

If the "POL" LED is lit

The "POL" LED indicates that the polarity is reversed on the receive pair if you are using a 10BASE-T connection. The emulator should still work properly in this situation, but other LAN devices may not work.

If it takes a long time to connect to the network

❏ Check the subnet masks on the other LAN devices connected to your network. All of the devices should be configured to use the same subnet mask.

Subnet mask error messages do not indicate a major problem. You can continue using the emulation probe.

The emulation probe automatically sets its subnet mask based on the first subnet mask it detects on the network. If it then detects other subnet masks, it will generate error messages.

If there are many subnet masks in use on the local subnet, the emulation probe may take a very long time to connect to the network after it is turned on.

To "clean up" the network, connect a terminal to the emulation porbe. You can then see error messages which will help you identify which devices on the network are using the wrong subnet masks.

Problems with the Serial Interface (Emulation Probe Only)

If you cannot verify RS-232 communication

If the emulation probe prompt does not appear in the terminal emulator window:

❏ Make sure that you have connected the emulation probe to the proper power source and that the power light is lit.

❏ Make sure that you have properly configured the data communications switches on the emulation probe and the data communications parameters on the host computer. You should also verify that you are using the correct cable.

The most common type of data communications configuration problem involves the configuration of the emulator as a DTE device instead of as a DCE device. If you are using the wrong type of cable, no prompt will be displayed.

A cable with one-to-one connections will work with a PC or an HP 9000 Series 700 workstation.

If you have RS-232 connection problems with the MS Windows Terminal program

❏ Remember that Windows 3.1 only allows two active RS-232 connections at a time. To be warned when you violate this restriction, choose Always Warn in the Device Contention group box under 386 Enhanced in the Control Panel.

❏ Use the "Terminal" program (usually found in the Accessories windows program group) and set up the "Communications..." settings as follows:

- Baud Rate: 9600 (or whatever you have chosen for the emulation probe)
- Data Bits: 8
- Parity: None
- Flow Control: hardware
- Stop Bits: 1

When you are connected, hit the Enter key. You should get a prompt back. If nothing echos back, check the switch settings on the emulation probe.

❏ If the switches are in the correct position and you still do not get a prompt when you hit return, try turning OFF the power to the emulation probe and turning it ON again.

❏ If you still don't get a prompt, make sure the RS-232 cable is connected to the correct port on your PC, and that the cable is appropriate for connecting the PC to a DCE device.

With certain RS-232 cards, connecting to an RS-232 port where the emulation probe is turned OFF (or is not connected) will hang the PC. The only way to get control back is to reboot the PC. Therefore, we recommend that you always turn ON the emulation probe before attempting to connect via RS-232.

Problems with the Emulation Probe

To run the power up self test

1 Unplug the emulation probe, then plug it in.

2 Watch the status lights. They should show the following pattern:

❍ = LED is off
● = LED is on
✳ = Not applicable (LED is off or on)

Normal sequence during power up self test

	Pwr/Target LEDs	Meaning
1	❍● ❍❍	Initial power up, system reset
2	❍● ❍❍	XILINX array initialized successfully
3	❍● ●❍	XILINX array tested successfully
4	●● ❍❍	BOOT ROM space tested successfully
5	❍● ●❍	GENERIC ROM space tested successfully
6	●● ❍❍	DRIVER ROM space tested successfully
7	❍● ●❍	RESERVED ROM space tested successfully

	Pwr/Target LEDs	Meaning
8	●● ○○	RAM tested successfully
9	○● ●○	LAN internal feedback tested successfully
10	○● ○○	Boundary scan master (BSM) test begun
11	●● ●○	BSM test completed, start system, load drivers, initialize LAN

If the power up self test fails, the RESET LED will flash the number of the test, then stay lit.

If any of the LEDs fail to change, or all of them remain on, there is a system failure.

Following power up, the LEDs will enter one of the following states shown on page 124.

Starting a user interface will change the pattern to the one requested by the interface.

If the power up self tests fail, try the following:

❏ Check and reset the LAN address. LAN powerup failures will occur if the emulation probe does not have a valid link-level address and IP address.

❏ Disconnect all external connections, including the LAN, serial (RS-232), and BNC break and trigger cables, then cycle power.

❏ To ensure that the firmware is working as it should, reprogram the firmware, then cycle power.

To run the emulation probe performance verification tests

In addition to the powerup tests, there are several additional performance verification (PV) tests available.

Some of these tests can be performed through the Agilent Technologies 16700A/16700A-series logic analysis system. The LAN tests for an emulation probe can only be executed through the RS-232 port.

To fully test the emulation probe, you will need to run the PV test with several hardware configurations:

- For the BREAK IN, TRIGGER OUT BNC FEEDBACK TEST, connect a coaxial cable between BREAK IN and TRIGGER OUT.

To run the performance verification tests using the logic analysis system

1 End any Emulation Control Interface or debugger sessions.

2 Disconnect the 50-pin cable from the emulation probe, and plug the loopback test board (Agilent part number E3496-66502) into the emulation probe.

3 In the system window, click the emulation probe and select **Performance Verification**.

4 Click **Start PV**.

The results will appear on screen.

To run complete performance verification tests for an emulation probe

The LAN tests can only be executed through the RS-232 port. The remainder of this section assumes that the tests are being run from a terminal emulator connected to the RS-232 port.

1 Disconnect the 50-pin cable from the emulation probe, and plug the emulator loopback test board (Agilent part number E3496-66502) directly into the emulator. Do not plug anything into the other end of the emulator loopback test board.

e3474e15
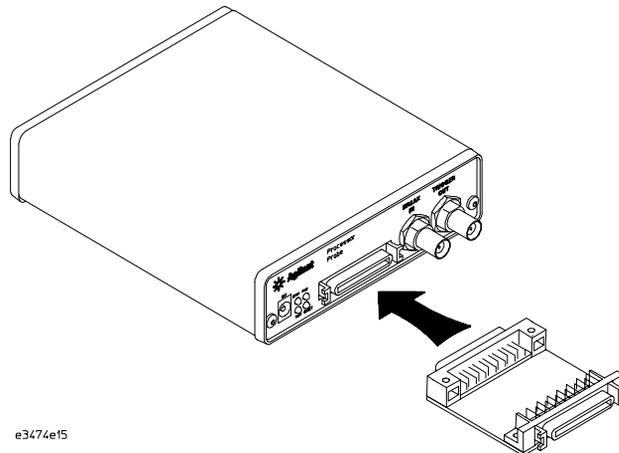
On a good system, the RESET LED will light and the BKG and USER LEDs will be out.

2 Connect a coaxial cable between BREAK IN and TRIGGER OUT.

3 Set all of the switches to CLOSED.

This is standard RS-232 at 9600 baud which can be connected directly to a 9 pin RS-232 interface that conforms to the IBM PC-AT 9 pin standard.

4 Use a terminal emulator to connect to the emulation probe.

5 Enter the **pv 1** command.

See Also   Options available for the **pv** command are explained in the help screen displayed by typing **help pv** or **? pv** at the prompt.

Examples

Here are some examples of ways to use the pv command.

To execute both tests one time:

pv 1

To execute test 2 with maximum debug output repeatedly until a Ctrl-c is entered:

pv -t2 -v9 0

To execute tests 3, 4, and 5 only for 2 cycles:

pv -t3-5 2

The results on a good system, with the BNCs connected, and with the loopback test board connected, are as follows:

```
c>pv 1
  Testing: E3499B Series Emulation System passed!
    Test # 1: Powerup PV Results                          passed!
    Test # 2: LAN 10Base2 Feedback Test                   passed!
    Test # 3: LAN 10BaseT Feedback Test                   passed!
    Test # 4: Break In and Trigger Out BNC Feedback Test  passed!
    Test # 5: Target Probe Feedback Test                  passed!
    Test # 6: Boundary Scan Master Test                   passed!
    Test # 7: 12C Test                                    passed!
    Test # 8: Data Lines Test                             passed!
  PASSED   Number of tests: 1        Number of failures: 0

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prior written permission is prohibited, except as allowed under copyright
laws.

  E3499B Series Emulation System
    Version:   A.07.56 28Sep98
    Location:  Generics

  E3453A Motorola MPC8200 Embedded PowerPC Emulator
    Version:   A.01.00 18Feb99

R>
```

If a performance verification test fails

There are some things you can do if a failure is found on one of these tests. Details of the failure can be obtained through using a -v value ("verbose level") of 2 or more.

> If the particular failure you see is not listed below, contact Agilent Technologies for assistance.

TEST 2: LAN 10BASE2 Feedback Test failed

For LAN 10BASE2 test, the following is an example of a failure which is not caused by a broken emulator.

```
R>pv -t2 -v2 1

  Testing: E3499B Series Emulation System
    Test # 2: LAN 10Base2 Feedback Test                    failed!
      FAILED - no lan connection (LAN probably not terminated
  FAILED  Number of tests: 1           Number of failures: 1
```

Check to see that the port under test has a good cable connected to it and that the cable is properly terminated with a 50 ohm terminator on each end of the overall cable.

```
R>pv -t2 -v2 1

  Testing: E3499B Series Emulation System
    Test # 2: LAN 10Base2 Feedback Test              failed!
      FAILED due to excessive collisions
  FAILED Number of tests: 1           Number of failures: 1
```

The most common cause of this problem is poor termination of the cable or failure to remove the port under test from the LAN before performing the test. Check to see that the terminators are good (50 ohms) and that you are isolated from any traffic on a system LAN.

```
R>pv -t2 -v2 1

  Testing: E3499B Series Emulation System
    Test # 2: LAN 10Base2 Feedback Test                  failed!
      FAILED - invalid Ethernet address in EEPROM
  FAILED Number of tests: 1           Number of failures: 1
```

First check to see that a correct link-level address and IP address have been set in the virtual EEPROM through the "lan" command. If the "lan" command shows bad information for the link-level address and IP,

then try to set them to correct values. If you are unable to set them to correct values, their is a failure in the FLASH ROM which requires service from Agilent Technologies.

Test 3: 10BaseT Feedback Test failed here

```
R>pv -t3 -v2 1

  Testing: E3499B Series Emulation System
    Test # 3: LAN 10BaseT Feedback Test                 failed!
  FAILED Number of tests: 1        Number of failures: 1
```

In addition to the internal checks performed in Test 2, this test also checks for shorts on the cable connected to the network. If this test fails, disconnect the cable and run the test again. If it then passes, the cable is faulty. If it still fails, it requires service from Agilent Technologies.

If the emulator passes this "pv" test, additional testing can be performed through exercising the connection to the network. To run this test, set configuration switch 1 and switch 5 to OPEN, all other configuration switches CLOSED (this enables LAN using 10BaseT). Cycle power and wait for 15 to 30 seconds. Then "ping" the emulator from your host computer or PC. See the LAN documentation for your host computer for the location and action of the "ping" utility. If the emulator fails to respond to the "ping" request, verify that the LAN parameters (IP address and gateway address) are set correctly and that your host computer recognizes the IP address of the emulator. If all else is good, then failure to respond to ping indicates a faulty emulator.

Test 4:   Break In and Trigger Out BNC Feedback Test

```
R>pv -t4 -v2 1

  Testing: E3499B Series Emulation System
    Test # 4: Break In and Trigger Out BNC Feedback Test  failed!
      Break In not receiving Break Out HIGH
  FAILED Number of tests: 1             Number of failures: 1
```

Before returning to Agilent Technologies, check to ensure that you have connected a good coaxial cable between the two BNCs. If the cable is good, the emulator is bad.

TEST 5: Target Probe Feedback Test
TEST 6: Boundary Scan Master Test
TEST 7: I2C Test
TEST 8: Data Line Test

If these tests are not executed, check that you have connected the emulator loopback test board.

If these tests fail, return the emulator to Agilent Technologies for replacement.

Returning Parts to Agilent Technologies for Service

The repair strategy for this emulation solution is board replacement.

Exchange assemblies are available when a repairable assembly is returned to Agilent Technologies. These assemblies have been set up on the "Exchange Assembly" program. This lets you exchange a faulty assembly with one that has been repaired, calibrated, and performance verified by the factory. The cost is significantly less than that of a new assembly.

To return a part to Agilent Technologies

1 Follow the procedures in this chapter to make sure that the problem is caused by a hardware failure, not by configuration or cabling problems.

2 In the U.S., call 1-800-403-0801. Outside the U.S., call your nearest Agilent Technologies sales office. Ask them for the address of the nearest Agilent Technologies service center.

3 Package the part and send it to the Agilent Technologies service center.

Keep any parts which you know are working. For example, if only the target interface module is broken, keep the emulation module and cables.

4 When the part has been replaced, it will be sent back to you.

The unit returned to you will have the same serial number as the unit you sent to Agilent Technologies.

The Agilent Technologies service center can also troubleshoot the hardware and replace the failed part. To do this, send your entire

measurement system to the service center, including the logic analysis system, target interface module, and cables.

In some parts of the world, on-site repair service is available. Ask an Agilent Technologies sales or service representative for details.

To obtain replacement parts

The following table lists some parts that may be replaced if they are damaged or lost. The part numbers are subject to change. Contact your nearest Agilent Technologies Sales Office for further information.

Exchange assemblies

Part number	Description
16600-69515	Emulation module
E3458-69401	Programmed emulation probe assembly

Replacement assemblies

Part number	Description
E3496-61601	50-pin control cable
E3494-61604	16-pin cable
E3496-66502	Loopback test board
E3452-66503	MPC8240 target interface module
E3452-66503	MPC8260 PowerQUICC II target interface module
16700-61608	Expansion cable for emulation module
0950-3043	Power supply for emulation probe

To clean the instrument

If the instrument requires cleaning:

1 Remove power from the instrument.

2 Clean with a mild detergent and water.

3 Make sure that the instrument is completely dry before reconnecting it to a power source.

Glossary

Analysis Probe A probing solution connected to the target microcontroller. It provides an interface between the signals of the target microcontroller and the inputs of the logic analyzer. Formerly called a "preprocessor."

Elastomeric Probe Adapter A connector that is fastened on top of a target microcontroller using a retainer and knurled nut. The conductive elastomer on the bottom of the probe adapter makes contact with pins of the target microcontroller and delivers their signals to connection points on top of the probe adapter.

Emulation Module An emulation module is installed within the mainframe of a logic analyzer. It provides run control within an emulation and analysis test setup. See Emulation Probe.

Emulation Probe An emulation probe is a standalone instrument connected via LAN to the mainframe of a logic analyzer or to a host computer. It provides run control within an emulation and analysis test setup. Formerly called a "processor probe" or "software probe." See Emulation Module.

Emulator An emulation module or

an emulation probe.

Extender A part whose only function is to provide connections from one location to another. One or more extenders might be stacked to raise a probe above a target microprocessor to avoid mechanical contact with other components installed close to the target microcontroller. Sometimes called a "connector board."

Flexible Adapter Two connection devices coupled with a flexible cable. Used for connecting probing hardware on the target microcontroller to the analysis probe.

General-Purpose Flexible Adapter A cable assembly that connects the signals from an elastomeric probe adapter to an analysis probe. Normally, a male-to-male header or transition board makes the connections from the general-purpose flexible adapter to the analysis probe.

High-Density Adapter Cable A cable assembly that delivers signals from an analysis probe hardware interface to the logic analyzer pod cables. A high-density adapter cable has a single Mictor connector that is installed into the analysis probe, and two cables that are connected to

Glossary

corresponding odd and even logic analyzer pod cables.

High-Density Termination Adapter Cable Same as a High-Density Adapter Cable, except it has a termination in the Mictor connector.

Jumper Moveable direct electrical connection between two points.

Mainframe Logic Analyzer A logic analyzer that resides on one or more board assemblies installed in an Agilent Technologies 16500, 1660-series, or 16600A/700A-series mainframe.

Male-to-male Header A board assembly that makes point-to-point connections between the female pins of a flexible adapter or transition board and the female pins of an analysis probe.

Preprocessor See Analysis Probe.

Preprocessor Interface See Analysis Probe.

Probe adapter See Elastomeric Probe Adapter.

Processor Probe See Emulation Probe.

Prototype Analyzer The Agilent Technologies 16505A prototype analyzer acts as an analysis and display processor for the Agilent Technologies 16500B/C logic analysis system. It provides a windowed interface and powerful analysis capabilities. Replaced by Agilent Technologies 16600A/700A-series logic analysis systems.

Run Control Probe See Emulation Probe and Emulation Module.

Setup Assistant A software program that guides a user through the process of connecting and configuring a logic analyzer to make measurements on a specific microcontroller.

Shunt Connector. See Jumper.

Software Probe See Emulation Probe.

Solution Agilent Technologies' term for a set of tools for debugging your target system. A solution includes probing, inverse assembly, the Agilent Technologies B4620B Source Correlation Tool Set, and an emulation module.

Stand-alone Logic Analyzer A standalone logic analyzer has a predefined set of hardware

components which provide a specific set of capabilities. It is designed to perform logic analysis. A standalone logic analyzer differs from a mainframe logic analyzer in that it does not offer card slots for installation of additional capabilities, and its specifications are not modified based upon selection from a set of optional hardware boards that might be installed within its frame.

Target Control Port An 8-bit, TTL port on a logic analysis system that you can use to send signals to your target system. It does not function like a pattern generator or emulation module, but more like a remote control for the target's switches.

Target Interface Module A small circuit board which connects the 50-pin cable from an emulation module or emulation probe to signals from the debug port on a target system.

TIM See Target Interface Module.

Trigger Specification A set of conditions that must be true before the instrument triggers. See the printed or online documentation for your logic analyzer for details.

Transition Board A board assembly that obtains signals connected to one side and rearranges them in a different order for delivery at the other side of the board.

1/4-Flexible Adapter An adapter that obtains one-quarter of the signals from an elastomeric probe adapter (one side of a target microcontroller) and makes them available for probing.

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DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name:	Agilent Technologies
Manufacturer's Address:	Digital Design Product Generation Unit 1900 Garden of the Gods Road Colorado Springs, CO 80907 USA

declares, that the product

Product Name:	Emulation Probe
Model Number(s):	E3453A
Product Option(s):	All

conforms to the following Product Specifications:

Safety: IEC 1010-1:1990+A1 / EN 61010-1:1993
UL3111
CSA-C22.2 No. 1010.1:1993

EMC: CISPR 11:1990 / EN 55011:1991   Group 1 Class A
IEC 555-2:1982 + A1:1985 / EN 60555-2:1987
IEC 555-3:1982 + A1:1990 / EN 60555-3:1987 + A1:1991
IEC 801-2:1991 / EN 50082-1:1992   4 kV CD, 8 kV AD
IEC 801-3:1984 / EN 50082-1:1992   3 V/m, {1kHz 80% AM, 27-1000 MHz}
IEC 801-4:1998 / EN 50082-1:1992   0.5 kV Sig. Lines, 1 kV Power Lines

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and carries the CE marking accordingly.

This product was tested in a typical configuration with Agilent Technologies test systems.

Colorado Springs, 03/19/99

John Strathman, Quality Manager

European Contact: Your local Agilent Technologies Sales and Service Office or Agilent Technologies GmbH, Department ZQ / Standards Europe, Herrenberger Strasse 130, D-71034 Böblingen Germany (FAX: +49-7031-14-3143)

Product Regulations

Safety   IEC 1010-1:1990+A1 / EN 61010-1:1993
UL3111
CSA-C22.2 No. 1010.1:1993

EMC

This Product meets the requirement of the European Communities (EC) EMC Directive 89/336/EEC.

CE
ISM 1-A

Emissions   EN55011/CISPR 11 (ISM, Group 1, Class A equipment),

⊙N279
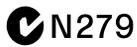
Immunity	EN50082-1	Code[1]	Notes[2]
	IEC 555-2	1	
	IEC 555-3	1	
	IEC 801-2 (ESD) 4kV CD, 8kV AD	1	1,2
	IEC 801-3 (Rad.) 3 V/m	1	2
	IEC 801-4 (EFT) 0.5 kV, 1kV	1	

[1]Performance Codes:
1 PASS - Normal operation, no effect.
2 PASS - Temporary degradation, self recoverable.
3 PASS - Temporary degradation, operator intervention required.
4 FAIL - Not recoverable, component damage.

[2]Notes:
1 The target cable assembly is sensitive to ESD events. use standard ESD preventative practices to avoid component damage.
2 The target cable assembly, 10Base-T and 10Base-2, cables were disconnected.

Sound Pressure Level   N/A

Safety

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."

Warning

• 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 fuseholders. To do so could cause a shock of fire hazard.

• 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.

• If you energize this instrument by an auto transformer (for voltage reduction), make sure the common terminal is 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.

• 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 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.

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.

WARNING

The Warning sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a Warning sign until the indicated conditions are fully understood and met.

CAUTION

The Caution sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a Caution symbol until the indicated conditions are fully understood or met.