Installation Instructions

for

E2460GS

Oscilloscope Upgrade Kit

Agilent 1670G-Series Logic Analyzers

This kit upgrades either the Agilent Technologies 1670G, Agilent 1671G, Agilent 1672G, or the Agilent 1673G logic analyzer to an analyzer that contains the 2 GSa/s oscilloscope.

Note

Your logic analyzer and this upgrade kit must be shipped together to an Agilent Technologies service center. The service center will install the upgrade and verify performance of the upgraded logic analyzer.
Contact your Agilent Technologies sales office for the location of the nearest Agilent Technologies service center.

TOOLS REQUIRED:

- T10 TORX screwdriver
- T15 TORX screwdriver
- T20 TORX screwdriver
- #1 pozidrive screwdriver
- 5/8-inch deep-well nut driver

April 2000 Part Number E2460-92009

1900 Garden of the Gods Road, Colorado Springs, Colorado U.S.A.

PARTS SUPPLIED

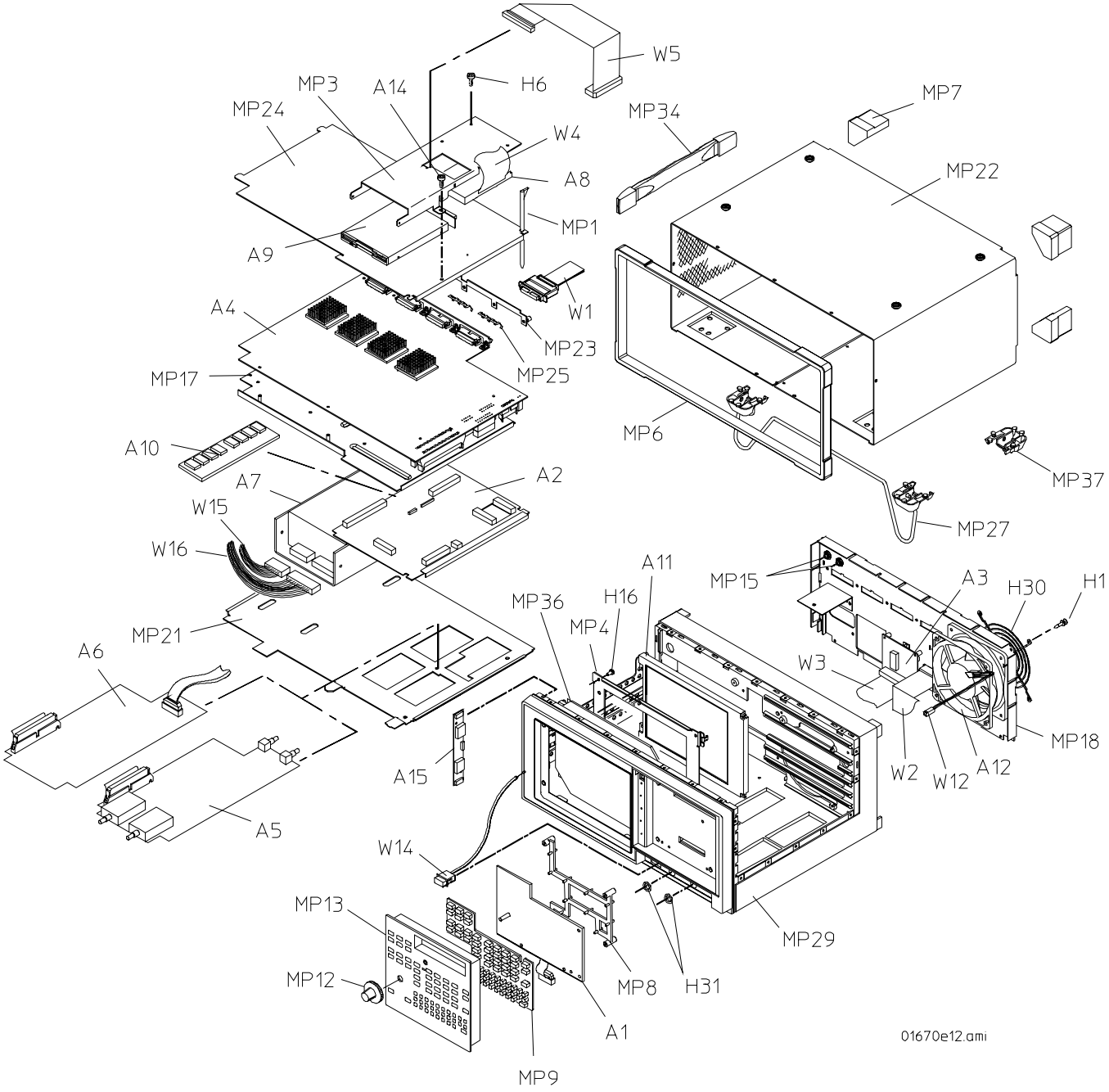
Most parts are not labeled. Refer to figure used in the instructions for easy identification.

Part Number	Description	QTY.
01660-41904	Elastomeric Keypad	1
01670-61602	Cable, 60 Conductor (Analyzer Board to Scope Board)	1
01660-68721	2 Chan., 2GSa/s Digital Oscilloscope Board Assy.	1
01670-68714	SW Disk Pouch (Latest Version)	1
01670-94305	Label-Line Switch	1
E2460-68705	Rear Panel Assembly	1
0515-0430	Machine Screw	1
01160-60001	1160A 10:1 Passive Probe	2
2190-0068	Washer, Lock 0.505 0.630 0.02	2
2950-0054	Nut, Hex 1/2-28 0.125	2
54503-25701	Nut, Hex, Tapered	2
5090-4383	Serial Number Tag	1

INTRODUCTION

Refer to figure 1, Agilent Technologies 167xG Logic Analyzer Exploded View, when performing this upgrade. Note that A5 is the oscilloscope card.

Figure 1 (Tear out and use as reference)



Agilent Technologies 167xG Logic Analyzer Exploded View

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REMOVAL PROCEDURES

WARNING **Hazardous voltages exist on the power supply. To avoid electrical shock, disconnect the power from the instrument before performing the following procedures. After disconnecting the power, wait at least three minutes for the capacitors on the power supply board to discharge before servicing the instrument.**

CAUTION **Electrostatic discharge can damage electronic components. Use grounded wrist straps and mats when performing any service to the logic analyzer.**

CAUTION **Do not remove or replace any circuit assemblies in this instrument while power is applied. The assemblies contain components which may be damaged if the assembly is removed or replaced while the instrument is powered.**

Remove the Probe Mounting Plate and the Probe Cables (See Figure 1)

1. Turn off the power and unplug the logic analyzer.
2. Using a #1 pozidrive screwdriver, loosen the five screws and remove the probe mounting plate (MP23).
3. Remove the probe cables (W1) by pulling them out of their connectors on the rear panel.

Remove the Cover Assembly (See Figure 1)

1. Using a T10 TORX screwdriver, remove the seven screws holding the trim strip (MP6) and the cover assembly (MP22) to the chassis assembly (MP29). Remove the trim strip (MP6).
2. Using a T10 TORX screwdriver, remove the four screws to remove the four rear feet (MP7).
3. Using a T10 TORX screwdriver, remove the two screws that attach the handle assembly (MP34) to the chassis assembly (MP29). Remove the handle assembly (MP34).
4. To remove the cover assembly (MP22) , set the instrument's front panel facing toward you. Prepare to remove the cover by using a T10 TORX to turn back three revolutions each the four screws fastening the equipment pouch to the cover assembly. Slide the chassis toward the front, out of the cover. Set the instrument on a static-safe work area.

Remove the Disk Drive (See Figures 1)

1. Disconnect the flexible disk drive cable (W5) from the CPU board (A2). Disconnect the hard disk drive cable (W4) from the CPU board (A2).

2 . Using a T10 TORX screwdriver, remove the two screws holding the disk drive bracket (MP3) to the support tray (MP24).

3 . Slide the disk drive bracket assembly toward the rear of the instrument, then lift it up and out.

Remove the Acquisition Board (See Figures 1 and 2)

1. Remove the PCB locking pins (MP1) from the chassis assembly (MP29). Slide the support tray (MP24) out of the chassis assembly.

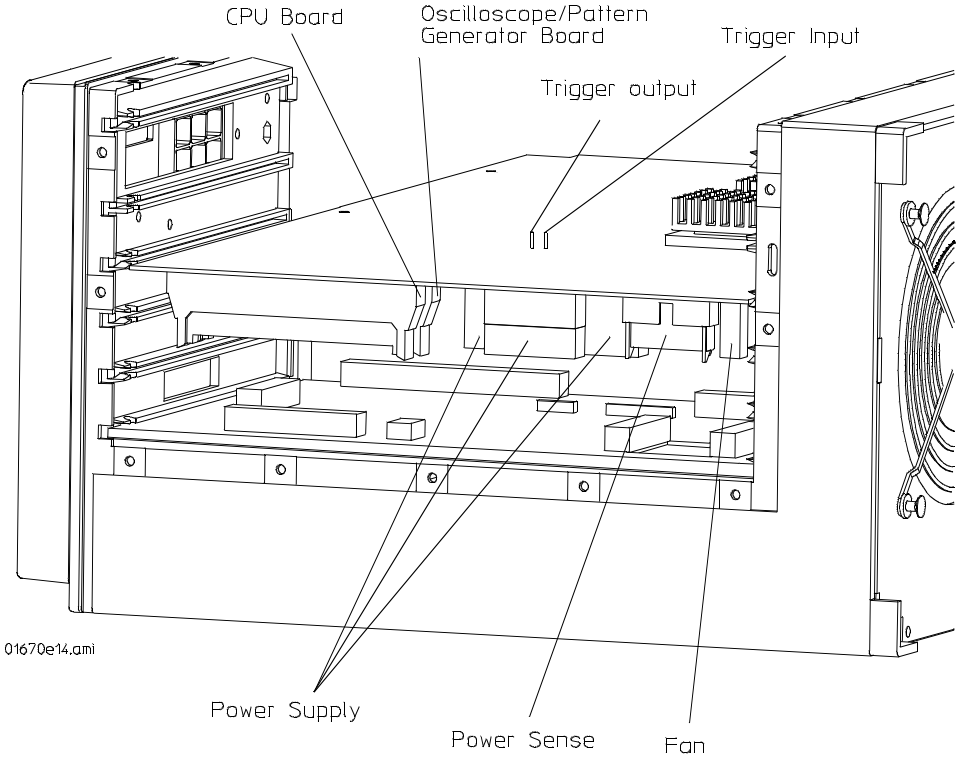
2. On the bottom of the acquisition board (A4), disconnect the following cables:

   - Power Sense
   - Fan
   - Power Supply
   - CPU Board

3. On the top of the acquisition board, disconnect the following cables:

   - Trigger input (white wire to J6)
   - Trigger output (orange wire to J5)

Figure 2



Acquisition Board Connector Location Diagram

3. Remove the acquisition board (A4).

   a. Using a T10 TORX screwdriver, remove six screws that secure the acquisition board to the deck (MP17).
   b. Angle the front edge of the acquisition board up out of the chassis assembly.
   c. Lift the acquisition board up and out of the chassis.

Remove the Deck (See Figure 1)

1. Using a T10 TORX screwdriver, remove the one screw that secures the deck (MP17) to the rear panel (MP18).

2. Using a T10 TORX screwdriver, remove the two screws that secures the deck (MP17) to the chassis assembly (MP29).

Remove the CPU Board (See Figure 1)

1. Disconnect all cables from the CPU board (A2). Note cable positions for later reference.

2. Slide the CPU board out of the chassis assembly.

Remove the Rear Panel Assembly (See Figures 1)

1. Using a T10 TORX screwdriver, remove the seven screws from the rear panel assembly (MP18). Note how the cables are routed through the cabinet rear wall and where the cables are connected.

2. Remove the rear panel and set it aside; do not remove any components from the rear panel.

Remove the Power Supply (See Figures 1 and 3)

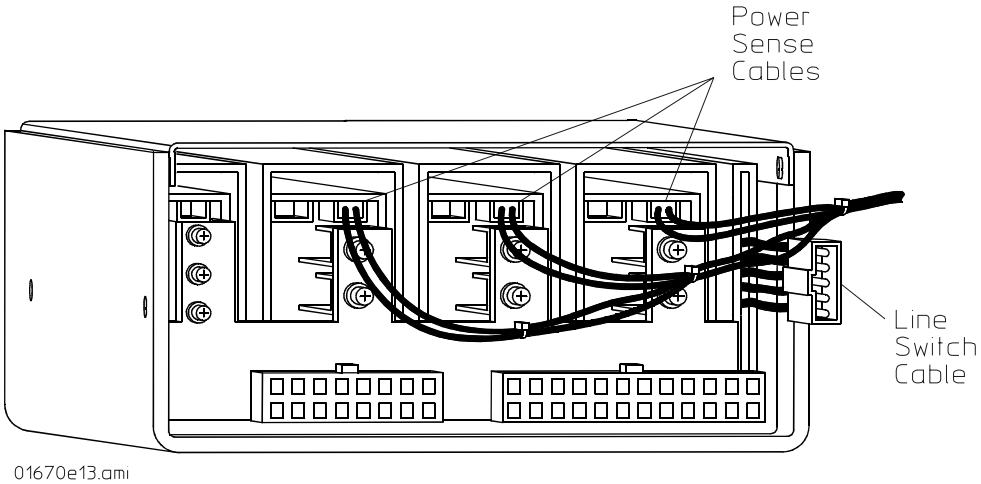
WARNING **Hazardous voltages exist on the power supply. To avoid electrical shock, disconnect the power from the instrument before performing the following procedures. After disconnecting the power, wait at least three minutes for the capacitors to discharge before continuing.**

1. Disconnect the power switch cable (W14) from the line switch cable.

2. Using a T20 TORX screwdriver, remove the four screws on the bottom of the instrument that secure the power supply to the bottom of the chassis.

3. Slide the power supply (A7) out of the instrument.

Figure 3



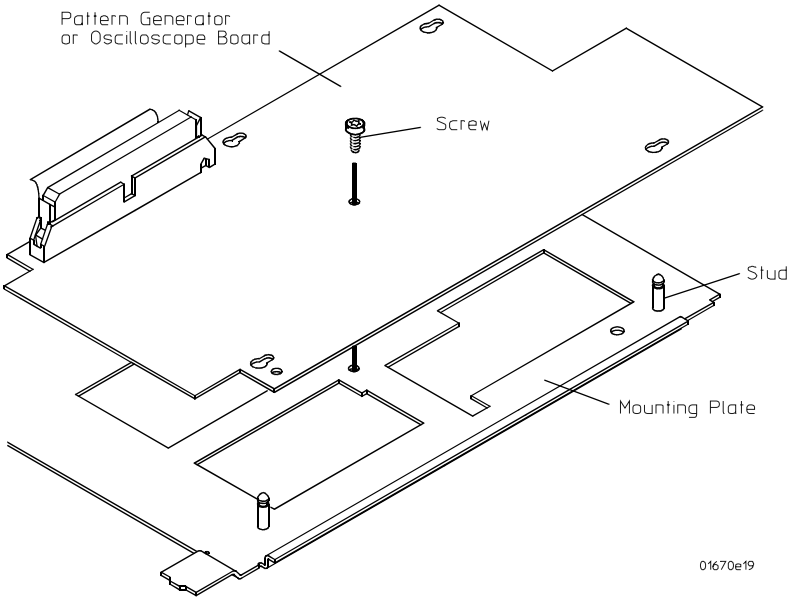
Power Supply Cable Connections Diagram

Mount the Oscilloscope Board (See Figures 1 and 4)

1. Place the supplied oscilloscope board assembly (01660-68721, A5 in figure 1) on the four studs on the circuit board mounting plate (MP21, figure 1) and slide the oscilloscope board assembly forward to lock it to the mounting plate.

2. Secure the oscilloscope board assembly to the mounting plate by placing the machine screw (0515-0430) in the hole in the center of the oscilloscope board assembly. Tighten with a T10 TORX screwdriver.

Figure 4



Oscilloscope Board Installation Diagram

Install the Elastomeric Keypad (Figure 1)

1. Using a T10 TORX screwdriver, remove the four screws from the spacer (MP8) to remove the front panel keypad assembly from the front panel.

2. Remove the RPG knob (MP12) from the front panel assembly by pulling it straight out.

3. Remove the PC board (A1).

4. Remove the elastomeric keypad (MP9) and replace with the new elastomeric keypad (01660-41904)

5. Using a T10 TORX screwdriver, reassemble the front panel keypad assembly (MP13) and secure to the front panel with the four existing screws.

REASSEMBLY PROCEDURE

Prefabricate the Front and Rear Panel Assemblies (See Figure 1)

1. Remove the line switch label in the lower right corner of the front panel and place the new line switch label (01670-94305) in its place.

Install the Oscilloscope Board Assembly (See Figures 1 and 2)

1. Install the oscilloscope board assembly into the instrument by sliding it through the rear of the instrument. Tabs at the front of the mounting plate must align with slots at the front of the cabinet. The board assembly must also be flush with the rear of the cabinet.

2. Connect the 60-pin ribbon cable assembly (01670-61602) to the oscilloscope 60-pin connector.

Install the Power Supply (See Figure 1)

1. Slide the power supply most of the way into the cabinet.

2. Connect the line filter cable to the power supply.

3. Slide the power supply the rest of the way into the cabinet.

4. Using a T20 TORX screwdriver and the four existing screws attach the power supply to the bottom of the chassis assembly.

Position the Rear Panel Assembly

1. Place the new rear panel assembly (E2460-68705) at the rear of the logic analyzer.

2. Feed the free ends of the cables through the cabinet rear wall. Ensure that the cables are routed the same as before. They must not block the fan.

3. After completing the cable routing, insert the rear panel onto the rear of the instrument.

Install the New Rear Panel Assembly (See Figures 1)

1. Using a T10 TORX screwdriver, attach the rear panel to the chassis using the seven existing screws.

2. Ensure that the rear panel is properly seated on the rear of the chassis.

3. Using a 5/8-inch deep-well nut driver, attach a tapered hex nut (54503-25701) to each of the two BNC connectors on the front panel of the chassis assembly. Use of tapered hex nut is only cosmetic.

4. Using a 5/8-inch deep-well nut driver, attach a lock washer (2190-0068) and hex nut (2950-0054) to the BNC connector on the rear panel of the chassis assembly.

Check Cable Installations (See Figures 1 and 2)

1. Verify that the GPIB, RS-232-C, and I/O board cables are routed through the rear of the chassis.
2. Verify that the keypad cable is routed through front of cabinet.

Install the CPU Board (See Figure 1)

1. Place the free ends of the RS-232-C and GPIB cables in the bottom of the cabinet close to where the cables would connect to the CPU board.
2. Slide the CPU board (A2, figure 1) into the bottom slot of the cabinet.
3. Plug the existing CPU-acquisition board cable (W9) into the CPU board.
4. Plug both the GPIB cable and the RS-232-C cable into the CPU board.
5. Plug the display cable into the CPU board (J6).
6. Plug the back light cable into the CPU board (J3).
7. Plug the keypad cable into the CPU board.
8. Plug the I/O cable into the CPU board.

Install the Deck (See Figure 1)

1. Slide the deck into the fourth slot of the chassis.
2. Using a T10 TORX screwdriver, install one screw that secures the deck to the rear panel.
3. Using a T10 TORX screwdriver, install two screws that secure the deck to the chassis assembly.

Install the Acquisition Board (See Figure 1 and 2)

1. Angle the back of the acquisition board down and insert it in the chassis assembly toward the rear panel.
2. Angle the front edge of the acquisition board down toward the deck
3. Using a T10 TORX screwdriver, install the existing six screws that secure the acquisition board to the deck.
4. Connect the following cables to the bottom of the acquisition board (A4),
   - Power Sense
   - Fan
   - Power Supply
   - CPU Board
   - Oscilloscope
5. Connect the following cables to the top of the acquisition board (A4),
   - Trigger input (white wire to J6)
   - Trigger output (orange wire to J5)

Install Support Tray (See Figure 1)

1. Slide the support tray (MP24) into the chassis assembly (MP29).

2. Insert the locking pins (MP1) into the chassis assembly (MP29).

Install the Disk Drive Assembly (See Figure 1)

1. Position the disk drive/bracket assembly so that the front of the flexible disk drive can be inserted in the corresponding hole in the front of the cabinet. Insert the flexible disk drive into the hole.

2. Insert the rear of the disk drive/bracket assembly so that the rear of the bracket can be inserted in the top slot in the rear of the cabinet. Position the bracket assembly so that the two screw holes in the bracket ears align with the screw holes in the support tray.

3. Using a T10 TORX screwdriver, use two existing screws to secure the disk drive/bracket assembly to the support tray. Ensure that the bracket is seated into a slot in back.

4. Connect the hard disk drive cable (W4) to the CPU board.

5. Connect the flexible disk drive cable (W5) to the CPU board.

6. Plug the flexible disk drive cable into the rear of the flexible disk drive. Plug the hard disk drive cable into the rear of the hard disk drive. Flat cables should be folded and inserted into the ribbon cable holder to prevent interference when sliding on outer cover.

Install Cover (See Figure 1)

1. Slide the cabinet into the cover. Using a T10 TORX, re-tighten the four screws fastening the equipment pouch.

2. Using a T10 TORX screwdriver, attach the four existing rear feet to the rear panel of the logic analyzer.

3. Using a T10 TORX screwdriver, install the trim strip to the outside front of the logic analyzer (7 screws). Hold the strip in place when starting screws to avoid cross-threading.

4. Using a T10 TORX screwdriver, install the handle assembly to the monitor side of the logic analyzer.

Install the Probe Mounting Plate and Probe Cables (See Figure 1)

1. Connect the probe cables to the rear panel of the instrument.

2. Using a #1 pozidrive screwdriver, install the probe mounting plate to the rear panel of the instrument.

LOADING THE SYSTEM SOFTWARE

You must load the system software to be able to run the instrument. Optionally, you may wish to load the Symbol Utility SW; it enables the instrument to download symbols created by other programs.

1. Apply power to the instrument.
2. Insert the Operating System Software disk 1 of 2 into the disk drive on the front of the instrument.
3. Press the System key in the MENU keys.
4. Using the arrow keys, Done key, and Select key, highlight the second field from the left and press Select. Arrow down and select Select Utilities from the pop-up menu.
5. Using the arrow keys, highlight the Update FLASH ROM field, press the Select key. Select Continue from the pop-up menu. Press the Done key and wait for the disk to complete. Insert disk 2 of 2 and press Done.
6. When your system software is done loading, remove the Operating System Software disk and put the disks in a safe place.
7. If desirable, load the Symbol Utility SW. Insert the disk into the analyzer and cycle power. The program loads automatically but takes more than a minute. Symbol Utility can be found under the System menu.

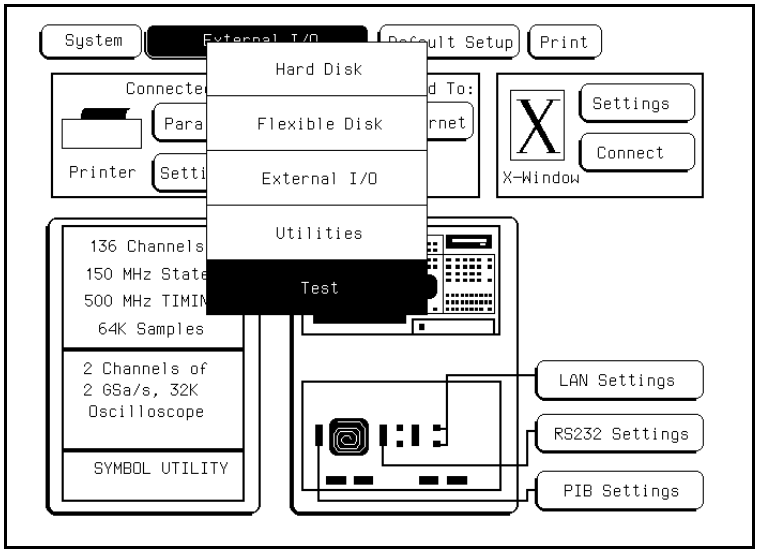
LOGIC ANALYZER TESTING

Self-Tests

The performance verification (PV) self-tests consist of system PV tests, analyzer PV tests, and oscilloscope PV tests.

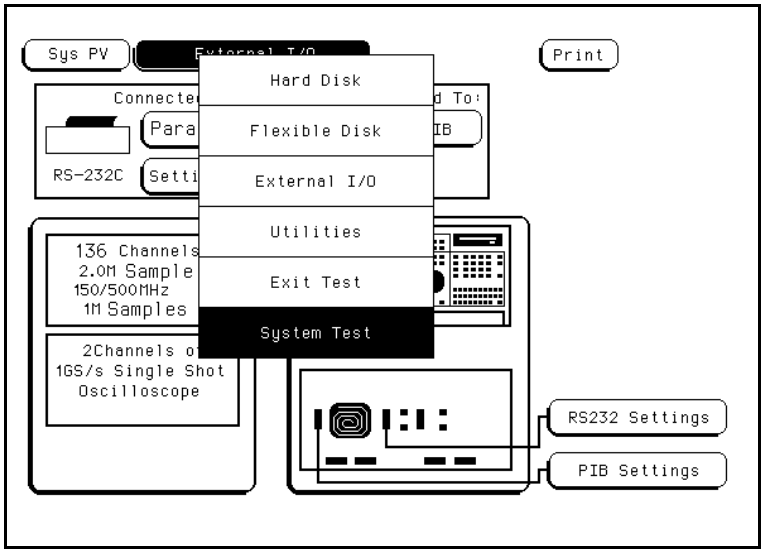
1. Disconnect all inputs, then turn on the power switch. Wait until the power-up tests are complete.

2. Press the System key. Select the field next to System, then select Test in the pop-up menu.



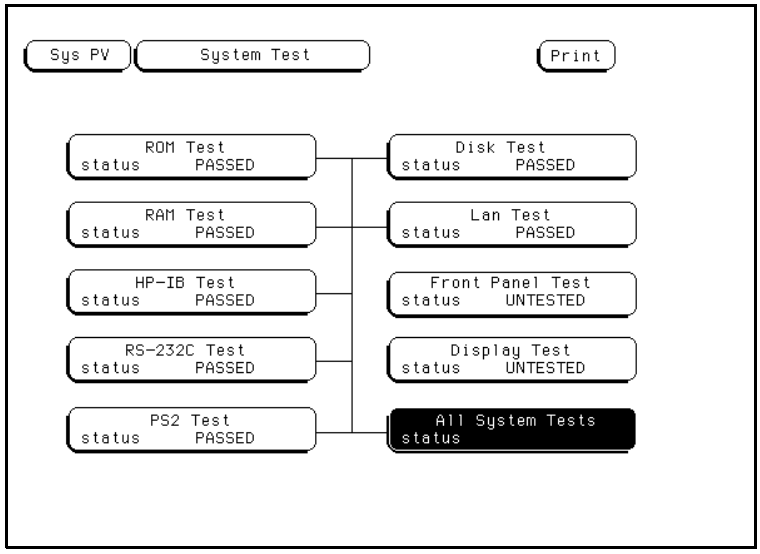
3. Select the field labeled Load Test System.

4. Press the System key. Select the field next to Sys PV, then select System Test in the pop-up menu.



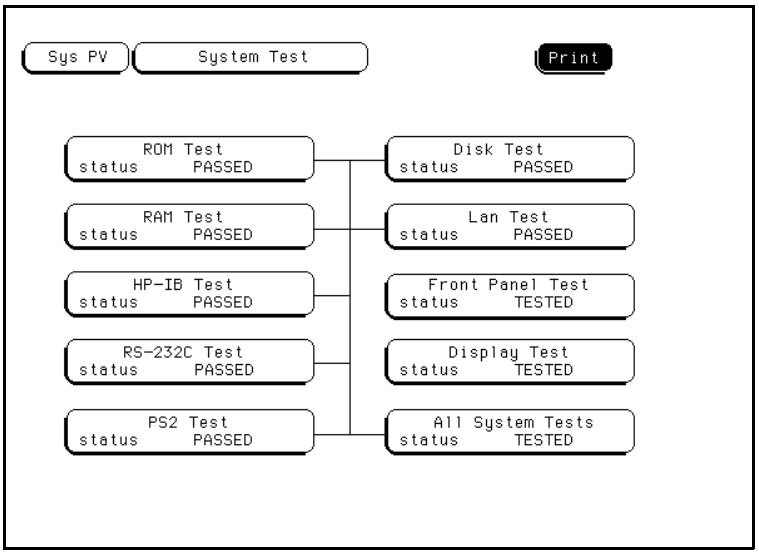
5. Install a formatted disk that is not write protected into the disk drive. Connect an RS-232-C loop back connector onto the RS-232-C port. The RS-232-C connector is supplied with the logic analyzer.

6. Select All System Tests. You can run all tests at one time, except for the Front Panel Test and Display Test, by running All System Tests. To see more details about each test when trouble shooting failures, you can run each test individually. When the tests finish, the status for each test shows PASSED or FAILED, and the status for the All System Tests changes from UNTESTED to TESTED. Note that the Front Panel Test and Display Test remain UNTESTED.

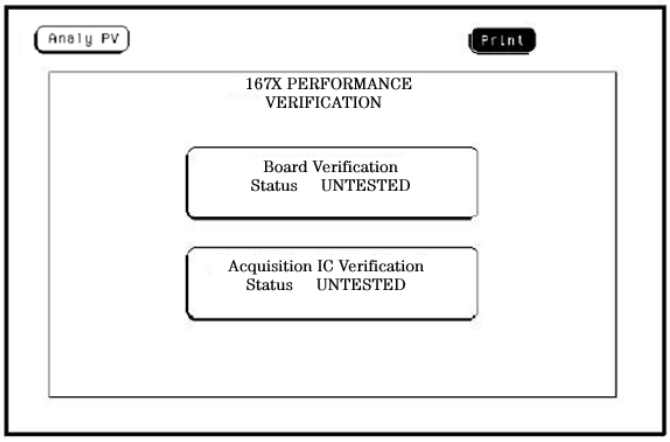


7. Select the Front Panel Test. A screen duplicating the front panel appears. Press each key on the front panel and the corresponding key on the screen will change from a light to a dark color. Test the knob by turning it in both directions. Note any failures, then press the Done key to exit the Front Panel Test. The status of the test changes from UNTESTED to TESTED.

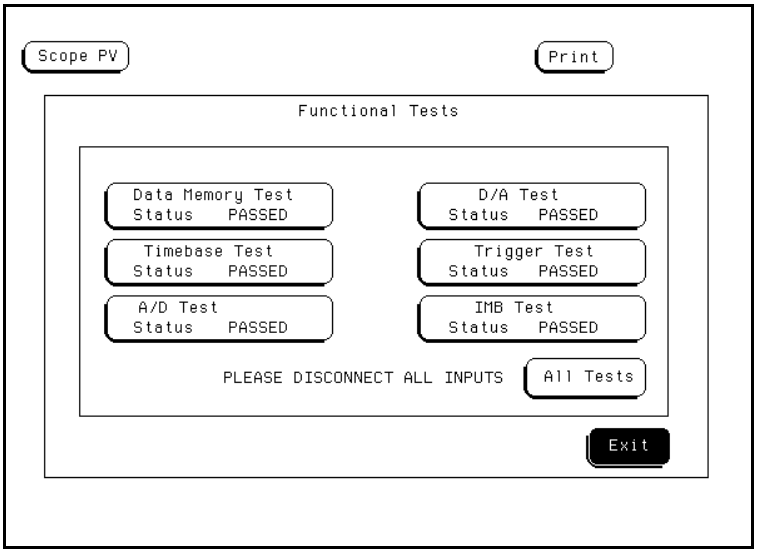
8. Select the Display Test. A white grid pattern is displayed. Refer to chapter 4, "Calibrating and Adjusting" of the Service Guide for display adjustments. Select Continue and the screen changes to full bright. Repeat selecting Continue until the screen changes to black. Select Continue once more and the test screen shows the Display Test status changed to TESTED.



9. Select Sys PV, then select Analy PV in the pop-up menu. In the Analy PV menu, select Board Verification. In the Board Verification menu select All Analyzer Tests. To see more details about each test when trouble shooting failures, you can run each test individually. When the tests finish, the status for each test shows PASSED or FAILED. Select Exit to return to the Analy PV main menu. Note the status for the All Analyzer Tests changes from UNTESTED to TESTED.



10. Select Acquisition IC Verification from the Analy PV menu. In the Acquisition IC Verification menu select All Tests. When the tests are finished, the status for each test shows PASSED or FAILED. Select Exit to return to the Analy PV main menu. Note the status for the Acquisition IC Verification changes from UNTESTED to TESTED.
11. Select Analy PV, then select Scope PV in the pop-up menu. In the Scope PV menu, select Functional Tests then select All Tests. To see more details about each test when trouble shooting failures, you can run each test individually. When the tests finish, the status for each test shows PASSED or FAILED. Select Exit.



12. To exit the test system, use the arrow keys to select Scope PV, then select Sys PV from the menu. Select the field to the right of the Sys PV field. Select Exit Test in the pop-up menu, then select Exit Test System.
13. The Agilent Technologies 1670G Logic Analyzer Service Guide should be ordered if trouble shooting is deemed necessary.

OSCILLOSCOPE TESTING

Oscilloscope Calibration

Turn on the logic analyzer. Let it warm up for 30 minutes if you have not already done so.

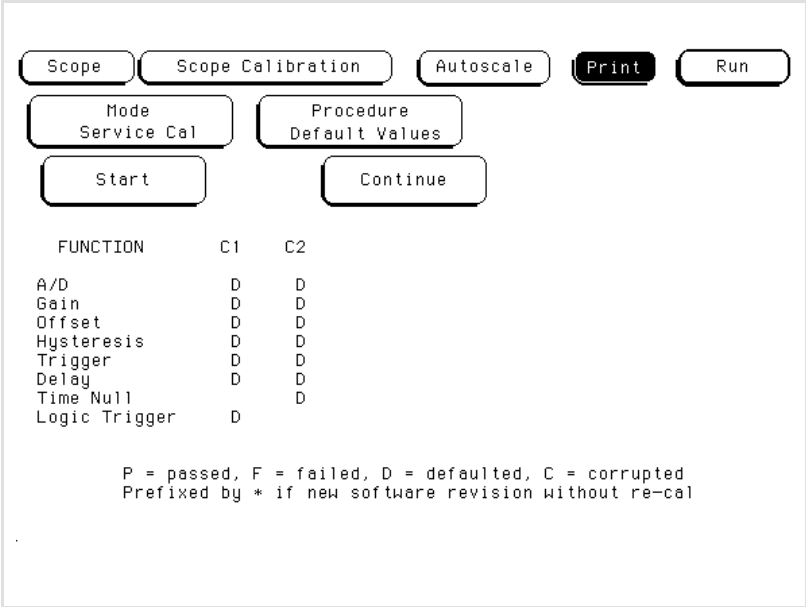
Equipment Required

Equipment	Critical Specification	Recommended Model/Part	Qty.
Cable	BNC, 9-inch (equal length)	10502A	2
Cable	BNC, at least 1 meter	10503A	1
Adapter	BNC tee (m)(f)(f)	1250-0781	1
Adapter	BNC (f)(f) (ug-914/u)	1250-0080	1

Default Calibration Factors

Note that once the default calibration factors are loaded, all calibrations must be done. This includes all of the calibrations in the Self Cal menu. The calibration must be performed in the exact sequence listed below.

1. Press the System key. Select System, then select Scope.
2. Select the menu field (top row, second from the left), then select Scope Calibration from the pop-up menu.
3. Select the Mode field, then select Service Cal from the pop-up menu.
4. Select the Procedure field, then select Default Values from the pop-up menu.
5. Select the Start field and follow the instructions on the display.



After you select the Start field, you can abort the calibration procedure by selecting either the Mode or Procedure fields if the Continue field is still displayed on the screen.

Self Cal menu calibrations

Messages will be displayed as each calibration routine is completed to indicate calibration has passed or failed. The resulting calibration factors are automatically stored to non-volatile RAM at the conclusion of each calibration routine. The Self Cal menu lets you optimize vertical sensitivity (Vert Cal) for channels 1 and 2 individually or both channels on a board simultaneously. Also, the Self Cal menu lets you optimize delay (Delay) for channel 1 and 2 separately, then Time Null for channel 2 and the Logic Trigger.

1. Optimize Vert Cal of the Self Cal
   a. Connect two BNC 50-Ω, 9-inch cables to the BNC tee adapter. Connect the BNC 50Ω (f)(f) adapter to the BNC tee adapter, and connect the 48-inch BNC cable to the BNC 50Ω (f)(f) adapter. Once you select Start, the instrument will prompt you to connect the cables to the appropriate locations on the rear panel of the instrument.
   b. Select the Mode field, then select Self Cal from the pop-up menu.
   c. Select the Procedure field, then select Vert Cal from the pop-up menu.
   d. Select the Channel field, then select a channel choice from the pop-up menu.
   e. Select the Start field and follow the instructions on the display.
   f. After completion of Vertical Calibration, remove the cables from the instrument.
2. Optimize Delay of the Self Cal.
   a. Obtain a BNC 50-Ω, 48-inch cable. Once you select Start, the instrument will prompt you to connect the cable to the appropriate location on the rear panel of the instrument.
   b. Select the Procedure field, then select Delay from the pop-up menu.
   c. Select the Channel field, then select C1.
   d. Select the Start field and follow the instructions on the display.
   e. Repeat steps c and d for channel 2.
   f. After completing all of the channel delay calibrations, remove the cable from the oscilloscope.
3. Optimize the Time Null of the Self Cal.
   a. Connect two BNC 50-Ω, 9-inch cables to the BNC tee adapter. Connect the BNC 50Ω (f)(f) adapter to the BNC tee adapter, and connect the 48-inch BNC cable to the BNC 50Ω (f)(f) adapter. Once you select Start, the instrument will prompt you to connect the cables to the appropriate locations on the rear panel of the instrument.
   b. Select the Procedure field, then select Time Null from the pop-up menu.
   c. Select the Start field and follow the instructions on the display.
   d. After completion of the Time Null calibration, remove the cables from the instrument.
4. Calibrate the Logic Trigger of the Self Cal.
   a. Obtain a BNC 50-Ω, 48-inch cable.
   b. Select Start. The instrument will prompt you to connect the cable to the appropriate location on the rear . panel of the instrument.
   c. Select the Procedure field, then select Logic Trigger from the pop-up menu.
   d. Select the Start field and follow the instructions on the display.
   e. After completion of the Logic Trigger calibration, remove the cable from the instrument.

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