Keysight E4982A LCR Meter

Troubleshooting Guide

KEYSIGHT TECHNOLOGIES

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

Notices

Manual Printing History

The manual's printing date and part number indicate its current edition. The printing date changes when a new edition is printed (minor corrections and updates that are incorporated at reprint do not cause the date to change). The manual part number changes when extensive technical changes are incorporated.

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Safety Notices

CAUTION

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

WARNING

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

NOTE

A **NOTE** notice denotes important information. It calls attention to a procedure, practice, or condition that is essential for the user to understand.

Caution

Do not exceed the operating input power, voltage, and current level and signal type appropriate for the instrument being used, refer to your instrument's Function Reference.

Electrostatic discharge (ESD) can damage the highly sensitive microcircuits in your instrument. ESD damage is most likely to occur as the test fixtures are being connected or disconnected. Protect them from ESD damage by wearing a grounding strap that provides a high resistance path to ground. Alternatively, ground yourself to discharge any static charge built-up by touching the outer shell of any grounded instrument chassis before touching the test port connectors.

Safety Summary

When you notice any of the unusual conditions listed below, immediately terminate operation and disconnect the power cable.

Contact your local Keysight Technologies sales representative or authorized service company for repair of the instrument. If you continue to operate without repairing the instrument, there is a potential fire or shock hazard to the operator.

- Instrument operates abnormally.
- Instrument emits abnormal noise, smell, smoke or a spark-like light during operation.
- Instrument generates high temperature or electrical shock during operation.
- Power cable, plug, or receptacle on instrument is damaged.
- Foreign substance or liquid has fallen into the instrument.

Manufacturer’s Declaration

Herstellerbescheinigung

GERA- USCHEMISSION

LpA < 70 dB

am Arbeitsplatz

normaler Betrieb

nach DIN 45635 T. 19

Manufacturer's Declaration

ACOUSTIC NOISE EMISSION

LpA < 70 dB

operator position

normal operation

per ISO 7779

Regulatory Compliance Information

This product complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- The Low Voltage Directive 2006/95/EC
- The EMC Directive 2004/108/EEC

To obtain Declaration of Conformity, please contact your local Keysight Technologies sales office, agent or distributor.

Safety Notice Supplement

- This equipment complies with EN/IEC61010-1:2001.
- This equipment is of MEASUREMENT CATEGORY I (CAT I). Do not use for CAT II, III, or IV.
- Do not connect the measuring terminals to mains.
- This equipment is a POLLUTION DEGREE 2, INDOOR USE product.
- This equipment is tested in stand-alone condition and in combination with the accessories supplied by Keysight Technologies against the requirement of the standards described in the Declaration of Conformity. If it is used as a system component, compliance of related regulations and safety requirements are to be confirmed by the builder of the system.

General Safety Precautions

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual may impair the protection provided by the equipment. Such noncompliance would also violate safety standards of design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these precautions.

NOTE The E4982A complies with INSTALLATION CATEGORY II as well as POLLUTION DEGREE 2 in IEC61010-1. The E4982A is an INDOOR USE product.

NOTE The LEDs in the E4982A are Class 1 in accordance with IEC60825-1, CLASS 1 LED PRODUCT.

- Ground the Instrument

  To avoid electric shock, the instrument chassis and cabinet must be grounded with the supplied power cable's grounding prong.

- DO NOT Operate in an Explosive Atmosphere

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

- Keep Away from Live Circuits

  Operators must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltage levels may remain even after the power cable has been disconnected. To avoid injuries, always disconnect the power and discharge circuits before touching them.

- DO NOT Service or Adjust the Instrument Alone

  Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

- DO NOT Substitute Parts or Modify the Instrument

To avoid the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Keysight Technologies Sales and Service Office for service and repair to ensure that safety features are maintained in operational condition.

- Dangerous Procedure Warnings

  Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING **Dangerous voltage levels, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting this instrument.**

Safety Symbols

General definitions of safety symbols used on the instrument or in manuals are listed below.

Instruction Manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instrument manual.

Alternating current.

Direct current.

On (Supply).

Off (Supply).

In-position of push-button switch.

Out-position of push-button switch.

A chassis terminal; a connection to the instrument's chassis, which includes all exposed metal structure.

Standby.

Certification

Keysight Technologies certifies that this product met its published specifications at the time of shipment from the factory. Keysight Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institution's calibration facility or by the calibration facilities of other International Standards Organization members.

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Assistance

Product maintenance agreements and other customer assistance agreements are available for Keysight Technologies products.

For any assistance, contact your nearest Keysight Technologies Sales and Service Office. Addresses are provided at the back of this manual.

Manuals for E4982A

Keysight provides the following three manuals for E4982A. The latest version of all documentations can be downloaded from http://www.keysight.com/find/e4982a-manual.

Installation Guide

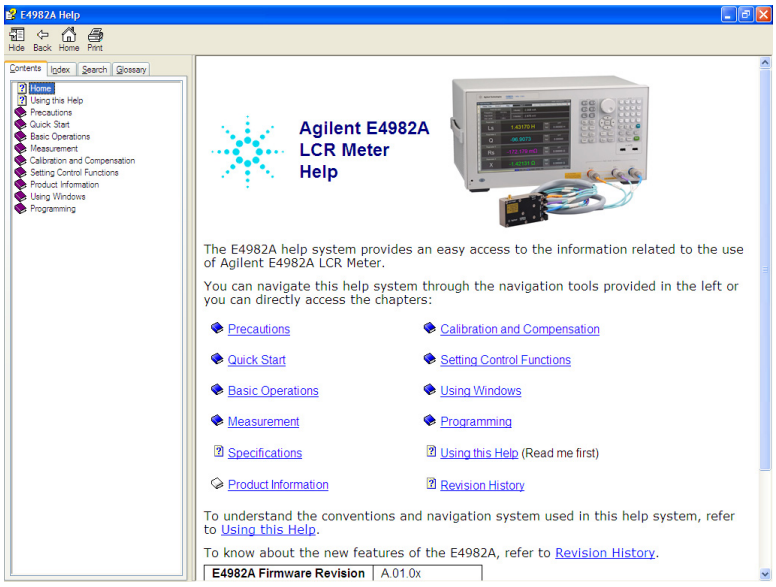
The installation guide provides start up setup information when you use the E4982A for the first time, system recovery procedures and troubleshooting information when Windows cannot boot up. See this manual first when you use the E4982A for the first time.

Troubleshooting Guide

The troubleshooting guide (this manual) provides troubleshooting information when operational problems are encountered on the E4982A. See this manual when you need to troubleshoot the E4982A.

Online Help

The online help provides the information about the quick start, measurement operation, programming, built-in VBA, I/O interface and error messages. This is pre-installed in the E4982A. Press the **[Help]** hard key on the front panel to open. Quick Start helps in understanding the E4982A operation quickly.



The latest version of online help is available at: http://ena.support.keysight.com/e4982a/manuals/webhelp/eng

The online help has context sensitive help, which is a great feature of the E4982A help. It allows you to get information about the selected softkey by pressing the **Help** key in the E4982A or by pressing **F1** in a keyboard attached to the E4982A or by clicking the help button in a dialog box. With context sensitive help, users can receive information quickly about the area the user is working in the firmware of the E4982A. It provides information relevant to the task that needs to be accomplished and reduces the time to search relevant information required to complete a task.

In This Guide...

The following shows the contents of this manual.

Chapter 1, "Troubleshooting"

This chapter provides the procedure to isolate a faulty assembly in the E4982A.

Chapter 2, "Post Repair Procedure"

This chapter lists the procedures required to verify the E4982A operation after an assembly is replaced with a new one.

Contents

1
Troubleshooting

This chapter provides the procedure to isolate a faulty assembly in the E4982A.

Introduction

WARNING **These servicing instructions are for use by qualified personnel only. To avoid possible electrical shock, do not perform any servicing unless you are qualified to do so.**

WARNING **The opening of covers or removal of parts are likely to expose dangerous voltages. Disconnect the instrument from its power supply beforehand.**

CAUTION Many of the assemblies in the instrument are very susceptible to damage from ESD (electrostatic discharge). Perform the following procedures only at a static-safe workstation and wear a grounding strap.

CAUTION DO NOT operate without following instructions. Program or files in the instrument may be broken.

How to exit from the E4982A Measurement View

Some troubleshooting procedures require you to exit from the E4982A Measurement View. The following procedure describes the steps to to exit from the E4982A Measurement View.

Step 1. Connect a mouse to the connectors on the E4982A rear panel.

Step 2. Turn the instrument on.

Step 3. Press System key.

Step 4. Click **Service**.

Step 5. Click **Exit**.

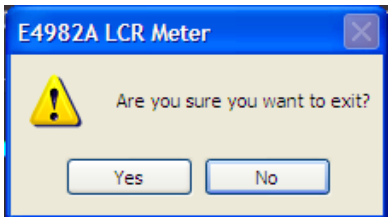


Figure 1 Exit dialog box

Step 6. Click **Yes** in **Exit** menu. The E4982A exits from Measurement View to Windows desktop.

NOTE If you want to return to the Measurement View, double-click the" E4982A" icon on the desktop.

NOTE If you need to shut down the E4982A, press the standby switch on the front panel.

To Troubleshoot the Instrument

This section describes the basic troubleshooting procedural flow when servicing the E4982A. The primary procedural tool in this section is the flowchart. The flowchart contains the entire troubleshooting path from the failure symptom to the isolation of faulty assembly, and will direct you through the repair in an orderly manner through the possible failure symptoms. Reference letters (Yes/No) on the flowchart point to procedural steps that briefly explain the next troubleshooting method to be performed.

Primary Trouble Isolation

The primary trouble isolation procedure can be performed without disassembling the E4982A. Figure 2 shows the trouble isolation flow chart.

Step 1. Turn the instrument power on.

A few minutes after the E4982A is turned on, the measurement view is displayed on the screen. The display screen should be similar to Figure 12, “Measurement View,” on page 31.

Step 2. Check the display.

- If no display appears on the LCD after the E4982A is turned on, go to “No Display Troubleshooting" on page 22.
- If the E4982A stops during booting process despite something being displayed on the LCD, go to “Booting Process Troubleshooting" on page 27.

Step 3. Check the basic function.

If the front-panel/keyboard/mouse controls, LCD display, data storage, remote interface or other function (except the measurement function) does not work correctly, go to “Function Specific Troubleshooting" on page 40.

Step 4. Check the measurement function.

If the instrument fails performance test, go to “Performance Test failure Troubleshooting" on page 48.

If the measurement function does not work correctly, perform the diagnostic tests provided in the E4982A’s service function. If the diagnostic tests fail, go to “Troubleshooting Using Diagnostic Test" on page 32.

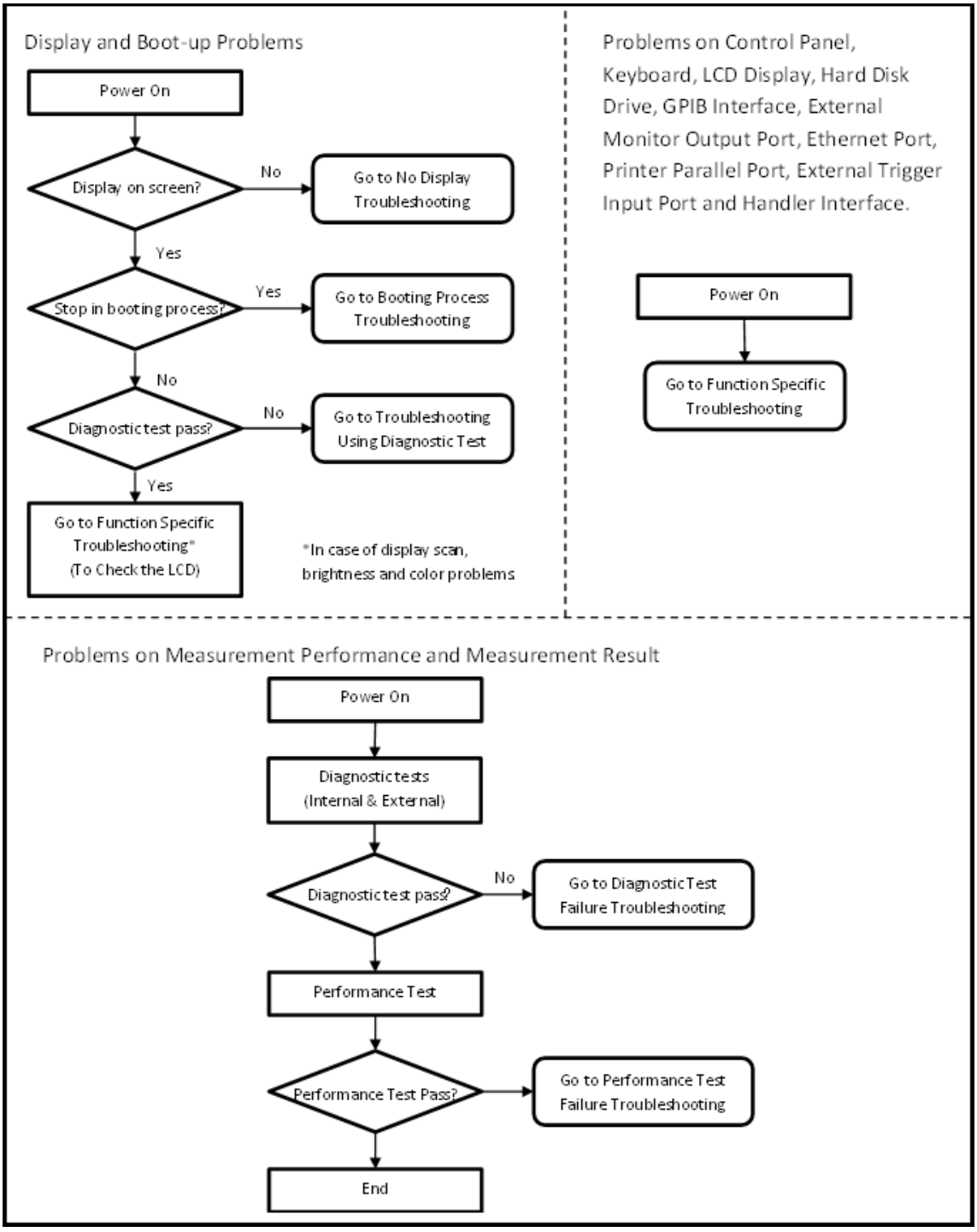


Figure 2 Primary trouble isolation flowchart

No Display Troubleshooting

If the E4982A displays nothing despite being powered from proper ac power line, isolate the failure in accordance with the procedure shown in Table 3.

Connect the keyboard to the E4982A rear panel connector and start trouble isolation. The methods of trouble isolation are described in the procedural step 1 to 6.

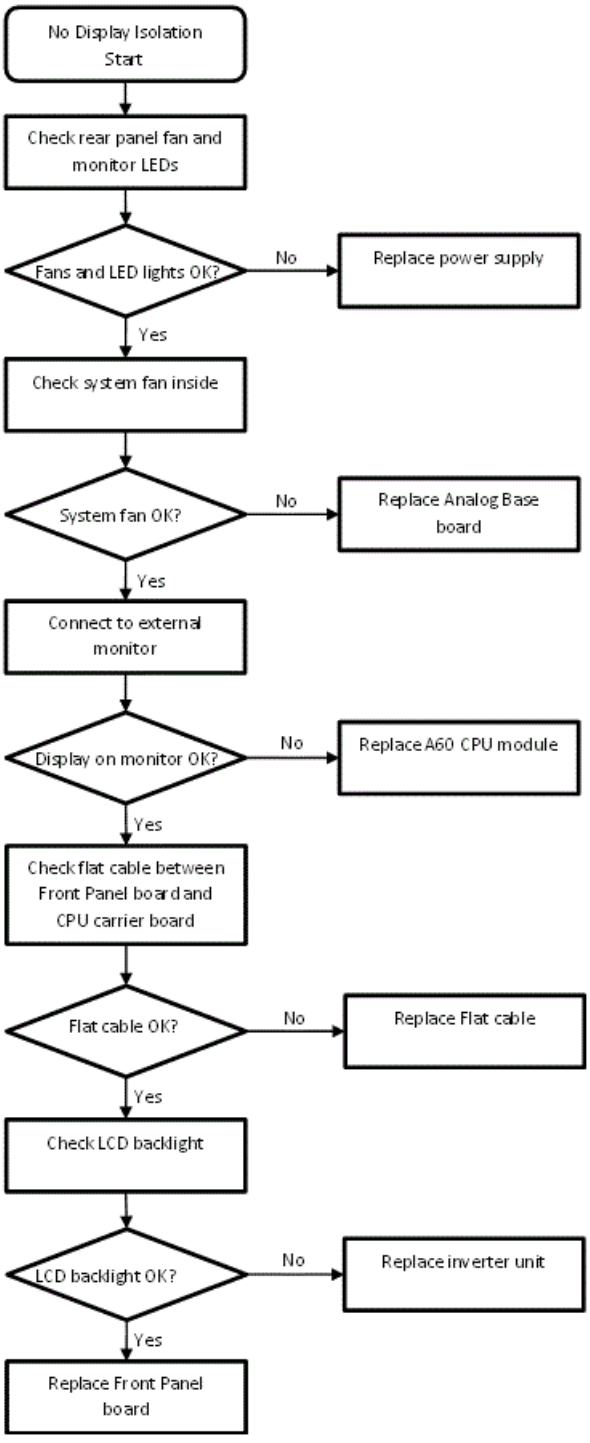


Figure 3 No display trouble isolation procedure

Step 1. Check fan operation and DC monitor LED.

If the rear panel fan (blower) doesn't run, a failure in power supply is assumed. Remove the E4982A outer cover and check if the following LEDs light:

- +3.3 V and +5 V DC monitor LEDs on A60 CPU module as shown in Figure 4.
- LEDs on A51 DSP module as shown in Figure 5.

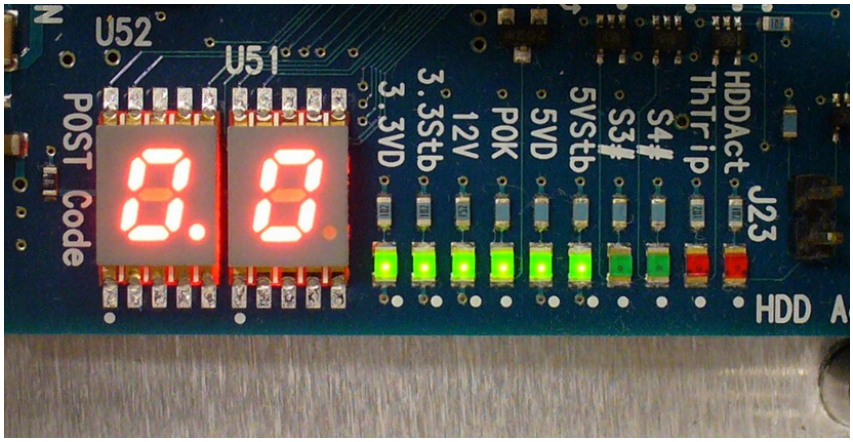


Figure 4 LEDs on CPU module

Figure 5 LEDs on DSP module

Step 2. Check system fan inside.

If the system fan, located on the left side of the chassis inside the E4982A, does not run, the problem seems to be in the A51 DSP board or the flat cable between the A51 DSP board and A60 CPU module. In this case, remove the E4982A outer cover and determine if the fan runs or not.

If a beep and power shutdown occurs immediately after the power is turned on, there is a possibility that the fan would not run. The power shutdown occurs the moment the system fan stops by any anomaly. In this case, check the fan.

If the power shutdown occurs without a beep, the problem seems to be with the A51 DSP board or the A60 CPU module.

Step 3. Check LED of “Num Lock” key.

Press the **Num Lock** key on the keyboard. If the LED on the keyboard does not light as shown in Figure 6, a problem seems to be in the A60 CPU module.

Figure 6 LED of the Num Lock key

Check the following before replacing the A60 CPU module.

- Connections to the A60 CPU Module are normal
- There are no disconnections or loose connections

Step 4. Check the external monitor

Connect an external VGA monitor to the External Monitor Output Port on the E4982A rear panel.

- If something is displayed on the external monitor, the problem seems to be related to the LCD display. Also, check the A52 Front Panel I/F board because the ON/OFF setting of the LCD backlight is controlled by the A52 Front Panel I/F board.
- If nothing is displayed even on the external monitor, the problems seems to be in the A60 CPU module.

Step 5. Check the flat cable

Check the flat cable between the A60 CPU Module and A52 Front Panel I/F board.

Step 6. Check around the backlight

Check the inverter board and the cable between the inverter board and A52 Front Panel I/F board. Also check the cables between the LCD and A52 Front Panel I/F board. If the cables are normal, check the LCD display.

Booting Process Troubleshooting

Figure 7 represents the booting process flow in the E4982A. If the E4982A stops in the booting process, troubleshoot using the following step-by-step procedure.

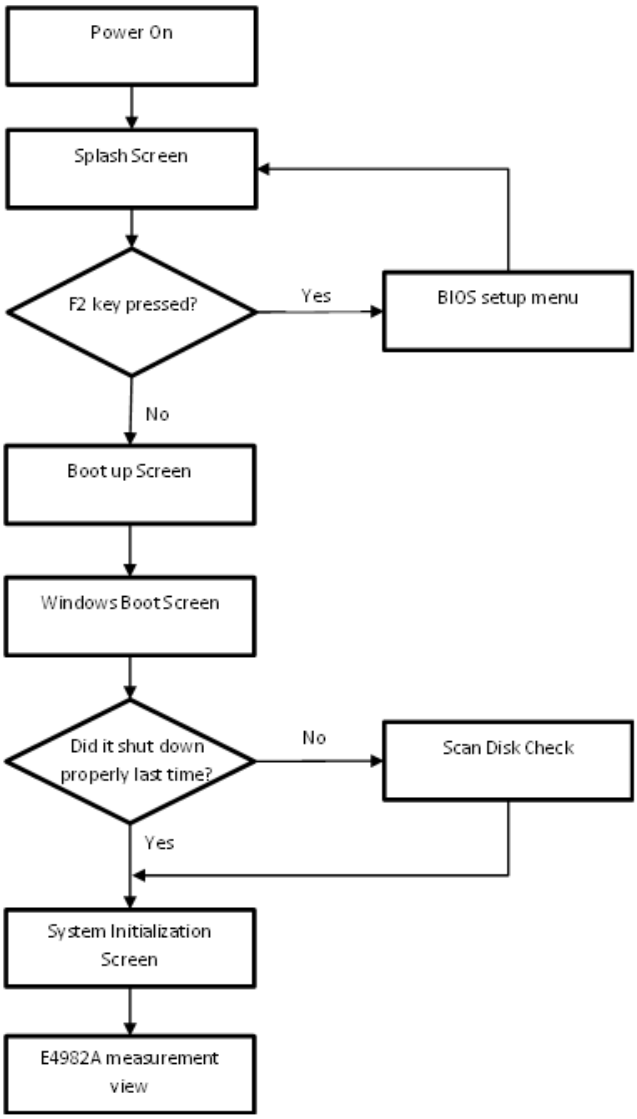


Figure 7 Booting process flowchart

Step 1. Splash Screen.

The splash screen is displayed with Keysight logo as shown in Figure 8.

If the splash screen is displayed, you can assume that the A60 CPU Module is functioning correctly.

NOTE

While the splash screen is displayed, if you want to run the BIOS setup utility, push F2 key on the attached external keyboard as soon as you see the splash screen. The password to enter BIOS setup utility is agt0nly (0 is Zero).

Changing BIOS setting may cause malfunction or lower performance of the instrument.

Figure 8 Splash Screen

Step 2. Boot up Screen.

The boot up screen is displayed as shown in Figure 9.

If no selection is made, the system will continue the boot up process after 3 seconds.

NOTE

While the Boot up screen is displayed, if you want to perform system recovery, select **Keysight Recovery System** as soon as the **Windows Boot Manager** screen is displayed. For details of the system recovery, refer to the **Installation Guide**.

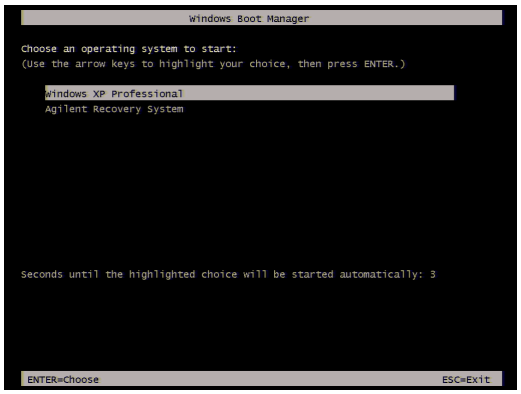


Figure 9 Boot up Screen

Step 3. Windows boot screen.

The Windows boot screen is displayed. The Windows boot screen consists of two screens. Each screen is displayed in order as shown in Figure 10. If the Windows boot screens are displayed, it is assumed that the HDD works and the Windows operating system is starting up.

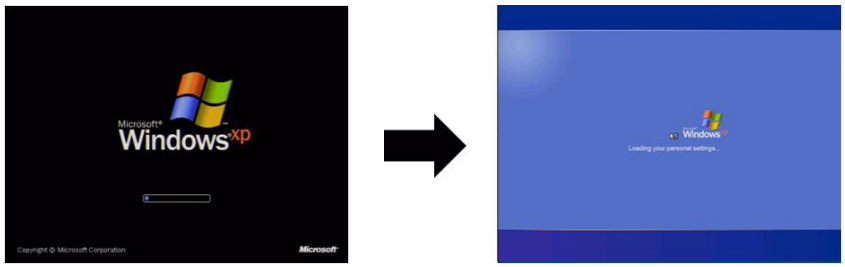


Figure 10 Windows boot screens

If you encounter the following problems, try to execute the system recovery before replacing the HDD.

- “xxx file is missing” message is displayed on DOS screen.
- The window boot screen is not displayed after the splash screen.
- Windows always boots up in Safe Mode.

NOTE If the E4982A was turned off without proper shutdown process, **Microsoft Scandisk** runs while the windows boot screens are displayed. If a serious problem is found during the scan, execute the system recovery. For details on executing the system recovery, refer to the **Installation Guide**. If the operating system still does not boot up properly after reinstallation, replace the HDD.

NOTE The operating system automatically checks the device drivers which are necessary for use in the E4982A and are installed in the system before the E4982A is shipped from Keysight factory. If the operating system does not detect them, a message box is displayed. In this case, install the device driver.

Step 4. System Initialization Screen.

The system initialization screen is displayed as shown in Figure 11. This screen shows the status of the items initialized at start up.

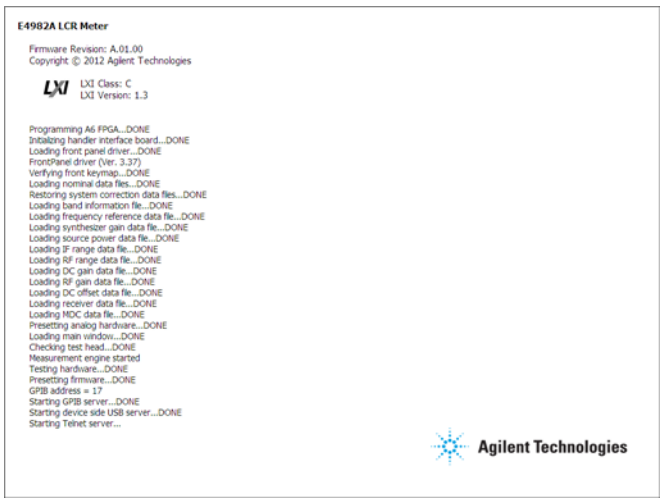


Figure 11 System Initialization Screen

If the display whites out, is entirely blue or a dialog box appears, a mass storage problem is suspected. Try to perform the mass storage recovery procedure.

NOTE

If the message “Will Shut Down in Five Seconds” is displayed and shutdown occurs, the A51 DSP board has failed to start up. The following messages may be displayed before the shutdown occurs:

“Fatal Error: Failed to Initialize DSP Driver”

or “Fatal Error: Failed to Initialize DSP”

This message indicates that the DSP board does not work or is not properly connected to the DSP DSP board.

“Fatal Error: Failed to Update DSP Code”

If this happens, the DSP board has failed to write the DSP program into the flash ROM when the firmware was first installed or after being updated to the latest version. A problem with the A51 DSP board or A60 CPU Module is suspected.

Step 5. Measurement view.

The measurement view as shown in Figure 12 is displayed after the system initialization is completed without problem.

Figure 12 Measurement View

Troubleshooting Using Diagnostic Test

The E4982A has an internal and an external diagnostic test function to diagnose the analog measurement section and internal dc power supply voltages. The diagnostic tests make it possible to isolate a faulty board assembly. The following paragraphs describe the procedure to perform the diagnostic tests.

Internal Diagnostic Test

Contents of the internal diagnostic test

The internal diagnostic test contains 3 test items shown in Table 1. Each test item can be performed independently and verifies one of various operating characteristics of the board assembly modules.

Table 1 Internal diagnostic test item menu

1	DC Bus Test
2	Rdc Test without User Calibration
3	Over Current Detect Test

Test equipment required for internal diagnostic test

None.

To execute the internal diagnostic test

To isolate faulty board assembly modules, execute the diagnostic test in accordance with the following procedure.

NOTE To perform the diagnostic test properly, the following conditions must be met:

Environmental temperature: 23°C ±5°C

Warm up time: > 30 minutes

NOTE Do not operate front panel keys, keyboard and mouse during the diagnostic test. Changing the instrument setting while the diagnostic test is in progress will cause incorrect test results.

Step 1. Press System key.

Step 2. Click **Service - Internal Test**.

The internal test warning screen as shown in Figure 13 is displayed. Check the warning conditions and click **Start Test**.

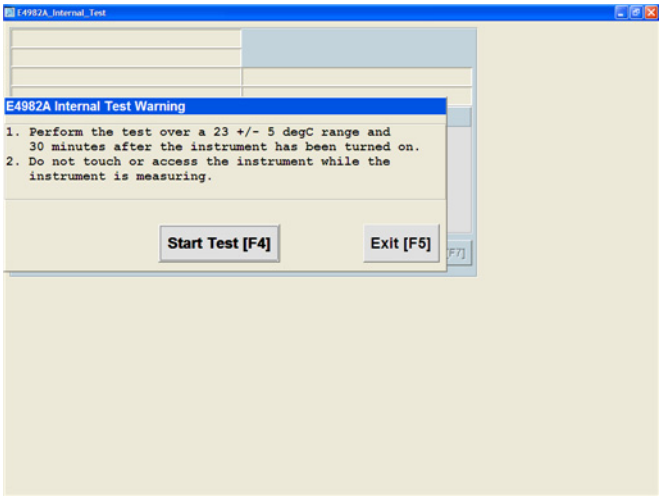


Figure 13 Internal Test 1/4

Step 3. Select **Execute All** or **Execute Single**.

The internal test window is shown as in Figure 14.

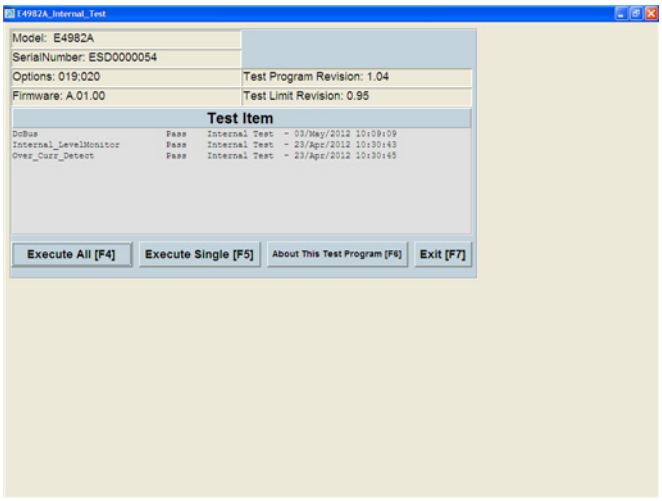


Figure 14 Internal Test 2/4

Execute All executes all tests in succession.

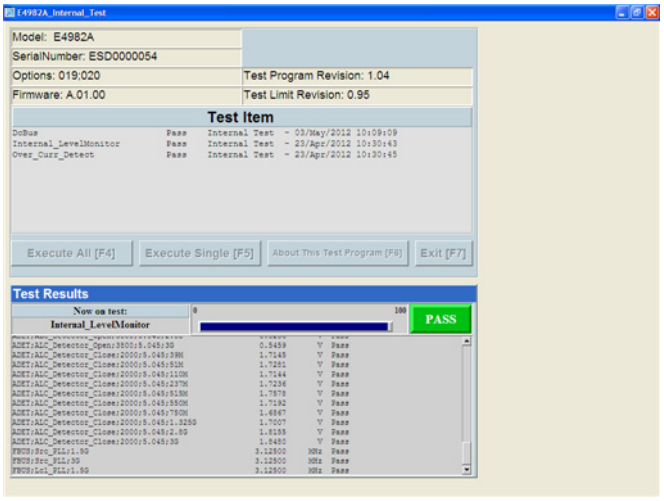


Figure 15 Internal Test 3/4

Execute Single allows you to choose the test you want to execute as shown in Figure 16.

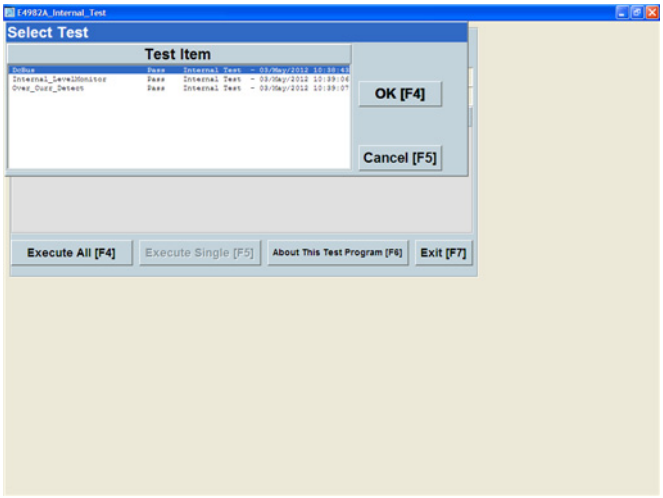


Figure 16 Internal Test 4/4

Step 4. Click **Exit** to exit the internal diagnostic test.

External Diagnostic Test

Contents of the external diagnostic test

The external diagnostic test contains 6 test items shown in Table 2. Each test item can be performed independently and verifies one of various operating characteristics of the board assembly modules.

Table 2 External diagnostic test item menu

1	IF Ranging Test	IF Ranging IF Ranging Power Up 1dB IF Ranging Power Down 1dB
2	Rdc Test without User Calibration	Non Cal Rdc
3	Rdc Performance Test with User Calibration	Z Performance 50 Ohm
4	Rdc SNR Test with User Calibration	Z Performance Short
5	Impedance Performance Test with User Calibration	Z Performance Open Z Performance Short Z Performance 50 Ohm
6	Impedance SNR Test with User Calibration	Z Performance 50 Ohm

Test equipment required for internal diagnostic test

Table 3 Required equipment

Test Item	Required Equipment
IF Ranging Test	16190B
Rdc Test without User Calibration	16190B
Rdc Performance Test with User Calibration	16190B, 16195B
Rdc SNR Test with User Calibration	16190B, 16195B
Impedance Performance Test with User Calibration	16190B, 16195B
Impedance SNR Test with User Calibration	16190B, 16195B

To execute the external diagnostic test

To isolate faulty board assembly modules, execute the diagnostic test in accordance with the following procedure.

NOTE To perform the diagnostic test properly, the following conditions must be met:

Environmental temperature: 23°C ±5°C

Warm up time: > 30 minutes

NOTE Do not operate front panel keys, keyboard and mouse during the diagnostic test. Changing the instrument setting while the diagnostic test is in progress will cause incorrect test results.

Step 1. Press System key.

Step 2. Click **Service - External Test**.

The external test warning screen as shown in Figure 17 is displayed. Check the warning conditions and click **Start Test**.

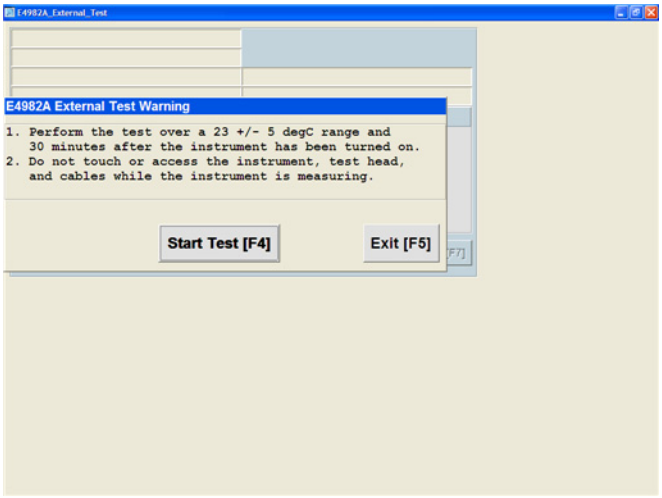


Figure 17 External Test 1/4

Step 3. Select **Execute All** or **Execute Single**.

The external test window is shown as in Figure 18.

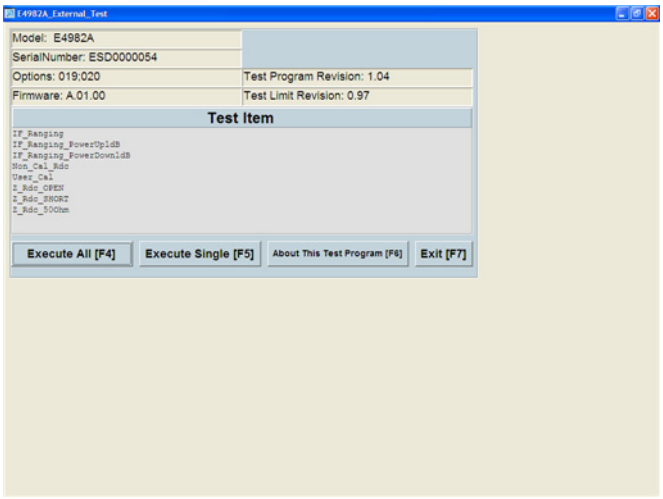


Figure 18 External Test 2/4

Execute All executes all tests in succesion.

Execute Single allows you to choose the test you want to execute as shown in Figure 19.

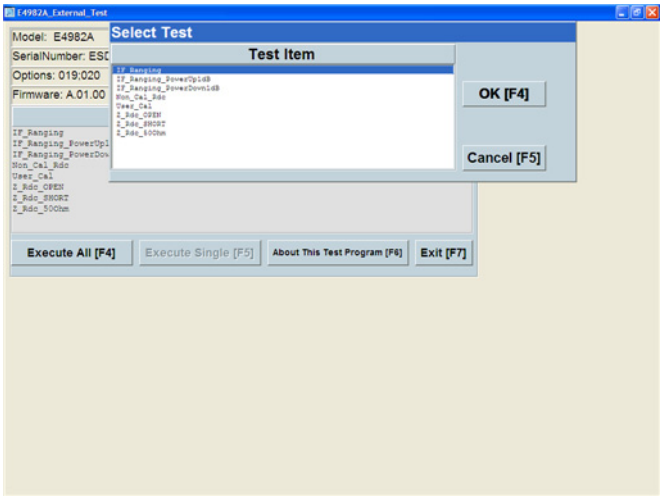


Figure 19 External Test 3/4

Step 4. Connect the equipment as shown.

A connection figure as shown in Figure 20 is displayed. Connect as shown and click **OK**.

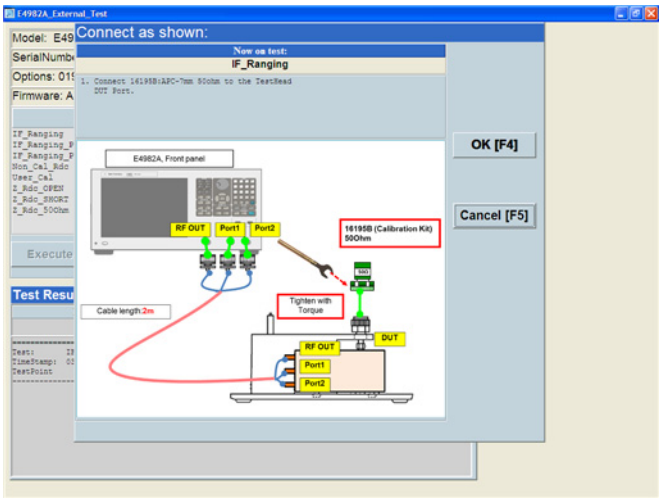


Figure 20 External Test 4/4

Step 5. In the main External Test window, click **Exit** to exit the external diagnostic test.

Diagnostic Test Failure Troubleshooting

Table 4 and Table 5 represents the contents of the diagnostic tests and the relationships of failed tests to probable faulty board assemblies.

Table 4 Internal diagnostic test failure troubleshooting information

Failed test	Probable faulty board assembly		
	A11 Source Board	A6 Receiver Board	Test Head
DC Bus*	#	#	
Rdc Test without User Calibration	#		
Over Current Detected			#

* If all DC Bus tests fail, the A6 Receiver board is suspected to be broken. This is because DC is measured by A/D in the A6 Receiver board.

Table 5 External diagnostic test failure troubleshooting information

Failed test	Probable faulty board assembly		
	A11 Source Board	A6 Receiver Board	Test Head
IF Ranging Test		#	
Rdc Test without User Calibration		#	#
Rdc Performance Test with User Calibration	#	#	#
Rdc SNR Test with User Calibration		#	#
Impedance Performance Test with User Calibration	#	#	#
Impedance SNR Test with User Calibration	#	#	#

Function Specific Troubleshooting

If the E4982A exhibits a failure symptom that is related to a specific function or control such as a front panel key control, data storage, remote control interface, external trigger, external keyboard or mouse, isolate the trouble using the Function Specific Troubleshooting procedures described below. The major functions of the E4982A and the troubleshooting procedure for each function are shown in Table 6.

Table 6 Major functions and troubleshooting procedures

Function	Description	Troubleshooting
Front panel keys	All E4982A functions can be set and controlled via the front panel keys.	Refer to "To Check the Front Panel" on page 43
Touch panel	The touch screen display on the E4982A allows all functions in the menu bars, setup windows and dialog boxes to be set by a touch to the screen panel.	Refer to "To Check the Touch Panel" on page 45
LCD display	Almost all the information including the measurement value, setup state, result data processing, menu bar, softkey label and others are indicated on the 10.4-inch color LCD display.	Refer to "To Check the LCD" on page 45
External keyboard	The external keyboard can be used for the entry of numerical and character data when it is connected to the USB connector on the front or rear panel.	Refer to "To Check the External Keyboard" on page 46
Mouse	The mouse can be used to move the pointer on the LCD display, select functions and change settings, when it is connected to the USB connected on the front or rear panel.	Refer to "To Check the Mouse" on page 46
External monitor	An external color monitor can be used to display the same information as the E4982A LCD display, when it is connected to the External Monitor Output Port (15-pin VGA connector) on the rear panel.	Refer to "To Check the External Monitor Output Port" on page 46

Table 6 Major functions and troubleshooting procedures

GPIB Interface	The GPIB compatibility allows the E4982A to be operated as a talker/listener on IEEE 488 interface bus.	Refer to "To Check the GPIB" on page 47
Handler Interface	The Handler Interface port can be used to transfer comparator decision output data and perform timing synchronization with an external handler.	Refer to "To execute the internal diagnostic test" on page 32 and "To execute the external diagnostic test" on page 35

To Check the Device Driver

First, confirm that the E4982A device drivers are properly installed with the following procedure.

Procedure

Step 1. Exit from the E4982A measurement view in accordance with the procedure described in "How to exit from the E4982A Measurement View" on page 19. Then, Windows desktop screen is displayed.

Step 2. Click **Start**, right click on **My Computer** and select **Properties** as shown in Figure 21. Then System Properties window will appear (Figure 22).

Figure 21 Opening System Property Window

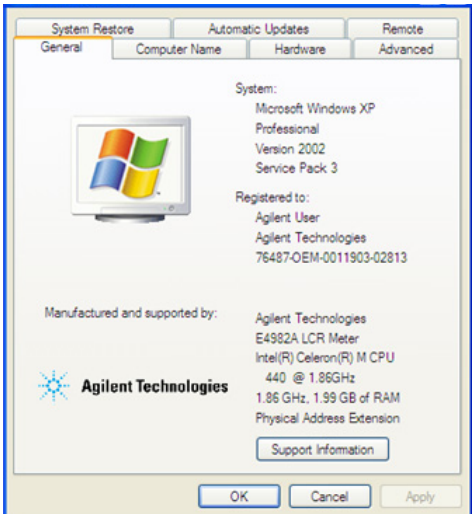


Figure 22 System Properties Window (General)

Step 3. Select the **Hardware** tab and click on the **Device Manager** button. The operating system detects all the necessary device drivers and displays the device names as shown in Figure 23.

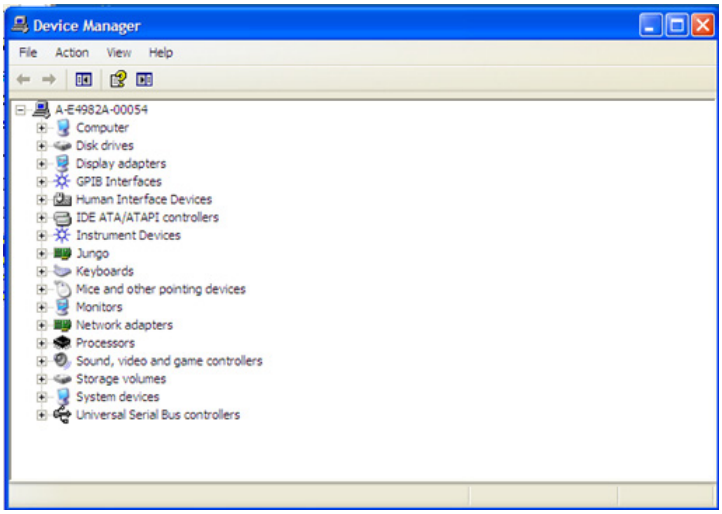


Figure 23 System Properties Window (Hardware)

Step 4. Click the expand icon (+) on the left to expand the selected device category. Right click on the selected device and click Property to show the status detail as shown in Figure 24.

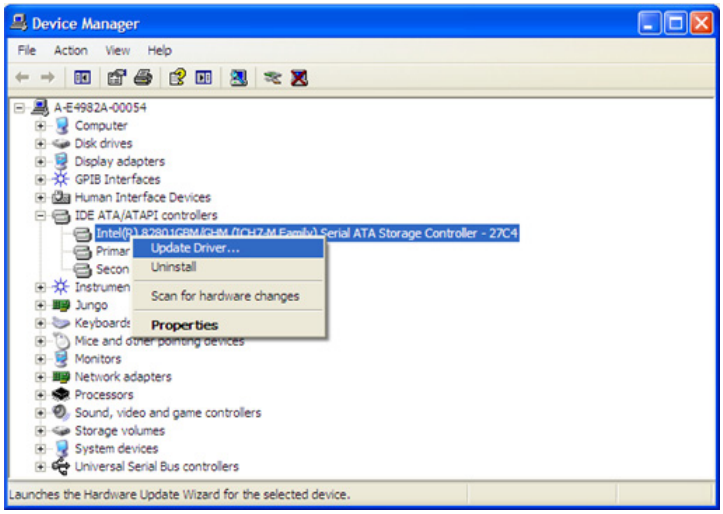


Figure 24 Opening Device Driver Property

Step 5. Execute the system recovery if device drivers are found to have problems.

To Check the Front Panel

Procedure

Step 1. Press System key.

Step 2. Click **Service - Keyboard Test**. This opens the Front Panel Test window as shown in Figure 25.

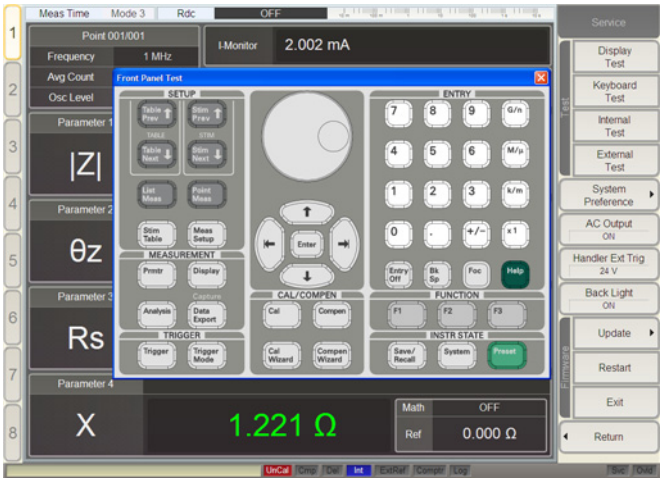


Figure 25 Front Panel Test window 1/2

Step 3. Press the front panel keys. Red ticks will appear on the Front Panel Test window whenever the corresponding key on the front panel is pressed as shown in Figure 26. Turn the rotary knob clockwise or counterclockwise. Red ticks will appear on the left of the rotary knob on the Front Panel Test window when you turn counterclockwise and on the right of the rotary knob when you turn clockwise.

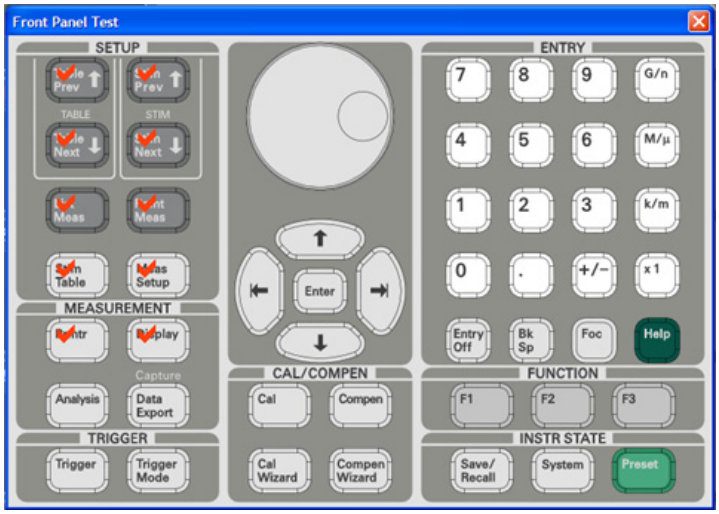


Figure 26 Front Panel Test window 2/2

Step 4. To exit the front panel test, click the button.

- If multiple keys fail to work, a problem in the A52 Front Panel I/F board or A60 CPU Module is suspected. Also, check the flat cable between the A52 Front Panel I/F board and A60 CPU Module.
- If only a specific key fails to work, check first if the key is subsided in the panel.
- If the rotary knob fails to work, check the A52 Front Panel I/F board involving the RPG.

To Check the Touch Panel

Procedure

Using the LCD display panel, select or change the setting of a function in the softkey menu and then, perform the same operation using the hardkeys.

- If the touch panel does not work correctly when the hardkeys function normally, a failure seems to be in the touch screen controller assembly or touch-panel LCD assembly. (The touch panel is not replaceable independently of the LCD.)
- Check the cable between the touch screen controller and the serial interface connector on the A60 CPU module.
- If no problem is found in the above checks, a failure in the A60 CPU Module is suspected.

To Check the LCD

Procedure

Step 1. Press System key.

Step 2. Click **Service - Display Test**. The whole LCD screen turns RED.

Step 3. Tap anywhere on the LCD to go through the color test screen of RED, GREEN, BLUE, WHITE and BLACK. You can also use the rotary knob turned clockwise or press the **ENTRY** keys on the E4982A front panel.

If the color test screen does not appear, perform Step 4.

Step 3. Connect an external VGA monitor to the External Monitor Output Port on the E4982A rear panel.

- If the monitor screen view is the same as the LCD display, the problem seems to be in the A60 CPU module.
- If only the LCD display has a problem, check the flat cable between the A52 Front Panel I/F board and A60 CPU Module.
- If the cables are normal, check the A51 LCD module.

To Check the External Keyboard

Procedure

Step 1. Connect an external keyboard to the E4982A rear panel USB port.

Step 2. Press [Meas] key.

Step 3. Press [↑] and [↓] keys on the external keyboard, and verify that the cursor on the menu bar moves up and down. If it doesn't work, the external keyboard or the A60 CPU Module may be faulty.

To Check the Mouse

Procedure

Step 1. Connect a mouse to the E4982A rear panel USB port.

Step 2. Verify that the mouse buttons work normally. If any button does not work or the mouse pointer does not move, a failure in the mouse or the A60 CPU Module is suspected.

To Check the External Monitor Output Port

Procedure

Step 1. Connect an external VGA color monitor to the External Monitor Output Port on the E4982A rear panel.

Step 2. Turn the external monitor on.

Step 3. Verify that the monitor screen view is the same as the display on the LCD. If the monitor screen view is abnormal, a failure seems to be in the A60 CPU module.

To Check the External Trigger Input

Procedure

Step 1. Press Preset key.

Step 2. Press **Trigger Mode** key.

Step 3. Click **External** in the menu bar to set the trigger mode to External.

Step 4. Connect a BNC Short or 50 ohm termination to the External Trigger Input Port on the rear panel and disconnect it. A measurement trigger should be generated and a measurement result should be refreshed.

Step 5. If no trigger occurs, a failure in the A51 DSP board is suspected.

To Check the GPIB

Procedure

Perform the E4982A Performance Test program. If the controller cannot detect the E4982A, the problem seems to be in the A60 CPU module.

To Check the USB

Procedure

Connect a USB cable between controller PC and USB Interface port (USBTMC) on the rear panel of the E4982A. Turn the controller PC on. If the E4982A cannot detect the controller PC, the problems seems to be in the CPU module. Keysight I/O Library should be installed on the PC.

Performance Test failure Troubleshooting

This section describes the adjustment and troubleshooting procedures used when the E4982A fails the performance tests. If the performance of the instrument is critical for the test limits and seems adjustable, perform first the adjustment(s) related to the failed test. When the test result are far from the tolerance of the test or the performance is not adjustable, isolate the faulty assembly in accordance with the "Performance Test failure Troubleshooting procedure.

Recommended Adjustment for Performance Test failure

Table 7 shows the recommended adjustments when the performance test fails. Select the adjustment program corresponding to the recommended adjustment and perform the adjustment.

Table 7 Recommended adjustment for performance test failure

Failed Performance test item	Recommended Adjusment
Frequency Accuracy	Frequency Reference
Power Level Accuracy	Synthesizer Gain Source Output Power
Impedance Measurement Accuracy	Local Gain Receiver Cal Receiver IF Range Receiver RF Range Receiver RF Gain Receiver Rdc Gain

Adjustment failure Troubleshooting

Table 8 represents the relationships between the failed adjustment item and probable faulty assembly.

Table 8 Adjustment failure Troubleshooting information

Failed item	Probable faulty board assembly		
	A11 Source Board	A6 Receiver Board	Test Head
Frequency Reference	###		
DC Offset Cancel DAC (Source DC Offset)	###		
Over Current Detect		#	###
Pre Receiver IF Range		###	
Pre Receiver RF Range		###	
Synthesizer Gain	###		##
Source Output Power	###		##
Local Gain	###	###	
Receiver Calibration		###	
Receiver IF Range		###	
Receiver RF Range		###	
Receiver Gain			
Mixer Calibration (Distortion)		###	

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

Performance Test failure Troubleshooting

Table 9 represents the relationship between the failed test and probable faulty assembly. If the performance test failure cannot be removed by a proper adjustment, replace the assembly shown in this table.

Note that this table lists some typical cases. There are possibilities that other assemblies may be faulty. To troubleshoot further, perform the "Troubleshooting Using Diagnostic Test" on page 32 procedures.

Table 9 Performance Test failure Troubleshooting information

Failed test	Probable faulty board assembly		
	A11 Source Board	A6 Receiver Board	Test Head
Frequency Accuracy	###		
Power Level Accuracy	###		##
Impedance Measurement Accuracy	##	###	###

2
Post Repair Procedure

This chapter lists the procedures required to verify the E4982A operation after an assembly is replaced with a new one.

Post Repair Procedures

Table 10 lists the required procedures that must be performed after the replacement of an assembly. These are the recommended minimum procedures to ensure that the replacement is successfully completed.

Table 10 Post Repair Procedures

Replaced Assembly or Part	Required Adjustment Correction Constants (CC)	Verification
A11 Source Board	Perform the following required adjustments using "A11 Source Board" in Spot Adjustment of the program.	Troubleshooting Using Diagnostic Test 32 Perform the following Performance Test: Frequency Accuracy Test Power Level Accuracy Impedance Measurement Accuraacy
A6 Receiver Board	Perform the following required adjustments using "A6 Receiver Board" in Spot Adjustment of the program.	Troubleshooting Using Diagnostic Test 32 Perform the following Performance Test: Power Level Accuracy Impedance Measurement Accuracy
Test Head Module	Perform the following required adjustments using "Test Head" in Spot Adjustment of the program.	Troubleshooting Using Diagnostic Test 32 Perform the following Performance Test: Power Level Accuracy
A51 DSP Board	Perform the following required adjustments using "A51 DSP Board" in Spot Adjustment of the program.	Troubleshooting Using Diagnostic Test 32 Inspect the Booting Process
Hard Disk Drive	Perform the following required adjustments using "HDD" in Spot Adjustment in the program.	Inspect the Booting Process

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