

**Agilent E5061B Network Analyzers**

# **Service Guide**

**First Edition**



**Manufacturing No. E5061-90105**

**October 2009**

---

## Notices

The information contained in this document is subject to change without notice.

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Agilent Technologies.

Microsoft®, MS-DOS®, Windows®, Visual C++®, Visual Basic®, VBA® and Excel® are registered

UNIX is a registered trademark in U.S. and other countries, licensed exclusively through X/Open Company Limited.

Portions ©Copyright 1996, Microsoft Corporation. All rights reserved.

© Copyright 2009 Agilent Technologies

---

## 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.

October 2009      First Edition

---

## Safety Summary

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. Agilent Technologies assumes no liability for the customer's failure to comply with these precautions.

---

<b>NOTE</b>	The E5061B complies with INSTALLATION CATEGORY II as well as POLLUTION DEGREE 2 in IEC61010-1. The E5061A/E5062A is an INDOOR USE product.
<b>NOTE</b>	The LEDs in the E5061B are Class 1 in accordance with IEC60825-1, CLASS 1 LED PRODUCT
<b>NOTE</b>	This equipment is MEASUREMENT CATEGORY I (CAT I). Do not use for CAT II, III, or IV.
<b>NOTE</b>	This equipment is tested with stand-alone condition or with the combination with the accessories supplied by Agilent 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.

---

- **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 an Agilent 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.**

- Do not connect the measuring terminals to mains.

---

## Safety Symbol

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.



Frame (or chassis) terminal. A connection to the frame (chassis) of the equipment which normally include all exposed metal structure.



Stand-by.

---

**WARNING**

---

**This warning sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.**

---

**CAUTION**

---

This Caution sign denotes a hazard. It calls attention to a procedure, practice, condition 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.

---

**NOTE**

---

Note denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.



---

## **Certification**

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent 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 to the calibration facilities of other International Standards Organization members.

---

## **Documentation Warranty**

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

---

## **Exclusive Remedies**

The remedies provided herein are buyer's sole and exclusive remedies. Agilent Technologies shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

---

## **Assistance**

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

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

---

## Typeface Conventions

<b>Sample (bold)</b>	Boldface type is used when a term is defined or emphasised.
<i>Sample (Italic)</i>	Italic type is used for emphasis.
<span style="border: 1px solid black; padding: 2px;">Sample</span> key	Indicates a hardkey (key on the front panel or external keyboard) labeled “Sample.” “key” may be omitted.
<b>Sample</b> menu/button/box	Indicates a menu/button/box on the screen labeled “Sample” which can be selected/executed by clicking. “menu,” “button,” or “box” may be omitted.
<b>Sample</b> block/toolbar	Indicates a block (group of hardkeys) or a toolbar (setup toolbar) labeled “Sample.”
<b>Sample 1 - Sample 2 - Sample 3</b>	Indicates a sequential operation of <b>Sample 1</b> , <b>Sample 2</b> , and <b>Sample 3</b> (menu, button, or box). “-” may be omitted.

**1. General Information**

Precautions . . . . .	14
Software Installed . . . . .	14
Organization of Service Guide . . . . .	15
Instrument Covered by This Manual . . . . .	17
Required Equipment . . . . .	18
Power Meter Accuracy Test . . . . .	20

**2. Performance Tests**

Introduction. . . . .	26
Test Equipment Required . . . . .	27
Individual Test Description. . . . .	28
1. Frequency Accuracy Test . . . . .	28
2. RF Output Level Accuracy and Flatness Test. . . . .	29
3. RF Output Level Linearity Test . . . . .	30
4. Trace Noise Test . . . . .	31
5. Crosstalk & System Dynamic Range Test . . . . .	32
6. Dynamic Accuracy Test . . . . .	33
7. Uncorrected System Performance Test . . . . .	34
8. LF Output Level Accuracy & Flatness Test (Option 3L5) . . . . .	35
9. LF Output Level Linearity Test (Option 3L5) . . . . .	36
10. DC Bias Accuracy Test (Option 3L5). . . . .	37
11. Crosstalk & Noise Level Test (Option 3L5) . . . . .	38
12. Input Impedance Test (Option 3L5) . . . . .	39
13. Absolute Amplitude Accuracy Test (Option 3L5) . . . . .	40
14. Magnitude Ratio/Phase Dynamic Accuracy Test (Option 3L5) . . . . .	41
15. Magnitude Ratio/Phase Frequency Response Test (Option 3L5) . . . . .	42
16. Trace Noise Test (Option 3L5) . . . . .	43
17. DC Measurement Accuracy Test (Option 3L5) . . . . .	44

**3. Adjustment**

Safety Considerations . . . . .	46
Warm-up for Adjustment . . . . .	46
Required Equipment . . . . .	46
Required Adjustment after Replacing Assembly . . . . .	47
Writing ID . . . . .	48
Oven Reference Adjustment . . . . .	48
Frequency Reference Adjustment . . . . .	48
Local Gain Adjustment . . . . .	48
Receiver Absolute Gain Rch Adjustment . . . . .	48
Mixer Local Leakage Adjustment. . . . .	48
Synthesizer Gain Adjustment . . . . .	49
Source Output Power Adjustment. . . . .	49
DC Bias Adjustment . . . . .	49
Receiver IF Range Adjustment . . . . .	49
Receiver Ports Characteristics Adjustment. . . . .	49
Receiver Absolute Gain Tch Adjustment . . . . .	50
Receiver Absolute Gain LF Adjustment . . . . .	50

---

# Contents

Source Output Power Adjustment . . . . .	50
DC Level Monitor Adjustment . . . . .	50
<b>4. Troubleshooting</b>	
Introduction . . . . .	52
How to exit from the E5061B Measurement View . . . . .	53
To Troubleshoot the Instrument . . . . .	54
Primary Trouble Isolation . . . . .	54
No Display Troubleshooting . . . . .	56
Booting Process Troubleshooting . . . . .	59
Troubleshooting Using Diagnostic Test . . . . .	64
Power On Self Test . . . . .	64
PLL unlock . . . . .	64
Contents of the diagnostic test . . . . .	64
Test equipment required for diagnostic test . . . . .	65
To Execute the Diagnostic Test . . . . .	65
Program Overall . . . . .	66
Diagnostic Test Failure Troubleshooting . . . . .	67
Function Specific Troubleshooting . . . . .	69
To Check the Device Driver . . . . .	70
To Check the Front Panel . . . . .	71
To Check the Touch Panel . . . . .	72
To Check the LCD . . . . .	73
To Check the External Keyboard . . . . .	73
To Check the Mouse . . . . .	73
To Check the Video output . . . . .	74
To Check the External Trigger Input . . . . .	74
To Check the GPIB . . . . .	74
To Check the USB . . . . .	74
Performance Test failure Troubleshooting . . . . .	75
Recommended adjustment for Performance Test failure . . . . .	75
Performance Test failure Troubleshooting . . . . .	77
<b>5. Replaceable Parts</b>	
Ordering Information . . . . .	80
Direct Mail Order System . . . . .	80
Exchange Assemblies . . . . .	80
Replaceable Parts List . . . . .	81
<b>6. Replacement Procedure</b>	
Replacing an Assembly . . . . .	84
Required Tools . . . . .	85
Outer Cover Replacement . . . . .	86
Tools Required . . . . .	86
Removal Procedure . . . . .	86
Replacement Procedure . . . . .	86
Front Panel Replacement . . . . .	88
Tools required . . . . .	88

Removal Procedure . . . . .	88
Replacement Procedure . . . . .	88
Hard Disk Assembly Replacement . . . . .	90
Tools Required . . . . .	90
Removal Procedure . . . . .	90
Replacement Procedure . . . . .	90
Power Supply Assembly Replacement . . . . .	92
Tools Required . . . . .	92
Removal Procedure . . . . .	92
Replacement Procedure . . . . .	92
A50 CPU Module Replacement . . . . .	94
Tools Required . . . . .	94
Removal Procedure . . . . .	94
Replacement Procedure . . . . .	94
24 Bit I/O Assembly Replacement . . . . .	96
Tools Required . . . . .	96
Removal Procedure . . . . .	96
Replacement Procedure . . . . .	96
DSP Assembly Replacement . . . . .	98
Tools Required . . . . .	98
Removal Procedure . . . . .	98
Replacement Procedure . . . . .	98
A9 LF Source Bias Module Replacement . . . . .	100
Tools Required . . . . .	100
Removal Procedure . . . . .	100
Replacement Procedure . . . . .	100
A2 Receiver Module Replacement . . . . .	102
Tools Required . . . . .	102
Removal Procedure . . . . .	102
Replacement Procedure . . . . .	102
A1 Source Module Replacement . . . . .	104
Tools Required . . . . .	104
Removal Procedure . . . . .	104
Replacement Procedure . . . . .	104
A10 Analog Mother Board Replacement . . . . .	106
Tools Required . . . . .	106
Removal Procedure . . . . .	106
Replacement Procedure . . . . .	106
Ref Oven (Opt. 1E5) Replacement . . . . .	108
Tools Required . . . . .	108
Removal Procedure . . . . .	108
Replacement Procedure . . . . .	108
Fan Assembly Replacement . . . . .	110
Tools Required . . . . .	110
Removal Procedure . . . . .	110
Replacement Procedure . . . . .	110
Angle (Fan Assembly) Replacement . . . . .	112
Tools Required . . . . .	112
Removal Procedure . . . . .	112

---

# Contents

Replacement Procedure . . . . .	112
Touch Screen Control Board Replacement . . . . .	113
Tools Required . . . . .	113
Removal Procedure. . . . .	113
Replacement Procedure . . . . .	113
Inverter Board Replacement. . . . .	114
Tools Required . . . . .	114
Removal Procedure. . . . .	114
Replacement Procedure . . . . .	114
Power Switch Assembly Replacement. . . . .	116
Tools Required . . . . .	116
Removal Procedure. . . . .	116
Replacement Procedure . . . . .	116
A52 Front Panel Interface Board / Key Pad Replacement . . . . .	118
Tools Required . . . . .	118
Removal Procedure. . . . .	118
Replacement Procedure . . . . .	118
LCD Assembly Replacement . . . . .	120
Tools Required . . . . .	120
Removal Procedure. . . . .	120
Replacement Procedure . . . . .	120
Front Frame Replacement . . . . .	122
Tools required . . . . .	122
Removal Procedure. . . . .	122
Replacement Procedure . . . . .	122
Handle Assembly Replacement . . . . .	124
Tools required . . . . .	124
Removal Procedure. . . . .	124
Replacement Procedure . . . . .	124
<b>7. Post-Repair Procedures</b>	
Post-Repair Procedures . . . . .	128
<b>A. Manual Changes</b>	
Manual Changes . . . . .	132
<b>B. System Recovery</b>	
System Recovery . . . . .	134
<b>C. Firmware Update</b>	
Firmware Update . . . . .	136
Required Equipment . . . . .	136
How to update the E5061B firmware . . . . .	136
<b>D. Power Requirement</b>	
Preparation for Power Supply . . . . .	138
Power Requirements . . . . .	138
Power Cable . . . . .	138

Turning the Power ON and OFF ..... 140  
    Turning the power ON ..... 140  
    Turning the power OFF ..... 140

**E. Messages**

Error Messages ..... 143  
    Warning Message ..... 143





---

# 1 General Information

The Service Guide is a guide to servicing the E5061B RF Network Analyzer. The guide contains information requisite to do performance tests, adjustments, troubleshooting, and repairs.

## Precautions

This section describes cautions that must be observed in operating the E5061B.

### Software Installed

The Windows operating system installed in this machine is customized for more effective operation, and has different functions that are not part of the Windows operating system for ordinary PCs (personal computers).

Therefore, do not attempt to use the system in ways other than those described in this manual as doing so may cause malfunctions.

Also note the followings.

- Do not update the Windows operating system installed in this machine to the Windows operating system for ordinary PCs. Doing so will cause malfunctions.
- Do not attempt to update VBA (Visual Basic for Applications) software installed in this machine to its equivalent developed for ordinary PCs. Doing so will cause malfunctions.
- Do not allow any computer virus to infect the system. This machine has no virus check function nor anti-virus software installed.

Agilent Technologies will not be held liable for any failure or damage arising from negligence regarding these prohibitions and warnings.

---

#### NOTE

If the pre-installed software is damaged somehow, resulting in errant behavior by the machine, perform a system recovery. For further details of system recovery, refer to Appendix B.

---

---

## Organization of Service Guide

Tabs are used to divide the major chapter and appendix of this manual. The contents of each chapter and appendix in this manual is as follows;

### Chapter 1 , “General Information,”

The Service Guide is a guide to servicing the E5061B RF Network Analyzer. The guide contains information requisite to do performance tests, adjustments, troubleshooting, and repairs.

### Chapter 2 , “Performance Tests,”

This chapter provides information on how to verify the E5061B performance.

### Chapter 3 , “Adjustment,”

This chapter provides the adjustment information for the E5061B to ensure that it is within its specifications. The adjustment must be performed by Agilent’s qualified service personnel. If you need the adjustment for your E5061B, it should be sent to the nearest Agilent Technologies service office.

### Chapter 4 , “Troubleshooting,”

This chapter provides the procedure to isolate a faulty assembly in the E5061B.

### Chapter 5 , “Replaceable Parts,”

This chapter contains information for ordering replacement parts for the E5061B.

### Chapter 6 , “Replacement Procedure,”

This chapter provides procedure for removing and replacing the major assemblies in the E5061B.

### Chapter 7 , “Post-Repair Procedures,”

This chapter lists the procedures required to verify the E5061B operation after an assembly is replaced with a new one.

### Appendix A , “Manual Changes,”

This appendix contains the information required to adapt this manual to versions or configurations of the E5061B manufactured earlier than the current printing date of this manual. The information in this manual applies directly to E5061B units with the serial number that is printed on the title page of this manual.

### Appendix B , “System Recovery,”

This appendix describes how to recover the operating system (Windows XP) when the operating system has been damaged.

### Appendix C , “Firmware Update,”

This appendix describes how to update the E5061B firmware. When you want to update the E5061B firmware, refer to this appendix.

General Information  
**Organization of Service Guide**

Appendix D , “Power Requirement,”

Appendix E, “Messages,”

The E5061B can display error messages as well as messages that indicate the internal operating status of the equipment. This appendix explains what these messages mean. They are listed in alphabetical order.

---

## Instrument Covered by This Manual

Agilent Technologies uses a two-part, ten-character serial number label (See Figure 1-1) attached to the instrument's rear panel. The first five characters are the serial prefix and the last five digits are the suffix.

Figure 1-1

### Serial Number Label Example



An instrument manufactured after the printing date of this manual may have serial number prefix that is not listed on the title page. This unlisted serial number prefix indicates the instrument is different from those described in this manual. The manual for this new instrument may be accompanied by a yellow Manual Changes supplement or have a different manual part number. This sheet contains “change information” that explains how to adapt the manual to the newer instrument.

In addition to change information, the supplement may contain information for correcting errors (Errata) in the manual. To keep this manual as current and accurate as possible, Agilent Technologies recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is identified by this manual's printing data and is available from Agilent Technologies. If the serial prefix or number of an instrument is lower than that on the title page of this manual, see Appendix A, Manual Changes. For information concerning, a serial number prefix that is not listed on the title page or in the Manual change supplement, contact the nearest Agilent Technologies office.

## Required Equipment

Table 1-1 lists the recommended equipment for performing maintenance on the E5061B.

**Table 1-1 Recommended Test Equipment**

Equipment	Recommended Model	Qty.	Use <sup>*1</sup>
Frequency Counter	Agilent 53181A with option 010 & Opt.030 <sup>*2</sup>	1	P,A
Power Meter	Agilent E4419B	1	P,A
Power Sensor	Agilent 8482A	1	P,A
Multimeter	Agilent 3458A	1	P,A
Dynamic Accuracy Test Kit	Agilent Z5623A with Opt. H01	1	P
Attenuator/Switch Driver	Agilent 11713A	1	P
Step Attenuator	Agilent 8496G with Opt 001 & Opt.H60	1	P
Calibration Kit	Agilent 85032F	1	P,A
Power Splitter	Agilent 11667A	1	P,A
6 dB Fixed Attenuator	Agilent 8491A with Opt 006/Opt.H60	1	P
10 dB Fixed Attenuator	Agilent 8491A	1	P,A
Feedthrough	Agilent p/n 04192-61002	2	P,A
BNC Tee	Agilent p/n 1250-0781	1	P,A
Dual Banana	Agilent p/n 1251-2277	1	P,A
Short	Agilent p/n 5063-0278	2	P,A
	Agilent p/n 85032-60008	2	P,A
	Agilent p/n 85032-60009	2	P,A
Cable	Agilent p/n 8120-8862	1	P,A
	Agilent p/n 5062-6691	2	P
	Agilent p/n 8120-1838	4	P,A
	Agilent p/n 8120-1839	1	P,A
	Agilnet p/n 8120-1840	1	P,A

**Table 1-1 Recommended Test Equipment**

Equipment	Recommended Model	Qty.	Use* <sup>1</sup>
Adapter	Agilent p/n 1250-0780	5	P
	Agilent p/n 1250-0077	1	P
	Agilent p/n 1250-1473	1	P
	Agilent p/n 1250-1474	1	P
	Agilent p/n 1250-2879	2	P
Torque Wrench	Agilent p/n 8710-1766	1	P,A
USB/GPIB Interface	Agilent 82357A	1	P,A
Personal Computer with GPIB board		1	P,A

\*1. P: Performance Tests, A: Adjustment.

\*2. Opt.050 and Opt.124 can be substituted for Opt.030. In this case, a N(m) -BNC(f) adapter is necessary.

**Table 1-2 Alternative Test Equipment**

Equipment	Model	Qty.	Use* <sup>1</sup>
Frequency Counter	Agilent 53131A/132A with Opt.010 and 030* <sup>2</sup>	1	P,A
Feedthrough	Agilent 10100C	1	P,A
Cable	Agilent p/n 5062-6691	1	P,A
Short	Agilent 11512A	2	P
	Agilent p/n 85032-60016	2	P

\*1. P: Performance Tests, A: Adjustment, T: Troubleshooting

\*2. Opt.050 and Opt.124 can be substituted for Opt.030. In this case, a N(m)-BNC(f) adapter is necessary.

### Power Meter Accuracy Test

This test is intended for power meters used in testing the E5061B. The “Dynamic Accuracy Test” requires the use of a power meter that has been calibrated to a higher accuracy than the standard power meter.

Power meters with options G12 and H12 specify an improved instrument accuracy over a limited power range. (These power meters do not contain unique hardware.) A power meter may be returned to the factory to have one of these options added to an existing power meter or to renew the calibration for one of these options.

This test procedure is an alternative to returning the power meter to the factory. When a power meter passes this test, it is considered to be *calibrated* for the G12 or H12 option even though it has not been returned to the factory.

#### Power Meters That Can Be Tested Using This Procedure

This procedure assume that the E4419B power meter is being tested.

---

**NOTE**

It is recommended that the revision number for the power meter “Main Firmware” be Ax.03.00 or higher.

---

#### Equipment Used for the Power Meter Accuracy Test

Equipment Type	Recommended Model or Part Number	Alternate Model or Part Number
Range calibrator	Agilent 11683A	None
Precision digital voltmeter	Agilent 3458A	Any with the required accuracy and resolution *1
Power sensor cable	Agilent 11730A, p/n 8120-8319	Any equivalent
Cable, BNC, 50 Ω	Any	Any
Adapter for connecting BNC cable to DVM inputs	Any	Any

\*1. Required accuracy and resolution at the following voltage levels:  
 14 mV input: 0.0100% accuracy, 10 nV resolution  
 0.14 V input: 0.0050% accuracy, 100 nV resolution  
 0.45 V input: 0.0030% accuracy, 100 nV resolution

#### Description of the Test

The power meter accuracy is verified for various power inputs and the actual readings are recorded in a test record. A range calibrator is used to provide the reference inputs.

---

**NOTE**

It is recommended that a copy of the test record on page 24 be made, and the values be recorded on the copy, thus preserving the original for future use.

---

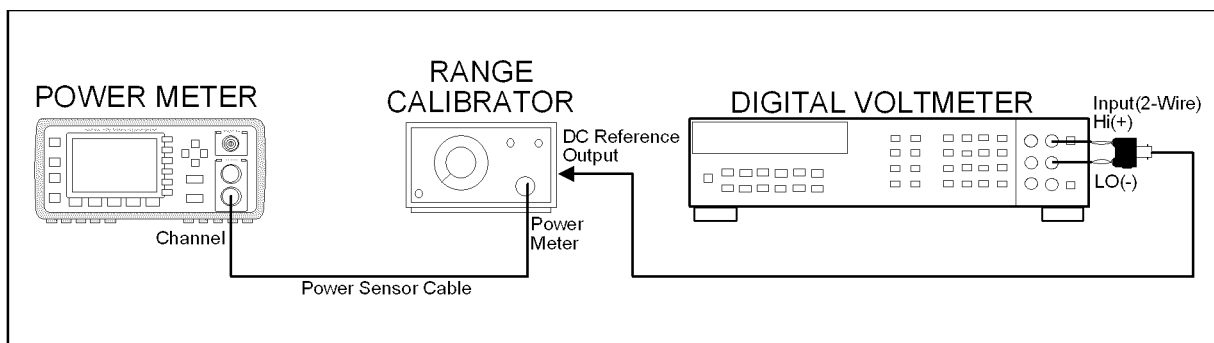


### Test Procedure

**NOTE** This procedure assumes the use of the recommended equipment model numbers. The actual step required, therefore, may differ for other model numbers of equipment used.

- Step 1.** Setup the equipment as shown in Figure 1-2.
- Connect the DC REFERENCE OUTPUT connector on the rear panel of the range calibrator to the DVM voltage input.
  - Connect the POWER METER output of the range calibrator to the input of the power meter being tested.
  - Switch on the power to the power meter, the range calibrator, and the digital voltmeter.

**Figure 1-2 Setup for the Power Meter Accuracy Test**



e5061ase037

- Step 2.** Press the power meter: Press **[Preset/Local]**, then **Confirm**.
- Step 3.** Perform the following steps for each channel on the power meter:
- Set to read in dBm: Press **[dBm/W]**, then **dBm**.
  - Set the ref cal factor to 100%: Press **[Zero/Cal]**, **Cal**, **A/B Ref CF**, then set to **100.0**, if necessary.
  - Set the cal factor to 100%: Press **[Frequency/Cal Fac]**, **A/B Cal Fac**, then set to **100.0**, if necessary.
  - Set readout to 0.001 dBm: Press **[Meas Setup]**, then **Resolution 1234**, to highlight **4**.
  - Set filter step detect on and filter length to 512: Press **[System/Inputs]**, channel **A or B Input Setting**, **[More]**, **Ch A/B Filter**, **Step Det On**, **Filter On**, **Mode MAN**, **Length**, then set the filter length to **512**.
- Step 4.** Setup the digital voltmeter (DVM) as follows:
- Reset the DVM: Press the **blue key** followed by **Reset**.
  - Set the sample period to a value greater than one second: Press **NPLC**, **5**, **0**, then **Enter**.
- Step 5.** Set the range calibrator controls as follows:
- POLARITY: NORMAL
  - RANGE: 1 mW

General Information  
Required Equipment

- FUNCTION: CALIBRATE

**Step 6.** Allow the equipment to warm up for approximately 30 minutes. Do not change any connections or control setting during this time.

**Step 7.** Zero and calibrate the power meter channel to which the range calibrator is connected:

- a. The range calibrator's RANGE switch should be set to 1 mW.
- b. Set the range calibrator's FUNCTION switch to STANDBY.
- c. Press [**Zero/Cal**], then **Zero A** or **Zero B** (as appropriate). Wait for the operation to complete.
- d. Set the range calibrator's FUNCTION switch to CALIBRATE.
- e. Press [**Zero/Cal**], **Cal**, then **Cal A** or **Cal B** (as appropriate). Wait for the operation to complete.

**Step 8.** Monitor the drift rate of the power meter reading: Five minutes following calibration, the meter must read 0.001, 0.000, or -0.001 dBm. If the power meter reading is not one of these values, allow additional warm up time, then check the drift rate again. The range calibrator must remain connected to the power meter during this warm up time.

**Step 9.** Zero and calibrate the power meter channel to which the range calibrator is connected:

---

**NOTE**

After a channel on the power meter is calibrated, do not allow more than 5 minutes to elapse before completing the remaining measurement steps for that channel.

- a. The range calibrator's RANGE switch should be set to 1 mW.
- b. Set the range calibrator's FUNCTION switch to STANDBY.
- c. Press [**Zero/Cal**], then **Zero A** or **Zero B** (as appropriate). Wait for the operation to be completed.
- d. Set the range calibrator's FUNCTION switch to CALIBRATE.
- e. Press [**Zero/Cal**], **Cal**, then **Cal A** or **Cal B** (as appropriate). Wait for the operation to complete.

**Step 10.** Record the DVM voltage reading as value A in the test record on page 24.

---

**NOTE**

All DVM readings in this procedure should be recorded showing five significant digits.

**Step 11.** The reading on the power meter should be  $0.000 \pm 0.001$  dBm.

**Step 12.** Switch the range calibrator RANGE to 300  $\mu$ W.

**Step 13.** Record the DVM voltage reading as value B in the test record.

**Step 14.** Wait for the power meter reading to settle (no settling drift within 20 seconds).

**Step 15.** Record the power meter reading as value C in the test record.

**Step 16.** Switch the range calibrator RANGE to 100  $\mu$ W.

**Step 17.** Record the DVM voltage reading as value D in the test record.

**Step 18.** Wait for the power meter reading to settle (no settling drift within 20 seconds).

- Step 19.** Record the power meter reading as value E in the test record.
- Step 20.** If testing a dual-channel power meter, perform Step 7 through Step 19 for the other channel.
- Step 21.** Perform the pass/fail calculations indicated on the test record.

---

**NOTE**

If a channel of the power meter does not pass this test, the power meter cannot be used in applications that require Option G12 or H12. There are no adjustments that can be performed to improve the performance of the power meter. Typically, replacing the A6 measurement assembly associated with the failed channel will correct the problem.

---

General Information  
**Required Equipment**

**TEST RECORD FOR POWER METER ACCURACY TEST**

<b>Power Meter Tested</b>			
Model Number:		Test Date:	
Serial Number:		Tested by:	

**Test Equipment Used**

<b>Range Calibrator: Model No.:</b>		Serial No.:	
<b>Digital Voltmeter: Model No.:</b>		Serial No.:	

**Test Results**

Range Calibrator: Setting	Channel A		Channel B	
	DVM Reading (Vdc)	Power Meter Reading (dBm)	DVM Reading (Vdc)	Power Meter Reading (dBm)
1 mW	A=	0.00±0.001	A=	0.00±0.001
300 µW	B =	C =	B =	C=
100 µW	D =	E=	D =	E =

**Pass/Fail Calculation**

300 µW	$R=B/A =$ $S=10^{(C/10)} =$ $\% \text{ ERROR} = ((R-S)/R) \times 100 =$ Limits: ±0.13% Pass __ Fail __	$R=B/A =$ $S=10^{(C/10)} =$ $\% \text{ ERROR} = ((R-S)/R) \times 100 =$ Limits: ±0.13% Pass __ Fail __
100 µW	$T=D/A =$ $U=10^{(E/10)} =$ $\% \text{ ERROR} = ((T-U)/T) \times 100 =$ Limits: ±0.10% Pass __ Fail __	$T=D/A =$ $U=10^{(E/10)} =$ $\% \text{ ERROR} = ((T-U)/T) \times 100 =$ Limits: ±0.10% Pass __ Fail __

---

## **2 Performance Tests**

This chapter provides information on how to verify the E5061B performance.

---

## Introduction

The performance tests for Agilent E5061B make up the VEE performance test software program. The performance test names are listed in Table 2-1.

---

**NOTE** Allow the analyzer to warm up for at least 30 minutes before you execute any of the performance tests.

Perform all performance tests in an ambient temperature of  $23 \pm 5$  °C

---

**NOTE** The performance tests should be performed periodically. The recommended test interval is 12 months.

The test interval depends on maintenance of use and the environmental conditions under which the instrument is used. You may find that the interval could be shortened or lengthened; however, such a decision should be based on substantial quantitative data.

---

**Table 2-1 List of the E5061B performance tests**

Para.	Title
1	Frequency accuracy test
2	RF output level accuracy and flatness test
3	RF output level linearity test
4	Trace noise test
5	Crosstalk test & system dynamic range test
6	Dynamic accuracy test
7	Uncorrected system performance test
8	LF output level accuracy & flatness test (Opt 3L5)
9	LF output level linearity test (Opt 3L5)
10	DC bias accuracy test (Opt. 3L5)
11	Crosstalk & noise level test (Opt 3L5)
12	Input impedance test (Opt 3L5)
13	Absolute amplitude accuracy test (Opt 3L5)
14	Magnitude ratio/phase dynamic accuracy test (Opt 3L5)
15	Magnitude ratio/phase frequency response test (Opt 3L5)
16	Trace noise test (Opt 3L5)
17	DC measurement accuracy test (Opt 3L5)

## Test Equipment Required

The required equipment for the performance test is listed on Table 1-1 and Table 1-2. Use only calibrated equipment when doing the performance test.

## Individual Test Description

### 1. Frequency Accuracy Test

#### Description

This test checks the frequency accuracy of the E5061B test port output signal. The frequency accuracy is checked at several frequencies with a frequency counter. Since the E5061B employs a PLL frequency synthesizer for the signal source, and the frequency accuracy test at these frequency points can verify the accuracy for the entire frequency range.

#### Test equipment

Frequency Counter	Agilent 53181A with Opt. 010 and 030
BNC cable, 122 cm	Agilent p/n 8120-1840
N(m)-BNC(f) adapter	Agilent p/n 1250-0780



## 2. RF Output Level Accuracy and Flatness Test

### Description

This test checks the level accuracy and frequency flatness of the E5061B test port output signal. The level accuracy is checked for an output power level setting of 0 dBm at 50 MHz using a power meter and a multimeter.

The frequency flatness is tested by measuring the power level at the following frequency points and calculating the differences of the power meter readings from the level at 50 MHz.

@50 MHz measurement point: Measure with absolute.

@Other measurement point: Measure with relative value (flatness) based on 50 MHz measurement point.

### Test equipment

Power meter	Agilent E4419B
Power sensor	Agilent 8482A
Multimeter	Agilent 3458A
50 Ohm feedthrough	Agilent p/n 04192-61002
Dual Banana-BNC(f)	Agilent p/n 1251-2277
N(m)-BNC(f) adapter	Agilent p/n 1250-0780
BNC Cable, 122cm,	Agilent p/n 8120-1840

### 3. RF Output Level Linearity Test

#### Description

This test checks the level accuracy of the E5061B test port output signal across the specified level range. The RF output level is measured for power level settings of -10 dBm to 10 dBm in 2.5 dB step increments at 5 Hz (Opt 3L5), 100kHz, 50 MHz, 1.5 GHz, and 3 GHz .

#### Test equipment

Power meter	Agilent E4419B
Power sensor	Agilent 8482A
Multimeter	Agilent 3458A
50 Ohm feedthrough	Agilent p/n 04192-61002
Dual Banana-BNC(f)	Agilent p/n 1251-2277
N(m)-BNC(f) adapter	Agilent p/n 1250-0780
BNC Cable, 122cm,	Agilent p/n 8120-1840

## 4. Trace Noise Test

### Description

This test checks the trace noise level for each test port of the E5061B. The trace noise level for S21 and S12 is quantified by performing a "through" measurement 32 times at 100 kHz to 3 GHz frequency range, with a cable connected between two test ports. For S11 and S22 are quantified by performing a "Short" measurement 32 times at 100 kHz to 3 GHz frequency range, with a cable (terminated with "Short" device) connected to each ports (1 and 2). Standard deviation of the measured values at each frequency is calculated and, then translated into a noise level expressed in dB rms / deg rms.

### Test equipment

SMA cable, 50 cm	Agilent p/n 5062-6691
N(f) Short Termination	Agilent p/n 85032-60009
N(m)-SMA(f) Adapter	Agilent p/n 1250-2879

## 5. Crosstalk & System Dynamic Range Test

### Description

The crosstalk test checks the crosstalks between test ports of the E5061B and system dynamic range for the E5061B. The crosstalk is tested by performing short-ended "isolation" measurements with the test ports terminated with Type-N "Short" devices. With segment sweep points for a specified frequency range, a swept measurement with the short-ended test ports is repeated 16 times and the measurement data is averaged. The worst crosstalk value in each test frequency range is determined from the peak value of the average data.

The system dynamic range test checks the system dynamic range for the receiver ports of the E5061B. The system dynamic range is tested by performing an "Isolation" measurement 16 times with segment sweep points for specified frequency ranges (same as the crosstalk test). The measurement data for each sweep frequency point is subtracted from the crosstalk data which is measured by the crosstalk test, and calculating the RMS deviation value from the 16 measurement data for each sweep frequency point. The maximum RMS deviation value in each frequency range is extracted to determine the system dynamic range performance.

### Test equipment

50 $\Omega$ N(m) Short termination	Agilent 85032B
------------------------------------	----------------

## 6. Dynamic Accuracy Test

### Description

This test checks the dynamic accuracy of the E5061B. The dynamic accuracy is tested at 1.195 GHz for each receiver port using the Agilent Z5623A (with option H01) Dynamic Accuracy Test Kit. The 1.195 GHz source signal of the E5061B goes through the Z5623A's first attenuator variable from 0 dB to 11 dB in 1 dB steps and second attenuator variable up to 100 dB in 10 dB steps and is measured with the receiver port. The test procedure checks the measured receiver-input power for each 5 dB increment in the range from 10 dBm to 100 dBm. The ratios of the measured receiver-input powers to the reference input level of -10 dBm are calculated and compared to the attenuation values of the Z5623A. The 1.195 GHz signal flow is split with a power splitter present between the two attenuators in the Z5623A and measured with an external power meter to calibrate the attenuated power level.

### NOTE

Since the dynamic accuracy does not have frequency dependence, this test is performed at 1.195 GHz only.

### Test Equipment

Power meter	Agilent E4419B
Power sensor	Agilent 8482A
Dynamic Accuracy Test Kit	Agilent Z5623A w/Opt. H01
6 dB fixed attenuator (for opt. 150/250)	Agilent 8491A w/Opt. 006 and H60
50 $\Omega$ N(m)-N(m) Cable 60 cm, 2 ea.	Agilent p/n 8120-8862)

## 7. Uncorrected System Performance Test

### Description

This test checks the directivity, source match, load match, transmission tracking, and reflection tracking which are the key S-parameter measurement hardware characteristics. These characteristics are tested using the Agilent 85032F Calibration Kit at 5 Hz to 3 GHz. After an enhanced response calibration performed for each test port, the test software is executed to output the directivity, source match transmission tracking, and reflection tracking data. The load match for a response port is measured by a stimulus (source) port performed a 1-port calibration.

### Test Equipment

Calibration Kit	Agilent 85032F
N(m)-N(m) cable, 60 cm	Agilent p/n 8120-8862

## 8. LF Output Level Accuracy & Flatness Test (Option 3L5)

### Description

This test checks the level accuracy and frequency flatness of the E5061B GP Port output signal (Option 3L5 only). The level accuracy is checked for an output power level setting of 0 dBm at 200 Hz using a power meter and multimeter.

The frequency flatness is tested by measuring the power level at the following frequency points and calculating the differences of the power meter and multimeter readings from the level at 200 Hz.

5 Hz, 200 Hz, 2 kHz, 20 kHz, 80 kHz, 100 kHz, 732.401 kHz, 1.464801 MHz, 3 MHz, 10 MHz, 23.4375M+1 Hz, 30 MHz

@200 Hz measurement point: Measure with absolute.

@Other measurement point: Measure with relative value (Flatness) based on 200 Hz measurement point.

### Test equipment

Power meter	Agilent E4419B
Power sensor	Agilent 8482A
Multimeter	Agilent 3458A
50 Ohm feedthrough	Agilent p/n 04192-61002
Dual Banana-BNC(f)	Agilent p/n 1251-2277
N(m)-BNC(f) adapter	Agilent p/n 1250-0077
BNC Cable, 122cm,	Agilent p/n 8120-1840

## 9. LF Output Level Linearity Test (Option 3L5)

### Description

This test checks the level accuracy of the E5061B GP port output signal across the specified level range (Option 3L5 only). The LF output level is measured for power level settings of -10 dBm to 10 dBm in 2.5 dB step increments at 5 Hz, 200 Hz, 100 kHz, 3 MHz, 30 MHz.

### Test equipment

Power meter	Agilent E4419B
Power sensor	Agilent 8482A
Multimeter	Agilent 3458A
50 Ohm feedthrough	Agilent p/n 04192-61002
Dual Banana-BNC(f)	Agilent p/n 1251-2277
N(m)-BNC(f) adapter	Agilent p/n 1250-0077
BNC Cable, 122cm,	Agilent p/n 8120-1840



## 10. DC Bias Accuracy Test (Option 3L5)

### Description

This test uses a multimeter to measure the actual DC bias voltage from LF out port and port 1.

### Test equipment

Multimeter	Agilent 3458A
Dual Banana-BNC(f)	Agilent p/n 1251-2277
N(m)-BNC(f) adapter	Agilent p/n 1250-0780
BNC Cable, 122cm,	Agilent p/n 8120-1840

## 11. Crosstalk & Noise Level Test (Option 3L5)

### Description

The crosstalk test checks the crosstalks between R and T of the E5061B, and the noise level test for the receiver R and T of the E5061B. The crosstalk is tested by performing short-ended "isolation" measurements with the test channel terminated with type-BNC "Short" devices. With segment sweep points for a specified frequency range, a swept measurement with the short-ended test channel is repeated 16 times and the measurement data is averaged. The worst crosstalk value in each test frequency range is determined from the peak value of the average data.

The noise level test checks the noise level for the receiver between R and T of the E5061B. The noise level is tested by performing an "Isolation" measurement 16 times with segment sweep points for specified frequency ranges (same as the crosstalk test). The measurement data for each sweep frequency point is subtracted from the crosstalk data which is measured by the crosstalk test, and calculating the RMS deviation value from the 16 measurement data for each sweep frequency point. The maximum RMS deviation value in each frequency range is extracted to determine the noise level performance.

### Test equipment

BNC(m) Short termination	Agilent p/n 5063-0278
BNC cable, 30 cm	Agilent p/n 8120-1838

## 12. Input Impedance Test (Option 3L5)

### Description

This test measure the impedance of GP port. 1-Port calibration is performed at port 2 to measured the return loss accurately.

### Test equipment

Calibration Kit	Agilent 85032F
50 $\Omega$ N(m)-N(m) Cable, 60 cm	Agilent p/n 8120-8862
N(f)-BNC(m) Adapter	Agilent p/n 1250-0077

### 13. Absolute Amplitude Accuracy Test (Option 3L5)

#### Description

This test confirm absolute amplitude accuracy using power meter, power sensor and multimeter. Then it compares the E5061B reading with the reading of power meter or the multimeter.

#### Test equipment

Multimeter	Agilent 3458A
Power Meter	Agilent E4419B
Power Sensor	Agilent 8482A
Power Splitter	Agilent 11667A
50 $\Omega$ Feedthrough	Agilent p/n 04192-61002
Dual Banana-BNC(f)	Agilent p/n 1251-2277
BNC Cable, 30 cm	Agilent p/n 8120-1838
BNC Cable, 61 cm, 2ea	Agilent p/n 8120-1839
N(m) -BNC(f) Adapter	Agilent 1250-0780

## 14. Magnitude Ratio/Phase Dynamic Accuracy Test (Option 3L5)

### Description

Dynamic accuracy is a measure of how well a receiver measure the magnitude and phase components of a signal as that signal varies in amplitude over a specified dynamic range. To measure the dynamic accuracy, this test applies a fixed level signal of -25 dBm to the E5061B R port. At the same time, it applies a signal that varies from -5 dBm to -115 dBm to one of the E5061B's T port. It then measures the magnitude ratio from -5 dB to -115 dB and phase of the signals. The signal amplitude at the test input is varied by inserting known attenuation value. The measured magnitude ratio values are then compared to the inserted attenuation's calibrated values.

The phase dynamic accuracy is measured at 1 MHz

### Test equipment

Attenuator/Switch Driver	Agilent 11713A
Step Attenuator	Agilent 8496G w/Opt 001 and Opt H60
10 dB Fixed Attenuator	Agilent 8491A w/Opt 006 and Opt H60
50 $\Omega$ BNC Cable, 30 cm	Agilent p/n 8120-1838
N(m) - BNC(f) Adapter	Agilent p/n 1250-0780
N(m) - BNC(m) Adapter	Agilent p/n 1250-1473
N(f) - BNC(f) Adapter	Agilent p/n 1250-1474

## 15. Magnitude Ratio/Phase Frequency Response Test (Option 3L5)

### Description

This test applies the LF OUT signal to E5061B T and R through a power splitter. It then measures the magnitude ratio and phase of the T/R measurements. The magnitude ratio frequency response is measured as the deviation from the ideal magnitude ratio value to 0 dB. The phase frequency response is measured as the deviation from linear phase

### Test equipment

Power Splitter	Agilent 11667A
50 $\Omega$ Feedthrough	Agilent p/n 04192-61002
BNC Cable, 30 cm	Agilent p/n 8120-1838
N(m) - BNC(f) Adapter	Agilent p/n 1250-0780

## 16. Trace Noise Test (Option 3L5)

### Description

This test checks the trace noise level for T/R of E5061B. The trace noise level for T/R is quantified by performing a “through” measurement 32 times at 5 Hz to 30 MHz frequency range, with a cable connected between two ports. Standard deviation of the measured value at each frequency is calculated and, then translated into a noise level expressed in dB rms / deg rms.

### Test equipment

Power Splitter	Agilent 11667A
50 $\Omega$ Feedthrough	Agilent p/n 04192-61002
BNC Cable, 30 cm	Agilent p/n 8120-1838
N(m) - BNC(f) Adapter	Agilent p/n 1250-0780

## 17. DC Measurement Accuracy Test (Option 3L5)

### Description

This test checks the accuracy of the DC voltage at port 1, T, R and LF Out ports, and the accuracy of the DC current at LF Out port.

### Test equipment

Multimeter	Agilent 3458A
Dual Banana - BNC(f)	Agilent p/n 1251-2277
N(m) - BNC(f) Adapter	Agilent p/n 1250-0780
BNC Tee(m) - (f) - (f)	Agilent p/n 1250-0781
BNC Cable, 30 cm	Agilent p/n 8120-1838
BNC Cable, 61 cm	Agilent p/n 8120-1839



---

## 3 Adjustment

This chapter provides the adjustment information for the E5061B to ensure that it is within its specifications. The adjustment must be performed by Agilent's qualified service personnel. If you need the adjustment for your E5061B, it should be sent to the nearest Agilent Technologies service office.

## Safety Considerations

This manual contains NOTES, CAUTIONs, and WARNINGs that must be followed to ensure the safety of the operator and to keep the instrument in a safe and serviceable condition. The adjustment must be performed by Agilent's qualified service personnel.

---

### WARNING

**Any interruption of the protective ground conductor (inside or outside the equipment) or disconnection of the protective ground terminal can make the instrument dangerous. Intentional interruption of the protective ground system for any reason is prohibited.**

---

---

## Warm-up for Adjustment

Warm-up the E5061B for at least 30 minute before performing any of the following Adjustment procedures to ensure proper results and correct instrument operation.

---

## Required Equipment

Table 1-1 on page 18 lists the equipment required to perform the Adjustment procedures described in this chapter. Use only calibrated test equipment when adjusting the E5061B.

## Required Adjustment after Replacing Assembly

After replacing the following assembly, the adjustment items described in Table 3-1 must be required. The adjustment must be performed by Agilent’s qualified service personnel. If you need the adjustment for your E5061B, it should be sent to the nearest Agilent Technologies service office.

**Table 3-1 Required Adjustment Item after Replacing Assembly**

Adjustment item	Replaced Assembly			
	A1 Source Module	A2 Receiver Module	A9 LF Source Bias Module	Oven
Writing ID				
Oven Reference Adjustment				√
Frequency Reference Adjustment	√			
Local Gain Adjustment	√			
Receiver Absolute Gain Rch Adjustment	√			
Mixer Local Leakage Adjustment		√		
Synthesizer Gain Adjustment	√	√		
Source Output Power Adjustment	√	√	√	
DC Bias Adjustment			√	
Receiver IF Range Adjustment		√		
Receiver Port Characteristics Adjustment	√	√	√	
Receiver Absolute Gain Tch Adjustment	√			
Receiver Absolute Gain LF Adjustment		√		
Source Output Power (Gain-Phase) Adjustment	√		√	
DC Level monitor		√	√	

## Adjustment

### Required Adjustment after Replacing Assembly

#### Writing ID

This item writes the serial number and the option structure into the E5061B.

#### Required equipment for the writing ID

None

#### Oven Reference Adjustment

The purpose of this procedure is to adjust the frequency of the crystal oven on the crystal oven assembly.

#### Required equipment for frequency reference adjustment

Description	Recommended Model
Frequency Counter	Agilent 53131A

#### Frequency Reference Adjustment

The purpose of this procedure is to adjust the 10 MHz frequency reference on the receiver board.

#### Required equipment for frequency reference adjustment

Description	Recommended Model
Frequency Counter	Agilent 53131A

#### Local Gain Adjustment

The purpose of this procedure is to select proper local adjustment attenuator.

#### Required equipment for frequency reference adjustment

None

#### Receiver Absolute Gain Rch Adjustment

The purpose of this procedure is to adjust absolute gain of reference receivers for both ports 1 and 2.

#### Required equipment for frequency reference adjustment

None

#### Mixer Local Leakage Adjustment

The purpose of this procedure is to minimize the leakage of mixer local signal..

#### Required equipment for frequency reference adjustment

None

### Synthesizer Gain Adjustment

The purpose of this procedure is to adjust the synthesizer gain of the source board.

#### Required equipment for the synthesizer gain adjustment

Description	Recommended Model
Power meter	Agilent E4419B
Power Sensor	Agilent 8482A
Multimeter	Agilent 3458A

### Source Output Power Adjustment

The purpose of this procedure is to adjust the RF output power level from source board.

#### Required equipment for the local output power adjustment

None

### DC Bias Adjustment

The purpose of this procedure is to adjust the level of the dc bias..

#### Required equipment for the local output power adjustment

Description	Recommended Model
Multimeter	Agilent 3458A

### Receiver IF Range Adjustment

The purpose of this procedure is to adjust the IF range of the receiver board.

#### Required equipment for the receiver IF range adjustment

None

### Receiver Ports Characteristics Adjustment

The purpose of this procedure is to adjust source match, directivity and tracking.

#### Required equipment for the receiver port characteristics adjustment

Description	Recommended Model
Calibration Kit	Agilent 85032F

## Adjustment

### Required Adjustment after Replacing Assembly

#### Receiver Absolute Gain Tch Adjustment

The purpose of this procedure is to adjust absolute gain of input receivers of both port 1 and 2.

##### Required equipment for the receiver port characteristics adjustment

None

#### Receiver Absolute Gain LF Adjustment

The purpose of this procedure is to adjust absolute gain input of receivers of both R and T.

##### Required equipment for the receiver port characteristics adjustment

Description	Recommended Model
Power meter	Agilent E4419B
Power Sensor	Agilent 8482A
Multimeter	Agilent 3458A

#### Source Output Power Adjustment

The purpose of this procedure is to adjust the LF output level from the source board..

##### Required equipment for the receiver port characteristics adjustment

None

#### DC Level Monitor Adjustment

The purpose of this procedure is to adjust the DC level monitor .

##### Required equipment for the receiver port characteristics adjustment

Description	Recommended Model
Multimeter	Agilent 3458A

---

## **4 Troubleshooting**

This chapter provides the procedure to isolate a faulty assembly in the E5061B.

---

## 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 is 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. Programs or files in the instrument may be broken.

---



---

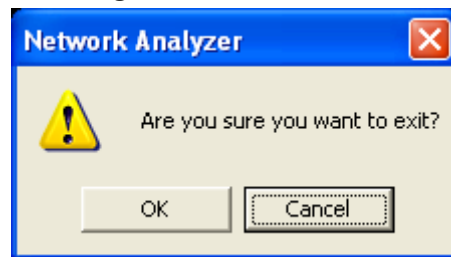
## How to exit from the E5061B Measurement View

You need to exit from the E5061B Measurement View to perform some troubleshooting. The following is the procedure to exit from the E5061B Measurement View.

- Step 1.** Connect the mouse and external keyboard to the connectors on the E5061B rear panel.
- Step 2.** Turn the instrument on.
- Step 3.** Press **System** key.
- Step 4.** Click **Service Menu - Exit**. Exit dialog box is as shown in Figure 4-1.

Figure 4-1

Exit dialog box



- Step 5.** Click **OK** in **Exit** Menu. Then the E5061B exit the Measurement View, then windows desktop screen appears.

---

**NOTE** If you wish to return to the Measurement View, double-click "Network Analyzer" icon.

---

**NOTE** If you need to shut down the E5061B and again turn on, perform in accordance with the following procedure.

- a. To get "Start" menu bar displayed, move the pointer to the bottom of the screen with mouse.
- b. Click "Start" and "Shut Down..." in the pull down menu. "Shut Down Windows" dialog box opens.
- c. Select "Shut down" button in the pull down menu.
- d. Click "OK" button in the dialog box.

## To Troubleshoot the Instrument

This section describes basic procedural flow of troubleshooting when servicing the E5061B. The primary procedural tool in this section is the flowchart. The flowchart contains entire troubleshooting path from a failure symptom to the isolation of faulty assembly, and will direct you to the completion of repair in an ordinary manner through the possible failure symptoms. Reference letters (Yes/No) on the flowcharts point to procedural steps that briefly explain the troubleshooting method to be performed next.

### Primary Trouble Isolation

The primary trouble isolation procedure can be performed without disassembling the E5061B. Figure 4-2 shows the trouble isolation flow chart.

**Step 1.** Turn the instrument power on

About a few minutes after the E5061B is turned on, the measurement view is displayed on the screen. The display on the screen should be similar to Figure 4-12, “Measurement view,” on page 63.

**Step 2.** Check the display

- If no display appears on the LCD after the E5061B is turned on, go to “No Display Troubleshooting” on page 56.
- If the E5061B stops in booting process despite something being displayed on the LCD, go to “Booting Process Troubleshooting” on page 59.
- The power-on self test is performed once automatically after the E5061B measurement view is displayed. If the power-on self test fails, go to “Troubleshooting Using Diagnostic Test” on page 64.

**Step 3.** Check the basic function

If the front-panel/keyboard/mouse controls, LCD display, data storage, remote interface or another function (except for measurement part) does not work correctly, go to “Function Specific Troubleshooting” on page 69.

**Step 4.** Check the measurement function

If the instrument fails performance tests, go to “Performance Test failure Troubleshooting” on page 75.

If the measurement function does not work correctly, perform the diagnostic test provided in the E5061B's service function. When the diagnostic test fails, go to “Diagnostic Test Failure Troubleshooting” on page 67.

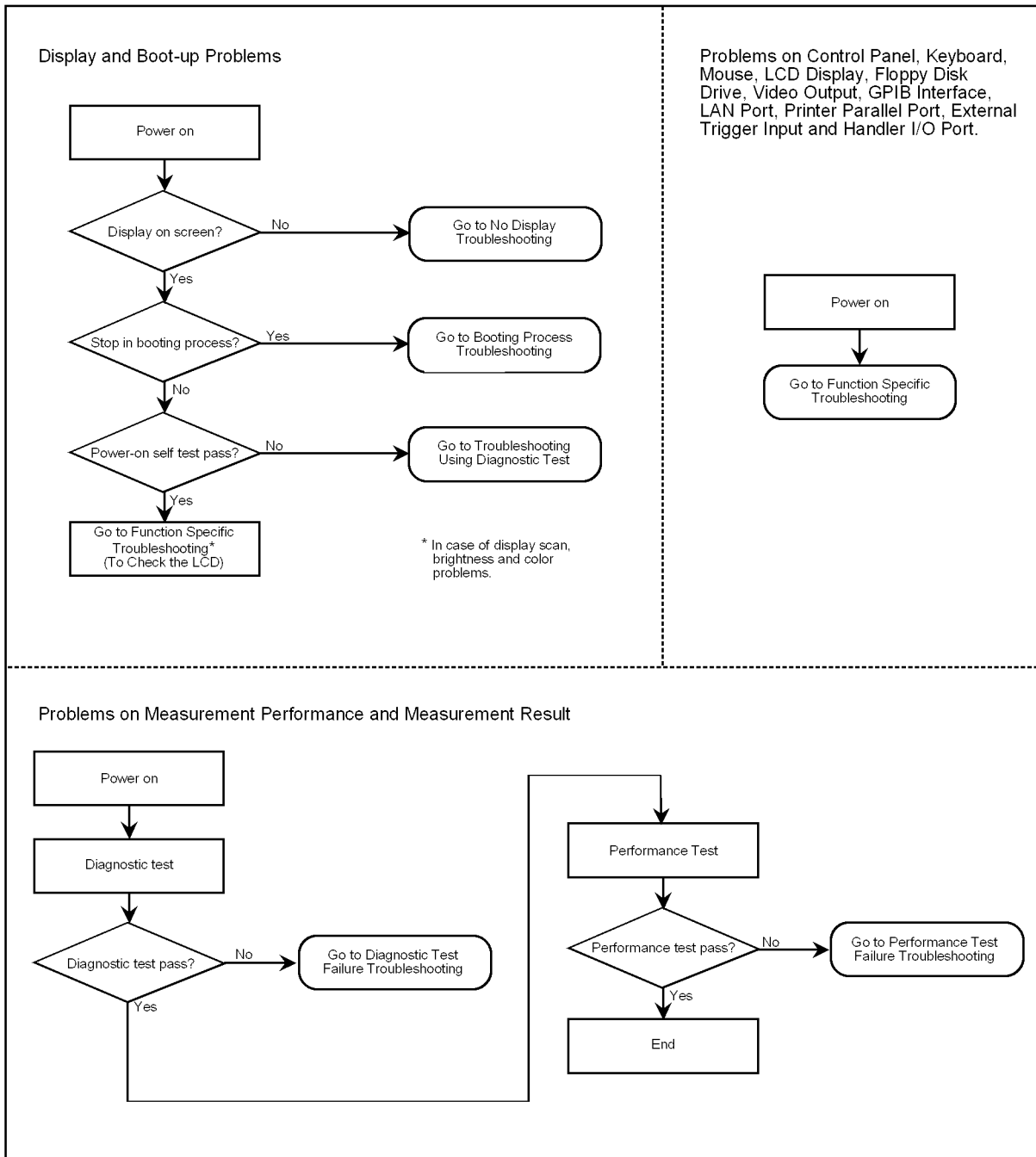
---

**NOTE**

The diagnostic test includes some unique measurement function tests in addition to the tests that are common to the power-on self test. Thus, it is necessary to perform the diagnostic test even if the power-on self test passed.

---

Figure 4-2 Primary trouble isolation flowchart



e5061ase033

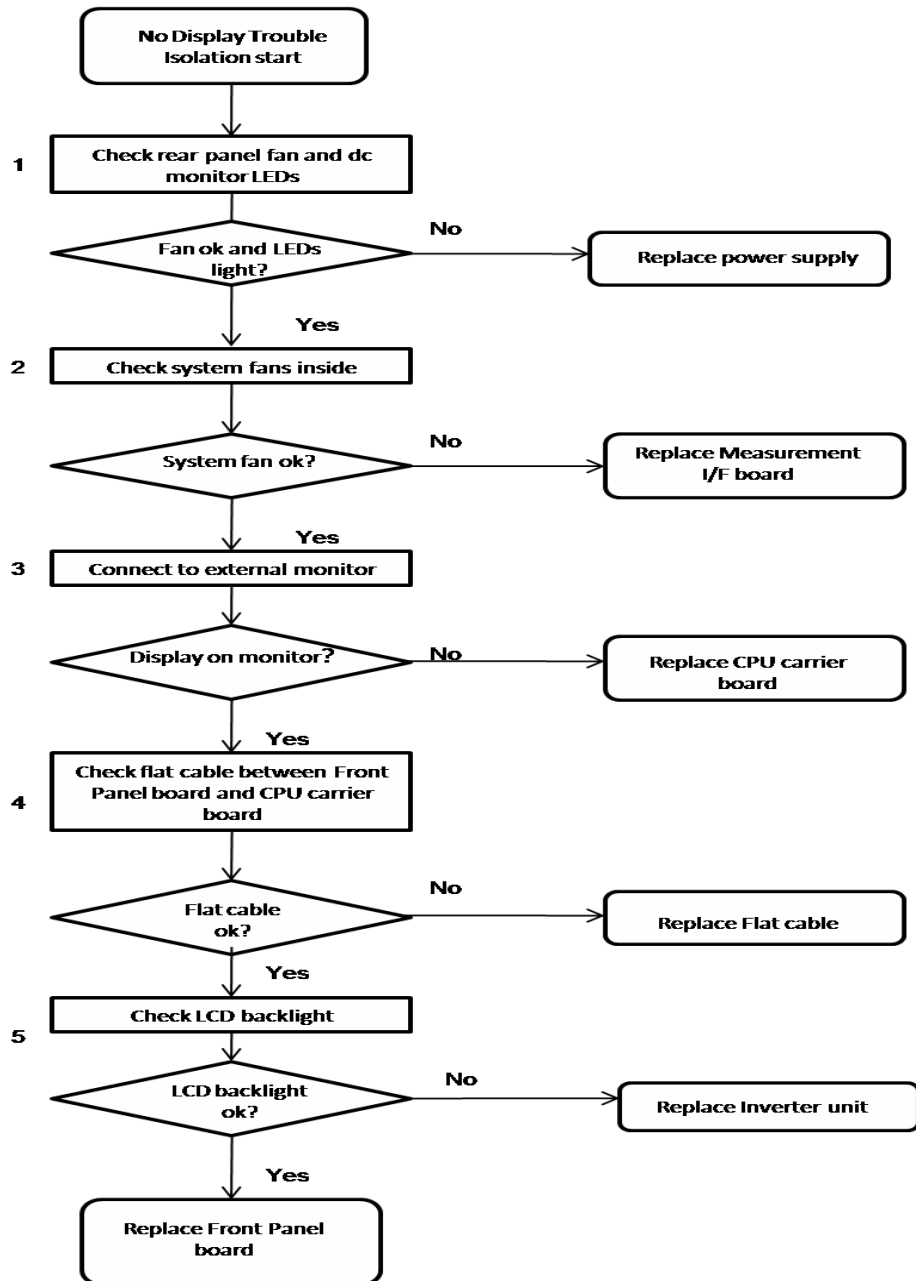
## No Display Troubleshooting

If the E5061B displays nothing despite it is powered from proper ac power line, isolate the failure in accordance with the procedure shown in Figure 4-3.

Connect the keyboard to the E5061B rear panel connector, turn the power on and start trouble isolation. The methods of trouble isolation are described in the procedural step 1 to 6.

Figure 4-3

No display trouble isolation procedure



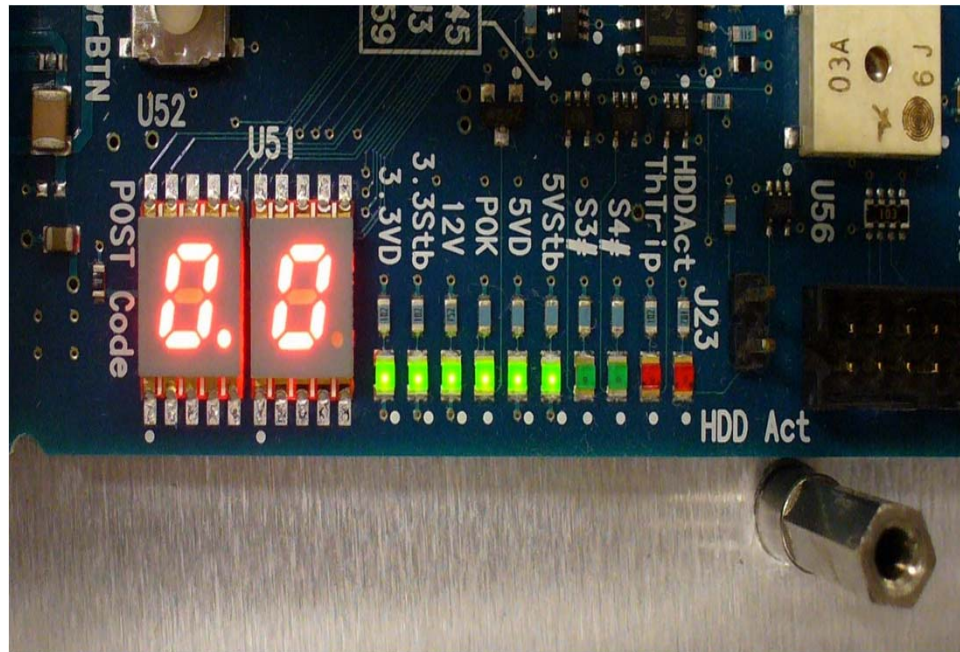
**Step 1.** Check fan operation and DC monitor LED

If the rear panel fan (blower) doesn't run, a failure in power supply is assumed. Remove the E5061B outer cover and check if the following LEDs light:

- +3.3 V and +5 V dc monitor LEDs on A50 CPU Module as shown in Figure 4-4
- LEDs on DSP module as shown in Figure 4-5

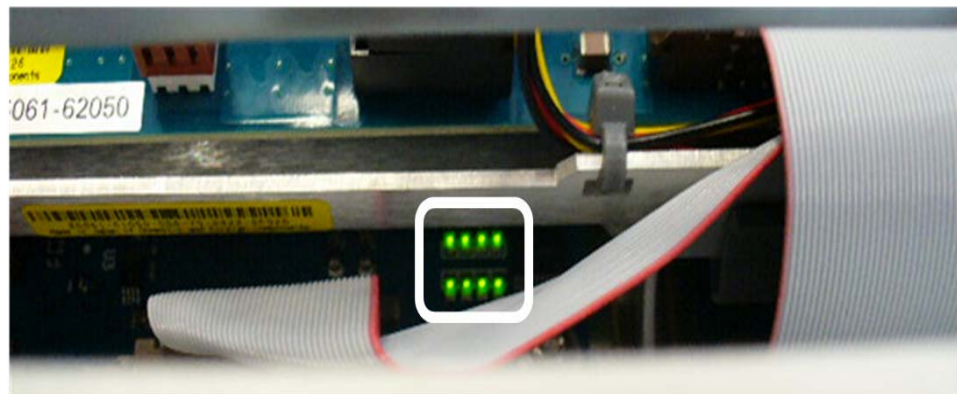
**Figure 4-4**

**LEDs on CPU module**



**Figure 4-5**

**LEDs on DSP module**



**NOTE**

To check all the outputs of the power supply, measure the dc voltages at the output lead connectors with a DMM. The dc output voltages and lead color information is provided in the module cover label of the power supply.

## Troubleshooting

### No Display Troubleshooting

#### Step 2. Check system fan inside.

If the system fan on the chassis inside the E5061B don't run, problem seems in the A51 Measurement I/F board or the flat cable between the A51 Measurement I/F board and CPU module. In this case, remove the E5061B outer cover and make sure whether the fan run or not.

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

If the power shutdown occurs without a beep, the problem seems in the A51 Measurement I/F board or the CPU module.

#### Step 3. Check LED of "Num Lock" key

Press "Num Lock" key on the keyboard. If the LED in the key doesn't light as shown in Figure 4-6, a problem seems in the CPU module.

Figure 4-6

#### LED of the Num Lock key



Make sure the following before replacing the CPU module.

- Whether all the connections to the A50 CPU Module are normal or not. Check if there is any disconnection or connection working loose.

#### Step 4. Checking with the external monitor

Connect an external VGA monitor to the VIDEO output on the E5061B rear panel.

- If something is displayed on the external monitor, the problem is present around the LCD. 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 problem seems in the CPU module.

#### Step 5. Checking flat cable

Check a flat cable between the A50 CPU Module and A52 Front Panel I/F board.

#### Step 6. Check around the backlight

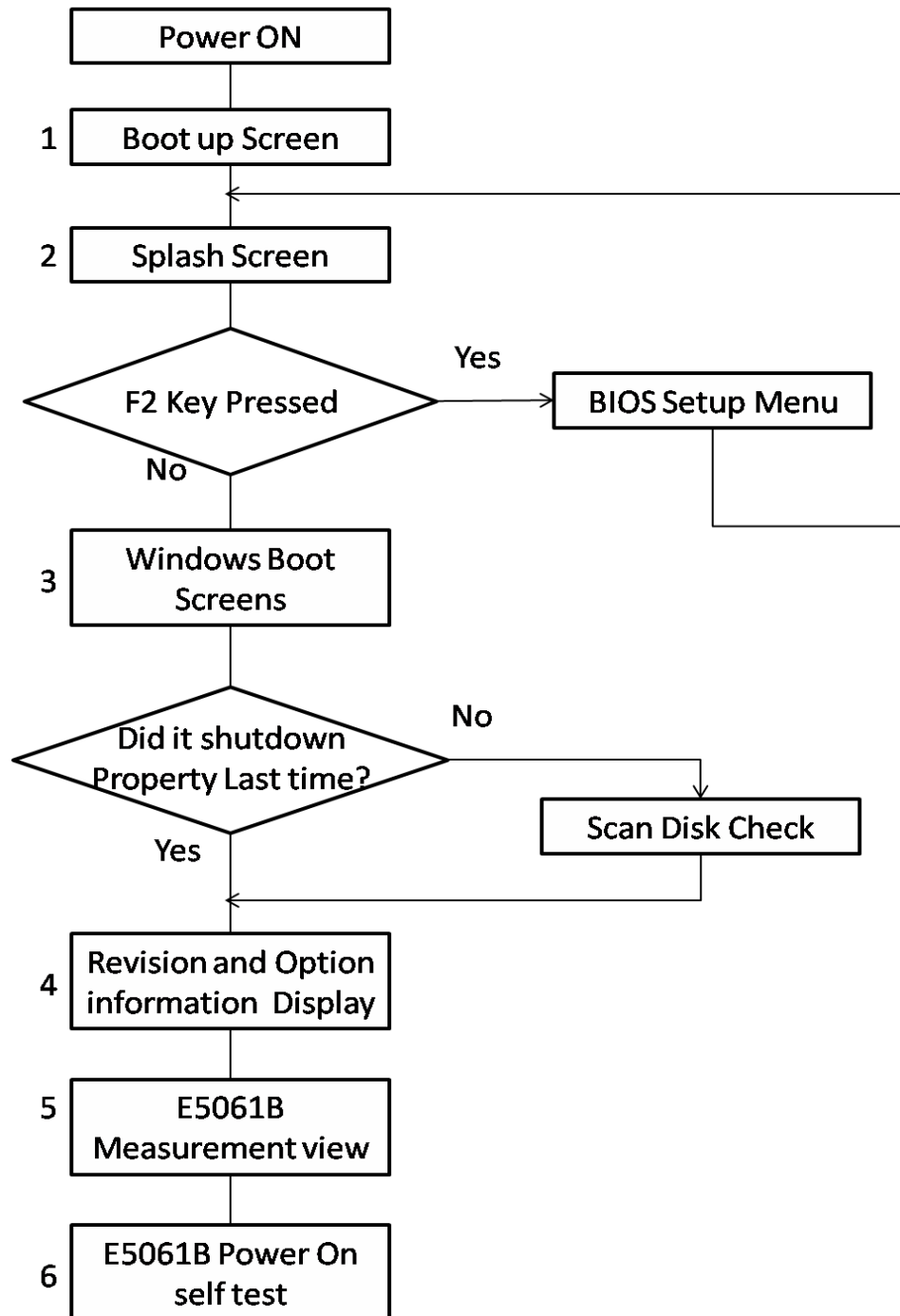
Check inverter board and a cable between the inverter board and A52 Front Panel I/F board. Also check the cables between the LCD and A52 Front Panel I/F board. If the cables are normal, check the LCD.

## Booting Process Troubleshooting

Figure 4-7 represents the booting process flow in the E5061B. If the E5061B stops in the booting process, troubleshoot using the following step-by-step procedure.

Figure 4-7

Booting process flowchart



## Troubleshooting

### Booting Process Troubleshooting

#### Step 1. Boot up Screen

The Boot up screen is displayed as shown in Figure 4-8.

Without choose any choice, the system will continue boot up process after 3 second.

---

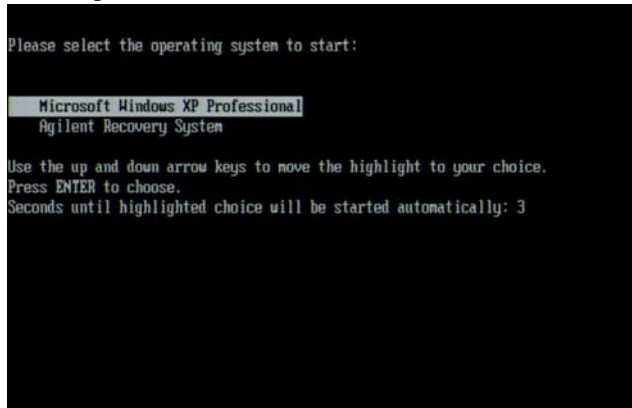
#### NOTE

While the Boot up screen is displayed, if you want to do system recovery , please select “Agilent Recovery System” as soon as in the screen.

---

Figure 4-8

#### Boot up Screen



#### Step 2. Splash Screen

The splash screen is displayed with Agilent logo as shown in Figure 4-9.

If the splash screen is displayed, you can assume that the A50 CPU Module is functioning correctly.

---

#### NOTE

While the splash screen is displayed, if you want to run the BIOS setup utility, push F2 key as soon as in the screen.

---

Figure 4-9

#### Splash Screen



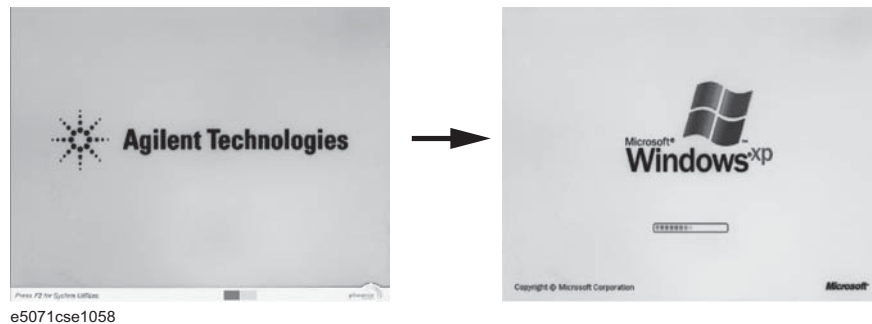
#### Step 3. Windows boot screens

The Windows boot screens are displayed. The Windows boot screens consists of two screens. Each screen is displayed in the order as shown in Figure 4-10. If the Windows boot screens are displayed, it is assumed that the HDD works. While the Window screens



are displayed, Windows operating system is starting up.

**Figure 4-10** Windows boot screens



If you encounter the following problems, try to reinstall the operating system before replacing the HDD.

- "xxx file is missing" is displayed on DOS screen.
- The Window boot screen is not displayed after the splash screen is displayed.
- Windows always boots up with Safe Mode.

**NOTE**

If the E5061B was turned off without shutdown process, Microsoft Scandisk runs while the windows boot screens are displayed. If a serious problem is found in the scandisk, reinstall the operating system. For details of the operating system installation, refer to Appendix B, "System Recovery," on page 133. If the operating system still doesn't boot up properly after reinstallation, replace the HDD.

**NOTE**

The operating system automatically checks the device drivers, which are necessary to use the E5061B functions and are installed in the system before the E5061B is shipped from Agilent factory. If the operating system doesn't detect them, a message box is displayed. In this case, install the device driver.

**Step 4.** Revision and option information

The firmware revision and hardware option information along with copyright declaration is displayed as shown in Figure 4-11. The E5061B firmware quickly starts up just before this display appears. While the revision and option information is displayed, the applications of various devices in the system are initialized.

Figure 4-11

Firmware revision and option information



If the display whited out, entirely blued or appeared with a dialog box, a mass storage problem is suspected. Try to perform the mass storage recovery procedure.

---

**NOTE**

If a message of "Will Shut Down in Five Seconds" is displayed in place of "Initializing.." and the shutdown occurs, the DSP board fails in starting up. The following message 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 doesn't work or is not properly connected to the DSP board.

"Fatal Error: Failed to Update DSP Code":

If this happened, the DSP board failed in writing DSP program into flash ROM when the firmware was installed first or updated to the newest version. A problem in the DSP or A50 CPU Module is suspected.

---

**Step 5.** Measurement view

The measurement view as shown in Figure 4-12 is displayed after the system initialization is completed without problem.

Figure 4-12

Measurement view



**Step 6.** Power-on self test

The power-on self test is executed once automatically before the measurement starts. While the power-on self test is in progress, "Power on test" is displayed at the left in the instrument status bar. If the power-on test fails, an error message is displayed there. For more details, refer to "Troubleshooting Using Diagnostic Test" on page 64.

## Troubleshooting Using Diagnostic Test

The Agilent E5061B has an diagnostic test function to diagnose the analog measurement section and internal dc power supply voltages. The diagnostic test makes it possible to isolate a faulty board assembly. The following paragraphs describe the procedure to perform the diagnostic test.

### Power On Self Test

Power-on self-test always takes place once the E5061B is turned on. When a failure is detected, a message "Power on self test failed" is displayed. The content of the power-on self-test is the same as a part of the diagnostic test program and includes the dc power supply voltage, source PLL synthesizer and level controller (ALC) tests. When the self-test failed, perform the diagnostic test to break down into the individual tests and narrow down failure possibilities.

---

#### NOTE

The following procedure can be used to restart the power-on self test as required.

- a. Press **System** key.
  - b. Click **Service Menu** and, then, **Test Menu** in the softkeys.
  - c. Click **Power On Test** to restart the test. Wait until the power-on test ends.
  - d. The test result (OK or Failed) is displayed in the **Power On Test** key.
- 

### PLL unlock

When a PLL of the frequency synthesizers is unlocked, not the "Power on self test failed" but "Phase lock loop unlocked" message is displayed. If it occurs, A1 Source Module may be faulty.

### Contents of the diagnostic test

The diagnostic test contains 8 test groups shown in Table 4-1. Each test group can be performed independently and verifies one of various operating characteristics of the analog measurement section.

**Table 4-1** Diagnostic test group menu

1	DC-BUS Test
2	Internal Level Monitor Test
3	RF Output Level Range Test
4	RF Output Level Power Sweep Test
5	Receiver Absolute Measurement Test
6	Receiver Compression Test
7	Receiver IF Ranging Test

**Table 4-1 Diagnostic test group menu**

8	Gain-Phase Absolute Measurement Test
---	--------------------------------------

**Test equipment required for diagnostic test**

Table 4-2 shows the equipment required for performing the diagnostic test.

**Table 4-2 Required equipment**

Required test equipment	Qty	Recommended model
24 inch 50Ω cable	1	8120-8862, 8120-1839

**To Execute the Diagnostic Test**

To isolate faulty board assembly in analog section, execute the diagnostic test in accordance with the following procedure. The test procedure needs to be performed using a mouse and an external keyboard in addition to the front panel keys.

**NOTE**

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

1. Environmental temperature: 23°C ± 5°C

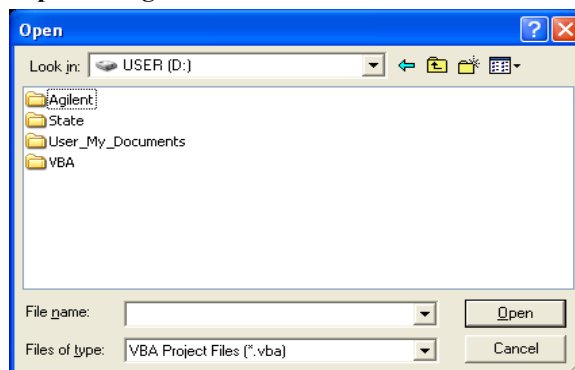
**NOTE**

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

- Step 1.** Connect a mouse and an external keyboard to the E5061B's rear panel connector.
- Step 2.** Press **Macro Setup** key.
- Step 3.** Press **Load Project** to select **Load Project** function."Open" dialog box will be displayed as shown in Figure 4-13.

**Figure 4-13**

**Open dialog box**



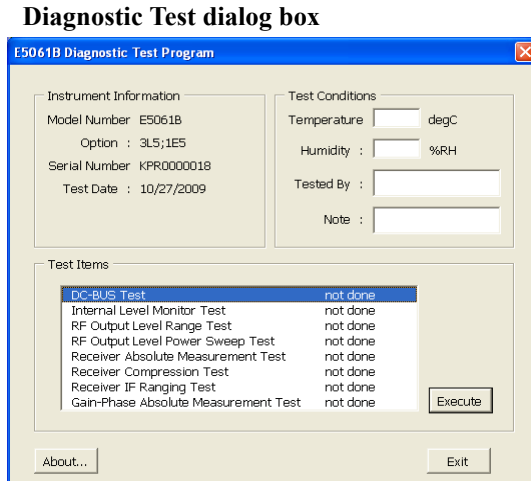
- Step 4.** Select "User [D]" (preset state) from menu in the "Look in:" box.
- Step 5.** Double-click "Agilent" folder to open it and to access its menu.

## Troubleshooting

### Troubleshooting Using Diagnostic Test

- Step 6.** Double-click "Service" folder to open it.
- Step 7.** Click "DiagnosticTest. VBA" program file to select it from program menu.
- Step 8.** Click "Open" button to download the diagnostic test program.
- Step 9.** Press **Select Macro** to select **Select Macro** function.
- Step 10.** Press **Module1 main** to open the **Module1 main** program file. "Diagnostic Test Program" dialog box (Main Menu) will appear as shown in Figure 4-14.

Figure 4-14



- Step 11.** To exit the diagnostic test, click "Exit" button.

## Program Overall

### Instrument Information

The option and serial number for the E5061B, and test date can be entered automatically.

### Test Conditions

The test conditions, "Temperature", "Humidity" and person doing the test ("Tested by") can be entered.

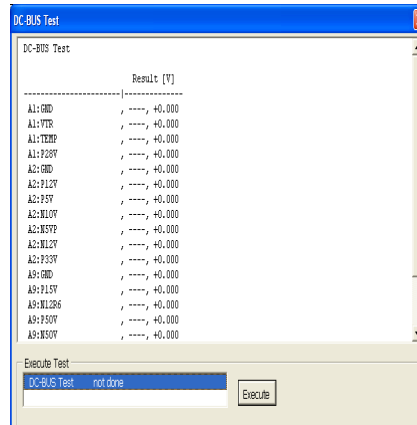
### Test Items

The following test can be selected. To execute the test you select, click "Execute" button.

- DC-BUS Test
- Internal Level Monitor Test
- RF Output Level Range Test
- RF Output Level Power SweepTest
- Receiver Absolute Measurement Test
- Receiver Compression Test
- Receiver IF Ranging Test
- Gain-Phase Absolute Measurement Test

When each test is executed, the test dialog box is displayed. The following screen is an example of the test dialog box.

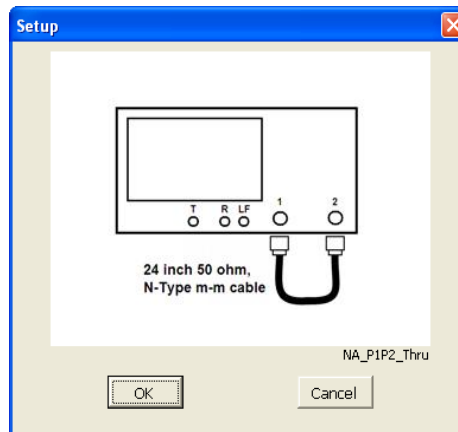
Figure 4-15 Test dialog box



To execute the test, click “Execute” button. To return the E5061B Diagnostic test program dialog box (Main Menu), click “Back to Main Menu”.

The test program will prompt you to connect cables or Short termination to the E5061B. Follow the instructions as shown below on the E5061B display for performing the test.

Figure 4-16 Setup dialog box



The test result file named “resultDT.txt” is created on the drive D (D:\Agilent\Service\Log\) of the E5061B after “Exit” button of the Main Menu is pressed. The text file can be read and edited with a PC.

### Diagnostic Test Failure Troubleshooting

Table 4-3 represents the contents of the diagnostic tests and the relationships of failed tests to probable faulty board assemblies. If the instrument fails the diagnostic test, replace the

Troubleshooting  
**Troubleshooting Using Diagnostic Test**

faulty board assembly as shown in Table 4-3.

**Table 4-3** Diagnostic tests failure troubleshooting information

Test No.	Test group	Failed Test	Probable faulty board assembly		
			A1 Source Module	A2 Receiver Module	A9 LF Source Bias Module
1	DC-BUS Test	ALL		###	##
		A1 Source Module	###	#	#
		A2 Receiver Module		###	#
		A9 LF Source Bias Module		#	###
2	Internal Level Monitor Test	ALL	##	###	##
		A1 Source Module	###	#	#
3	RF Output Level Range Test		###	#	#
4	RF Output Level Power Sweep Test		###	#	#
5	Receiver Absolute Measurement Test		#	###	#
6	Receiver Compression Test		#	###	#
7	Receiver IF Ranging Test		#	###	#
8	Gain-Phase Absolute Measurement Test		#	###	#

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

**NOTE** Diagnostic tests 1 and 2 are common to the power on self test.



## Function Specific Troubleshooting

If the E5061B exhibits a failure symptom that is related to a specific function or control such as a front panel key control, display, data storage, remote control interface, printer interface, external trigger, external keyboard or mouse, isolate the trouble using the Function Specific Troubleshooting procedures described below. The major functions of the E5061B and the troubleshooting procedure for each function are shown in Table 4-4.

**Table 4-4 Major functions and troubleshooting procedures**

Function	Description	Troubleshooting
Front panel keys	All the E5061B functions except for VBA and service functions can be set and controlled via the front panel keys.	Refer to “To Check the Front Panel” on page 71.
Touch panel	The E5061B equipped with option 016 has a touch screen display that allows all the 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 72.
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 73.
External keyboard	The external keyboard can be used for the entry of numerical and character data when it is connected to USB connector on front and rear panels.	Refer to “To Check the External Keyboard” on page 73.
Mouse	The mouse can be used to move the pointer on the LCD display, select a function and change a setting, when it is connected to USB connector on front and rear panels.	Refer to “To Check the Mouse” on page 73.
Video output	An external color monitor can be used to display the same information as the E5061B LCD display, when it is connected to the Video output connector (24-pin D-Sub) on the rear panel.	Refer to “To Check the Video output” on page 74.
External trigger input	The external trigger input terminal (BNC) on the rear panel allows an external trigger source to be used for measurement trigger.	Refer to “To Check the External Trigger Input” on page 74.
GPIB Interface	The GPIB compatibility allows the E5061B to be operated as a talker/listener on IEEE 488 interface bus.	Refer to “To Check the GPIB” on page 74.
Handler I/O port	The Handler I/O port can be used to transfer a comparator decision output data to and perform timing synchronization with an external handler.	Refer to in “To Execute the Diagnostic Test” on page 65 .

### To Check the Device Driver

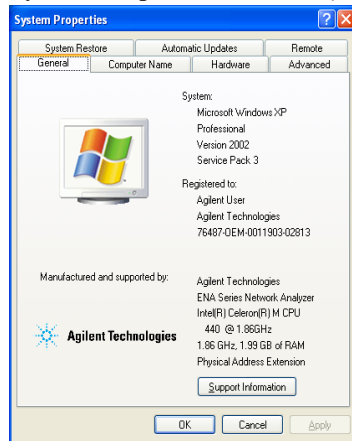
Make sure first whether the E5061B device drivers are installed properly or not by the following procedure, if a function of specific device in the E5061B doesn't work.

- Step 1.** Exit from the E5061B measurement view in accordance with the procedure described in “How to exit from the E5061B Measurement View” on page 53. Then, Windows desktop screen is displayed.
- Step 2.** Click "My Computer" with the right button and select "Properties" as shown in Figure 4-17. Then, the System Properties(Figure 4-18) will appear.

Figure 4-17 Opening System Property Window



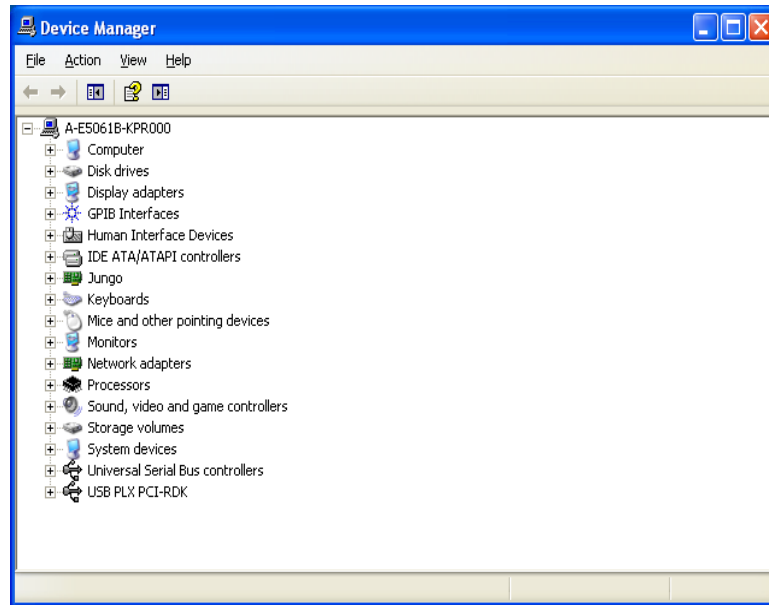
Figure 4-18 System Properties Window (General)



- Step 3.** Click Hardware tab and Device Manager button. The operating system detects all the necessary device drivers and displays the device names as shown in Figure 4-19.

Figure 4-19

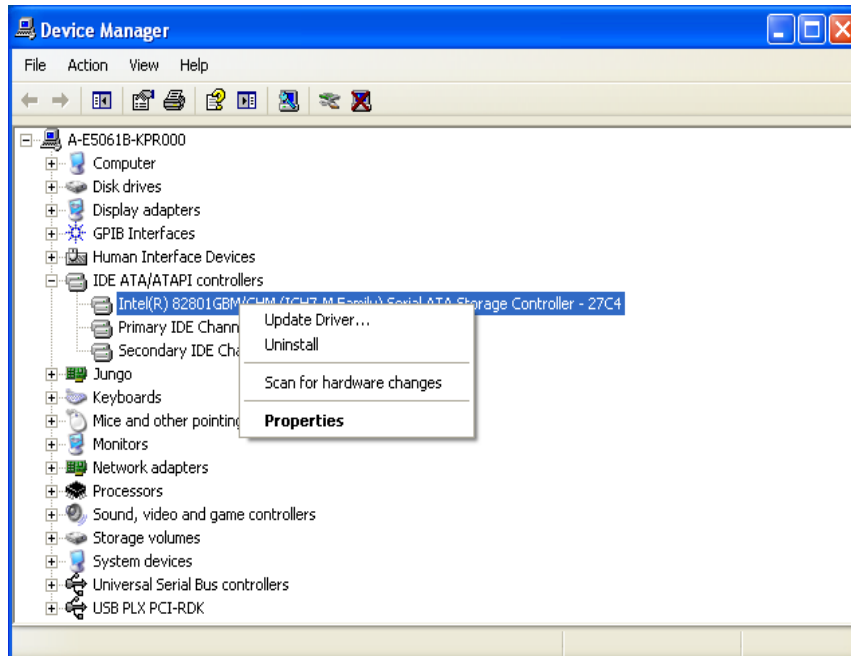
### System Properties Window (Hardware)



Click the icon with the right button and click Property to show the detail of the status. as shown in Figure 4-20.

Figure 4-20

### Opening Device Driver Property



4. Troubleshooting

### To Check the Front Panel

#### Procedure

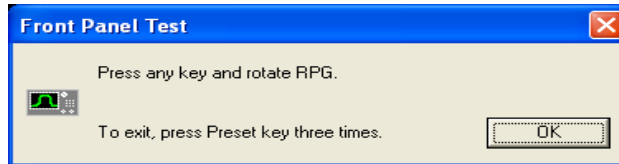
Randomly press the front panel keys and rotate the knob to verify that they work normally.

## Troubleshooting

### Function Specific Troubleshooting

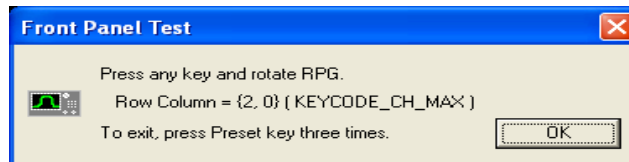
- Step 1.** Press **System** key.
- Step 2.** Click **Service Menu** and, then, **Test Menu** in the softkeys.
- Step 3.** Click **Front Panel** in the test menu. This opens "Front Panel Test" dialog box as shown in Figure 4-21.

**Figure 4-21** Front Panel Test dialog box



- Step 4.** Randomly press the front panel keys. The key code along with the name of the pressed key are displayed in the dialog box as shown in Figure 4-22. Turn the rotary knob clockwise or counterclockwise. The dialog box indicates the direction of the turned knob and a count of RPG output.

**Figure 4-22** Key code and key name display example



- Step 5.** To exit the front panel test, press **Preset** key three times.
  - If multiple keys fail to work, a problem in A52 Front Panel I/F board or A50 CPU Module is suspected. Also check the flat cable between the A52 Front Panel I/F board and CPU module.
  - If only a specific key doesn't work, check first if the key is subsided in the panel.
  - If the rotary knob doesn't work, check the A52 Front Panel I/F board involving the RPG.

## To Check the Touch Panel

### Procedure

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

- If the touch panel doesn't work correctly whereas the hardkeys function normally, a failure seems in the touch screen controller assembly (5183-4184) or touch-panel LCD assembly (E5070-60102). (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 CPU module.
- If no problem is found in the above checks, a failure in the A50 CPU Module is suspected.

## To Check the LCD

### Procedure

- Step 1.** Press **System** key.
- Step 2.** Click **Service Menu** and, then, **Test Menu** in the softkeys menu.
- Step 3.** Click **Display** in the test menu. The whole of the LCD screen turns Red, Green, Blue, White and Black every 2 seconds and returns to the measurement view. If the color test screen doesn't appear correctly, perform step 4.
- Step 4.** Connect an external VGA monitor to the VIDEO output port on the E5061B rear panel.
  - If the monitor screen view is the same as the LCD display, the problem seems in the CPU module.
  - If only the LCD display has a problem, check the flat cable between the A52 Front Panel I/F board and CPU module.
  - If the cables are normal, check the A51 LCD.

## To Check the External Keyboard

### Procedure

- Step 1.** Connect the external keyboard to the E5061B rear panel USB port.
- Step 2.** Turn the instrument on.
- Step 3.** Press **Meas** key.
- Step 4.** 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 A50 CPU Module may be faulty.

## To Check the Mouse

### Procedure

- Step 1.** Connect the mouse to the E5061B rear panel USB port.
- Step 2.** Turn the instrument on.
- Step 3.** Move the mouse and verify that the mouse pointer move smoothly. If it doesn't move smoothly, check first whether a foreign substance (dust, lint, etc.) is in the track ball hole of the mouse or not.
- Step 4.** Verify that the mouse buttons work normally. If any button doesn't work or the mouse pointer doesn't move, a failure in the mouse or the A50 CPU Module is suspected.

## To Check the Video output

### Procedure

- Step 1.** Connect an external VGA color monitor to the Video output port on the E5061B 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 in the CPU module.

## To Check the External Trigger Input

### Procedure

- Step 1.** Press **Preset** key to initialize the E5061B.
- Step 2.** Press **Trigger** key.
- Step 3.** Click **Trigger Source** and, then, **External** in the menu bar to set the trigger mode to "External".
- Step 4.** Connect a BNC Short or 50  $\Omega$  termination to the Ext Trig connector on the rear panel and disconnect it. Thereby a measurement trigger should be generated and a measurement result (trace) should be refreshed.
- Step 5.** If no trigger occurs, a failure in the DSP board is suspected.

## To Check the GPIB

### Procedure

Perform the E5061B performance test program. If the controller cannot detect the E5061B, the problem seems in the CPU module.

## To Check the USB

### Procedure

Connect USB cable between controller PC and USB Interface port (USBTMC) on the rear panel of E5061B. Turn the controller PC on. If the E5061B cannot detect controller PC, the problem seems in the CPU module. Agilent I/O Library should be installed on PC.

## Performance Test failure Troubleshooting

This section describes the adjustment and troubleshooting procedures used when the E5061B fails the performance tests. If the performance of the instrument is critical for the test limits and seems to be adjustable, perform first the adjustment(s) related to the failed test. When the test result is far from the tolerance of the test or the performance is not adjustable, isolate the faulty assembly in accordance with the "Performance Tests failure Troubleshooting procedure".

### Recommended adjustment for Performance Test failure

Table 4-5 shows the recommended adjustments when the performance test fails. Select the adjustment program corresponding to the recommended adjustment and perform the adjustment.

**Table 4-5 Recommended adjustment for performance test failure**

Test Num.	First failed test	Recommended adjustment													
		Oven reference	Frequency reference	Local gain	Mixer local leakage	Receiver absolute gain Rch	Synthesizer gain	Source output power	DC bias	Receiver IF range	Receiver port characteristics	Receiver absolute gain Tch	Receiver absolute gain LF	Source output power (LF)	DC level monitor
1	Frequency accuracy test		√												
2	Frequency accuracy test (Opt. 1E5)	√													
3	RF output level accuracy and flatness test			√			√	√				√			
4	RF output level linearity test			√			√	√				√			
5	Trace noise test														
6	Crosstalk & system dynamic range test			√	√										
7	Dynamic accuracy test			√						√					
8	Uncorrected system performance test									√	√				

4. Troubleshooting

**Table 4-5 Recommended adjustment for performance test failure**

Test Num.	First failed test	Recommended adjustment													
		Oven reference	Frequency reference	Local gain	Mixer local leakage	Receiver absolute gain Rch	Synthesizer gain	Source output power	DC bias	Receiver IF range	Receiver port characteristics	Receiver absolute gain Tch	Receiver absolute gain LF	Source output power (LF)	DC level monitor
9	LF output level accuracy & flatness test (Opt 3L5)			√									√	√	
10	LF output level linearity test (Opt 3L5)			√									√	√	
11	DC bias accuracy test (Opt 3L5)							√							
12	Crosstalk & noise level test (Opt 3L5)			√	√										
13	Input impedance test (Opt 3L5)														
14	Absolute amplitude accuracy test (Opt 3L5)			√									√	√	
15	Magnitude ratio/phase dynamic accuracy test (Opt 3L5)			√					√						
16	Magnitude ratio/phase frequency response test (Opt 3L5)		√						√			√			
17	Trace noise test (Opt 3L5)														
18	DC measurement accuracy test (Opt 3L5)														√



### Performance Test failure Troubleshooting

Table 4-6 represents the relationships 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 assembly may be faulty. To troubleshoot further, perform the Diagnostic Test procedures.

**NOTE**

When Crosstalk, System dynamic range or Uncorrected system performance test fails, check first whether the connections of the RF semi-rigid cables between the suspicious assembly and others are tight or loose. Also check for possible disconnection (impairment) of the cables and connectors.

**Table 4-6 Performance Test failure Troubleshooting information**

Test Num.	First failed test	Probable faulty board assembly or parts		
		A1 Source Module	A2 Receiver Module	A9 LF Source Bias Module
1	Frequency accuracy test	###	#	#
2	RF output level accuracy and flatness test	###	#	#
3	RF output level linearity test	###	#	#
4	Trace noise test	##	###	#
5	Crosstalk & system Dynamic Range test	##	###	#
6	Dynamic accuracy test	#	###	#
7	Uncorrected system performance test	##	###	#
8	LF output level accuracy& flatness test (Opt 3L5)	##		###
9	LF output level linearity test (Opt 3L5)	##		###
10	DC bias accuracy test (Opt 3L5)		#	###
11	Crosstalk & noise level test (Opt 3L5)	#	###	#
12	Input impedance test (Opt 3L5)		###	
13	Absolute amplitude accuracy test (Opt 3L5)	#	###	#

Table 4-6

Performance Test failure Troubleshooting information

Test Num.	First failed test	Probable faulty board assembly or parts		
		A1 Source Module	A2 Receiver Module	A9 LF Source Bias Module
14	Magnitude ratio/phase dynamic accuracy test (Opt 3L5)	#	###	#
15	Magnitude ratio/phase frequency response test (Opt 3L5)	#	###	#
16	Trace noise test (Opt 3L5)	##	###	#
17	DC measurement accuracy test (Opt 3L5)		###	###

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

---

## **5** **Replaceable Parts**

This chapter contains information for ordering replacement parts for the E5061B.

## Ordering Information

To order a part in the replaceable parts lists, quote the Agilent Technologies part number, indicate the quantity required, and address the order to the nearest Agilent Technologies Sales Office.

To order a part not listed in the replaceable parts lists, include the instrument model number, the description and function of the part, and the quantity of parts required. Address the order to the nearest Agilent Technologies Sales Office.

## Direct Mail Order System

Within the USA, Agilent Technologies can supply parts through a direct mail order system. There are several advantages to this system:

- Direct ordering and shipping from the Agilent Technologies parts center in California, USA.
- No maximum or minimum on any mail order. (There is a minimum amount for parts ordered through a local Agilent Technologies Sales Office when the orders require billing and invoicing.)
- Prepaid transportation. (There is a small handling charge for each order.)
- No invoices.

In order for Agilent Technologies to provide these advantages, please send a check or money order with each order.

Mail order forms and specific ordering information are available through your local Agilent Technologies Sales Office. Addresses and telephone numbers are located in a separate document shipped with the manuals.

---

## Exchange Assemblies

Under the rebuilt-exchange assembly program, certain factory-repaired and tested assemblies are available on a trade-in basis. These assemblies are offered at lower cost than a new assembly, but meet all factory specifications required of a new assembly.

The defective assembly must be returned for credit under the terms of the rebuilt-exchange assembly program. Any spare assembly stock desired should be ordered using the new assembly part number.

---

## **Replaceable Parts List**

The latest replaceable parts list is shown on the Agilent web site. See the [http://www.agilent.com/find/ena\\_support/](http://www.agilent.com/find/ena_support/)

Replaceable Parts  
**Replaceable Parts List**

---

## **6** Replacement Procedure

This chapter provides procedure for removing and replacing the major assemblies in the E5061B.

## Replacing an Assembly

The following steps show the sequence for replacing an assembly in a E5061B Network Analyzer.

1. Identify the faulty group. Refer to Chapter 4, “Troubleshooting.”
2. Order a replacement assembly. Refer to Chapter 5, “Replaceable Parts.”
3. Replace the faulty assembly and determine what adjustments are necessary. Refer to This chapter and Chapter 7, “Post-Repair Procedures.”
4. Perform the necessary adjustments. Refer to Chapter 3, “Adjustment.”
5. Perform the necessary performance tests. Refer to Chapter 2, “Performance Tests.”

---

**WARNING**

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

---

---

**WARNING**

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

---

---

**CAUTION**

Many of the assemblies in this 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.

---



## Required Tools

The following tools are required for repair of E5061B.

**Table 6-1 Required Tools**

Assembly	torque screwdriver				flat edge screwdriver	hex key	box torque driver	box torque wrench		open torque wrench
	T8	T10	T15	T20				1.5 mm	5.5 mm	
Outer Cover			√	√						
Front Panel			√	√	√					
Hard Disk Assembly		√	√	√						
Power Supply Assembly		√	√	√			√			
A50 CPU Module		√	√	√						
24 Bit I/O Assembly		√	√	√	√					
DSP Assembly		√	√	√	√				√	
A9 LF Source Bias Module		√	√	√	√					
A2 Receiver Module		√	√	√	√					√
A1 Source Module		√	√	√	√					√
A10 Analog Mother Board		√	√	√	√			√	√	√
Ref Oven		√	√	√				√		
Fan Assembly		√	√	√				√		
Angle (for Fan Assembly)		√	√	√				√		
Touch Screen Control Board	√		√	√	√					
Inverter Board	√	√	√	√	√					
Power Switch Assembly	√	√	√	√	√					
A52 Front Panel Interface Board / Key Pad	√	√	√	√	√	√				
LCD Assembly	√	√	√	√	√					
Front Frame			√	√	√					
Handle Assembly				√						

## Outer Cover Replacement

### Tools Required

- torque screwdriver, T20
- torque screwdriver, T15 (set to 14 in-lb)

### Removal Procedure

Refer to Figure 6-1 for this procedure.

- Step 1.** Disconnect the power cable from the E5061B.
- Step 2.** Remove the four bottom feet (item 1).
- Step 3.** Remove the two TORX T20 screws (item 2) fastening the side strap handles.
- Step 4.** Remove the four TORX T15 screws (item 3) fastening the four rear foot.
- Step 5.** Remove the four TORX T15 screws (item 4) fastening the cover.
- Step 6.** Slide up the outer cover and remove it carefully.

### Replacement Procedure

- Step 1.** Reverse the order of the removal procedure.

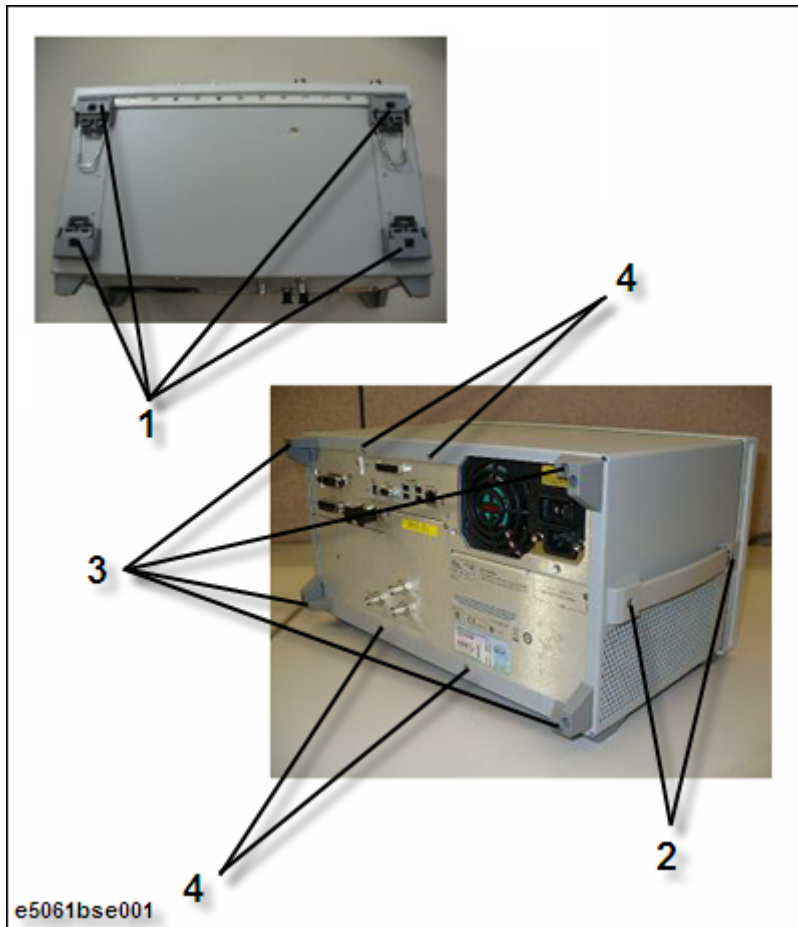
---

**NOTE**

Set a torque to 14 in-lb for torque driver when fasten the TORX T15 screws (item 3 and item 4).

Figure 6-1

Outer Cover Removal



## **Front Panel Replacement**

### **Tools required**

- torque screwdriver T20
- torque screwdriver T15 (set to 14 in-lb)
- flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-2 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the top trim (item 1) using a flat edge driver.
- Step 3.** Remove the seven TORX T15 screws (item 2) fastening front panel.
- Step 4.** Gradually push the front panel assembly towards the outside.
- Step 5.** Release the flat cable (item 3) from the cable clamp (item 4).
- Step 6.** Disconnect the flat cable (item 3) from the front panel.

### **Replacement Procedure**

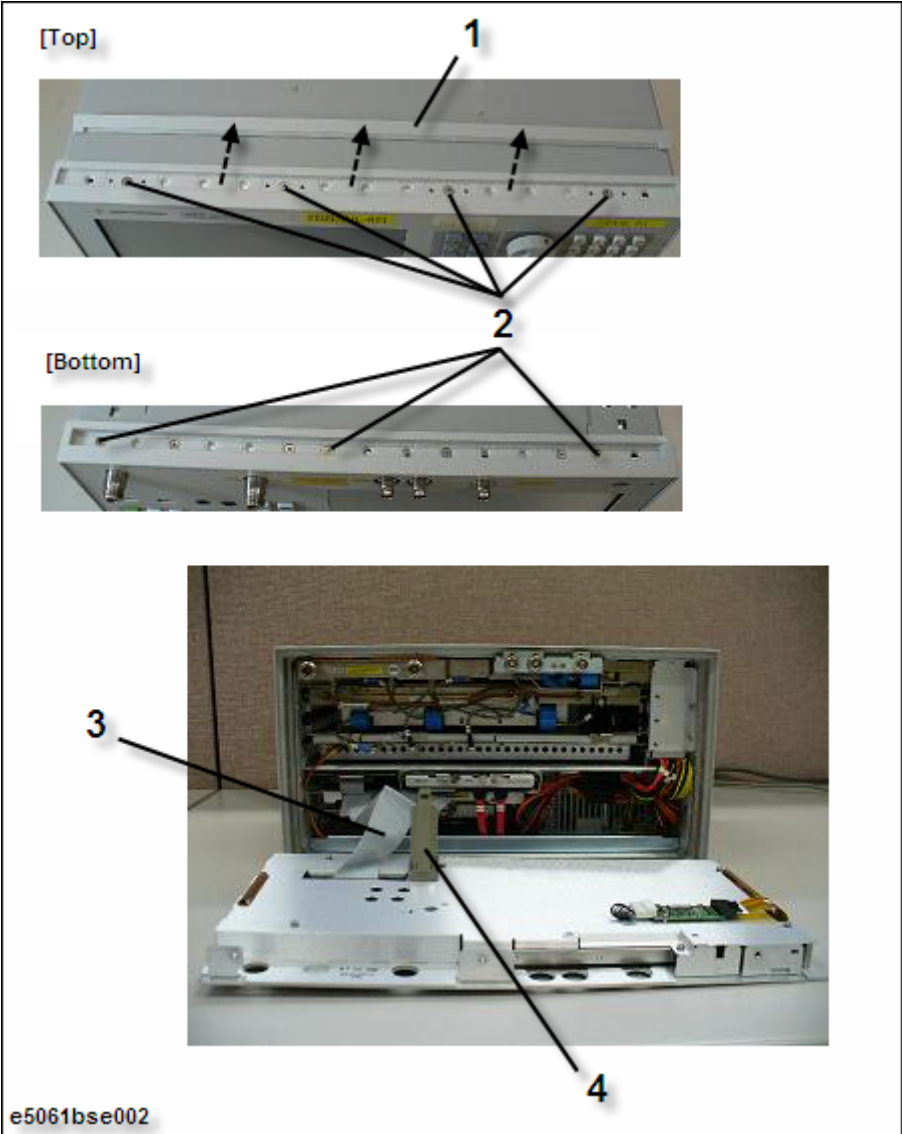
- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

Set a torque to 14 in-lb for torque driver when fasten the TORX T15 screws (item 2).

Figure 6-2 Front Panel Removal



## **Hard Disk Assembly Replacement**

### **Tools Required**

- torque screwdriver, T15, and T20
- torque screwdriver, T10 (set to 4.4 in-lb, and 9 in-lb)

### **Removal Procedure**

Refer to Figure 6-3 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Disconnect the power supply cable (item 1) from the Hard Disk Drive.
- Step 3.** Disconnect the S-ATA cable (item 2) from the Hard Disk Drive.
- Step 4.** Release the clamped cables from the clamps (item 3) on the Hard Disk Assembly and the A50 CPU Module.
- Step 5.** Remove the four TORX T10 screws (item 4) fastening the Hard Disk Assembly.
- Step 6.** Lift the Hard Disk Assembly.
- Step 7.** Remove the four TORX T10 screws (item 5) fastening the Hard Disk Drive.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

---

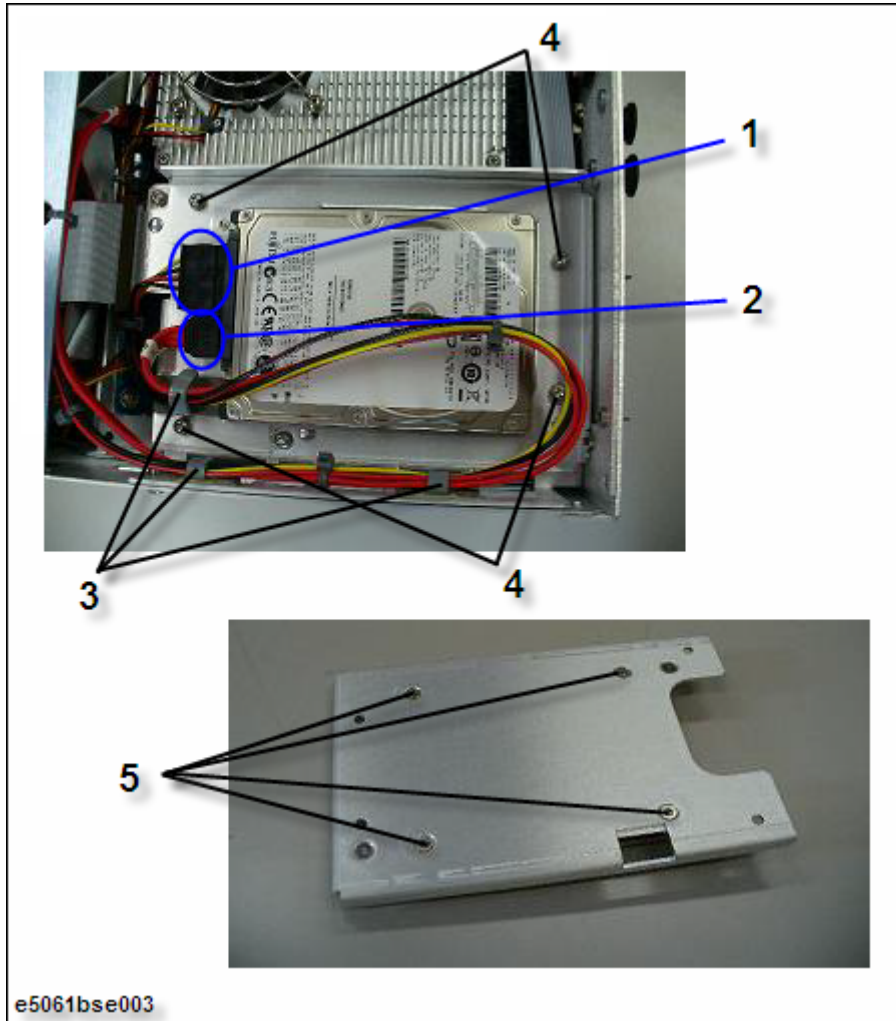
**NOTE**

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 4).

Set a torque to 4.4 in-lb for torque driver when fasten the TORX T10 screws (item 5).

---

Figure 6-3 Hard Disk Assembly Removal



## **Power Supply Assembly Replacement**

### **Tools Required**

- torque screwdriver, T15, and T20
- torque screwdriver, T10 (set to 9 in-lb)
- box torque driver, 5.5 mm (set to 6 in-lb)

### **Removal Procedure**

Refer to Figure 6-4 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Cut the three cable ties (item 1) on the guide bar.
- Step 3.** Remove the two TORX T10 screws (item 2) fastening the guide bar.
- Step 4.** Disconnect the three power supply cables (item 3) for the Hard Disk Drive, Fan Assembly and A50 CPU Module.
- Step 5.** Remove the two TORX T10 screws and two washers (item 4) fastening the chassis assembly for power supply.
- Step 6.** Remove the three TORX T10 screws (item 5) from the rear panel.
- Step 7.** Lift the power supply assembly.
- Step 8.** Remove the two hex screws (5.5 mm) and two washers (item 6).
- Step 9.** Remove the gasket (item 7), and then, re-install the two hex screws and two washers.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

---

#### **NOTE**

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 4 and item 5).

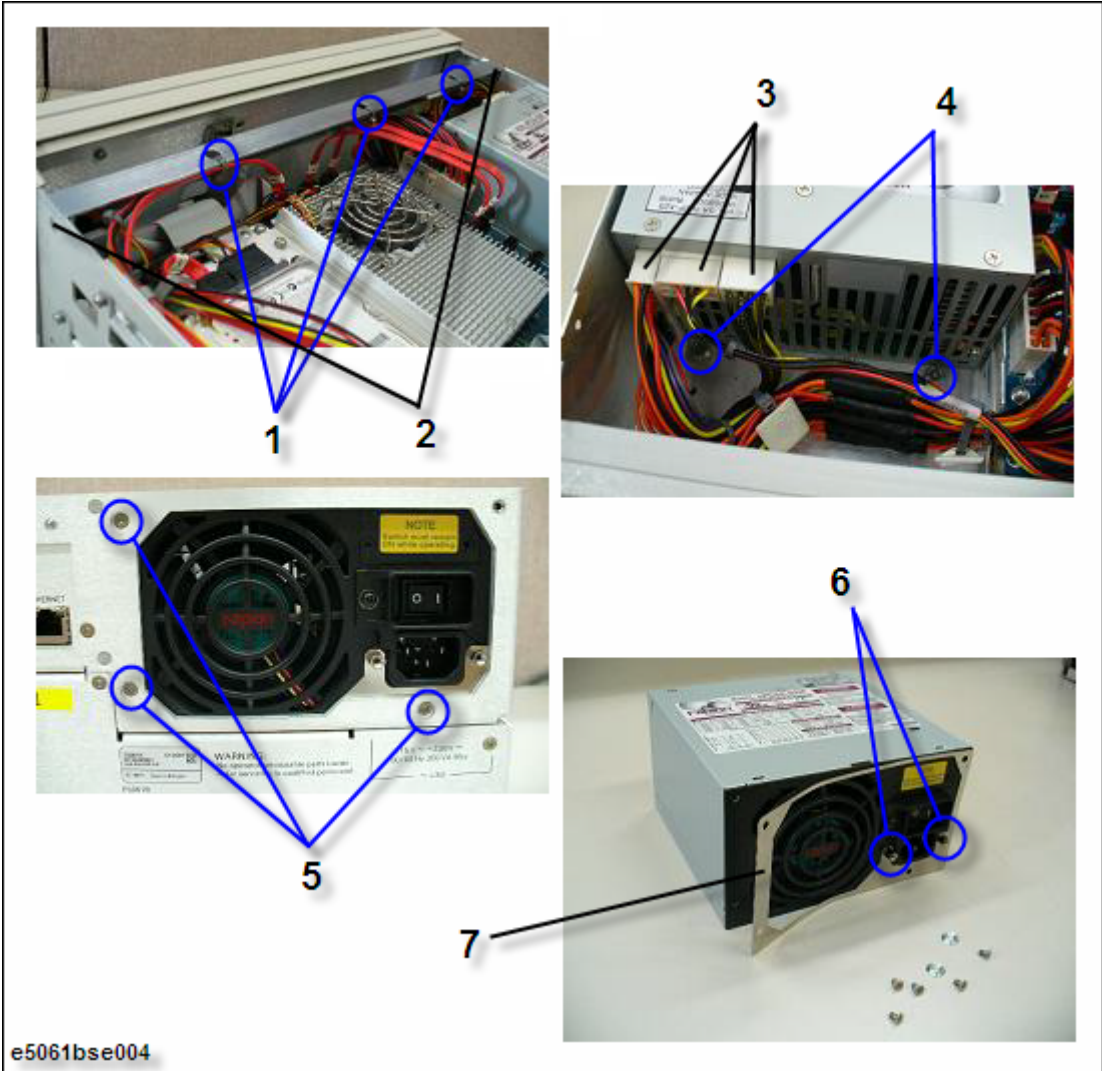
Set a torque to 6 in-lb for box torque driver when fasten the 5.5 mm screws and washers (item 6).

In step 8, the washers must not drop into the power supply.

---



Figure 6-4 Power Supply Assembly Removal



## **A50 CPU Module Replacement**

### **Tools Required**

- torque screwdriver, T15, and T20
- torque screwdriver, T10 (set to 9 in-lb)

### **Removal Procedure**

Refer to Figure 6-5 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the guide bar as described in “Power Supply Assembly Replacement” on page 92.
- Step 3.** Disconnect the power supply cable and S-ATA cable (item 1) from the Hard Disk Drive.
- Step 4.** Release the clamped cables from the three clamps (item 2).
- Step 5.** Disconnect the three cables (item 3) on the A50 CPU Module.
- Step 6.** Remove the flat cable from the clamp (item 4).
- Step 7.** Remove the two S-ATA cables and power supply cable (item 5) from the A50 CPU Module.
- Step 8.** Remove the three TORX T10 screws (item 6) fastening the Chassis Assembly for the A50 CPU Module with Hard Disk Assembly.
- Step 9.** Remove the three TORX T10 screws (item 7) fastening rear panel of the Chassis Assembly for the A50 CPU Module with Hard Disk Assembly.
- Step 10.** Lift the A50 CPU Module with Hard Disk Assembly.
- Step 11.** Remove the four TORX T10 screws (item 8) fastening the A50 CPU Module for the Hard Disk Assembly.
- Step 12.** Lift the Hard Disk Assembly.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

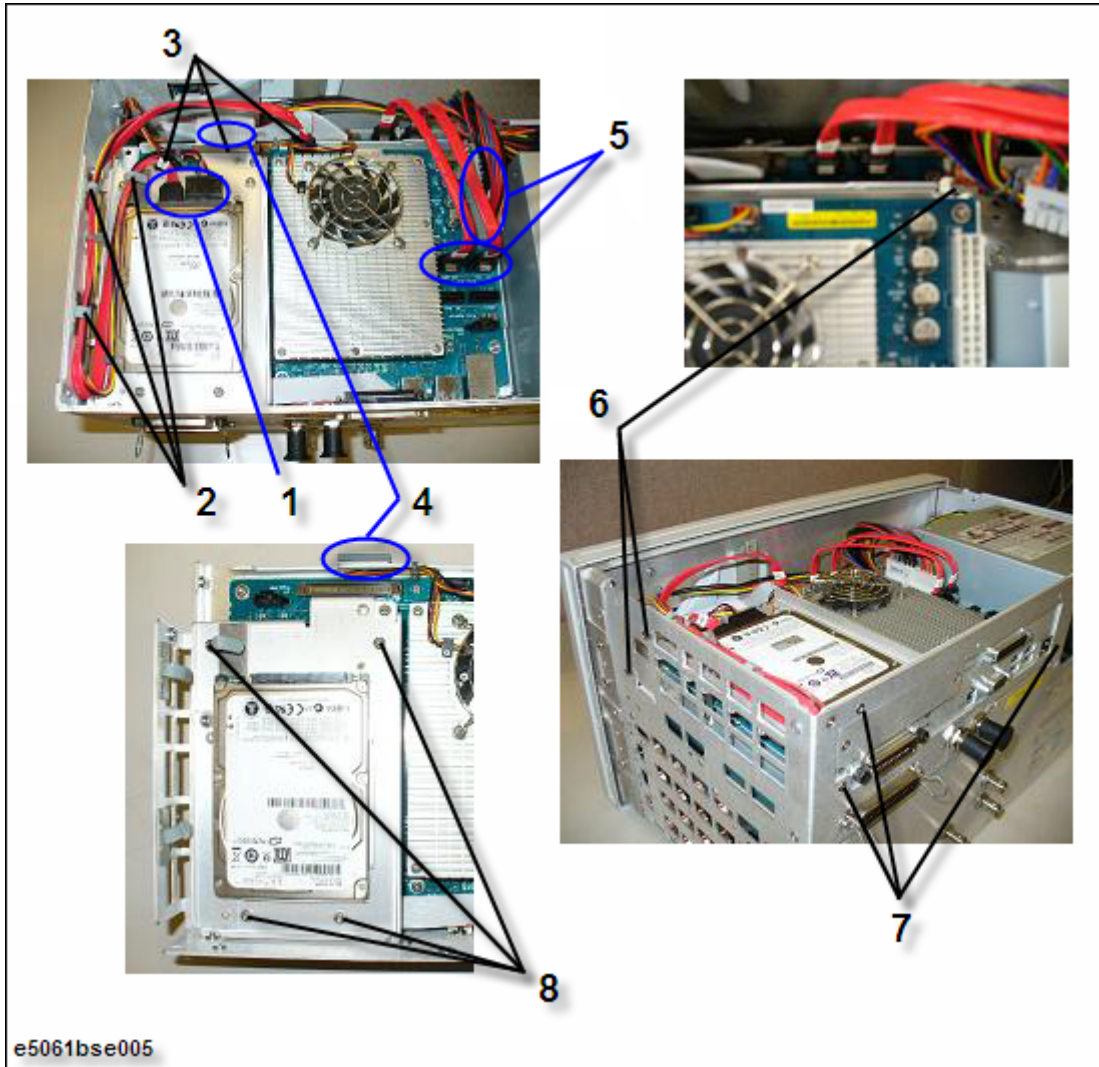
---

**NOTE**

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 6, item 7 and item 8).

---

Figure 6-5 A50 CPU Module Removal



## 24 Bit I/O Assembly Replacement

### Tools Required

- torque screwdriver, T15, and T20
- torque screwdriver, T10 (set to 9 in-lb)
- flat edge screwdriver

### Removal Procedure

Refer to Figure 6-6 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Disconnect the flat cable (item 1) from the 24 Bit I/O Assembly and the DSP Assembly.
- Step 4.** Release the flat cable from the clamp (item 2).
- Step 5.** Disconnect the cable (item 3) from the 24 Bit I/O Assembly and the A50 CPU Module.
- Step 6.** Release the cable from the clamp (item 4).
- Step 7.** Remove the two TORX T10 screws (item 5) fastening the 24 Bit I/O Assembly.
- Step 8.** Slide forward the 24 Bit I/O Assembly.

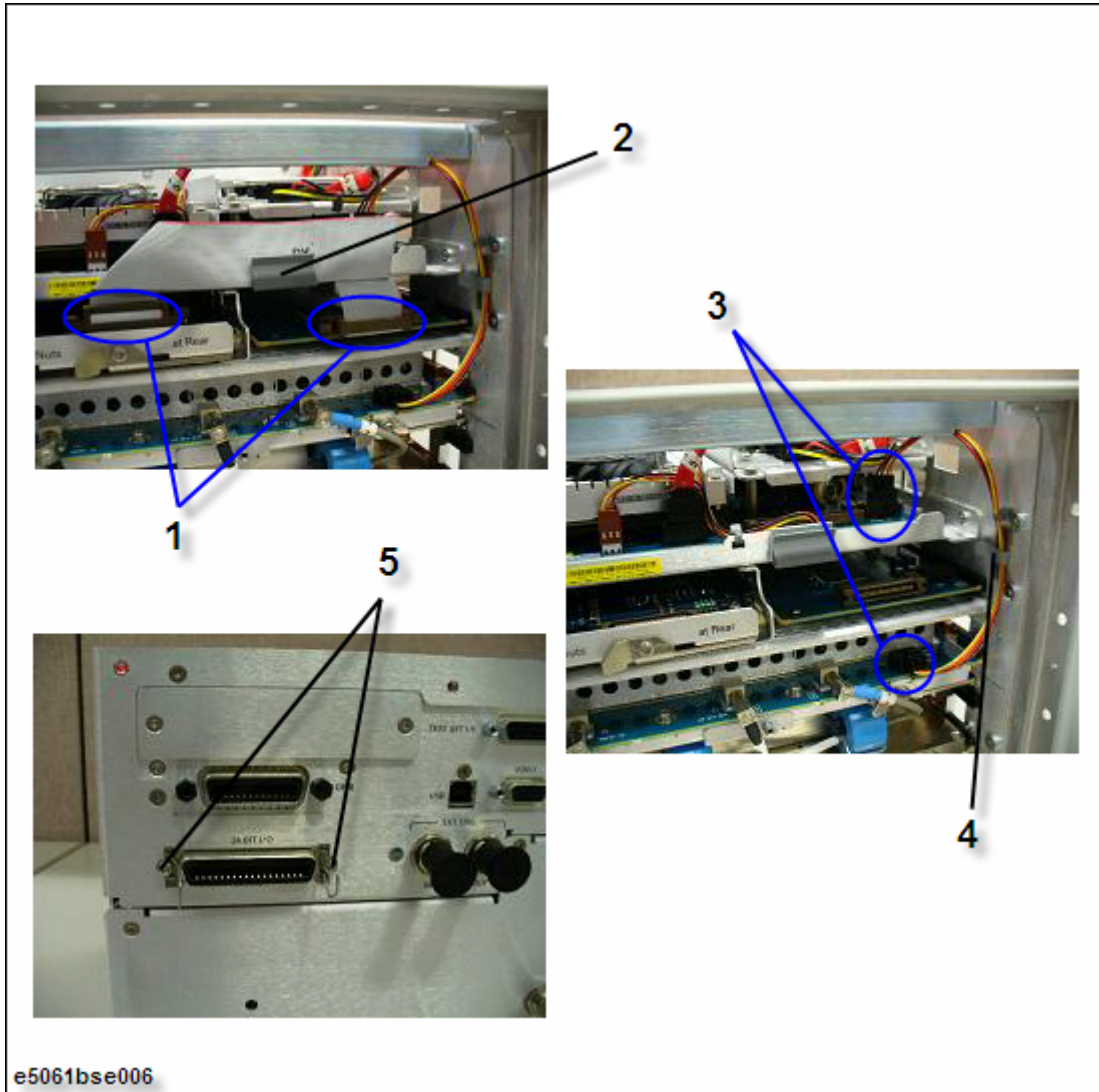
### Replacement Procedure

- Step 1.** Reverse the order of the removal procedure.

---

**NOTE** Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 5).

Figure 6-6 24 Bit I/O Assembly Removal



## DSP Assembly Replacement

### Tools Required

- torque screwdriver, T15, and T20
- torque screwdriver, T10 (set to 9 in-lb)
- box torque wrench, 5/8 inch (set to 30.4 in-lb)
- flat edge screwdriver

### Removal Procedure

Refer to Figure 6-7 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Disconnect the flat cable (item 1) from the DSP Assembly.
- Step 4.** Disconnect the two S-ATA cable (item 2) from the DSP Assembly.
- Step 5.** Remove the two 5/8 inch nuts and the two washers (item 3) from the BNC connectors.
- Step 6.** Remove the two TORX T10 screws (item 4) fastening the DSP Assembly.
- Step 7.** Slide forward the DSP Assembly.

### Replacement Procedure

- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

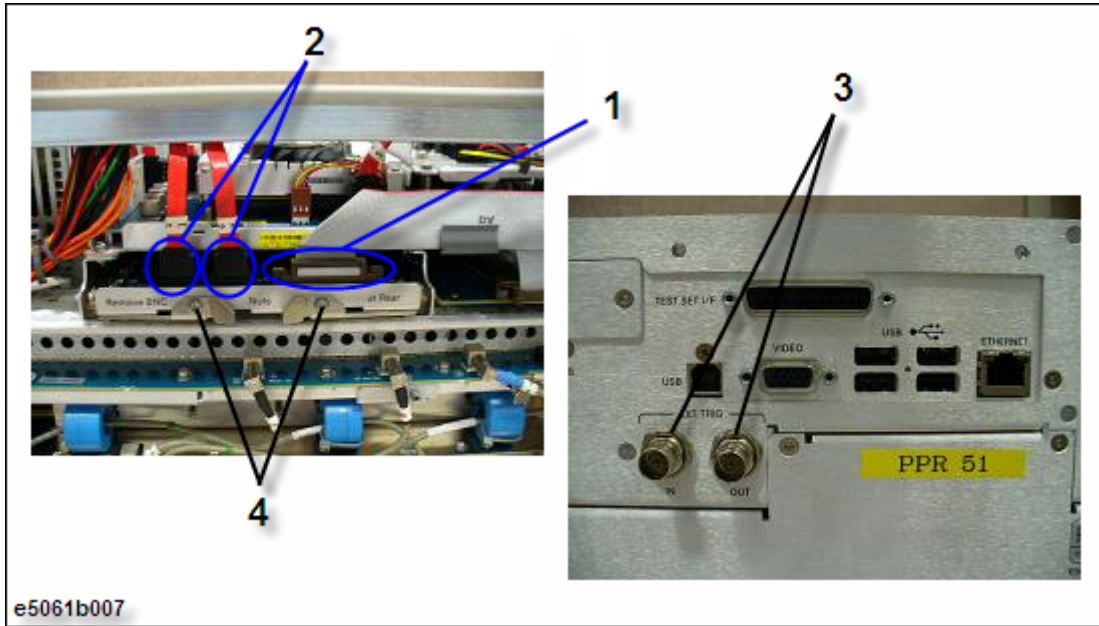
Set a torque 30.4 in-lb for box torque wrench when fasten the 5/8 inch nuts and the washers (item 3).

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 4).

---



Figure 6-7 DSP Assembly Removal



## **A9 LF Source Bias Module Replacement**

### **Tools Required**

- torque screwdriver, T15, and T20
- torque screwdriver, T10 (set to 9 in-lb)
- flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-8 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Disconnect the cable (item 1) from the A9 LF Source Bias Module.
- Step 4.** Disconnect the three RF cables (item 2) from the A9 LF Source Bias Module.
- Step 5.** Remove the two TORX T10 screws (item 3) fastening the A9 LF Source Bias Module.
- Step 6.** Slide forward the A9 LF Source Bias Module.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

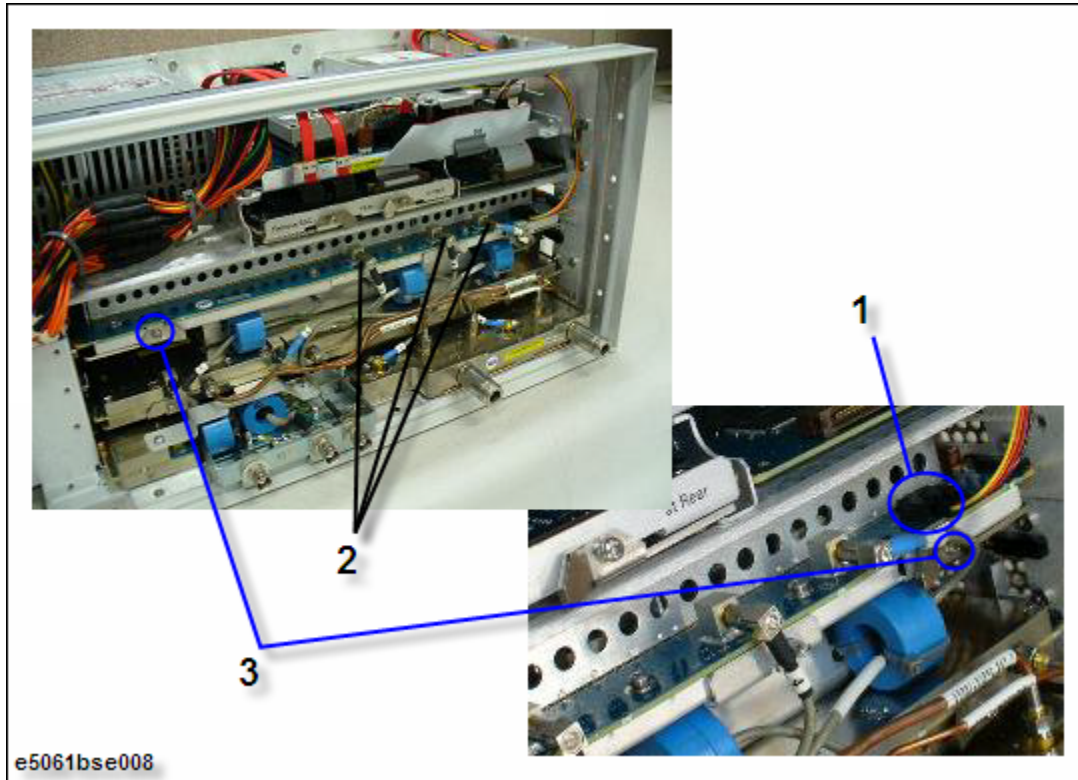
---

**NOTE**

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 3).



Figure 6-8 A9 LF Source Bias Module Removal



## **A2 Receiver Module Replacement**

### **Tools Required**

- torque screwdriver, T20
- torque screwdriver, T15 (set to 14 in-lb)
- torque screwdriver, T10 (set to 9 in-lb)
- open torque wrench, 5/16 inch (set to 9.5 in-lb)
- flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-9 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Remove the three semi-rigid cables (item 1).
- Step 4.** Disconnect the three RF cables (item 2) from the A2 Receiver Module and the A9 LF Source Bias Module.
- Step 5.** Remove the two TORX T10 screws (item 3) fastening Chassis Assembly for the A2 Receiver Module.
- Step 6.** Remove the TORX T15 screw (item 4) fastening Chassis Assembly for the A2 Receiver Module.
- Step 7.** Slide forward the A2 Receiver Module.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

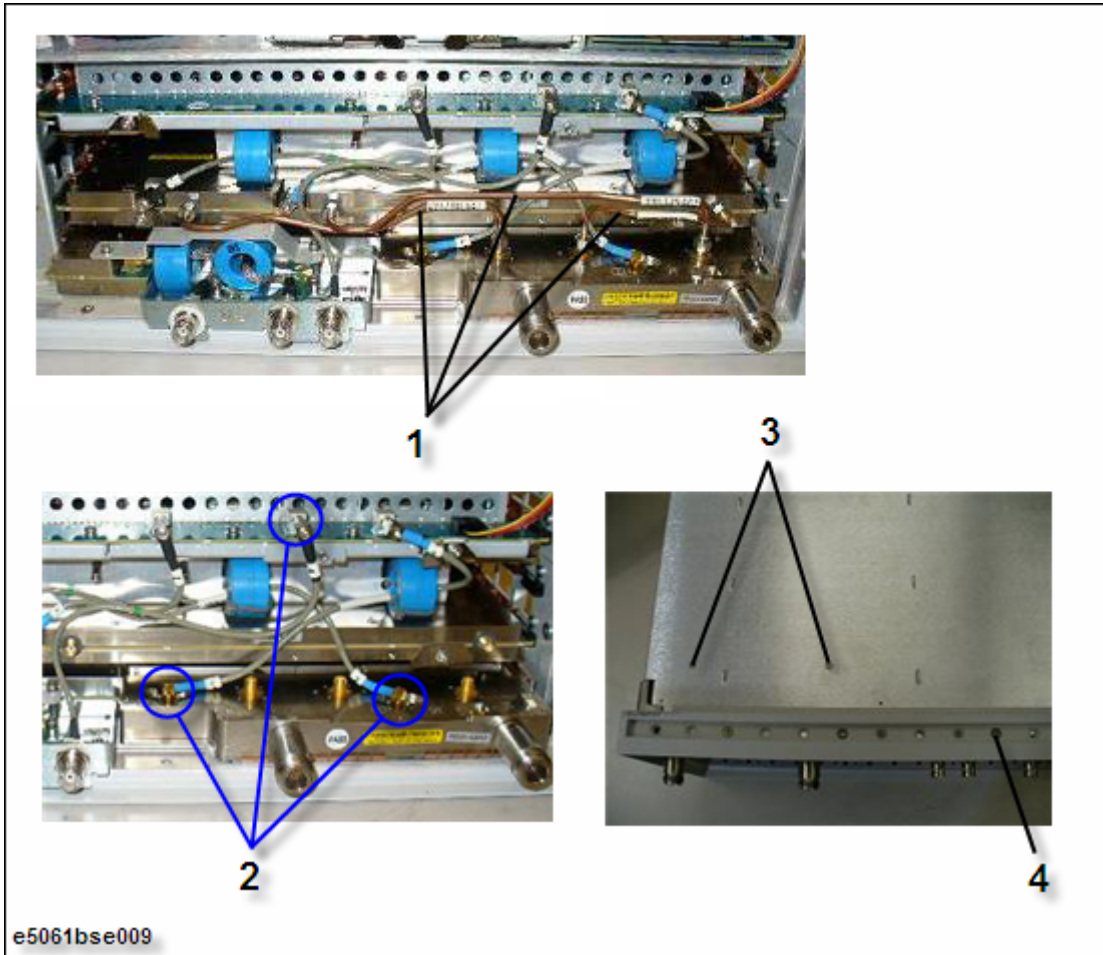
Set a torque to 9.5 in-lb for open torque wrench when fasten the semi-rigid cables (item 1).

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 3).

Set a torque to 14 in-lb for torque driver when fasten the TORX T15 screw (item 4).

---

Figure 6-9 A2 Receiver Module Removal



## **A1 Source Module Replacement**

### **Tools Required**

- torque screwdriver, T15 and T20
- torque screwdriver, T10 (set to 9 in-lb)
- open torque wrench, 5/16 inch
- flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-10 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Remove the A2 Receiver Module as described in “A2 Receiver Module Replacement” on page 102.
- Step 4.** Disconnect the four RF cable connectors (item 1) from the A1 Source Module and the A9 LF Source Bias Module.
- Step 5.** Remove the two TORX T10 screws (item 2) fastening the A1 Source Module.
- Step 6.** Slide forward the A1 Source Module.
- Step 7.** Remove the four TORX T10 screws (item 3) fastening bracket and angle for the A1 Source Module.

### **Replacement Procedure**

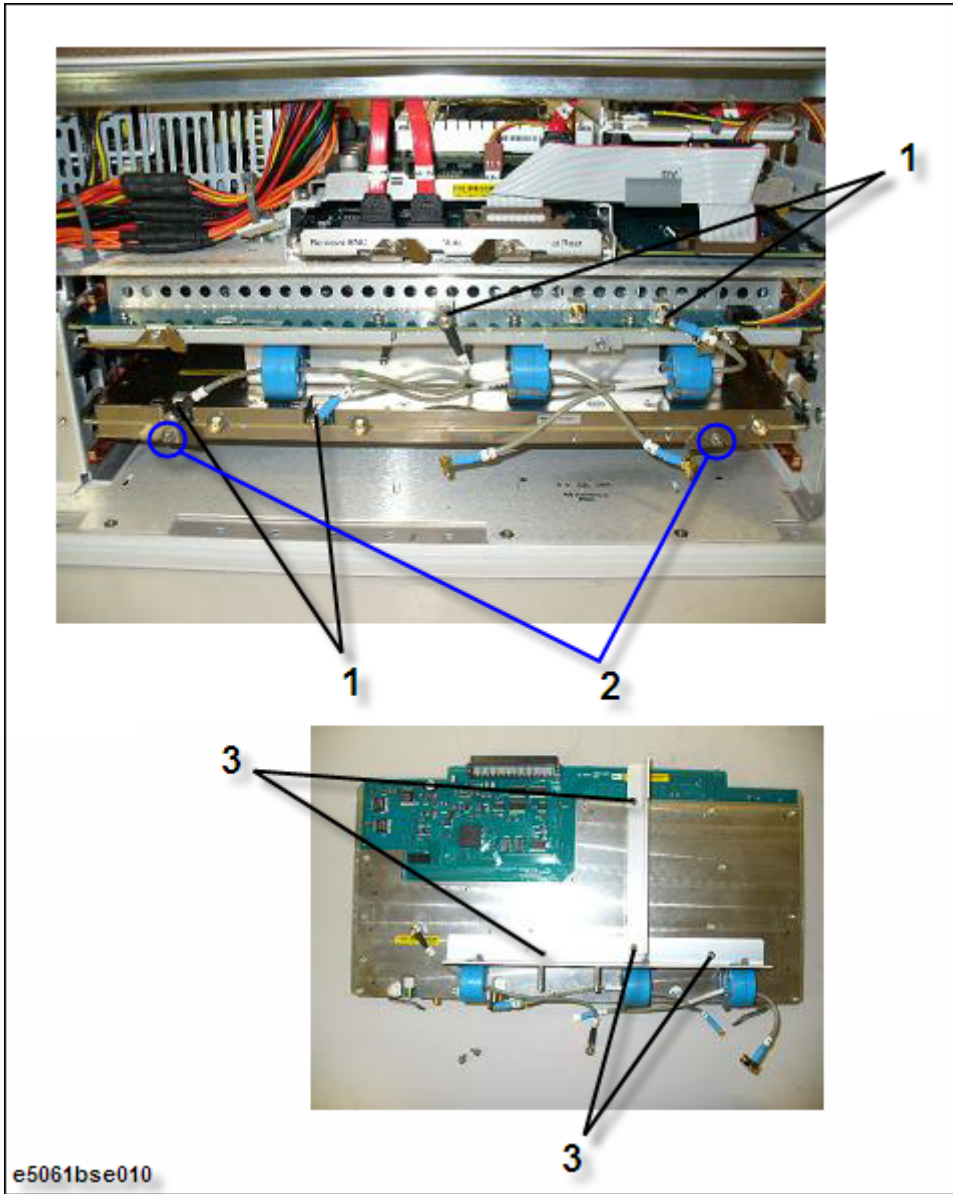
- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 2, and item 3).

Figure 6-10 A1 Source Module Removal



## **A10 Analog Mother Board Replacement**

### **Tools Required**

- torque screwdriver, T15 and T20
- torque screwdriver, T10 (set to 9 in-lb)
- box torque wrench, 9/16 inch (set to 30.4 in-lb)
- box torque wrench, 5/8 inch
- open torque wrench, 5/16 inch
- flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-11 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Remove the following assemblies.
- Hard Disk Assembly (Refer to “Hard Disk Assembly Replacement” on page 90.)
  - A50 CPU Module (Refer to “A50 CPU Module Replacement” on page 94.)
  - DSP Assembly (Refer to “DSP Assembly Replacement” on page 98.)
  - A9 LF Source Bias Module (Refer to “A9 LF Source Bias Module Replacement” on page 100.)
  - A2 Receiver Module (Refer to “A2 Receiver Module Replacement” on page 102.)
  - A1 Source Module (Refer to “A1 Source Module Replacement” on page 104.)
- Step 4.** Remove the three 9/16 inch nuts and the three washers (item 1) from the BNC connectors.
- Step 5.** Remove the seven TORX T10 screws (item 2) fastening the rear panel.
- Step 6.** Remove the TORX T10 screw (item 3) fastening the small unit of the A10 Analog Mother Board.
- Step 7.** Disconnect the two cable connectors (item 4) from the Fan Assembly.
- Step 8.** Disconnect the two cable connectors (item 5) from the Power Supply Assembly.
- Step 9.** Disconnect the two cable connectors (item 6) from the Ref Oven.
- Step 10.** Remove the eleven TORX T10 screws (item 7) fastening the A10 Analog Mother Board.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

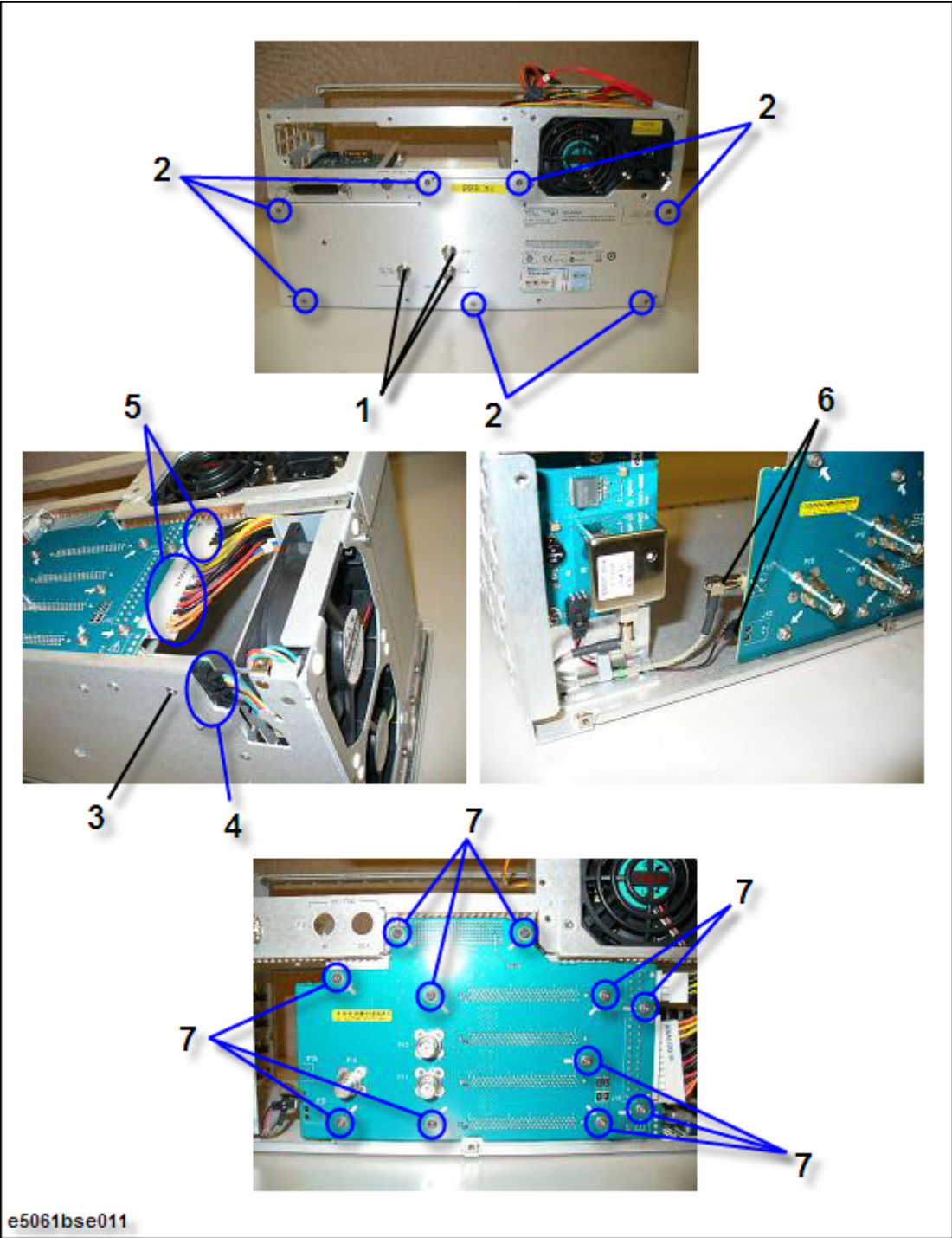
Set a torque to 30.4 in-lb for box torque wrench when fasten the 9/16 inch nuts and the washers (item 1).

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 2, item 3, and item 7).

---



Figure 6-11 A10 Analog Mother Board Removal



## Ref Oven (Opt. 1E5) Replacement

### Tools Required

- torque screwdriver, T15 and T20
- torque screwdriver, T10 (set to 9 in-lb)
- box torque wrench, 9/16 inch (set to 30.4 in-lb)

### Removal Procedure

Refer to Figure 6-12 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the three 9/16 inch nuts and the three washers (item 1) from the BNC connectors.
- Step 3.** Remove the seven TORX T10 screws (item 2) fastening the rear panel.
- Step 4.** Disconnect the two cable connectors (item 3) from the Ref Oven.
- Step 5.** Remove the three TORX T10 screws (item 4) fastening the Ref Oven.
- Step 6.** Lift the Ref Oven.

### Replacement Procedure

- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

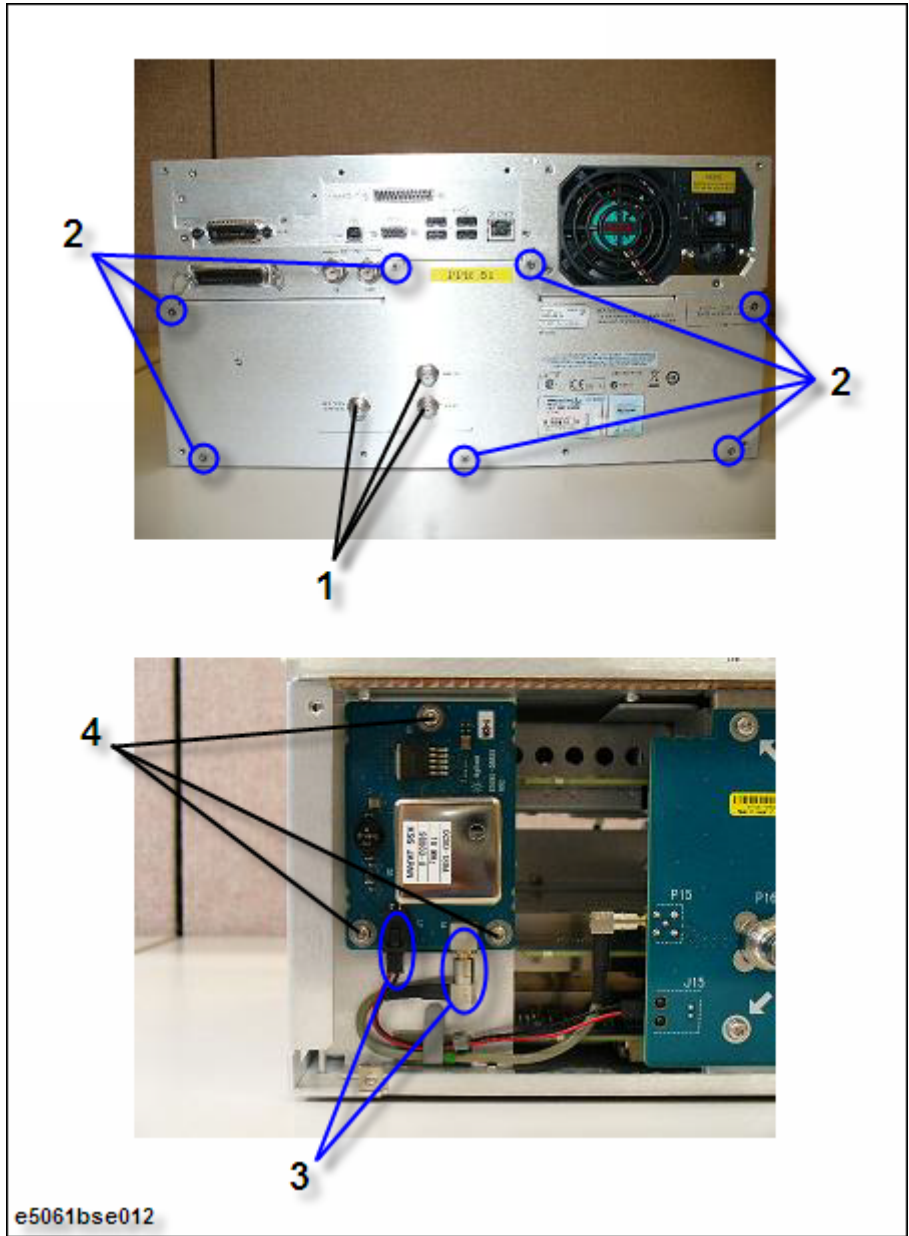
Set a torque to 30.4 in-lb for box torque wrench when fasten the 9/16 inch nuts and the washers (item 1).

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 2, and item 4).

---



Figure 6-12 Ref Oven Removal



## **Fan Assembly Replacement**

### **Tools Required**

- torque screwdriver, T15 and T20
- torque screwdriver, T10 (set to 9 in-lb)
- box torque wrench, 9/16 inch (set to 30.4 in-lb)

### **Removal Procedure**

Refer to Figure 6-13 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the three 9/16 inch nuts and the three washers (item 1) from the BNC connectors.
- Step 3.** Remove the seven TORX T10 screws (item 2) fastening the rear panel.
- Step 4.** Cut the cable ties (item 3) fastening the Fan Assembly cables.
- Step 5.** Disconnect the two cable connectors (item 4) from the Fan Assembly.
- Step 6.** Remove the six TORX T10 screws (item 5) fastening the Fan Assembly.
- Step 7.** Lift the Fan Assembly.
- Step 8.** Remove the eight rivets (plastic) (item 6) fastening the Fans for the blacket.
- Step 9.** Peel off the tape (item 7) fastening the Fan Assembly cables.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

---

#### **NOTE**

Set a torque to 30.4 in-lb for box torque wrench when fasten the 9/16 inch nuts and the washers (item 1).

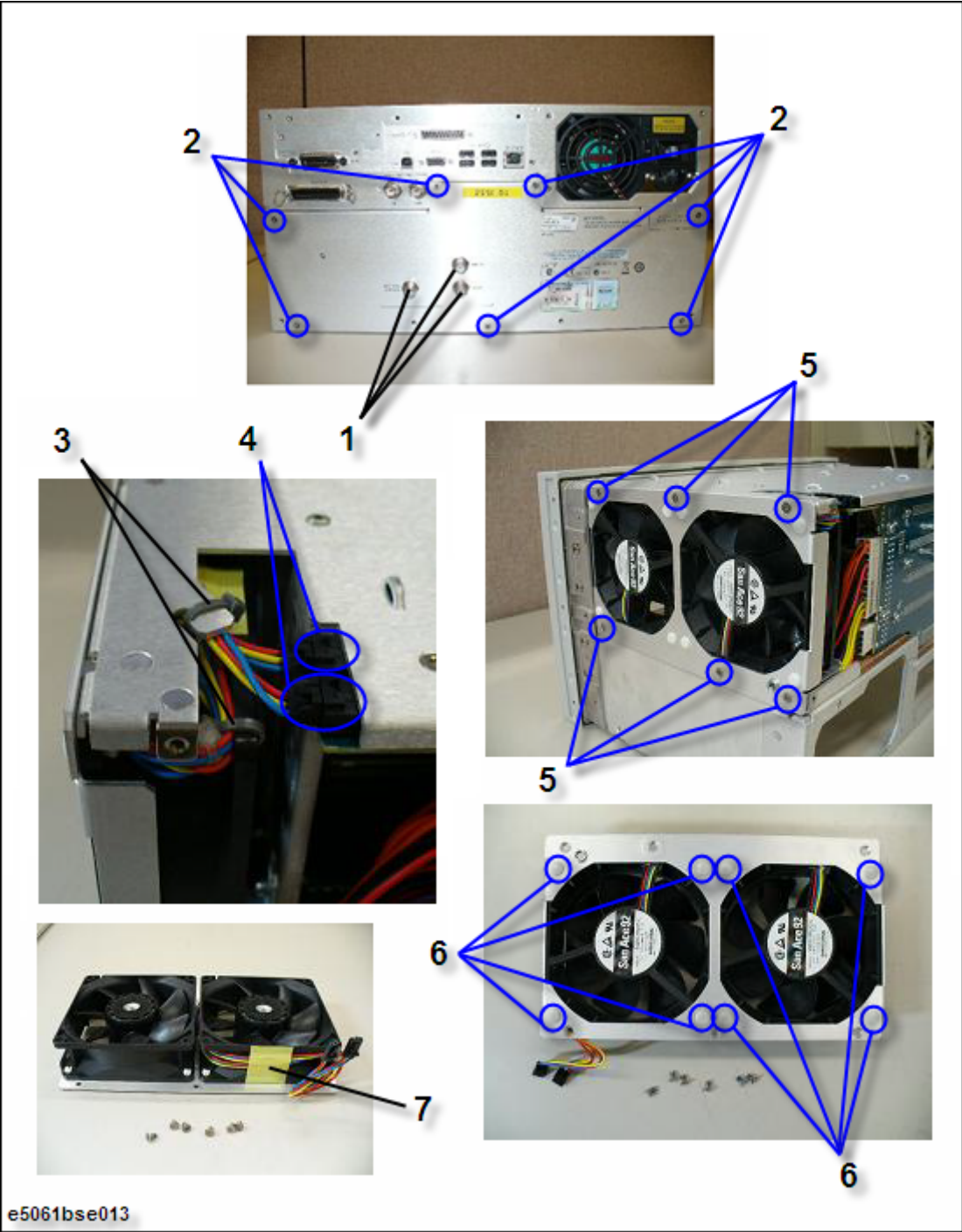
Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 2, and item 5).

Do not use the rivets (item 6) used once.

Pull the Fan Assembly cables before paste on tape.

---

Figure 6-13 Fan Assembly Removal



## Angle (Fan Assembly) Replacement

### Tools Required

- torque screwdriver, T15 and T20
- torque screwdriver, T10 (set to 9 in-lb)
- box torque wrench, 9/16 inch

### Removal Procedure

Refer to Figure 6-14 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Fan Assembly as described in “Fan Assembly Replacement” on page 110.
- Step 3.** Remove the two TORX T10 screws (item 1) fastening the Angle for Fan Assembly.
- Step 4.** Lift the Angle (item 2).

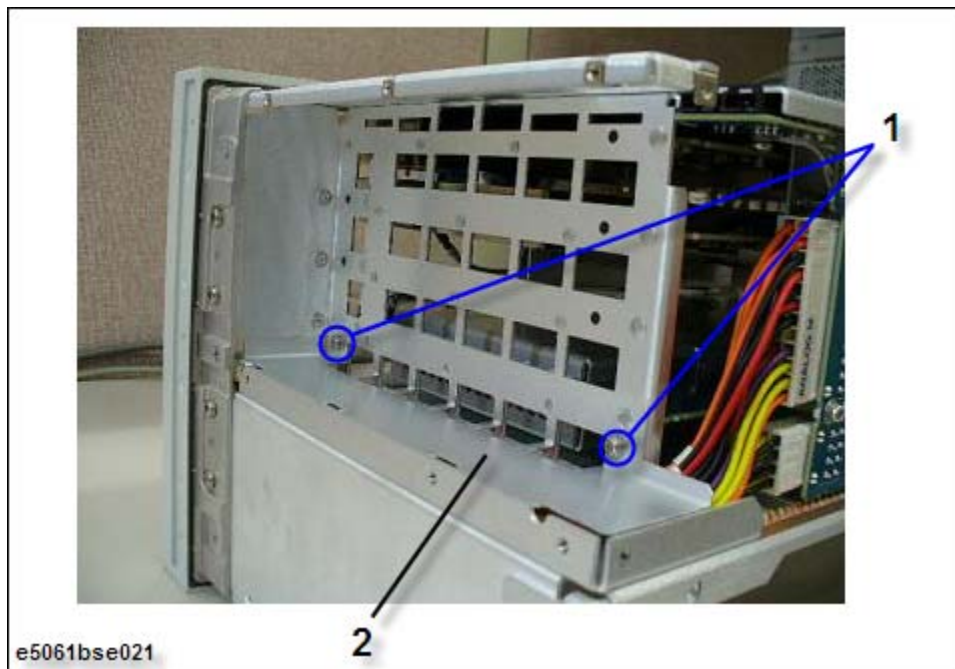
### Replacement Procedure

- Step 1.** Reverse the order of the removal procedure.

---

**NOTE** Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 1).

**Figure 6-14** Angle (for Fan Assembly) Removal



## Touch Screen Control Board Replacement

### Tools Required

- torque screwdriver, T15 and T20
- torque screwdriver, T8 (set to 5 in-lb)
- flat edge screwdriver

### Removal Procedure

Refer to Figure 6-15 for this procedure.

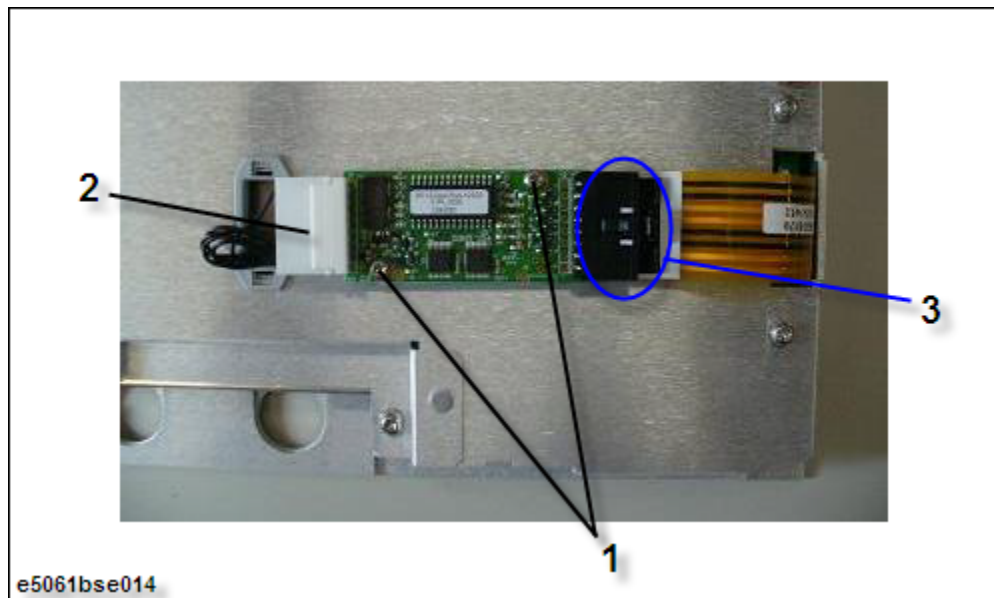
- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Remove the two TORX T8 screws (item 1) fastening the Touch Screen Control Board for the front panel rear side.
- Step 4.** Disconnect the flat cable connector (item 2) from the A52 Front Panel Interface Board.
- Step 5.** Disconnect the flat cable connector (item 3) from the LCD Assembly.

### Replacement Procedure

- Step 1.** Reverse the order of the removal procedure.

**NOTE** Set a torque to 5 in-lb for torque driver when fasten the TORX T8 screws (item 1).

Figure 6-15 Touch Screen Control Board Removal



## **Inverter Board Replacement**

### **Tools Required**

- torque screwdriver, T15 and T20
- torque screwdriver, T10 (set to 9 in-lb)
- torque screwdriver, T8 (set to 5 in-lb)
- flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-16 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Remove the Touch Screen Control Board as described in “Touch Screen Control Board Replacement” on page 113.
- Step 4.** Remove the cable clamp (nylon) (item 1) from the front panel rear side cover.
- Step 5.** Remove the six TORX T10 screws (item 2) fastening the front panel rear side cover.
- Step 6.** Lift the front panel rear side cover.
- Step 7.** Remove the two TORX T10 screws (item 3) fastening the Inverter Board Assembly.
- Step 8.** Lift the Inverter Board Assembly, and disconnect the two cable connectors (item 4) from the Inverter Board Assembly.
- Step 9.** Remove the two TORX T8 screws (item 5) fastening the Inverter Board for the plate.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 2, and Item 3).

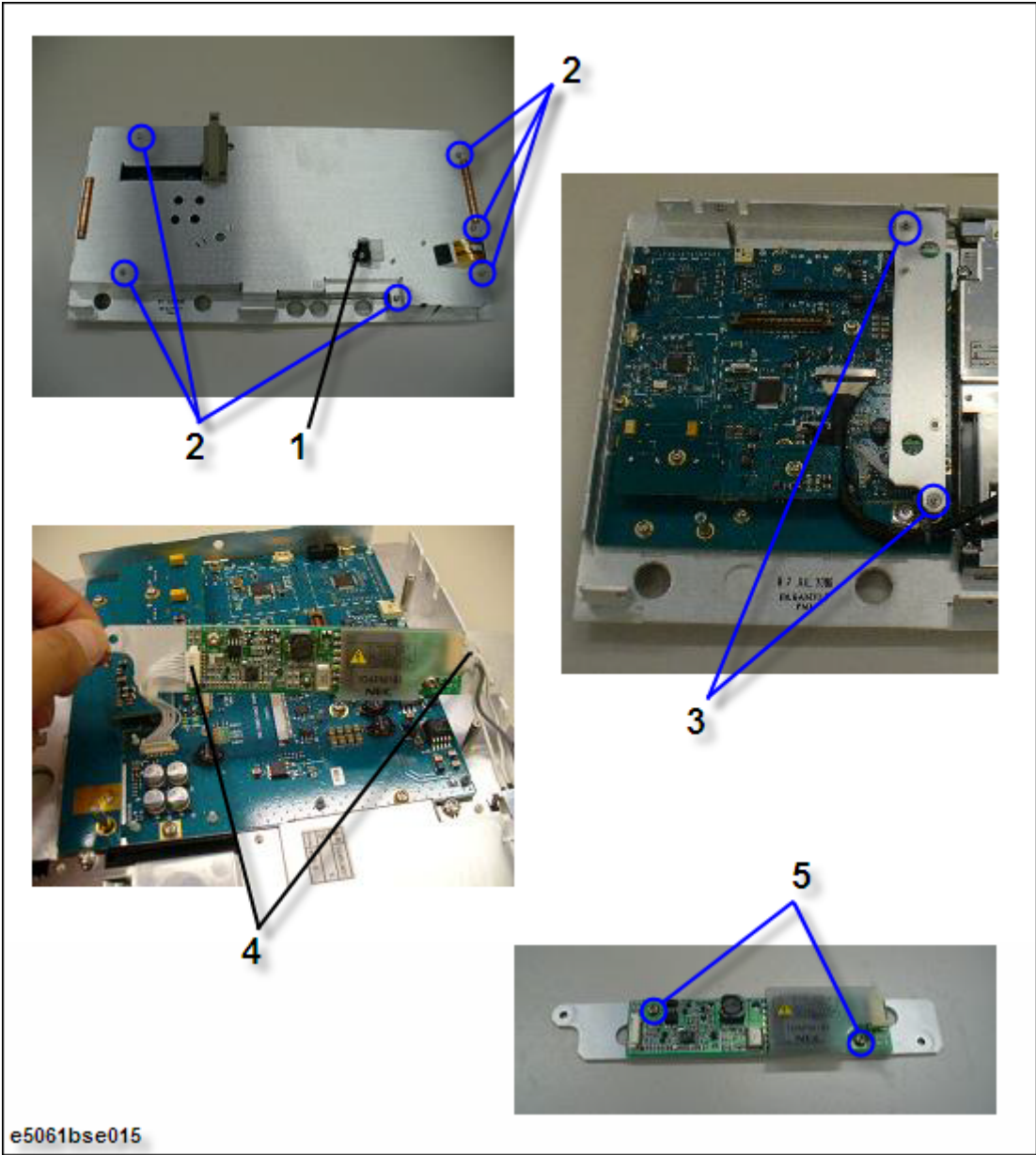
Set a torque to 5 in-lb for torque driver when fasten the TORX T8 screws (item 5).

---



Replacement Procedure  
Inverter Board Replacement

Figure 6-16 Inverter Board Removal



## **Power Switch Assembly Replacement**

### **Tools Required**

- torque screwdriver, T8, T15 and T20
- torque screwdriver, T10 (set to 9 in-lb)
- flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-17 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Remove the Touch Screen Control Board as described in “Touch Screen Control Board Replacement” on page 113.
- Step 4.** Remove the front panel rear side cover as described in “Inverter Board Replacement” on page 114.
- Step 5.** Disconnect the connector (item 1) of cable from the A52 Front Panel Interface Board.
- Step 6.** Remove the two TORX T10 screws (item 2) fastening the Power Switch Assembly.
- Step 7.** Remove the parts (item 3) of the Power Switch Assembly.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

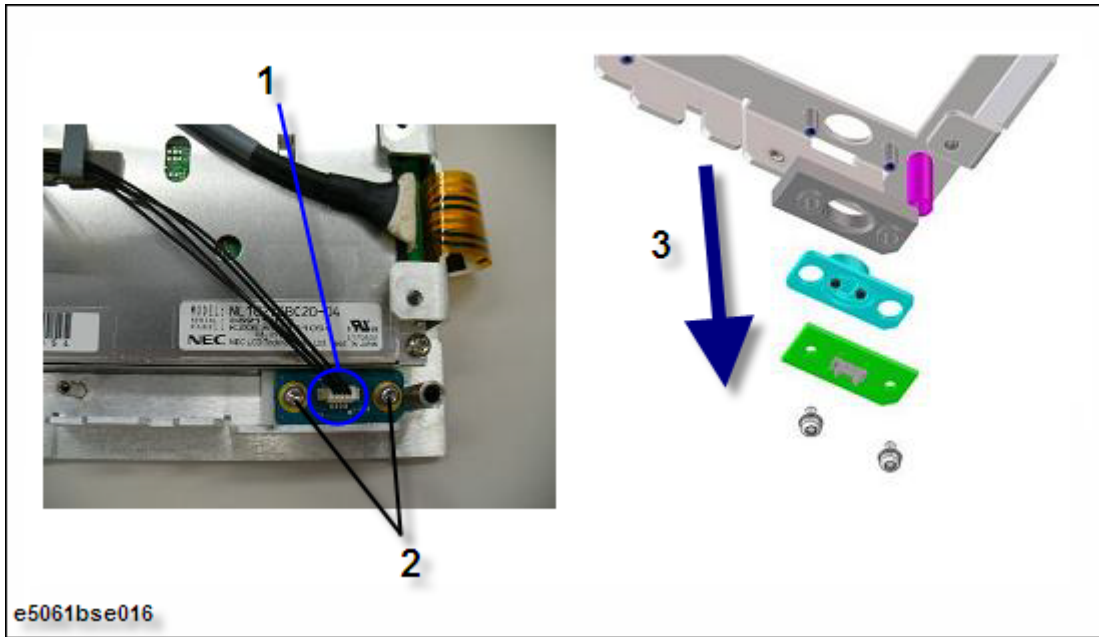
---

**NOTE**

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 2).



Figure 6-17 Power Switch Assembly Removal



## **A52 Front Panel Interface Board / Key Pad Replacement**

### **Tools Required**

- torque screwdriver, T8, T15 and T20
- torque screwdriver, T10 (set to 9 in-lb)
- hex key, 1.5 mm
- flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-18 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Remove the Touch Screen Control Board as described in “Touch Screen Control Board Replacement” on page 113.
- Step 4.** Remove the Inverter Board as described in “Inverter Board Replacement” on page 114.
- Step 5.** Remove the rotary knob (item 1) using hex key from the front panel.
- Step 6.** Disconnect the three connectors (item 2) of the cables.
- Step 7.** Remove the TORX T10 screw and washer (item 3) fastening the cable from the LCD Assembly.
- Step 8.** Remove the 13th TORX T10 screws (item 4) fastening the A52 Front Panel Interface Board.
- Step 9.** Remove the Key Pad (item 5) from the A52 Front Panel Interface Board while noting 14 pins (item 6) of rear side on Key Pad.
- Step 10.** Remove the USB module (item 7) of the A52 Front Panel Interface Board carefully.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

Set a torque to 9 in-lb for torque driver when fasten the TORX T10 screws (item 3, and item 4).

Push the USB module (item 7) sufficiently to ensure connector is fully insert.

---



## LCD Assembly Replacement

### Tools Required

- torque screwdriver, T8, T10 and T20
- torque screwdriver, T15 (set to 14 in-lb)
- flat edge screwdriver

### Removal Procedure

Refer to Figure 6-19 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Remove the Touch Screen Control Board as described in “Touch Screen Control Board Replacement” on page 113.
- Step 4.** Remove the Inverter Board as described in “Inverter Board Replacement” on page 114.
- Step 5.** Disconnect the two connectors (item 1) of the cables.
- Step 6.** Release the clamped cable from the clamp (item 2) on the LCD Assembly.
- Step 7.** Remove the two cables (item 3) on the LCD Assembly.
- Step 8.** Remove the four TORX T15 screws (item 4) fastening the LCD Assembly.
- Step 9.** Lift the LCD Assembly carefully.

### Replacement Procedure

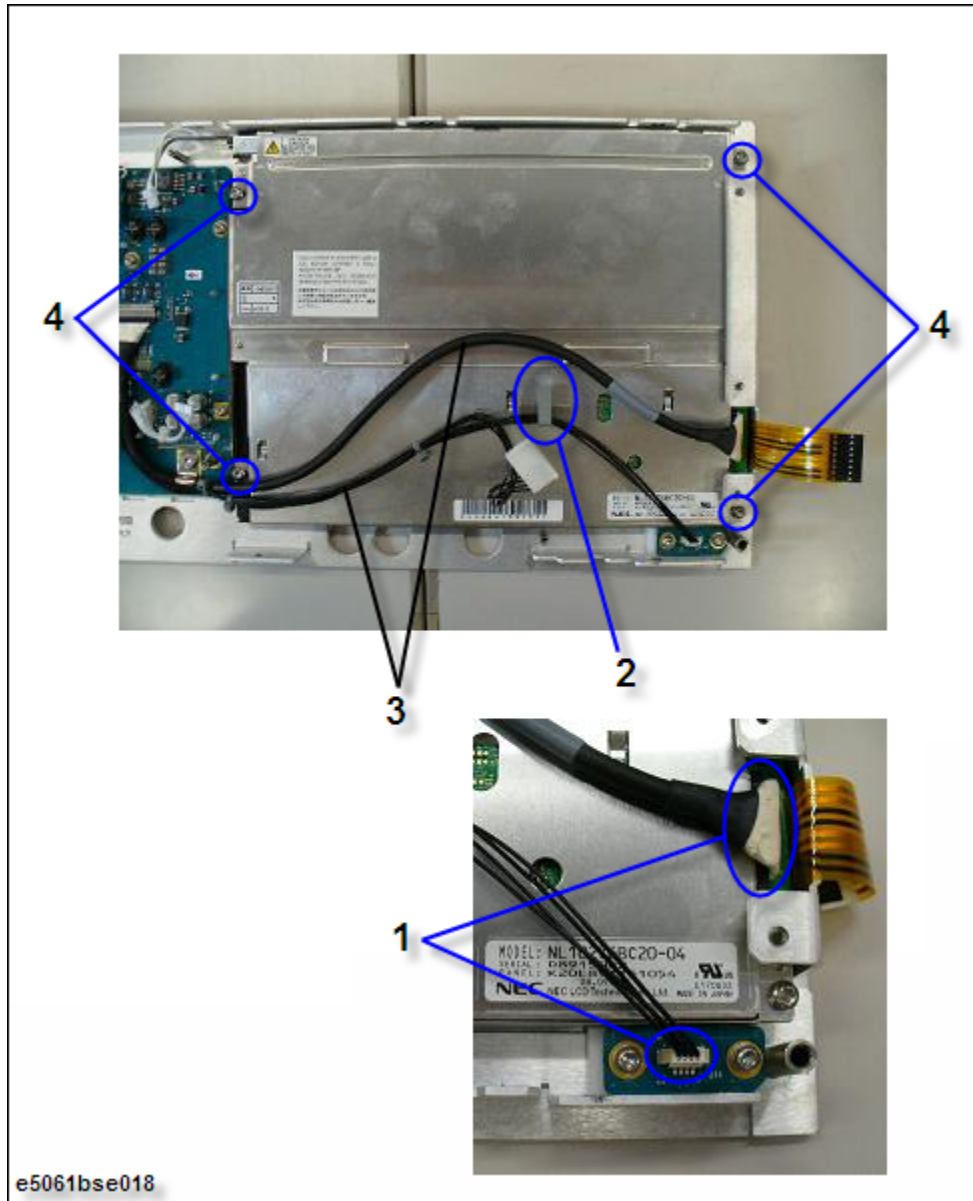
- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

Set a torque to 14 in-lb for torque driver when fasten the TORX T15 screws (item 4).

Figure 6-19 LCDAssembly Removal



## **Front Frame Replacement**

### **Tools required**

- torque screwdriver T20 (set to 21 in-lb)
- torque screwdriver T15 (set to 14 in-lb)
- flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-20 for this procedure.

- Step 1.** Remove the Outer Cover as described in “Outer Cover Replacement” on page 86.
- Step 2.** Remove the Front Panel as described in “Front Panel Replacement” on page 88.
- Step 3.** Remove the four TORX T15 screws (item 1) fastening the Front Frame.
- Step 4.** Remove the seven TORX T20 screws (item 2) fastening the Front Frame.
- Step 5.** Slide forward the Front Frame.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.

---

**NOTE**

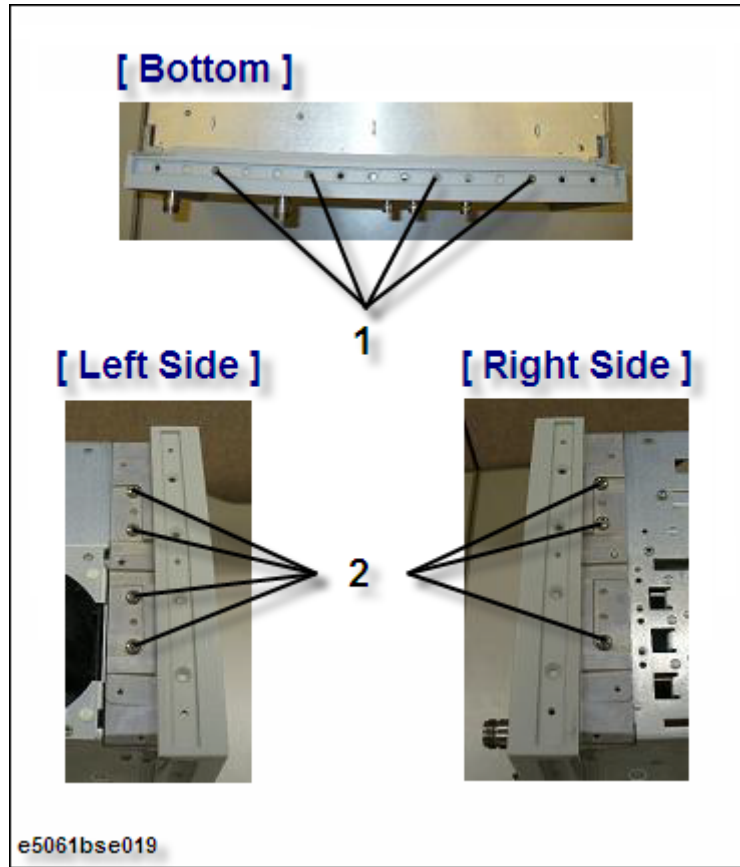
Set a torque to 14 in-lb for torque driver when fasten the TORX T15 screws (item 1).

Set a torque to 21 in-lb for torque driver when fasten the TORX T20 screws (item 2).

---

Figure 6-20

Front Frame Removal



## **Handle Assembly Replacement**

### **Tools required**

- torque screwdriver T20

### **Removal Procedure**

Refer to Figure 6-21 for this procedure.

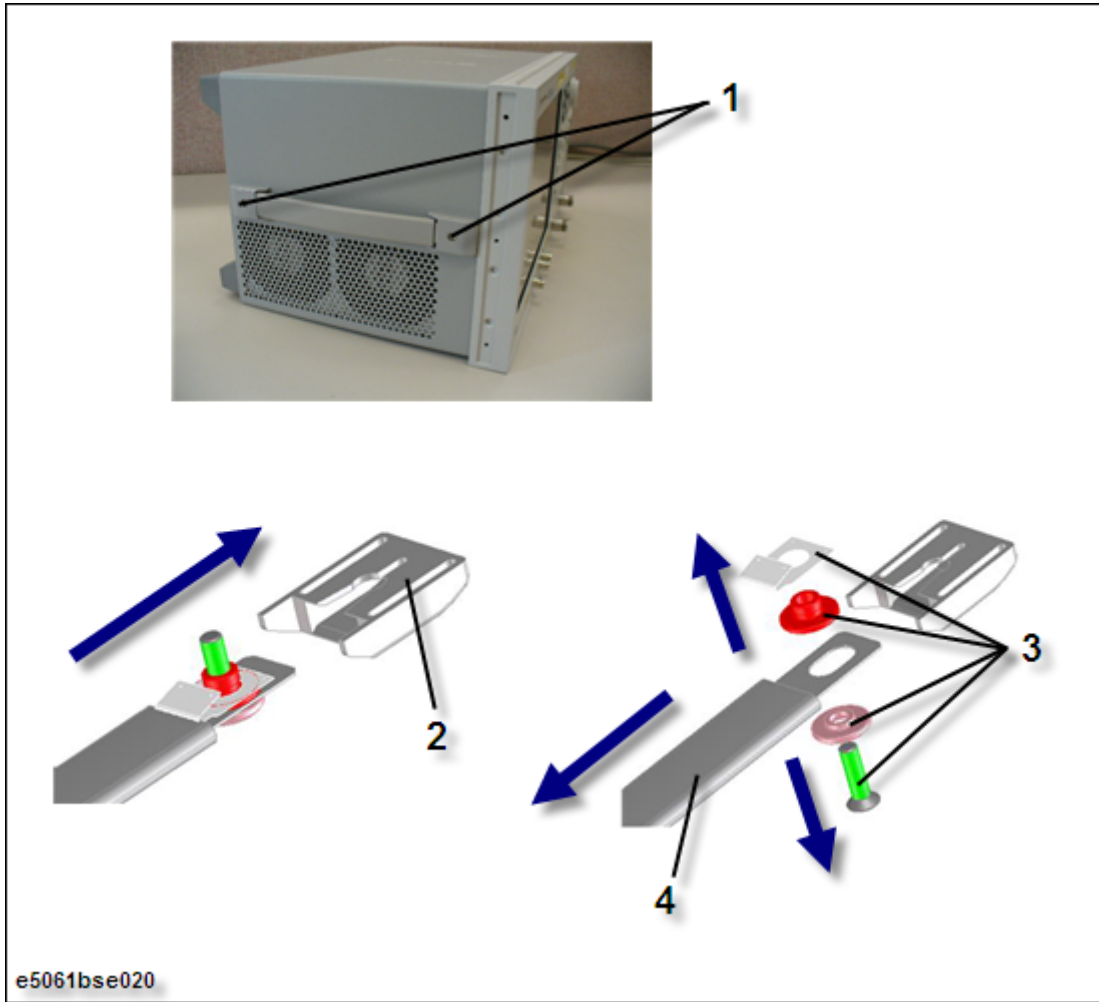
- Step 1.** Remove the four TORX T20 screws (item 1) fastening the Handle Assembly.
- Step 2.** Remove the end caps (both side) (item 2) from the Handle Assembly.
- Step 3.** Detach parts at both sides (item 3) of the Handle Assembly.
- Step 4.** Remove the strap cover (item 4) of the Handle Assembly.

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.



Figure 6-21 Handle Assembly Removal



Replacement Procedure  
**Handle Assembly Replacement**

---

**7****Post-Repair Procedures**

This chapter lists the procedures required to verify the E5061B operation after an assembly is replaced with a new one.

## Post-Repair Procedures

Table 7-1 *Post Repair Procedures* 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 7-1 Post-Repair Procedures**

<b>Replaced Assembly or Part</b>	<b>Required Adjustments Correction Constants (CC)</b>	<b>Verification</b>
A1 Source Module	Perform the following required adjustments using “A1 Source Module” in Spot Adjustment of the program.  Frequency Reference Adjustment Local Gain Adjustment Receiver Absolute Gain Rch Adjustment Synthesizer Gain Adjustment Source Output Power Adjustment. Receiver Ports Characteristics Adjustment. Receiver Absolute Gain Tch Adjustment. Source Output Power LF Adjustment.	“To Execute the Diagnostic Test” on page 65  Frequency Accuracy Test RF Output Level Accuracy and Flatness Test RF Output Level Linearity Test Trace Noise Test Crosstalk & System Dynamic Range Test Dynamic Accuracy Test Uncorrected System Performance Test  LF Output Level Accuracy Test (Opt 3L5) LF Output Level Linearity Test (Opt 3L5) Input Impedance Test (Opt 3L5) Absolute Amplitude Accuaracy Test (Opt 3L5) Magnitude Ratio/Phase Frequency Response Test (Opt 3L5) Trace Noise Test (Opt 3L5) Crosstalk and Noise Level Test (Opt 3L5) Magnitude Ratio/Phase Dynamic Accuracy Test (Opt 3L5)

**Table 7-1 Post-Repair Procedures**

<b>Replaced Assembly or Part</b>	<b>Required Adjustments Correction Constants (CC)</b>	<b>Verification</b>
A2 Receiver Module	<p>Perform the following required adjustments using “A2 Receiver Module” in Spot Adjustment of the program.</p> <p>Mixer Local Leakage Adjustment            Synthesizer Gain Adjustment            Source Output Power Adjustment            Receiver Ports Characteristics Adjustment            Receiver Absolute Gain Tch Adjustment            Receiver Absolute Gain LF Adjustment            DC Level Monitor.</p>	<p>“To Execute the Diagnostic Test” on page 65</p> <p>Frequency Accuracy Test            RF Output Level Accuracy and Flatness Test            RF Output Level Linearity Test            Trace Noise Test            Crosstalk &amp; System Dynamic Range Test            Dynamic Accuracy Test            Uncorrected System Performance Test            Input Impedance Test (Opt 3L5)            Absolute Amplitude Accuracy Test (Opt 3L5)            Magnitude Ratio/Phase Frequency Response Test (Opt 3L5)            Trace Noise Test (Opt 3L5)            Crosstalk and Noise Level Test (Opt 3L5)            Magnitude Ratio/Phase Dynamic Accuracy Test (Opt 3L5)            DC Measurement Accuracy Test (Opt 3L5)</p>
A9 LF Source Bias Module	<p>Perform the following required adjustments using “A9 LF Source Bias Module” in Spot Adjustment of the program.</p> <p>Source Output Power Adjustment            Receiver Ports Characteristics Adjustment            Source Output Power LF Adjustment            DC Level Monitor.</p>	<p>“To Execute the Diagnostic Test” on page 65</p> <p>Frequency Accuracy Test            RF Output Level Accuracy and Flatness Test            RF Output Level Linearity Test            Trace Noise Test            Crosstalk &amp; System Dynamic Range Test            Dynamic Accuracy Test            Uncorrected System Performance Test            LF Output Level Accuracy Test (Opt 3L5)            LF Output Level Linearity Test (Opt 3L5)            Input Impedance Test (Opt 3L5)            Absolute Amplitude Accuracy Test (Opt 3L5)            Magnitude Ratio/Phase Frequency Response Test (Opt 3L5)            Trace Noise Test (Opt 3L5)            Crosstalk and Noise Level Test (Opt 3L5)            Magnitude Ratio/Phase Dynamic Accuracy Test (Opt 3L5)            DC Measurement Accuracy Test (Opt 3L5)</p>
A10 Analog Motherboard	No adjustment needed	<p>Inspect the Booting Process</p> <p>When the symptom of failure is out of specification, perform the performance test.</p>

7. Post-Repair Procedures

**Table 7-1 Post-Repair Procedures**

<b>Replaced Assembly or Part</b>	<b>Required Adjustments Correction Constants (CC)</b>	<b>Verification</b>
A50 CPU module	No adjustment needed	Inspect the Booting Process
DSP Card	Perform the following required adjustments using “DSP board” in Spot Adjustment of the program.  Writing ID	Inspect the Booting Process Executed all of the performance test. “To Check the Front Panel” on page 71 “To Check the External Trigger Input” on page 74
Front Panel Board	No adjustment needed	“To Check the Front Panel” on page 71
Handler I/O Board	No adjustment needed	“To Execute the Diagnostic Test” on page 65
HDD	Perform “HDD” (Hard Disk Drive) in Spot Adjustment of the program.  Calibration of the Touch Screen (for opt. 016)	Inspect the Booting Process
Power Supply Assembly	No adjustment needed	Inspect the Booting Process
LCD	Not adjustment needed	Inspect the Booting Process “To Check the LCD” on page 73
Touch panel (for Opt. 016)	Calibration of the Touch Screen	Inspect the Booting Process “To Check the Touch Panel” on page 72
Inverter Board	No adjustment needed	Inspect the Booting Process

---

## **A** **Manual Changes**

This appendix contains the information required to adapt this manual to versions or configurations of the E5061B manufactured earlier than the current printing date of this manual. The information in this manual applies directly to E5061B units with the serial number that is printed on the title page of this manual.

---

## Manual Changes

To adapt this manual to your E5061B, refer to Table A-1 and Table A-2.

**Table A-1** Manual Changes by Serial Number

Serial Prefix or Number	Make Manual Changes

**Table A-2** Manual Changes by Firmware Version

Version	Make Manual Changes

Agilent Technologies uses a two-part, ten-character serial number that is stamped on the serial number plate (Figure A-1). The first five characters are the serial prefix and the last five digits are the suffix.

**Figure A-1** Serial Number Plate Example





---

## **B** **System Recovery**

This appendix describes how to recover the operating system (Windows XP) when the operating system has been damaged.

## **System Recovery**

By executing system recovery, you can return the system of the E5061B (the Windows operating system and the firmware) to the factory state (at the time of purchase <sup>\*1</sup>).

The procedure of system recovery is described in Installation Guide. Please refer to Agilent website below.

[http://www.agilent.com/find/ena\\_support](http://www.agilent.com/find/ena_support)

---

\*1. If the hard disk failed and has been replaced after purchase, the state when the replacement was performed is recovered.

---

## **C** **Firmware Update**

This appendix describes how to update the E5061B firmware. When you want to update the E5061B firmware, refer to this appendix.

## **Firmware Update**

### **Required Equipment**

- E5061B (with keyboard and mouse).
- USB mass storage.

### **How to update the E5061B firmware**

The firmware update procedure is described in E5061B WebHelp. Please refer to Agilent website as below.

[http://ena.tm.agilent.com/e5061b/manuals/webhelp/eng/index.htm#product\\_information/maintenance/updating\\_firmware.htm](http://ena.tm.agilent.com/e5061b/manuals/webhelp/eng/index.htm#product_information/maintenance/updating_firmware.htm)

---

**D**      **Power Requirement**

## Preparation for Power Supply

Before turning on power to the equipment, be sure to verify the following:

### Power Requirements

The E5061B requires the following power source:

	Requirements
Voltage	90 to 132 VAC or 198 to 264 VAC *1
Frequency	47 to 63 Hz
Maximum power consumption	300 VA

\*1. Switched automatically by the E5061B in conformity to the voltage.

### Power Cable

In accordance with international safety standards, this instrument is equipped with a three-wire power cable. When connected to an appropriate ac power outlet, this cable grounds the instrument frame. The type of power cable shipped with each instrument depends on country of destination. Refer to Figure D-1 for the part numbers of the power cables available.

---

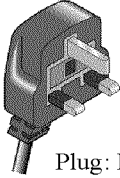
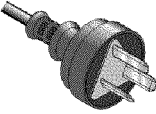
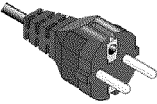
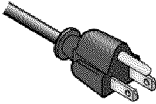

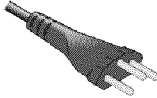
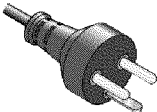
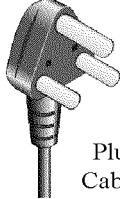
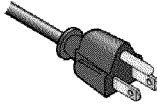
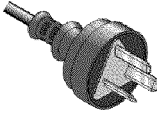
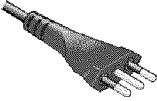
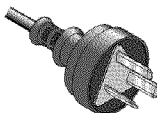
#### **WARNING**

**For protection from electrical shock, the power cable ground must not be defeated.**

**The power plug must be plugged into an outlet that provides a protective earth ground connection.**

---

Figure D-1 Power cable options





<p>OPTION 900</p>  <p>United Kingdom</p> <p>Plug: BS 1363/A, 250V, 10A Cable: 8120-1351, 8120-8705</p>	<p>OPTION 901</p>  <p>Australia/New Zealand</p> <p>Plug: AS 3112, 250V, 10A Cable: 8120-1369</p>
<p>OPTION 902</p>  <p>Continental Europe</p> <p>Plug: CEE 7 Standard Sheet VII, 250V, 10A Cable: 8120-1689</p>	<p>OPTION 903</p>  <p>U.S./Canada</p> <p>Plug: NEMA 5-15P, 125V, 10A Cable: 8120-1378</p>
<p>OPTION 904</p>  <p>U.S./Canada</p> <p>Plug: NEMA 6-15P, 250V, 6A Cable: 8120-0698</p>	<p>OPTION 906</p>  <p>Switzerland</p> <p>Plug: SEV Type 12, 250V, 10A Cable: 8120-2104</p>
<p>OPTION 912</p>  <p>Denmark</p> <p>Plug: SR 107-2-D, 250V, 10A Cable: 8120-2956</p>	<p>OPTION 917</p>  <p>India/Republic of S. Africa</p> <p>Plug: IEC 83-B1, 250V, 10A Cable: 8120-4211</p>
<p>OPTION 918</p>  <p>Japan</p> <p>Plug: JIS C 8303, 125V, 12A Cable: 8120-4753</p>	<p>OPTION 920</p>  <p>Argentina</p> <p>Plug: Argentine Resolution 63, Annex IV, 250V, 10A Cable: 8120-6870</p>
<p>OPTION 921</p>  <p>Chile</p> <p>Plug: CEI 23-16, 250V, 10A Cable: 8120-6978</p>	<p>OPTION 922</p>  <p>China</p> <p>Plug: GB 1002, 250V, 10A Cable: 8120-8376</p>
<p>NOTE: Each option number includes a 'family' of cords and connectors of various materials and plug body configurations (straight, 90° etc.).</p>	

power\_e




## Turning the Power ON and OFF

Perform the following steps to turn the power ON or OFF.

### Turning the power ON

- Step 1.** If the standby switch (  ) in the lower-left part of the front panel is in the pressed down (  ) position, press the switch to the popped up position (  ).
- Step 2.** Press the standby switch to the pressed down position (  ).  
This operation turns ON the power, and the E5061B starts the self-test.
- Step 3.** Confirm that the self-test indicates normal operation.  
Normal operation is confirmed by the self-test if no error message appears.


### Turning the power OFF

- Step 1.** Use either of the following methods to turn OFF the E5061B.
- Press the standby switch (  ) in the lower-left part of the front panel (now in the pressed down (  ) position) to the popped up (  ) position.
  - Send the shutdown command from an external controller.

These operations will start the E5061B shutdown process (required software and hardware processes for turning the power off), and the power will turn OFF after a few seconds.

---

#### NOTE

Under normal circumstances, always press the standby switch (  ), or send the shutdown command from the external controller, to actuate the E5061B shutdown process. **Never cut off the power supply directly by disconnecting the power cable plug from the rear panel of the unit.**

If the power supply is cut off directly by disconnecting the power cable plug or by disconnecting the power supply to the AC outlet, the shutdown process will not be carried out, and there is a risk of damage to the software or hardware of the E5061B.

---



---

## **E** Messages

The E5061B can display error messages as well as messages that indicate the internal operating status of the equipment. This appendix explains what these messages mean. They are listed in alphabetical order.

Messages showing the status of the E5061B are displayed in the lower-left area of the E5061B LCD screen. These messages include error messages that occur during the

## Messages

execution of GPIB commands and others that indicate the internal status of the equipment.

Error messages are indicated following the character string “[Err]” and can be read out by a GPIB command. Other kinds of messages are indicated without the “[Err]” character string and cannot be read out by a GPIB command. This section explains the meaning of each message and how to resolve the problem it indicates.

---

## Error Messages

An error message is displayed against a red background in the instrument message/warning area in the lower left part of the screen. Pushing a front panel key or executing :DISP:CCL command clears the error message. Errors caused by the operation of a front panel key simply appear on the display. They are not stored in the error queue with some exceptions.

An error with a positive error number is one uniquely defined for this instrument. On the other hand, an error with a negative error number is basically one defined for common GPIB devices in IEEE488.2

Error messages are described in WebHelp. Please kindly refer to Agilent Website below.  
[http://ena.tm.agilent.com/e5061b/manuals/webhelp/eng/index.htm#product\\_information/error\\_messages/error\\_messages.htm](http://ena.tm.agilent.com/e5061b/manuals/webhelp/eng/index.htm#product_information/error_messages/error_messages.htm)

## Warning Message

A warning message is displayed in the instrument message/Warning area in the lower left part of the display against a gray background. Pushing a front panel key or executing :DISP:CCL command clears the message.

This message simply appears on the display, being not known to a remote environment such as a GPIB. This message is not displayed when another error (against a red background) has already been displayed in the instrument message/Warning area.

The warning messages for this instrument are described in WebHelp. Please refer to Agilent website.  
[http://ena.tm.agilent.com/e5061b/manuals/webhelp/eng/index.htm#product\\_information/error\\_messages/warning\\_message.htm](http://ena.tm.agilent.com/e5061b/manuals/webhelp/eng/index.htm#product_information/error_messages/warning_message.htm)

## Messages