

**Agilent E5070B/E5071B ENA Series RF Network Analyzers**

# **Service Guide**

**Eighth Edition**



**Manufacturing No. E5070-90370**

**November 2008**

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## Notices

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## 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 2002	First Edition
March 2003	Second Edition
November 2004	Third Edition (Update service information for serial prefix MY422, and the A20 motherboard change.)
May 2005	Fourth Edition (Added removable HDD and USB (USBTMC) interface port for serial prefix MY424 and above.)
November 2005	Fifth Edition
May 2006	Sixth Edition
February 2007	Seventh Edition
November 2008	Eighth Edition

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## 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. In addition it violates 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 requirements.

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|-------------|--|
| <b>NOTE</b> | E5070B/E5071B comply with INSTALLATION CATEGORY II and POLLUTION DEGREE 2 in IEC61010-1. E5070B/E5071B are INDOOR USE product. |
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| <b>NOTE</b> | LEDs in E5070B/E5071B are Class 1 in accordance with IEC60825-1. CLASS 1 LED PRODUCT |
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| <b>NOTE</b> | This equipment is MEASUREMENT CATEGORY I (CAT I). Do not use for CAT II, III, or IV. |
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|-------------|---|
| <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. |
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- **Ground The Instrument**

To avoid electric shock hazard, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.
  - **DO NOT Operate In An Explosive Atmosphere**

Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
  - **Keep Away From Live Circuits**

Operating personnel 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 voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.
  - **DO NOT Service Or Adjust 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 Instrument**

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

- Dangerous Procedure Warnings

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

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**WARNING**

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**Dangerous voltages, capable of causing death, are presenting this instrument. Use extreme caution when handling, testing, and adjusting this instrument.**

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## 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.

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**WARNING**

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**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.**

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**CAUTION**

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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.

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**NOTE**

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



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## **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.

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## **Assistance**

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

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## Typeface Conventions

**Sample (bold)**

Boldface type is used when a term is defined or emphasised.

*Sample (Italic)*

Italic type is used for emphasis.

Sample key / [Sample] key

Indicates a hardkey (key on the front panel or external keyboard) labeled "Sample." "key" may be omitted.

**Sample** 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.

**Sample** block/toolbar

Indicates a block (group of hardkeys) or a toolbar (setup toolbar) labeled "Sample."

**Sample 1 - Sample 2 - Sample 3**

Indicates a sequential operation of **Sample 1**, **Sample 2**, and **Sample 3** (menu, button, or box). "-" may be omitted.

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# 1 General Information

The Service Manual is a guide to servicing the E5070B/E5071B ENA Series Network Analyzer. The manual contains information requisite to do performance tests, adjustments, troubleshooting, and repairs.

## Precautions

This section describes cautions that must be observed in operating the E5070B/E5071B.

### 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 or to install Windows-based software (including anti-virus software) for ordinary PCs 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.

---



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## Organization of Service Manual

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 Manual is a guide to servicing the E5070B/E5071B ENA Series Network Analyzer. The manual contains information requisite to do performance tests, adjustments, troubleshooting, and repairs.

### Chapter 2 , “Performance Tests,”

This chapter provides information on how to verify the E5070B/E5071B performance.

### Chapter 3 , “Adjustment,”

This chapter provides the adjustment information for the E5070B/E5071B ENA Series Network Analyzer to ensure that the it is within its specifications. The adjustment must be performed Agilent’s qualified service personnel. If you need the adjustment for your E5070B/E5071B, it should be sent to the nearest Agilent Technologies service office.

### Chapter 4 , “Troubleshooting,”

This chapter provides procedure to isolate a faulty assembly in the E5070B/E5071B Network Analyzer

### Chapter 5 , “Replaceable Parts,”

This chapter contains information for ordering replacement parts for the E5070B/E5071B ENA Series RF Network Analyzers.

### Chapter 6 , “Replacement Procedure,”

This chapter provides procedure for removing and replacing the major assemblies in the E5070B/E5071B ENA Series Network Analyzer.

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

This chapter lists the procedures required to verify the E5070B/E5071B 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 E5070B/E5071B manufactured earlier than the current printing date of this manual. The information in this manual applies directly to E5070B/E5071B 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 2000) when the operating system has been damaged.

General Information  
**Organization of Service Manual**

Appendix C , “Firmware Update,”

This appendix describes how to update the E5070B/E5071B firmware. When you want to update the E5070B/E5071B firmware, refer to this appendix.

Appendix D , “Computer Virus Check,”

This appendix describes an example of how to check the system of E5070B/E5071B for computer viruses using computer viruses check software.

Appendix E , “Power Requirement,”

Appendix F, “Messages,”

The E5070B/5071B can display error messages as well as messages that indicate the internal operating status of the equipment. This appendix explains what these messages mean by listing them 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 E5070B/E5071B.

**Table 1-1 Recommended Test Equipment**

Equipment	Critical specifications	Recommended Model	Qty.	Use* <sup>1</sup>
Frequency Counter	Frequency: 50 MHz to 3 GHz Accuracy: < 2.5 ppm	Agilent 53181A with Opt.010 & 030* <sup>2</sup>	1	P,A
Frequency Standard	Frequency: 10 MHz, Time Base Error: $\leq \pm 1 \times 10^{-10}$ /year	Agilent 5071A	1	A
Power Meter	No Substitute	Agilent E4419A/B* <sup>3</sup> or E4418A/B	1	P,A
Power Sensor	No Substitute	Agilent 8482A	1	P,A
Power Sensor	No Substitute	Agilent E4412A	1	P,A
Dynamic Accuracy Test Kit	No substitute	Agilent Z5623A with Opt. H01	1	P
Calibration Kit	No Substitute	Agilent 85032F	1	P,A,T
Short	Type-N(m)	part of Agilent 85032F/54D/33E/50D with Type-N adapter	4	P,T
Load	Type-N(m)	part of Agilent 85032F/54D/33E/50D with Type-N adapter	2	P
Fixed attenuator (6 dB)	50 $\Omega$ , N(m)-N(f), VSWR $\leq$ 1.015	Agilent 8491A w/Opt.006 and H60	1	P,A
Fixed attenuator (10 dB)	50 $\Omega$ , N(m)-N(f)	Agilent 8491A/B/C	1	T
Handler I/O Test Kit	No substitute	Agilent p/n E5070-65001	1	T
Cable	BNC(m)-BNC(m) Cable, 61 cm Coaxial cable with Type-N (m) connectors, 61 cm (24 in), 2 ea.	Agilent p/n 8120-1839	1	P,A
		Agilent N6314A (p/n 8120-8862)	1	P,A,T
Adapter	N(m)-BNC(f) Adapter	Agilent p/n 1250-0780	1	P,A
Torque Wrench	Size: 3/4 inch Torque: 136 N-cm	Agilent p/n 8710-1766	1	P,A

**Table 1-1 Recommended Test Equipment**

Equipment	Critical specifications	Recommended Model	Qty.	Use *1
Personal Computer with GPIB board	Windows 95, 98, NT4 or 2000, VEE5.0 or 6.0		1	P,A

\*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.

\*3. The accuracy of a standard E4419A/B or E4418A/B of  $\pm 0.02$  dB is adequate for all tests/adjustment except "Dynamic Accuracy Test". This test requires a power meter with Option G12 or H12 that has been certified to a higher accuracy specification. If an Option G12 or H12 power meter is not available, a test is provide on "Power Meter Accuracy Test" on page 26 to verify the accuracy of a standard power meter.

**Table 1-2 Alternative Test Equipment**

Equipment	Critical specifications	Model	Qty.	Use *1
Frequency Counter	Frequency: 50 MHz to 3 GHz Accuracy: < 2.5 ppm	Agilent 53131/2A with Opt.010 and 030 *2	1	P,A
Power Meter	No Substitute	Agilent E4418A/B *3	1	P
Short	Type-N(m)	Agilent 11512A	4	P,T
Load	Type-N(m)	Agilent 909F Opt. 012	4	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.

\*3. If an accurate measurement of the dynamic accuracy specification is not required, a standard power meter can be used.

---

## Power Meter Accuracy Test

This test is intended for power meters used in testing the E5070B/E5071B. 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* <sup>1</sup>
Power sensor cable	Agilent 11730A, p/n 8120-8319	Any equivalent
Cable, BNC, 50 $\Omega$	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.

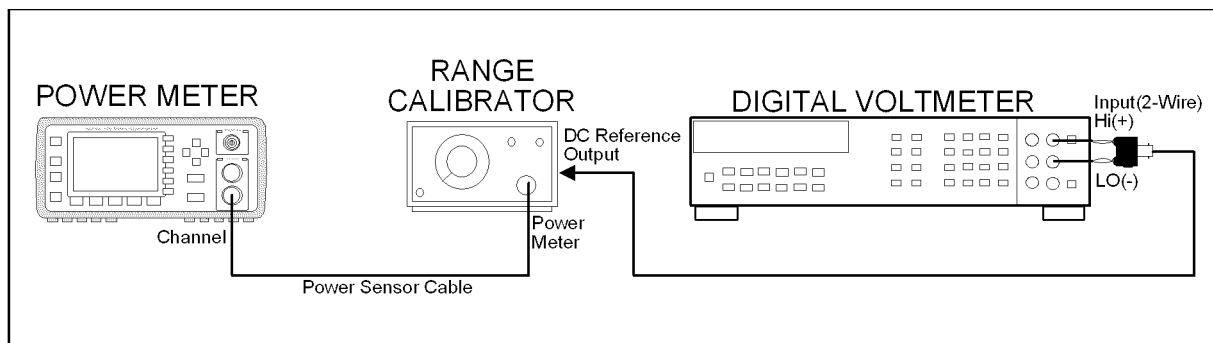
**NOTE** It is recommended that a copy of the test record on page 30 be made, and the values be recorded on the copy, thus preserving the original for future use.

**Test Procedure**

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

- Step 1.** Setup the equipment as shown in Figure 1-2.
- a. Connect the DC REFERENCE OUTPUT connector on the rear panel of the range calibrator to the DVM voltage input.
  - b. Connect the POWER METER output of the range calibrator to the input of the power meter being tested.
  - c. 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:
- a. Set to read in dBm: Press [**dBm/W**], then **dBm**.
  - b. Set the ref cal factor to 100%: Press [**Zero/Cal**], **Cal**, **A/B Ref CF**, then set to **100.0**, if necessary.
  - c. Set the cal factor to 100%: Press [**Frequency/Cal Fac**], **A/B Cal Fac**, then set to **100.0**, if necessary.
  - d. Set readout to 0.001 dBm: Press [**Meas Setup**], then **Resolution 1234**, to highlight **4**.
  - e. 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:
- a. Reset the DVM: Press the **blue key** followed by **Reset**.
  - b. 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:

General Information  
Power Meter Accuracy Test

- POLARITY: NORMAL
- RANGE: 1 mW
- 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 30.

---

**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  
**Power Meter Accuracy Test**

**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:</b> Model No.:		Serial No.:	
<b>Digital Voltmeter:</b> Model No.:		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 E5070B/E5071B performance.

---

## Introduction

This literature provides the performance test procedures for the Agilent E5070B/E5071B RF Network Analyzers. The performance test names are listed in Table 2-1. The test procedures are described sequentially in the following pages.

The test name indicates the tested performance and to which performance group the tested performance belongs.

Each procedure consists of the following parts:

- Description:** describes the test procedure.
- Specification:** describes the performance verified in the test.
- Test Equipment:** describes test equipment required in the test.
- Procedure:** describes test procedure step by step.

---

**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.

---

**NOTE** Before performing any tests, make extra copies of the calculation sheets and the performance test record pertaining to the test procedure. These are required in the test procedure. For explanation of how to use these records, see the calculation sheet and performance test record at the end of this literature.

---

**NOTE** All the test procedures are described without using the optional touch screen LCD features (option 016) of the E5070B/E5071B. For the option 016 instruments, the touch screen operating procedures corresponding to the described procedures may be used.

---

**Table 2-1** The E5070B/E5071B performance test procedure

Para.	Title
1	Frequency accuracy test
2	RF output level accuracy and flatness test
3	RF output level linearity test
4	Trace noise CW test
5	Crosstalk test
6	System dynamic range test

**Table 2-1**                      **The E5070B/E5071B performance test procedure**

<b>Para.</b>	<b>Title</b>
7	Dynamic accuracy test
8	Uncorrected system performance test

**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.

**Softkey Selection Procedure for Performance Test**

---

**NOTE**

The procedure of the softkey selection depends on the firmware revision. Please note that some softkey selection procedures for your E5070B/E5071B might be a little bit different from the procedure described in this chapter.

---

## 1. FREQUENCY ACCURACY TEST

### Description

This test checks the frequency accuracy of the E5070B/E5071B test port output signal. The frequency accuracy is checked at 50 MHz and 3 GHz with a frequency counter. Since the E5070B/E5071B employs a PLL frequency synthesizer for the signal source, the frequency accuracy test at these two frequency points can verify the accuracy for the entire frequency range.

### Specification

@23 ± 5 °C, referenced to 23 °C

Frequency accuracy	≤ ± 5 ppm @ 300 kHz to 3 GHz (E5070B)
	≤ ± 5 ppm @ 300 kHz to 8.5 GHz (E5071B)

@23 ± 5 °C, referenced to 23 °C

High stability time-base accuracy (option 1E5)	≤ ± 1 ppm @ 300 kHz to 3 GHz (E5070B)
	≤ ± 1 ppm @ 300 kHz to 8.5 GHz (E5071B)

### Test equipment

Frequency Counter	Agilent 53181A with Opt. 010 and 030
BNC cable, 61 cm	Agilent p/n 8120-1839
N(m)-BNC(f) adapter	Agilent p/n 1250-0780

### Procedure

- Step 1.** Connect the test equipment as shown in Figure 2-1. For testing the E5070B/E5071B equipped with option 1E5, connect a BNC(m)-BNC(m) adaptor between the Ref In connector and the Ref Oven (10 MHz) connector on the E5070B/E5071B rear panel.

---

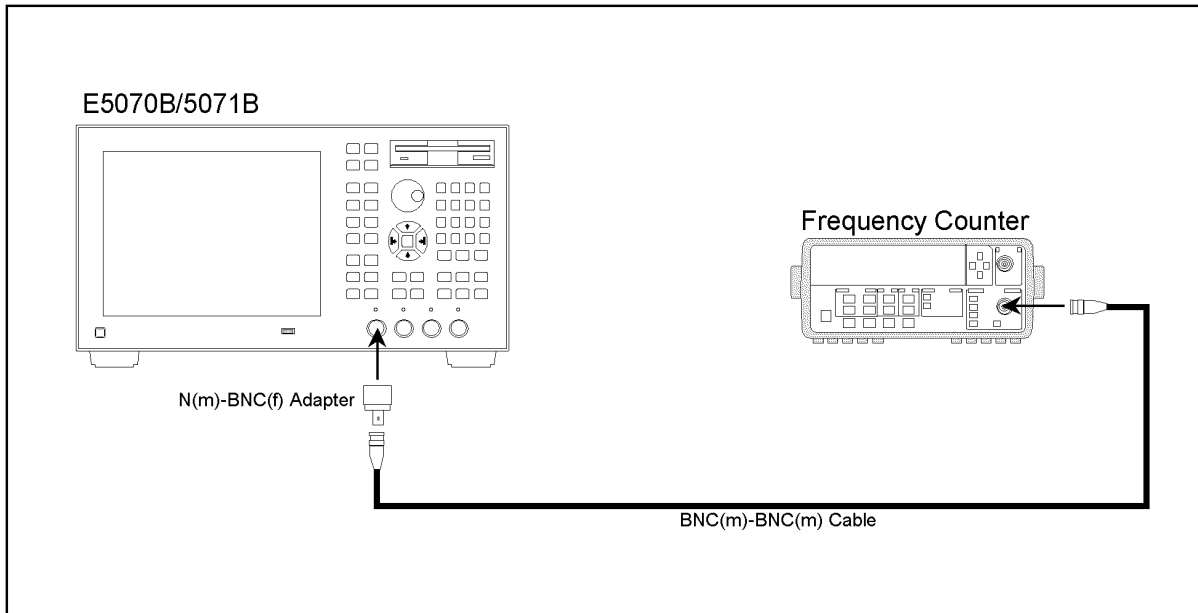
**NOTE** For testing without option 1E5, disconnect the above BNC(m)-BNC(m) adaptor.

---

**NOTE** Figure 2-1 shows the test setup for the E5070B/E5071B with 4-port option (Opt. 413/414). For 2-port and 3-port options (Opt. 213/214/313/314), connect the frequency counter input cable to Port 1 as well.

---

**Figure 2-1** Frequency accuracy test setup (50 MHz)



e5070bse003

2. Performance Test

**Step 2.** Initialize the frequency counter. Set the frequency counter as follows:

Controls	Setting
Gate time	1 sec
50 Ω/1 MΩ	50 Ω

**Step 3.** Press **Preset** and **Enter** to initialize the E5070B/E5071B. And press **Sweep Setup** - **Power** - **Auto Range** to turn off Auto Power Range set function (FW 3.60 and above), and press **System** - **Servise** - **Init Src Ctrl** to turn off Initial Source Port Control function (FW 3.54 and above). Then set the controls as follows:

Control settings	Key strokes
Center frequency: 50 MHz	<b>Center</b> - <b>5</b> - <b>0</b> - <b>M/μ</b>
Frequency span: 0 Hz	<b>Span</b> - <b>0</b> - <b>x1</b>

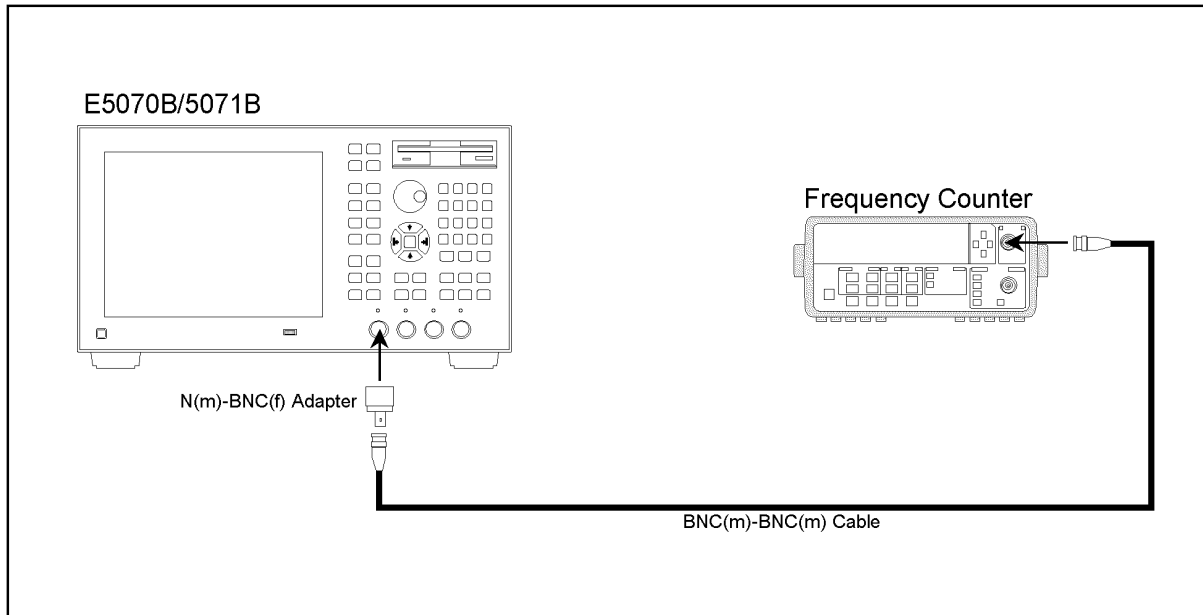
The source power now is set to 0 dBm (preset value).

**Step 4.** Press **Trigger** - **↓** and **Enter** to make a **Single** sweep measurement. Wait for frequency counter reading to settle.

**Step 5.** Record the frequency counter reading to a 1 Hz resolution in the performance test record ("Test result" column for the Frequency accuracy test.)

Performance Tests  
1. FREQUENCY ACCURACY TEST

Figure 2-2 Frequency accuracy test setup (3GHz)



e5070bse004

**Step 6.** Connect the BNC cable to the frequency counter input channel measurable for a 3 GHz input signal. See Figure 2-2.

**Step 7.** Press **Center** - **3** - **G/n** to set the frequency to 3 GHz.

**Step 8.** Perform Step 4 and 5.



## 2. RF OUTPUT LEVEL ACCURACY AND FLATNESS TEST

### Description

This test checks the level accuracy and frequency flatness of the E5070B/E5071B 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. The frequency flatness is tested by measuring the power level at 12 frequency points from 10 MHz to 8.5 GHz and calculating the differences of the power meter readings from the level at 50 MHz.

### Specification

#### Level accuracy

$\leq \pm 0.65$  dBm @  $23 \pm 5$  °C, 50 MHz, 0 dBm

#### Flatness

##### E5070B

$\leq \pm 1$  dBm @  $23 \pm 5$  °C, 10 MHz to 3 GHz, 0 dBm, relative to 50 MHz

##### E5071B

$\leq \pm 1$  dBm @  $23 \pm 5$  °C, 10 MHz to 8.5 GHz, 0 dBm, relative to 50 MHz

#### NOTE

The level accuracy and flatness specifications apply to Port 1 only. The levels for other ports are given as supplemental performance characteristic.

### Test equipment

Power meter	Agilent E4419A/B
Power sensor	Agilent E4412A

### Procedure

- Step 1.** Connect the power sensor to the power meter. Calibrate the power meter for the power sensor used.
- Step 2.** Connect the test equipment as shown in Figure 2-3.

## 2. RF OUTPUT LEVEL ACCURACY AND FLATNESS TEST

Figure 2-3 RF output level accuracy and flatness test setup.

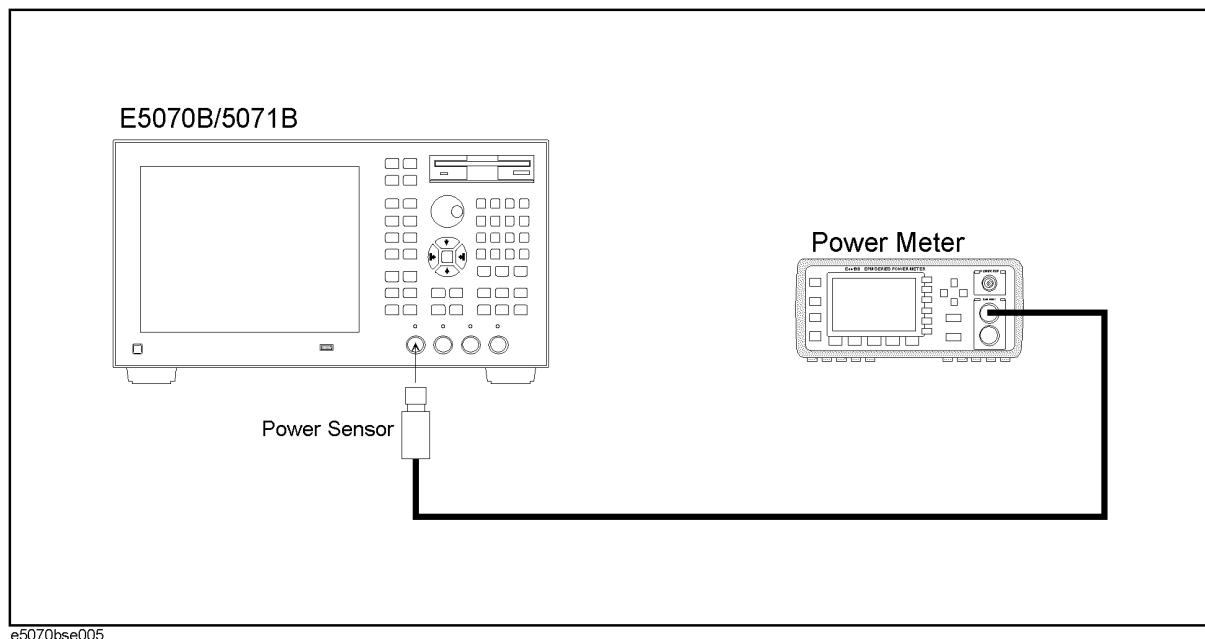
**NOTE**

Figure 2-3 shows the test setup for the E5070B/E5071B with 4-port option (Opt. 413/414). For 2-port and 3-port options (Opt. 213/214/313/314), connect the power sensor to Port 1 as well.

- Step 3.** Press **Preset** and **Enter** to initialize the E5070B/E5071B. And press **Sweep Setup** - **Power** - **Auto Range** to turn off Auto Power Range set function (FW 3.60 and above), and press **System** - **Servise** - **Init Src Ctrl** to turn off Initial Source Port Control function (FW 3.54 and above). Then set the controls as follows:

Control settings	Key strokes
Center frequency: 50 MHz	<b>Center</b> - <b>5</b> - <b>0</b> - <b>M/μ</b>
Frequency span: 0 Hz	<b>Span</b> - <b>0</b> - <b>x1</b>

The source power now is set to 0 dBm (preset value).

- Step 4.** Press **Trigger** - **↓** and **Enter** to make a **Single** sweep measurement.

**Step 5.** RF output level accuracy test

- Wait for power meter reading to settle.
- Record the power meter reading in the performance test record ("Test result" column for the level accuracy test).

**Step 6.** RF output level flatness test

- Record the power meter reading (same as that in Step 5-b) in the calculation sheet ("Power meter reading [Ref]" column for the level flatness test).

## 2. RF OUTPUT LEVEL ACCURACY AND FLATNESS TEST


- b. Press **Center** - **1** - **0** - **M/μ** to change the E5070B/E5071B center frequency to 10 MHz, which is the first one of the frequency flatness test frequencies listed in Table 2-2.

**Table 2-2 RF output level flatness test conditions**

Agilent E5070B/E5071B Center Frequency	
E5070B/E5071B	10 MHz 550 MHz 1.05 GHz 1.55 GHz 2.05 GHz 3 GHz
E5071B only	4.25 GHz 5.05 GHz 6.05 GHz 7.05 GHz 8.05 GHz 8.5 GHz

**NOTE**

The RF output level is measured at the minimum, maximum and proper frequencies other than the source adjustment frequencies within the specified frequency range.

- c. Press **Trigger** -  and **Enter** to make a **Single** sweep measurement.
- d. Wait for the power meter reading to settle. Then record the reading in the calculation sheet ("Power meter reading [a]" column).
- e. Change the E5070B/E5071B center frequency in accordance with Table 2-2 and perform Step 6-c and 6-d for each frequency.
- f. Calculate test results using the equation given in the calculation sheet. Record the calculated test results in the performance test record ("Test result" column for the level flatness test).

---

### 3. RF OUTPUT LEVEL LINEARITY TEST

#### Description

This test checks the level accuracy of the E5070B/E5071B test port output signal across the specified level range. The RF output level is measured for power level settings of -15 dBm to 10 dBm, 8 dBm, or 6 dBm in 1 dB step increments at 10MHz, 3 GHz, 4.25 GHz, 6 GHz and 8.5 GHz as serial number prefix is MY421, or JP1KK. The RF output level is measured for power level settings of -15 dBm to 10 dBm, 9 dBm, 7 dBm, or 5 dBm in 1 dB step increments at 10MHz, 3 GHz, 4.25 GHz, 6 GHz and 8.5 GHz as serial number prefix is MY422, and above.

#### Specification

**Serial Number Prefix: MY421, or JP1KK**

##### E5070B

$\leq \pm 0.75$  dB @  $23 \pm 5$  °C, 10 MHz to 3 GHz, - 15 dBm to 10 dBm

##### E5071B

$\leq \pm 0.75$  dB @  $23 \pm 5$  °C, 10 MHz to 4.25 GHz, - 15 dBm to 10 dBm

$\leq \pm 0.75$  dB @  $23 \pm 5$  °C, 4.25 GHz to 6 GHz, - 15 dBm to 8 dBm

$\leq \pm 0.75$  dB @  $23 \pm 5$  °C, 6 GHz to 8.5 GHz, - 15 dBm to 6 dBm

**Serial Number Prefix: MY422, and above**

##### E5070B

$\leq \pm 0.75$  dB @  $23 \pm 5$  °C, 10 MHz to 3 GHz, - 15 dBm to 10 dBm

##### E5071B

$\leq \pm 0.75$  dB @  $23 \pm 5$  °C, 10 MHz to 3 GHz, - 15 dBm to 10 dBm

$\leq \pm 0.75$  dB @  $23 \pm 5$  °C, 3 GHz to 4.25 GHz, - 15 dBm to 9 dBm

$\leq \pm 0.75$  dB @  $23 \pm 5$  °C, 4.25 GHz to 6 GHz, - 15 dBm to 7 dBm

$\leq \pm 0.75$  dB @  $23 \pm 5$  °C, 6 GHz to 8.5 GHz, - 15 dBm to 5 dBm

---

#### NOTE

The level linearity specification applies to Port 1 only. The levels for other ports are given as supplemental performance characteristic.

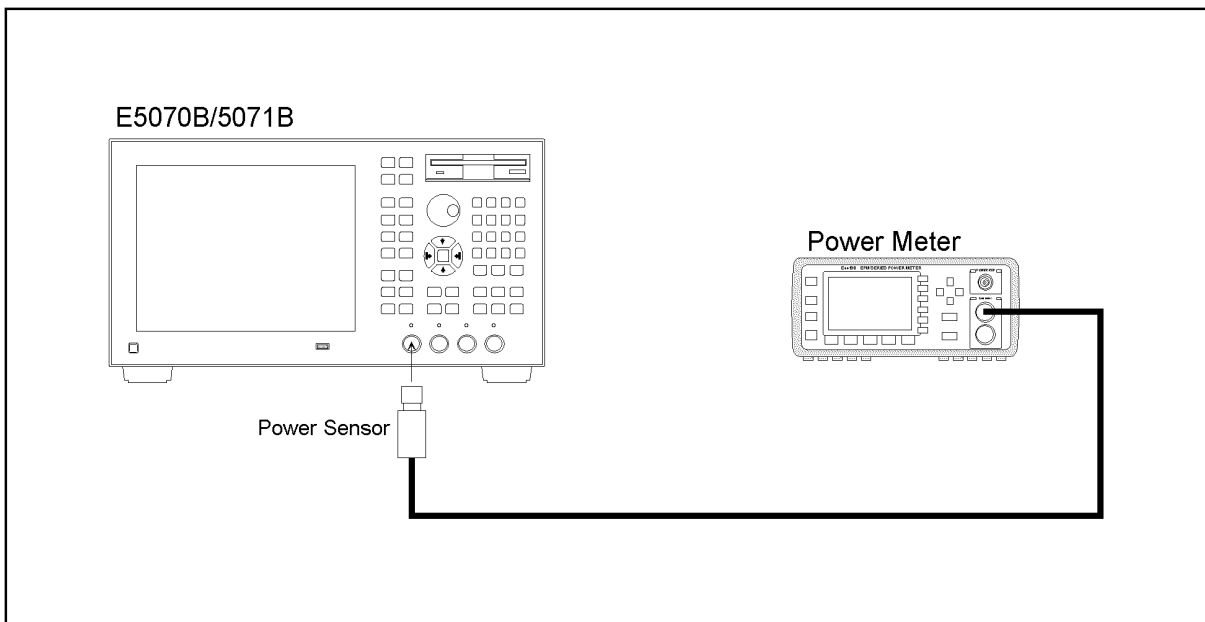
**Test equipment**

Power meter	Agilent E4419A/B
Power sensor	Agilent E4412A

**Procedure**

- Step 1.** Connect the power sensor to the power meter. Calibrate the power meter for the power sensor used.
- Step 2.** Connect the test equipment as shown in Figure 2-4.

**Figure 2-4 RF output level linearity test setup**



e5070bse005

**NOTE**

Figure 2-4 shows the test setup for the E5070B/E5071B with 4-port option (Opt. 413/414). For 2-port and 3-port options (Opt. 213/214/313/314), connect the power sensor to Port 1 as well.

- Step 3.** Press **Preset** and **Enter** to initialize the E5070B/E5071B. And press **Sweep Setup** - **Power** - **Auto Range** to turn off Auto Power Range set function (FW 3.60 and above). The power range of “-20 to 10” should be selected for the maximum output level. Press **System** - **Service** - **Init Src Ctrl** to turn off Initial Source Port Control function (FW 3.54 and above). Then set the controls as follows:

**Control settings**

**Key strokes**

Center frequency: 10 MHz

**Center** - **1** - **0** - **M/μ**

Frequency span: 0 Hz

**Span** - **0** - **x1**

Performance Tests

3. RF OUTPUT LEVEL LINEARITY TEST

The source power now is set to 0 dBm (preset value).


- Step 4.** Press **Trigger** -  and **Enter** to make a **Single** sweep measurement.
- Step 5.** Wait for power meter reading to settle. Record the power meter reading in the calculation sheet ("Power meter reading [Ref]" column for the level linearity test).
- Step 6.** Press **Sweep Setup** - **1** - **x1** to set the power level to 1 dBm, which is the second value of the level linearity test levels listed in Table 2-3.

Table 2-3

**RF output level linearity test conditions for serial prefix MY421, or JP1KK**

Test frequency	E5070B/E5071B		E5071B only		
	10 MHz	3 GHz	4.25 GHz	6 GHz	8.5 GHz
Power level	0 dBm (reference level)		0 dBm (ref)	0 dBm (ref)	0 dBm (ref)
	1 dBm		1 dBm	1 dBm	1 dBm
	2 dBm		2 dBm	2 dBm	2 dBm
	3 dBm		3 dBm	3 dBm	3 dBm
	4 dBm		4 dBm	4 dBm	4 dBm
	5 dBm		5 dBm	5 dBm	5 dBm
	6 dBm		6 dBm	6 dBm	6 dBm
	7 dBm		7 dBm	7 dBm	
	8 dBm		8 dBm	8 dBm	
	9 dBm				
	10 dBm				


Table 2-4

**RF output level linearity test conditions for serial prefix MY422, and above**

Test frequency	E5070B/E5071B		E5071B only		
	10 MHz	3 GHz	4.25 GHz	6 GHz	8.5 GHz
Power level	0 dBm (reference level)		0 dBm (ref)	0 dBm (ref)	0 dBm (ref)
	1 dBm		1 dBm	1 dBm	1 dBm
	2 dBm		2 dBm	2 dBm	2 dBm
	3 dBm		3 dBm	3 dBm	3 dBm
	4 dBm		4 dBm	4 dBm	4 dBm
	5 dBm		5 dBm	5 dBm	5 dBm
	6 dBm		6 dBm	6 dBm	
	7 dBm		7 dBm	7 dBm	
	8 dBm		8 dBm		
	9 dBm		9 dBm		
	10 dBm				

**NOTE**

The RF output level linearity is tested at the minimum, maximum and proper frequencies other than the source adjustment frequencies within the specified frequency range.

- Step 7.** Press **Trigger** -  and **Enter** to make a **Single** sweep measurement.
- Step 8.** Wait for the power meter reading to settle. Then record the reading in the calculation sheet ("Power meter reading [a]" column for the level linearity test).
- Step 9.** Change the E5070B/E5071B power level setting in accordance with Table 2-3 and perform

## 3. RF OUTPUT LEVEL LINEARITY TEST

Step 7 and 8 for each power level to 10, (8, or 6) dBm for serial prefix MY421, or KP1KK.

Change the E5070B/E5071B power level setting in accordance with Table 2-4 and perform Step 7 and 8 for each power level to 10, (9, or 7, or 5) dBm for serial prefix MY422, and above.

- Step 10.** Press **Sweep Setup** - **+/-** - **1** - **x1** to set the power level to -1 dBm, which is the second value of the level linearity test levels listed in Table 2-5.

Table 2-5

## RF output level linearity test conditions

Test frequency	E5070B/E5071B		E5071B only		
	10 MHz	3 GHz	4.25 GHz	6 GHz	8.5 GHz
Power level	0 dBm (reference level) -1 dBm -2 dBm -3 dBm -4 dBm -5 dBm -6 dBm -7 dBm -8 dBm -9 dBm -10 dBm -11 dBm -12 dBm -13 dBm -14 dBm -15 dBm				

- Step 11.** Press **Trigger** - **↓** and **Enter** to make a **Single** sweep measurement.
- Step 12.** Wait for the power meter reading to settle. Then record the reading in the calculation sheet ("Power meter reading [a]" column for the level linearity test).
- Step 13.** Change the E5070B/E5071B power level setting in accordance with Table 2-5 and perform Step 7 and 8 for each power level to -15 dBm.
- Step 14.** Set the power level to 0 dBm and change the E5070B/E5071B center frequency to the next level-linearity test frequency in accordance with Table 2-5.
- Step 15.** Perform Step 4 through 14 for each frequency.
- Step 16.** Calculate test results using the equation given in the calculation sheet. Record the calculated test results in the performance test record ("Test result" column for the level linearity test).

---

## 4. TRACE NOISE CW TEST

### Description

This test checks the trace noise level for each test port of the E5070B/E5071B. The trace noise level is quantified by performing a "through" measurement 32 times at 3 MHz, 1.3 GHz, 2.1 GHz, 3 GHz, 4.25 GHz, 6 GHz, 7.5 GHz and 8.5 GHz, with a cable connected between two test ports. Standard deviation of the measured values at each frequency is calculated and, then translated into a noise level expressed in dB rms.

### Specification

**Serial Prefix: MY421, or JP1KK**

#### E5070B

≤ 1 mdB rms @ 23 ± 5 °C, 3 MHz to 3 GHz, IFBW 3 kHz, 10 dBm, through

#### E5071B

≤ 1 mdB rms @ 23 ± 5 °C, 3 MHz to 4.25 GHz, IFBW 3 kHz, 10 dBm, through

≤ 3 mdB rms @ 23 ± 5 °C, 4.25 GHz to 6 GHz, IFBW 3 kHz, 8 dBm, through

≤ 3 mdB rms @ 23 ± 5 °C, 6 GHz to 7.5 GHz, IFBW 3 kHz, 6 dBm, through

≤ 5 mdB rms @ 23 ± 5 °C, 7.5 GHz to 8.5 GHz, IFBW 3 kHz, 6 dBm, through

**Serial Prefix: MY422, and above**

#### E5070B

≤ 1 mdB rms @ 23 ± 5 °C, 3 MHz to 3 GHz, IFBW 3 kHz, 10 dBm, through

#### E5071B

≤ 1 mdB rms @ 23 ± 5 °C, 3 MHz to 3 GHz, IFBW 3 kHz, 10 dBm, through

≤ 1.2 mdB rms @ 23 ± 5 °C, 3 GHz to 4.25 GHz, IFBW 3 kHz, 9 dBm, through

≤ 3.6 mdB rms @ 23 ± 5 °C, 4.25 GHz to 6 GHz, IFBW 3 kHz, 7 dBm, through

≤ 3.6 mdB rms @ 23 ± 5 °C, 6 GHz to 7.5 GHz, IFBW 3 kHz, 5 dBm, through

≤ 6 mdB rms @ 23 ± 5 °C, 7.5 GHz to 8.5 GHz, IFBW 3 kHz, 5 dBm, through

### Test equipment

Coaxial cable with Type-N (m) connectors, 61 cm (24 in)	Agilent N6314A (p/n 8120-8862)
---	--------------------------------------

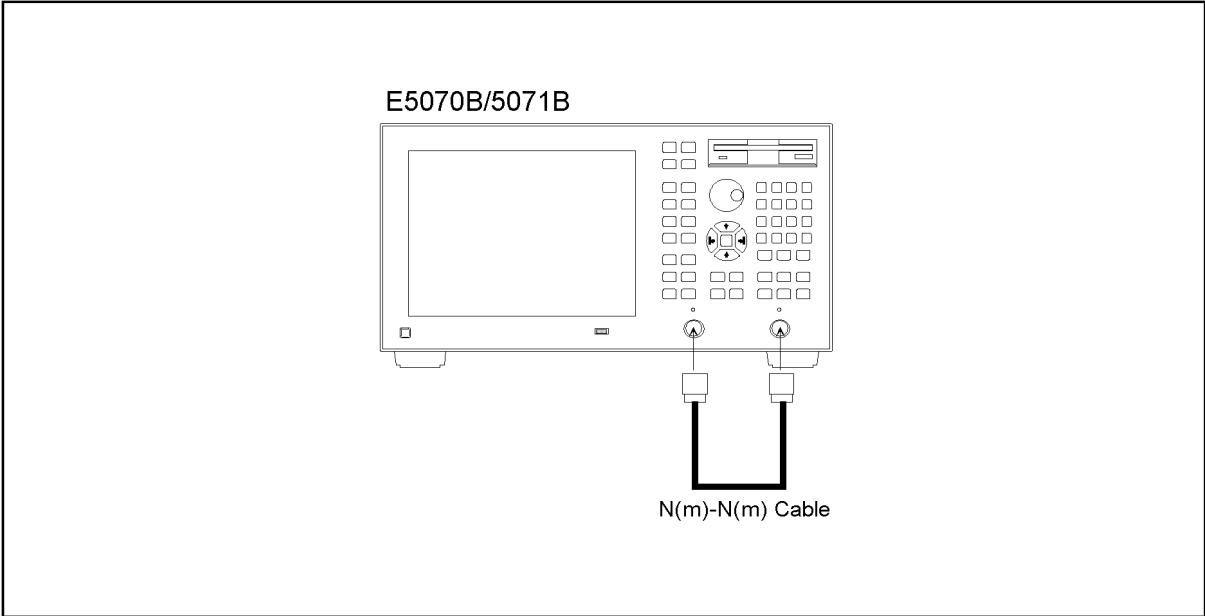


**Procedure**

**Step 1.** Connect test equipment (N-N cable) as shown in the following figures:

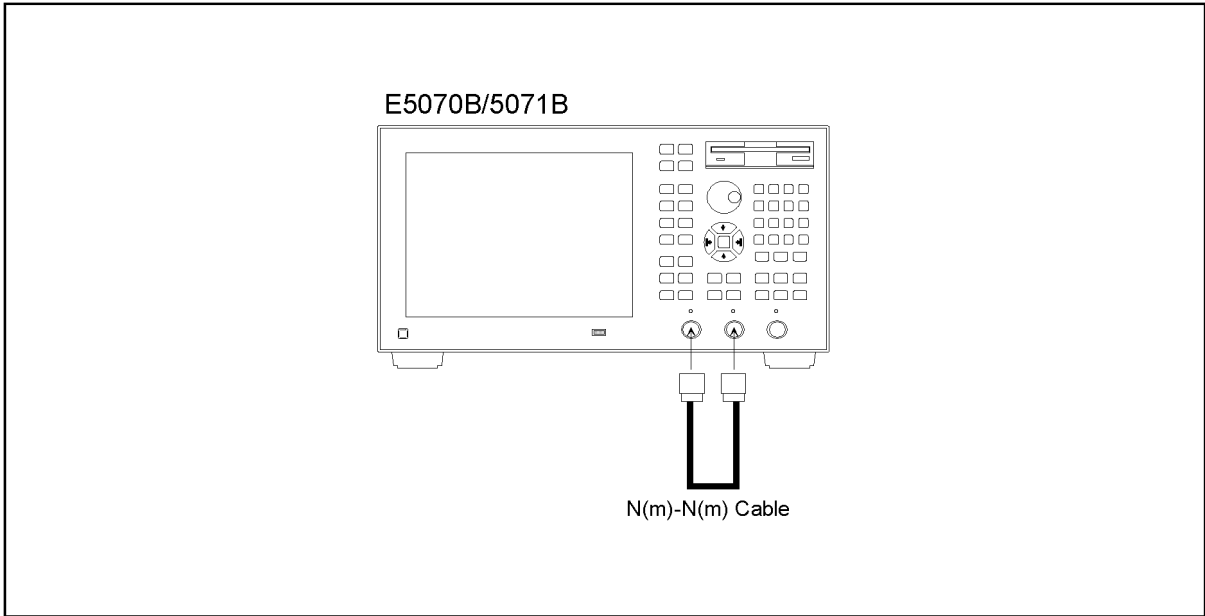
- Opt. 213/214: Figure 2-5
- Opt. 313/314: Figure 2-6
- Opt. 413/414: Figure 2-7

**Figure 2-5** Trace Noise CW Test setup (Opt. 213/214)



e5070bse006

**Figure 2-6** Trace Noise CW Test setup (Opt. 313/314)

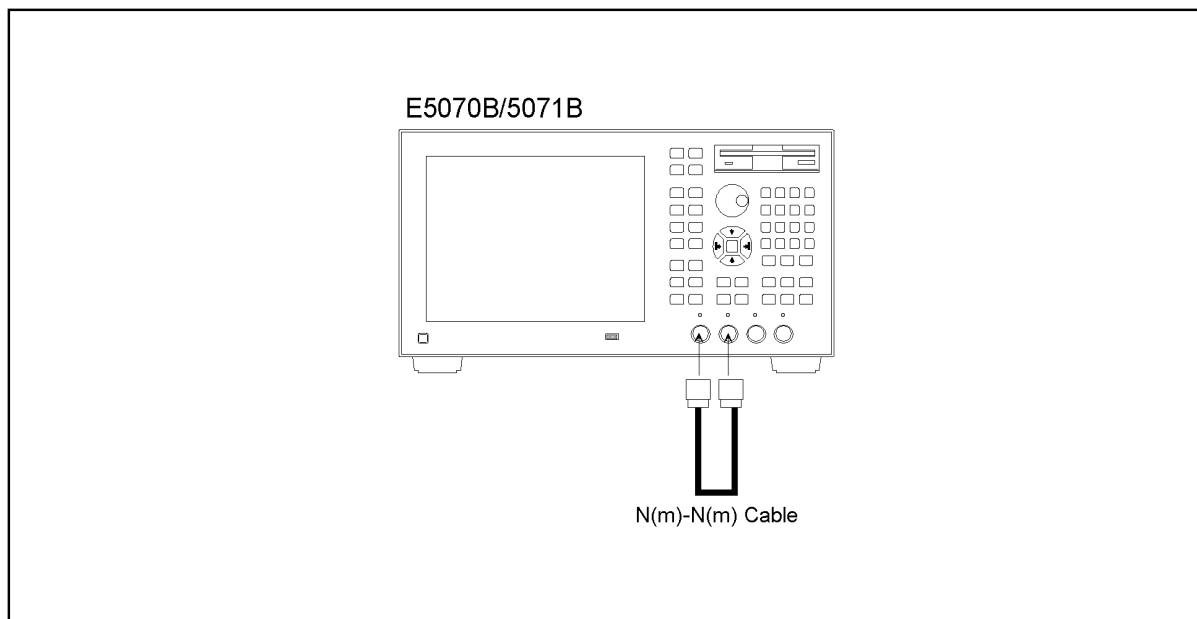


e5070bse007

2. Performance Test

Performance Tests  
**4. TRACE NOISE CW TEST**

**Figure 2-7** Trace Noise CW Test setup (Opt. 413/414)



e5070bse008

**NOTE** Do not touch or move the N-N cable during measurements. To do so will cause a variance in measured values.

**Step 2.** Press **Preset** and **Enter** to initialize the E5070B/E5071B. And press **Sweep Setup** - **Power** - **Auto Range** to turn off Auto Power Range set function (FW 3.60 and above), and press **System** - **Servise** - **Init Src Ctrl** to turn off Initial Source Port Control function (FW 3.54 and above).

**Step 3.** Press **Format** - **↓** - **↓** - **↓** - **↓** - **↓** - **Enter** to select **Lin Mag** from display format menu.

**Step 4.** Press **Marker Fctn** - **↓** - **↓** - **↓** - **↓** - **↓** - **↓** - **↓** (select **Statistics**) - **Enter** and set **Statistics** function to on.

**Step 5.** Press **Meas** and select **S21** from S-parameter menu.

**Step 6.** Set the controls as follows:

Control settings	Key strokes
Center frequency: 3 MHz	<b>Center</b> - <b>3</b> - <b>M/μ</b>
Frequency span: 0 Hz	<b>Span</b> - <b>0</b> - <b>x1</b>
Number of points: 32	<b>Sweep Setup</b> - <b>↓</b> - <b>↓</b> - <b>↓</b> - <b>↓</b> - <b>↓</b> (select <b>Points</b> ) - <b>Enter</b> - <b>3</b> - <b>2</b> - <b>x1</b>
IF Bandwidth: 3 kHz	<b>Avg</b> - <b>Enter</b> - <b>3</b> - <b>k/m</b>

The source power now is set to 0 dBm (preset value).

**Step 7.** Press **Sweep Setup** - **1** - **0** - **x1** to set the power level to 10 dBm, which is the value of the trace noise test levels listed in Table 2-6 or Table 2-7.

**Step 8.** Press **Trigger** - **↓** and **Enter** to make a **Single** sweep measurement. A "s.dev" (standard deviation) value will be displayed in the upper left corner of the graphic display.

**Step 9.** Record the s.dev value in the calculation sheet ("s.dev [μU]" column for the CW trace noise test).

**Step 10.** Calculate the dB value of the trace noise level using the following equation and record the calculated value in the calculation sheet ("Trace noise level [dB rms]" column).

$$\text{Trace noise level} = 20 \log (1 + \text{s.dev} \times 10^{-6})$$

**Step 11.** Change the E5070B/E5071B center frequency in accordance with Table 2-6 or Table 2-7 and perform Step 8 through 10 for each frequency.

**Table 2-6**

**Trace noise CW Test test frequencies/power level for serial prefix MY421, or JP1KK**

Test frequency	E5070B/E5071B	E5071B only			
	3M, 1.3G, 2.1G, 3GHz	4.25 GHz	6 GHz	7.5 GHz	8.5 GHz
Power level	10 dBm	8 dBm	6 dBm		

**Table 2-7**

**Trace noise CW Test test frequencies/power level for serial prefix MY422, and above**

Test frequency	E5070B/E5071B	E5071B only			
	3M, 1.3G, 2.1G, 3GHz	4.25 GHz	6 GHz	7.5 GHz	8.5 GHz
Power level	10 dBm	9 dBm	7 dBm	5 dBm	

**NOTE**

The CW trace noise level is tested at the minimum and maximum frequencies of the specified frequency range, the frequencies where an internal frequency divider works (between 1.3 GHz and 2.1 GHz) and, the frequency where the signal source frequency band is switched (4.25 GHz).

**Step 12.** Record the calculated values of the trace noise level in the performance test record ("Test result [dB rms]" column for the CW trace noise test).

**Step 13.** Press **Meas** and select **S12** from S-parameter menu.

**Step 14.** Press **Center** - **3** - **M/μ** to set the frequency to 3 MHz.

**Step 15.** Perform Step 8 through 12 for the S12 measurement.

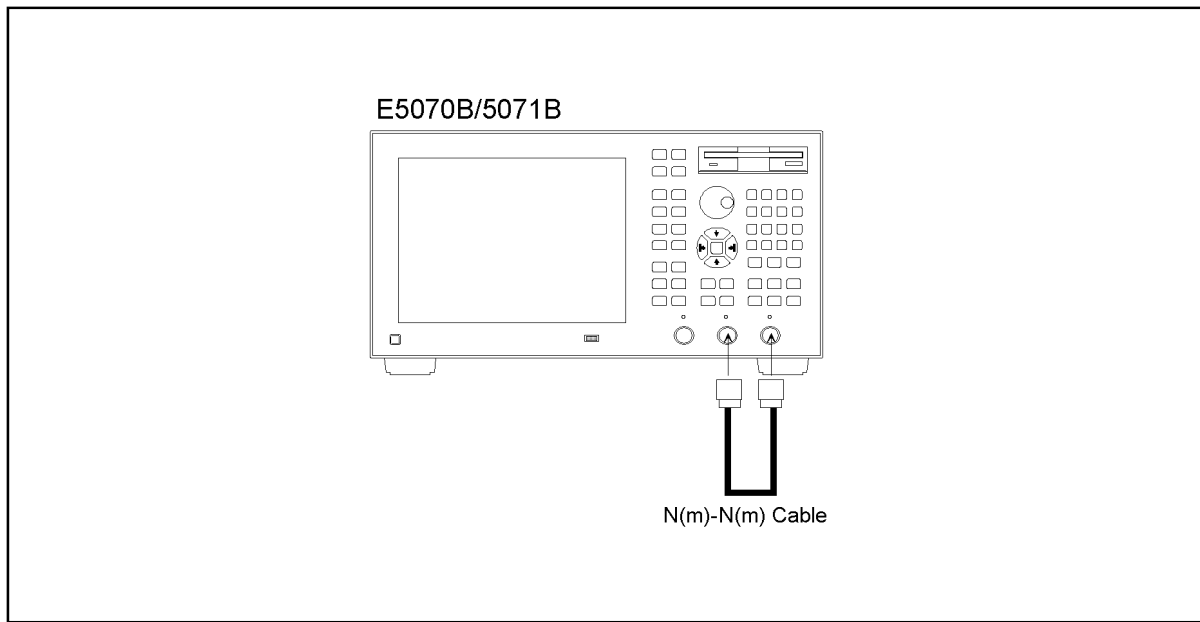
**Options 313, 314, 413 and 414 only**

Performance Tests  
**4. TRACE NOISE CW TEST**

**NOTE** Perform Step 16 through 19 for the option 313, 314, 413 and 414 instruments only.

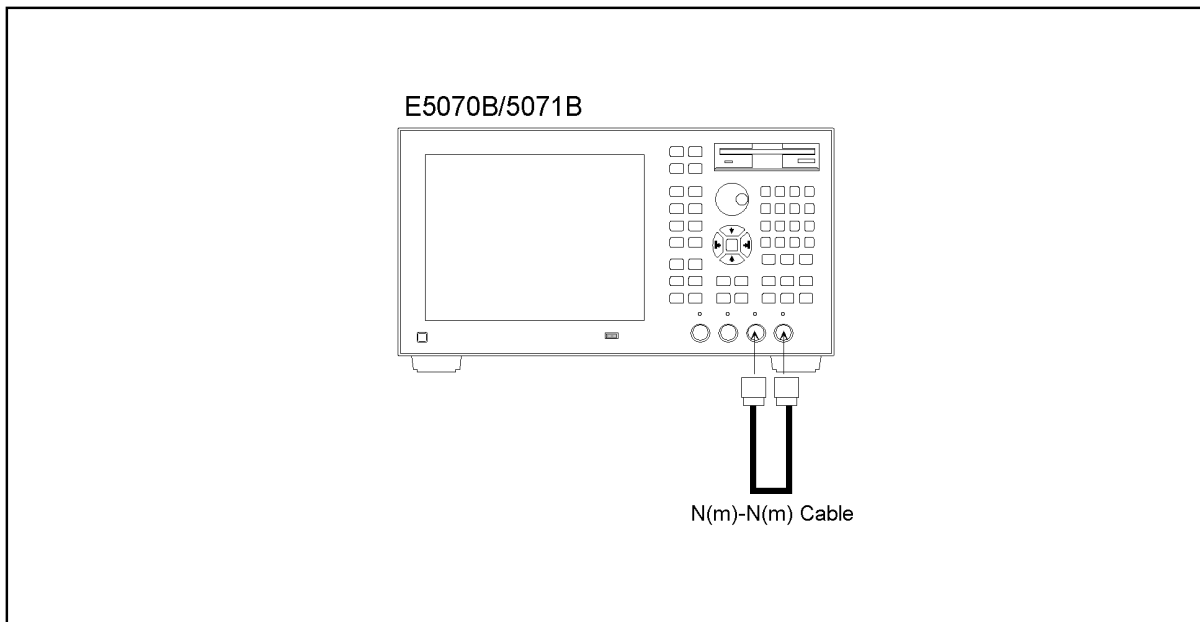
**Step 16.** Connect the test equipment (N-N cable) as shown in Figure 2-8 (Opt. 313/314) and Figure 2-9 (Opt. 413/414).

**Figure 2-8** Trace Noise CW Test setup (Opt. 313/314)



e5070bse009

**Figure 2-9** Trace Noise CW Test setup (Opt. 413/414)



e5070bse010

**Step 17.** Select S-parameter from menu in accordance with Table 2-8.

**Table 2-8** S-parameter settings for Trace Noise CW Test

	Option	
	313/314	413/414
1	S23	S43
2	S32	S34

- Step 18.** Set the center frequency to 3 MHz.
- Step 19.** Perform Step 8 through 12 for each of the S-parameters shown in the first and second rows in Table 2-8.

2. Performance Test

## 5. CROSSTALK TEST

### Description

This test checks the crosstalks between test ports of the E5070B/E5071B. The crosstalk is tested by performing "through" measurements with two test ports connected together and, short-ended "isolation" measurements with the test ports terminated with N-type "Short" devices. A "through" calibration is performed to have the through measurement data as the reference to which the isolation measurement data is compared. 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 is determined from the peak value of the average data.

### Specification

**Serial Prefix: MY421, or JP1KK**

#### E5070B

-120 dB @  $23 \pm 5$  °C, 3 MHz to 3 GHz

#### E5071B

-120 dB @  $23 \pm 5$  °C, 3 MHz to 3 GHz

-110 dB @  $23 \pm 5$  °C, 3 GHz to 6 GHz

-100 dB @  $23 \pm 5$  °C, 6 GHz to 7.5 GHz

-90 dB @  $23 \pm 5$  °C, 7.5 GHz to 8.5 GHz

**Serial Prefix: MY422, and above**

#### E5070B

-120 dB @  $23 \pm 5$  °C, 3 MHz to 3 GHz

#### E5071B

-120 dB @  $23 \pm 5$  °C, 3 MHz to 3 GHz

-109 dB @  $23 \pm 5$  °C, 3 GHz to 6 GHz

-99 dB @  $23 \pm 5$  °C, 6 GHz to 7.5 GHz

-89 dB @  $23 \pm 5$  °C, 7.5 GHz to 8.5 GHz

The crosstalk specification applies when response calibration is performed.

**Test equipment**

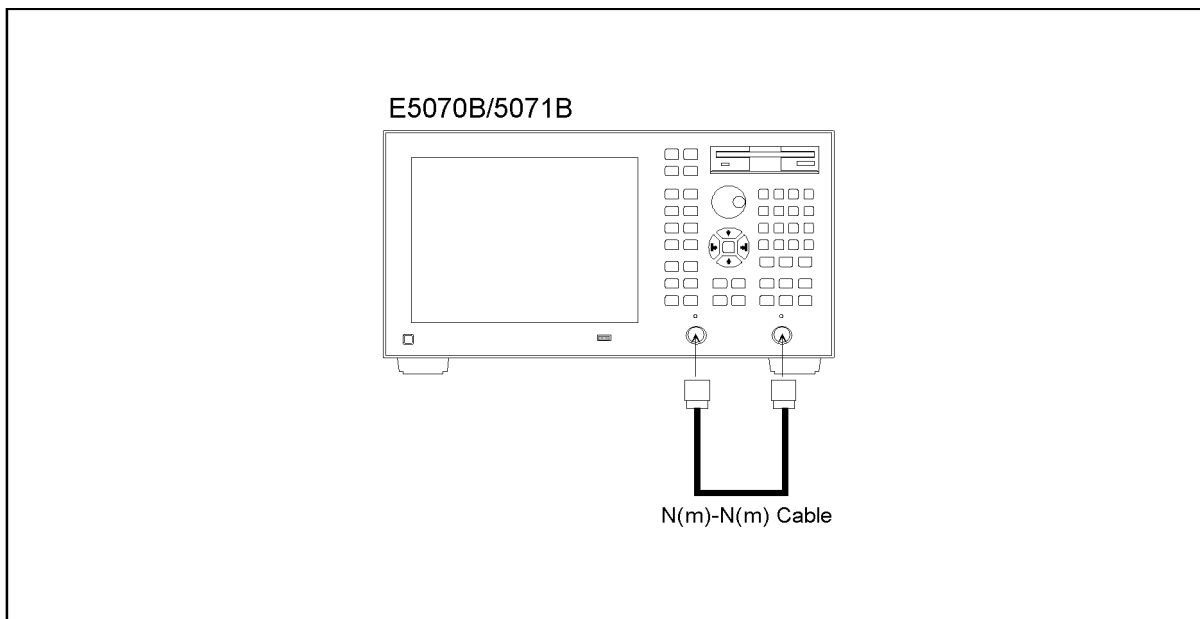
Coaxial cable with Type-N (m) connectors, 61 cm (24 in)	Agilent N6314A(p/n 8120-8862)
Type-N(m) coaxial Short termination (4 ea.)	part of Agilent 85032F/54D/3 3E/50D with Type-N adapter

**Procedure**

**Step 1.** Connect the N-N cable as shown in the following figures:

- Opt. 213/214: Figure 2-10
- Opt. 313/314: Figure 2-11
- Opt. 413/414: Figure 2-12

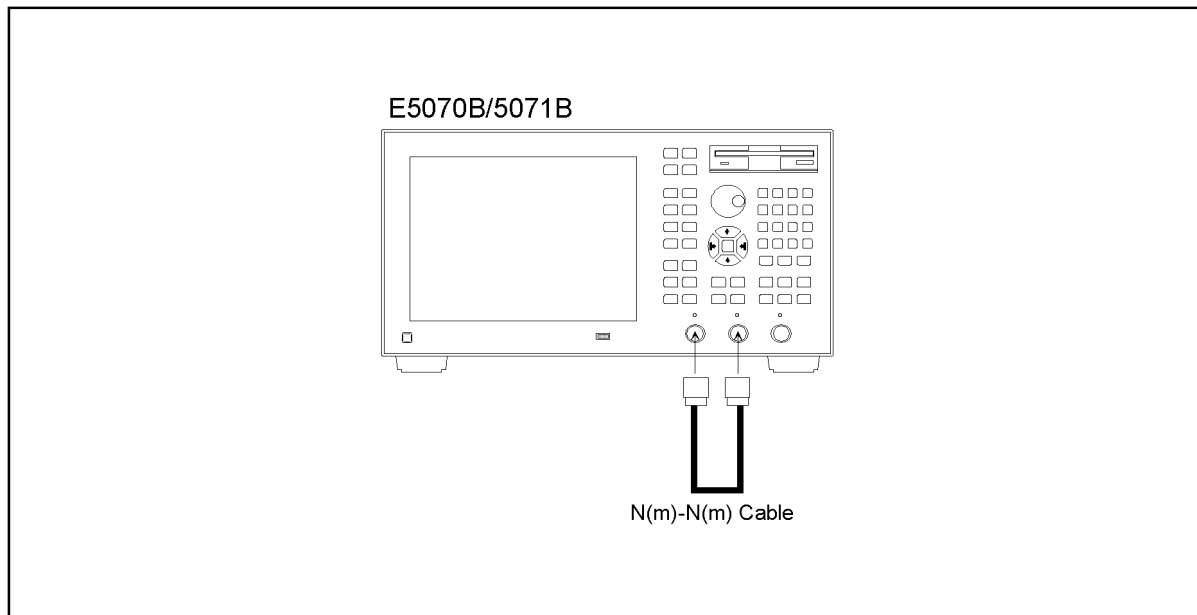
**Figure 2-10**      **Response calibration setup for crosstalk test (Opt.213/214)**



e5070bse006

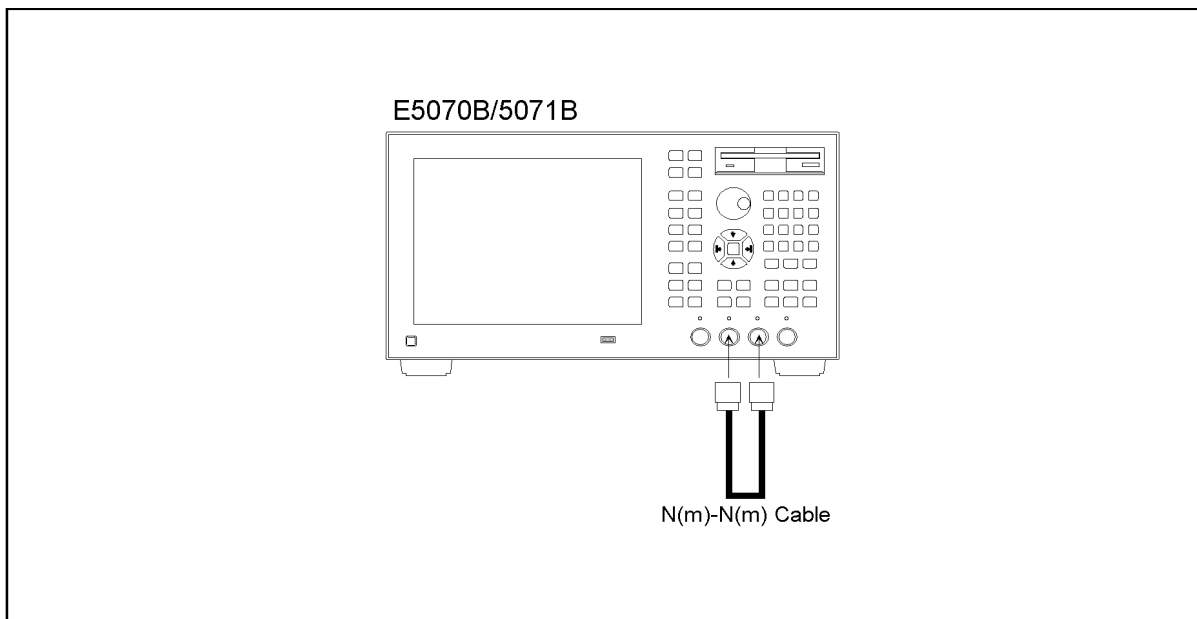
Performance Tests  
5. CROSSTALK TEST

Figure 2-11 Response calibration setup for crosstalk test (Opt.313/314)



e5070bse007

Figure 2-12 Response calibration setup for crosstalk test (Opt.413/414)



e5070bse011

**NOTE** Do not touch or move the N-N cable during measurements. To do so will cause a variance in measured values.

**Step 2.** Press **Preset** and **Enter** to initialize the E5070B/E5071B. And press **Sweep Setup** - **Power** - **[5]** - **[x1]** to set the power +5 dBm (FW 3.60 and above), and press **Sweep Setup** - **Power** - **Auto Range** to turn off Auto Power Range set function (FW 3.60 and above), and press **System** - **Service Menu** - **Init Src Ctrl** to turn off Initial Source Port Control function (FW



3.54 and above).

**Step 3.** Press **[Format]** and select **Lin Mag** from display format menu.

**Step 4.** Set the controls as follows:

Control settings	Key strokes
IF Bandwidth: 10 Hz	<b>[Avg]</b> - <b>IF Bandwidth</b> - <b>[1]</b> - <b>[0]</b> - <b>[x1]</b>
Averaging: ON	<b>[↑]</b> - <b>[↑]</b> - <b>[↑]</b> (select <b>Averaging</b> ) - <b>[Enter]</b>

Averaging factor now is set to 16 (preset value).

**Step 5.** Set the test frequencies using the Segment Table as follows:

- a. Press **[Sweep Setup]** - **[↓]** - **[↓]** - **[↓]** - **[↓]** - **[↓]** - **[↓]** (select **Edit Segment Table**) - **[Enter]**.  
 The first "Start" frequency entry box in the Segment Sweep table will be focused.
  - b. Press **[Focus]** in the ENTRY block. The softkey menu title area is displayed in blue.
  - c. Press **[↓]** - **[↓]** (select **List Power**) - **[Enter]** to set the **list Power** function to ON. The row (**Power**) for setting appears in the segment table.
  - d. Press **[Focus]** in the ENTRY block. The window frame of the segment table is displayed as bright.
  - e. For the E5070B, proceed to the next Step f. For the E5071B, skip to Step j or Step x.
- E5070B**
- f. Press **[3]** - **[0]** - **[0]** - **[k/m]** to enter 300 kHz as the start frequency. "Stop" frequency will be focused.
  - g. Press **[3]** - **[G/n]** to enter 3 GHz as the stop frequency. "Points" will be focused.
  - h. Press **[5]** - **[0]** - **[x1]** to set the number of sweep points to 50. "Power" will be focused.
  - i. Press **[1]** - **[0]** - **[x1]** to set the power level to 10 dBm.

**NOTE**

See Table 2-9 for the entire Segment Table setting for the E5070B.

**Table 2-9**









**E5070B Segment Table setting**

	<b>Start</b>	<b>Stop</b>	<b>Points</b>	<b>Power</b>
1	300 kHz	3 GHz	50	10 dBm

**E5071B (for serial prefix MY421, or JP1KK)**

- j. Press **[3]** - **[0]** - **[0]** - **[k/m]** to enter 300 kHz as the start frequency. "Stop" frequency will be focused.
- k. Press **[4]** - **[.]** - **[2]** - **[5]** - **[G/n]** to enter 4.25 GHz as the stop frequency. "Points" will be focused.

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**5. CROSSTALK TEST**

- l. Press **[5] - [0] - [x1]** to set the number of sweep points to 50. "Power" will be focused.
- m. Press **[1] - [0] - [x1]** to set the power level to 10 dBm.
- n. Press ** -  -  - ** to focus on the "Start" frequency of the second segment.
- o. Press **[4] - [.] - [2] - [5] - [0] - [0] - [0] - [0] - [0] - [0] - [1] - [G/n]** to enter 4.250000001 GHz as the start frequency. "Stop" frequency will be focused.
- p. Press **[6] - [G/n]** to enter 6 GHz as the stop frequency. The "Points" will be focused.
- q. Press **[2] - [0] - [x1]** to set the number of sweep points to 20. "Power" will be focused.
- r. Press **[8] - [x1]** to set the power level to 8 dBm.
- s. Press ** -  -  - ** to focus on the "Start" frequency of the third segment.
- t. Press **[6] - [.] - [0] - [0] - [0] - [0] - [0] - [0] - [0] - [0] - [1] - [G/n]** to enter 6.000000001 GHz as the start frequency. "Stop" frequency will be focused.
- u. Press **[8] - [.] - [5] - [G/n]** to enter 8.5 GHz as the stop frequency. "Points" will be focused.
- v. Press **[3] - [0] - [x1]** to set the number of sweep points to 30. "Power" will be focused.
- w. Press **[6] - [x1]** to set the power level to 6 dBm.

**NOTE**





See Table 2-10 for the entire Segment Table setting for the E5071B (for serial prefix MY421, or JP1KK).

**Table 2-10**

**E5071B Segment Table setting (for serial prefix MY421, or JP1KK)**

	Start	Stop	Points	Power
1	300 kHz	4.25 GHz	50	10 dBm
2	4.250000001 GHz	6 GHz	20	8 dBm
3	6.000000001 GHz	8.5 GHz	30	6 dBm

**E5071B (for serial prefix MY422, and above)**

- x. Press **[3] - [0] - [0] - [k/m]** to enter 300 kHz as the start frequency. "Stop" frequency will be focused.
- y. Press **[3] - [G/n]** to enter 3 GHz as the stop frequency. "Points" will be focused.
- z. Press **[3] - [5] - [x1]** to set the number of sweep points to 35. "Power" will be focused.
- aa. Press **[1] - [0] - [x1]** to set the power level to 10 dBm.
- ab. Press ** -  -  - ** to focus on the "Start" frequency of the second segment.
- ac. Press **[3] - [.] - [0] - [0] - [0] - [0] - [0] - [0] - [0] - [0] - [1] - [G/n]** to enter 3.000000001 GHz as the start frequency. "Stop" frequency will be focused.
- ad. Press **[4] - [.] - [2] - [5] - [G/n]** to enter 4.25 GHz as the stop frequency. "Points"

will be focused.

ae. Press [1] - [5] - [x1] to set the number of sweep points to 15. "Power" will be focused.

af. Press [9] - [x1] to set the power level to 9 dBm.

ag. Press - - - to focus on the "Start" frequency of the third segment.

ah. Press [4] - [.] - [2] - [5] - [0] - [0] - [0] - [0] - [0] - [0] - [1] - [G/n] to enter 4.250000001 GHz as the start frequency. "Stop" frequency will be focused.

ai. Press [6] - [G/n] to enter 6 GHz as the stop frequency. The "Points" will be focused.

aj. Press [2] - [0] - [x1] to set the number of sweep points to 20. "Power" will be focused.

ak. Press [7] - [x1] to set the power level to 7 dBm.

al. Press - - - to focus on the "Start" frequency of the fourth segment.

am. Press [6] - [.] - [0] - [0] - [0] - [0] - [0] - [0] - [0] - [0] - [0] - [1] - [G/n] to enter 6.000000001 GHz as the start frequency. "Stop" frequency will be focused.

an. Press [8] - [.] - [5] - [G/n] to enter 8.5 GHz as the stop frequency. "Points" will be focused.

ao. Press [3] - [0] - [x1] to set the number of sweep points to 30. "Power" will be focused.

ap. Press [5] - [x1] to set the power level to 5 dBm.

**NOTE**

See Table 2-11 for the entire Segment Table setting for the E5071B (for serial prefix MY422, and above).

**Table 2-11**

**E5071B Segment Table setting (for serial prefix MY422, and above)**

	Start	Stop	Points	Power
1	300 kHz	3 GHz	35	10 dBm
2	3.000000001 GHz	4.25 GHz	15	9 dBm
3	4.250000001 GHz	6 GHz	20	7 dBm
4	6.000000001 GHz	8.5 GHz	30	5 dBm

**Step 6.** Press [Sweep Setup] - - - - - (select **Sweep Type**) - [Enter] to set the **Sweep type** to **Segment**.

**Response calibration**

**Step 7.** Press [Cal] - - - - and [Enter] to select **Cal Kit**.



**Step 8.** Press - - and [Enter] to select **85032F**.

**NOTE**

If **Cal Kit** is set to **85032F\***, press , [Enter] , - - - [Enter] - [Enter] to select **Restore Cal Kit**.

Performance Tests  
**5. CROSSTALK TEST**

**Step 9.** Press **Cal** -  and **Enter** to select **Calibrate** function.

**Step 10.** Press  -  and **Enter** to select **Response (Thru)** calibration.


**Step 11.** Press **Enter** to go down to **Select Ports** menu.



**Step 12.** Select **2-1 (S21)** for the option 213/214/313/314 instruments and **3-2 (S32)** for the option 413/414 instruments as shown in the first row in Table 2-12.

**Table 2-12**

**Select Ports settings for response calibration**

	Option		
	213/214	313/314	413/414
1	2-1(S21)	2-1(S21)	3-2 (S32)
2	1-2 (S12)	1-2 (S12)	2-3 (S23)
3	Not required	3-2 (S32)	4-1 (S41)
4	Not required	2-3 (S23)	1-4 (S14)

**Step 13.** Press  and **Enter** to perform **Thru** calibration. Wait until the calibration is completed.

**Step 14.** Press  -  and **Enter** to perform **Done**.

**Step 15.** Change **Select Ports** setting as shown in the second row in Table 2-12.

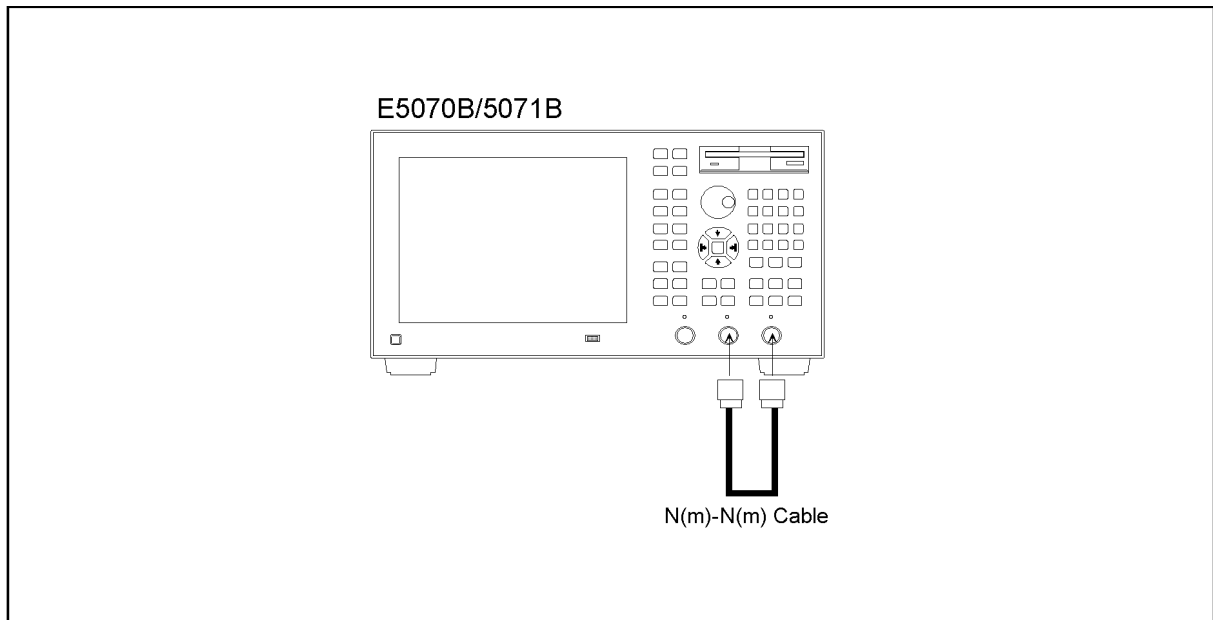
**Step 16.** Perform Step 13 and 14.

**Step 17.** For the option 213/214 instruments, skip to Step 20. For the option 313/314/413/414, proceed to Step 18.

**Response calibration for options 313, 314, 413 and 414 only**

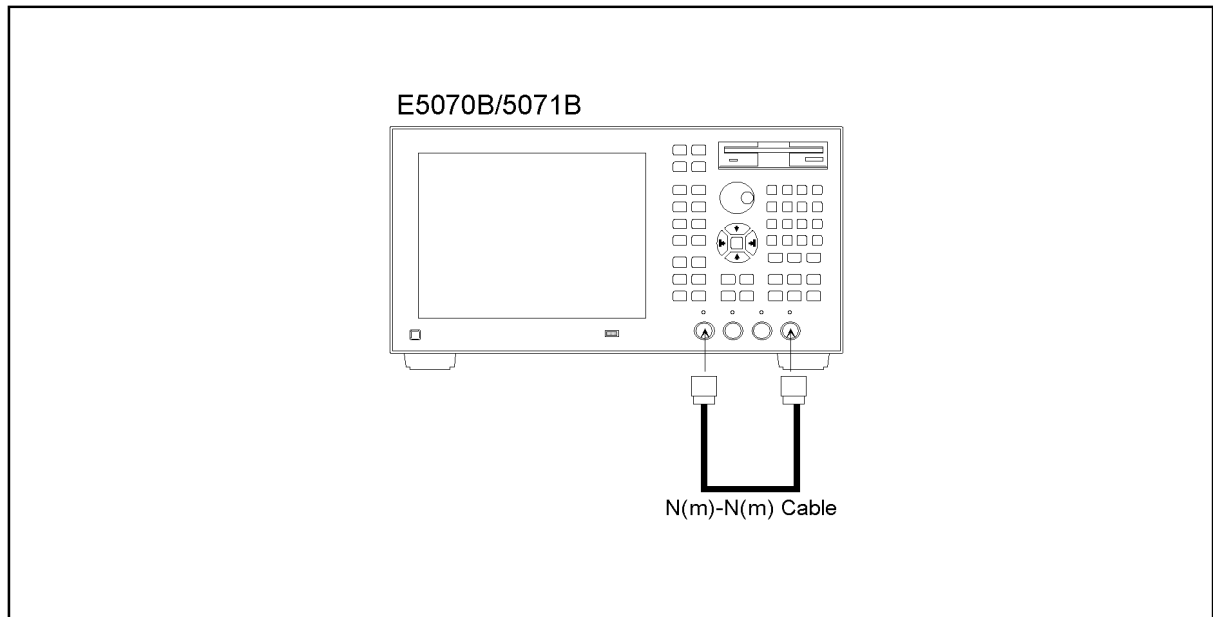
**Step 18.** Connect the test equipment (N-N cable) as shown in Figure 2-13 (Opt. 313/314) and Figure 2-14 (Opt. 413/414).

**Figure 2-13** Response calibration setup for crosstalk test (Opt.313/314)



e5070bse009

**Figure 2-14** Response calibration setup for crosstalk test (Opt.413/414)



e5070bse012

**Step 19.** Perform the response calibration for each of the **Select Ports** settings shown in the third and fourth rows in Table 2-12.

**Crosstalk measurement**

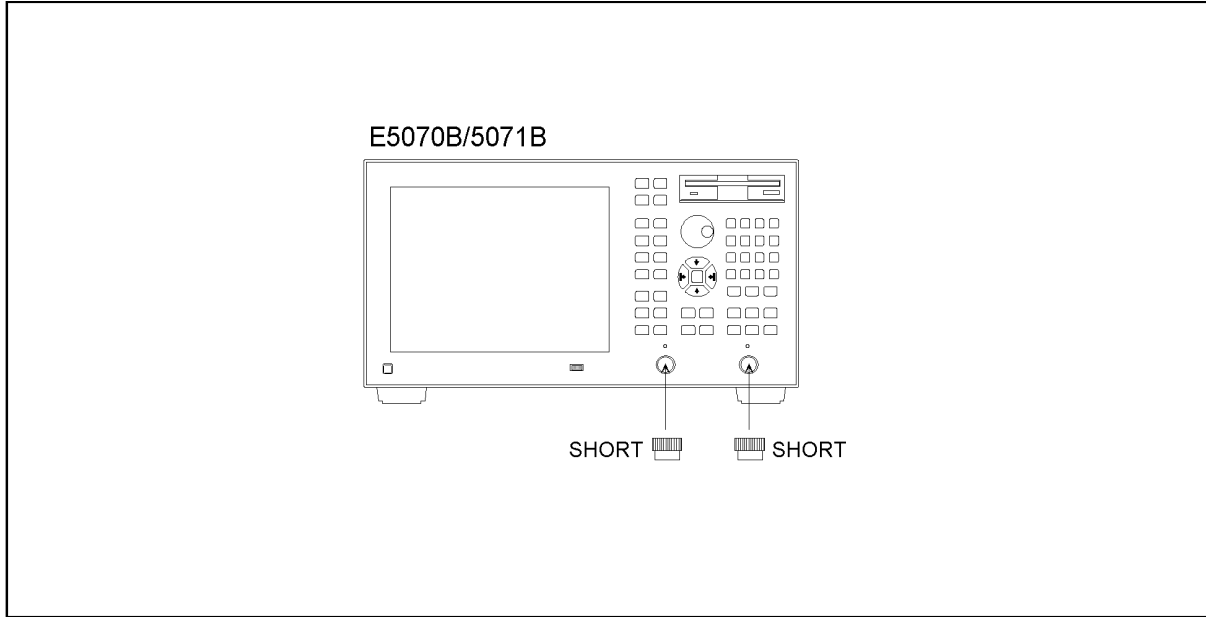
**Step 20.** Press  and verify that **Correction** is set to **ON**.

**Step 21.** Disconnect the N-N cable and connect an N-type coaxial Short termination to each test port as shown in the following figures:

Performance Tests  
**5. CROSTALK TEST**

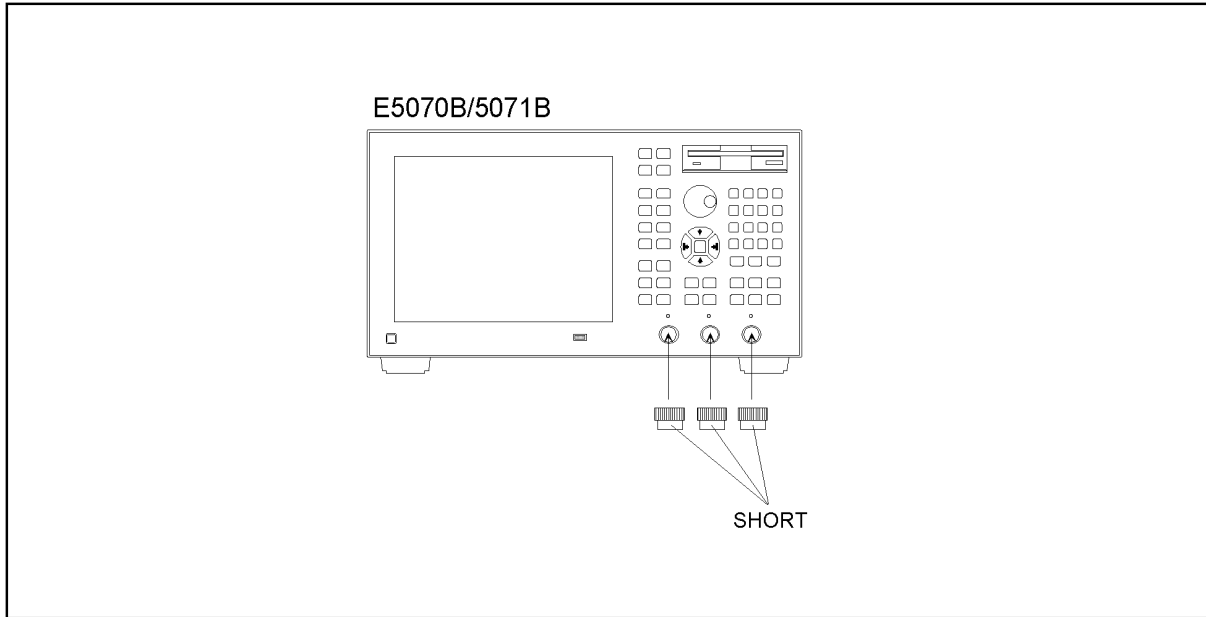
Opt. 213/214: Figure 2-15  
Opt. 313/314: Figure 2-16  
Opt. 413/414: Figure 2-17

**Figure 2-15** Crosstalk test setup (Opt. 213/214)



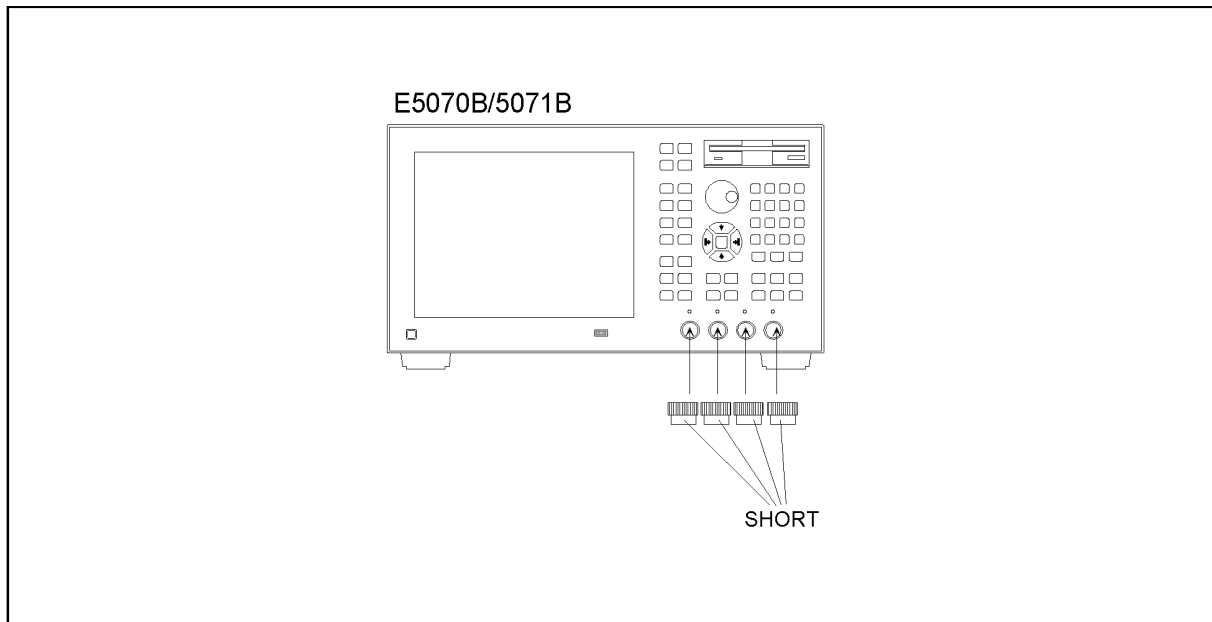
e5070bse013

**Figure 2-16** Crosstalk test setup (Opt. 313/314)



e5070bse014

**Figure 2-17** Crosstalk test setup (Opt. 413/414)



e5070bse015

**Step 22.** Program or download the VBA test program shown in Program 2-1.

**NOTE**

Also set a UserForm window to enable the test result output data to be displayed. An example of the UserForm window is shown in Figure 2-18. Refer to the Agilent E5070B/E5071B VBA Programmer's Guide for the UserForm setup procedure.

**Step 23.** Press **Meas** and select the following S-parameter from menu:

- Option 213/214/313/314: **S21**
- Option 413/414: **S32**

These parameters are shown in the first row in Table 2-13.

**Table 2-13**

**S-parameter settings for crosstalk tests.**

	Option		
	213/214	313/314	413/414
1	S21	S21	S32
2	S12	S12	S23
3	Not required	S32	S41
4	Not required	S23	S14

**Step 24.** Press **Avg** - **↑** - **↑** - **↑** - **↑** - **↑** (select Averaging Restart) **Enter** to restart the swept measurements. Wait until a trace for the average of 16 swept measurements is displayed.

## Performance Tests

### 5. CROSSTALK TEST

---

**NOTE**

---

The number of averaging times is displayed in the status bar of the measurement channel window.

**Step 25.** Press **Trigger** and **Enter** to set the trigger operation to **Hold** mode.

**Step 26.** Press **Macro Run** to execute the test program. This test program searches the maximum point of the trace for each of the following frequency ranges.

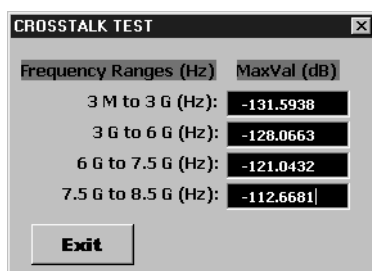
E5070B: 3 MHz to 3 GHz (one range only)

E5071B: 3 MHz to 3 GHz, 3 GHz to 6 GHz, 6 GHz to 7.5 GHz and 7.5 GHz to 8.5 GHz (four ranges)

The test results are represented in dB and displayed in the VBA UserForm window as shown in the display example below.

Figure 2-18

VBA UserForm window display example



**Step 27.** Read the maximum value(s) and record them in the performance test record ("Test result [dB]" column for the crosstalk test).

**Step 28.** Press **Exit** button on the CROSSTALK TEST window.

**Step 29.** Press **Trigger** - **Down Arrow** - **Down Arrow** - **Enter** to select the **Continuous** trigger mode.

**Step 30.** Change the S-parameter setting in accordance with Table 2-13 (the second through fourth rows) and perform Step 24 through Step 29.

### Crosstalk test program

Coding procedure:

**Step 1.** Press **Macro Setup** key.

**Step 2.** Press **Enter** to activate **VBA Editor** function.

**Step 3.** Click **Insert** and select **Module** from pull-down menu. VBA Project - Module1 [Code] window screen for coding a program will be displayed.

**Step 4.** Input the test program shown below.

**Step 5.** Save the test program with a proper file name.

Program 2-1

#### Test Program:

```
Sub Main()
```



```
Dim Ver As String
Dim MaxValA As Variant
Dim MaxValB As Variant, MaxValC As Variant, MaxValD As Variant,
MaxValE As Variant

Ver = Name

If Ver = "E5070B" Then
    SCPI.CALCulate(1).PARAMeter(1).SElect
    SCPI.CALCulate(1).SElected.Function.TYPE = "MAX"
    SCPI.CALCulate(1).SElected.Function.DOMain.START = 3000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 3000000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
    SCPI.CALCulate(1).SElected.Function.EXECute
    MaxValA = SCPI.CALCulate(1).SElected.Function.DATA

    frmCrossTalk1.txtVal.Text = CSng(20 * Log10(MaxValA(0)))
    frmCrossTalk1.Show

ElseIf Ver = "E5071B" Then
    SCPI.CALCulate(1).PARAMeter(1).SElect
    SCPI.CALCulate(1).SElected.Function.TYPE = "MAX"
    SCPI.CALCulate(1).SElected.Function.DOMain.START = 3000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 3000000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
    SCPI.CALCulate(1).SElected.Function.EXECute
    MaxValB = SCPI.CALCulate(1).SElected.Function.DATA

    SCPI.CALCulate(1).SElected.Function.DOMain.START = 3000000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 6000000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
    SCPI.CALCulate(1).SElected.Function.EXECute
    MaxValC = SCPI.CALCulate(1).SElected.Function.DATA

    SCPI.CALCulate(1).SElected.Function.DOMain.START = 6000000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 7500000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
```

## Performance Tests

### 5. CROSSTALK TEST

```
SCPI.CALCulate(1).SElected.Function.EXECute
MaxValD = SCPI.CALCulate(1).SElected.Function.DATA

SCPI.CALCulate(1).SElected.Function.DOMain.START = 7500000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 8500000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STATe = True
SCPI.CALCulate(1).SElected.Function.EXECute
MaxValE = SCPI.CALCulate(1).SElected.Function.DATA

frmCrossTalk2.txtVal1.Text = CSng(20 * Log10(MaxValB(0)))
frmCrossTalk2.txtVal2.Text = CSng(20 * Log10(MaxValC(0)))
frmCrossTalk2.txtVal3.Text = CSng(20 * Log10(MaxValD(0)))
frmCrossTalk2.txtVal4.Text = CSng(20 * Log10(MaxValE(0)))
frmCrossTalk2.Show

End If

End Sub

Function Log10(X)

    Log10 = Log(X) / Log(10)

End Function
```

## 6. SYSTEM DYNAMIC RANGE TEST

### Description

This test checks the system dynamic range for the receiver ports of the E5070B/E5071B. The system dynamic range is tested by performing an "Isolation" measurement 16 times with segment sweep points for specified frequency ranges (after the response and isolation calibrations are performed) 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.

### Specification

**Serial Prefix: MY421, or JP1KK**

#### E5070B

95 dB @  $23 \pm 5$  °C, 3 MHz to 1.5 GHz, IFBW 3 kHz

97 dB @  $23 \pm 5$  °C, 1.5 GHz to 3 GHz, IFBW 3 kHz

120 dB @  $23 \pm 5$  °C, 3 MHz to 1.5 GHz, IFBW 10 Hz

122 dB @  $23 \pm 5$  °C, 1.5 GHz to 3 GHz, IFBW 10 Hz

#### E5071B

95 dB @  $23 \pm 5$  °C, 3 MHz to 1.5 GHz, IFBW 3 kHz

97 dB @  $23 \pm 5$  °C, 1.5 GHz to 4 GHz, IFBW 3 kHz

93 dB @  $23 \pm 5$  °C, 4 GHz to 6 GHz, IFBW 3 kHz

88 dB @  $23 \pm 5$  °C, 6 GHz to 7.5 GHz, IFBW 3 kHz

81 dB @  $23 \pm 5$  °C, 7.5 GHz to 8.5 GHz, IFBW 3 kHz

120 dB @  $23 \pm 5$  °C, 3 MHz to 1.5 GHz, IFBW 10 Hz

122 dB @  $23 \pm 5$  °C, 1.5 GHz to 4 GHz, IFBW 10 Hz

118 dB @  $23 \pm 5$  °C, 4 GHz to 6 GHz, IFBW 10 Hz

113 dB @  $23 \pm 5$  °C, 6 GHz to 7.5 GHz, IFBW 10 Hz

106 dB @  $23 \pm 5$  °C, 7.5 GHz to 8.5 GHz, IFBW 10 Hz

**Serial Prefix: MY422, and above**

#### E5070B

95 dB @  $23 \pm 5$  °C, 3 MHz to 1.5 GHz, IFBW 3 kHz

97 dB @  $23 \pm 5$  °C, 1.5 GHz to 3 GHz, IFBW 3 kHz

## Performance Tests

### 6. SYSTEM DYNAMIC RANGE TEST

120 dB @  $23 \pm 5$  °C, 3 MHz to 1.5 GHz, IFBW 10 Hz

122 dB @  $23 \pm 5$  °C, 1.5 GHz to 3 GHz, IFBW 10 Hz

#### **E5071B**

95 dB @  $23 \pm 5$  °C, 3 MHz to 1.5 GHz, IFBW 3 kHz

97 dB @  $23 \pm 5$  °C, 1.5 GHz to 3 GHz, IFBW 3 kHz

96 dB @  $23 \pm 5$  °C, 3 GHz to 4 GHz, IFBW 3 kHz

92 dB @  $23 \pm 5$  °C, 4 GHz to 6 GHz, IFBW 3 kHz

87 dB @  $23 \pm 5$  °C, 6 GHz to 7.5 GHz, IFBW 3 kHz

80 dB @  $23 \pm 5$  °C, 7.5 GHz to 8.5 GHz, IFBW 3 kHz

120 dB @  $23 \pm 5$  °C, 3 MHz to 1.5 GHz, IFBW 10 Hz

122 dB @  $23 \pm 5$  °C, 1.5 GHz to 3 GHz, IFBW 10 Hz

121 dB @  $23 \pm 5$  °C, 3 GHz to 4 GHz, IFBW 10 Hz

117 dB @  $23 \pm 5$  °C, 4 GHz to 6 GHz, IFBW 10 Hz

112 dB @  $23 \pm 5$  °C, 6 GHz to 7.5 GHz, IFBW 10 Hz

105 dB @  $23 \pm 5$  °C, 7.5 GHz to 8.5 GHz, IFBW 10 Hz

---

#### **NOTE**

---

The specification applies when the response and isolation calibration is performed and averaging factor is 16.

#### **Test equipment**

Coaxial cable with Type-N (m) connectors, 61 cm (24 in)	Agilent N6314A(p/n 8120-8862)
Type-N(m) 50 $\Omega$ Load termination (2 ea.)	part of Agilent 85032F/54D /33E/50D with Type-N adapter

#### **Procedure**

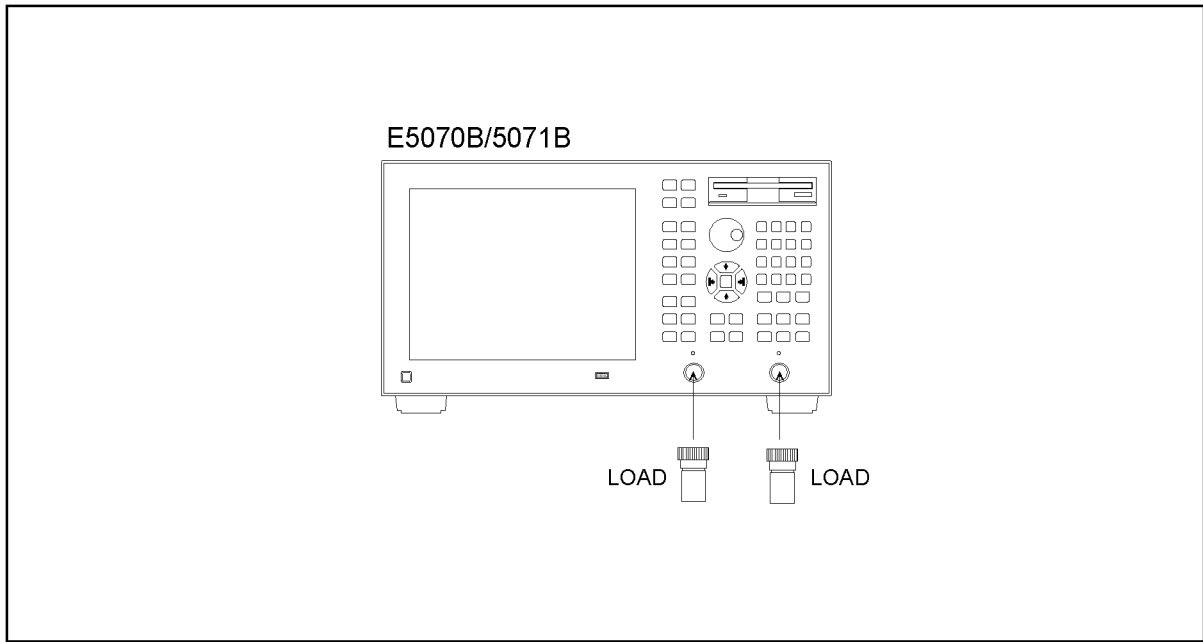
**Step 1.** Connect a load termination to each test port as shown in the following figures:

Opt. 213/214: Figure 2-19

Opt. 313/314: Figure 2-20

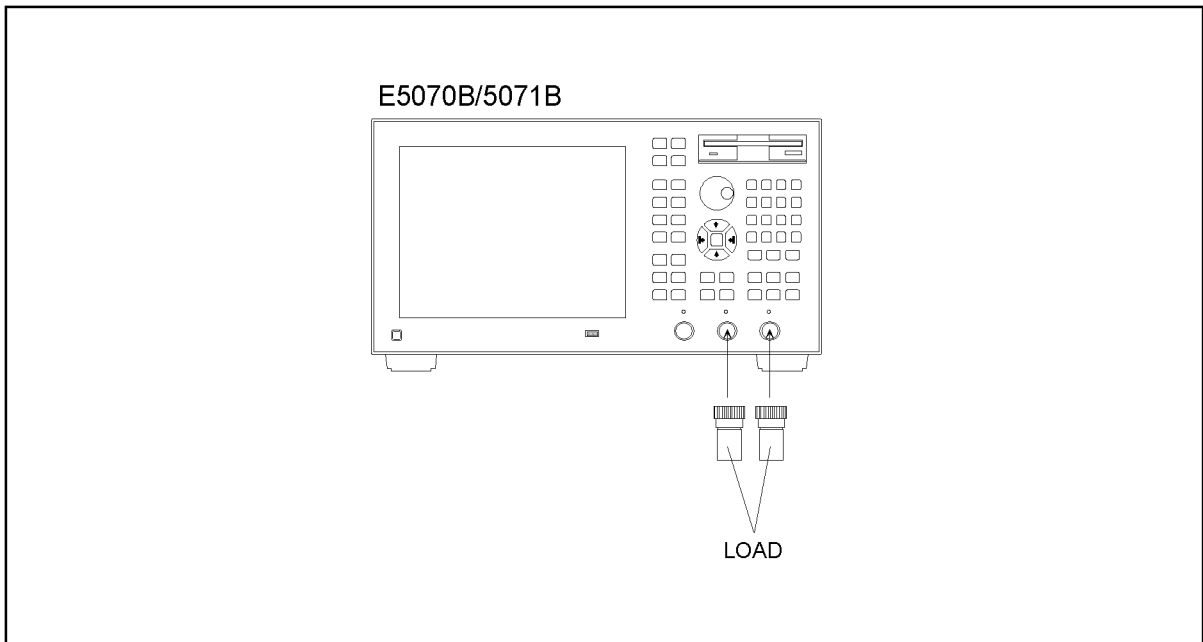
Opt. 413/414: Figure 2-21

**Figure 2-19** Isolation calibration setup for system dynamic range test (Opt. 213/214)



e5070bse016

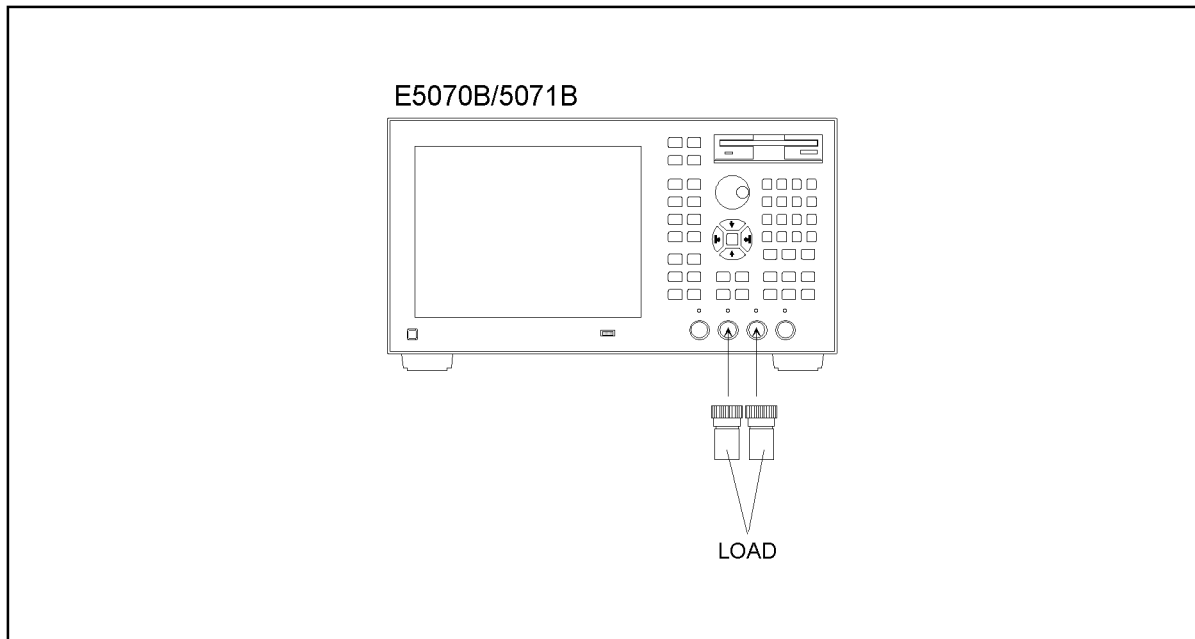
**Figure 2-20** Isolation calibration setup for system dynamic range test (Opt. 313/314)



e5070bse017

Performance Tests  
**6. SYSTEM DYNAMIC RANGE TEST**

**Figure 2-21** Isolation calibration setup for system dynamic range test (Opt. 413/414)



e5070bse018

**Step 2.** Press **Preset** and **Enter** to initialize the E5070B/E5071B. And press **Sweep Setup** - **Power** - **[5]** - **[x1]** to set the power +5 dBm (FW 3.60 and above), and press **Sweep Setup** - **Power** - **Auto Range** to turn off Auto Power Range set function (FW 3.60 and above), and press **System** - **Service Menu** - **Init Src Ctrl** to turn off Initial Source Port Control function (FW 3.54 and above).

**Step 3.** Press **Format** and select **Lin Mag** from display format menu.

**Step 4.** Set the controls as follows:

Control settings	Key strokes
IF Bandwidth: 10 Hz	<b>Avg</b> - <b>IF Bandwidth</b> - <b>[1]</b> - <b>[0]</b> - <b>[x1]</b>
Averaging: ON	<b>↑</b> - <b>↑</b> - <b>↑</b> (select <b>Averaging</b> ) - <b>Enter</b>
Averaging factor now is set to 16 (preset value).	

**Step 5.** Set the test frequencies using the Segment Table as follows:

- a. Press **Sweep Setup** - **↓** - **↓** - **↓** - **↓** - **↓** - **↓** (select **Edit Segment Table**) - **Enter**.  
The first "Start" frequency entry box in the Segment Sweep table will be focused.
- b. Press **Focus** in the ENTRY block. The softkey menu title area is displayed in blue.
- c. Press **↓** - **↓** (select **List Power**) - **Enter** to set the **List Power** function to ON.  
The row (**Power**) for setting appears in the segment table.
- d. Press **Focus** in the ENTRY block. The window frame of the segment table is

displayed as bright.

- e. For the E5070B, proceed to the next Step f. For the E5071B, skip to Step j or Step x.

### **E5070B**

- f. Press **[3]** - **[0]** - **[0]** - **[k/m]** to enter 300 kHz as the start frequency. "Stop" frequency will be focused.
- g. Press **[3]** - **[G/n]** to enter 3 GHz as the stop frequency. "Points" will be focused.
- h. Press **[5]** - **[0]** - **[x1]** to set the number of sweep points to 50. "Power" will be focused.
- i. Press **[1]** - **[0]** - **[x1]** to set the power level to 10 dBm.

### **NOTE**

See Table 2-14 for the entire Segment Table setting for the E5070B.

**Table 2-14**

### **E5070B Segment Table setting**

	<b>Start</b>	<b>Stop</b>	<b>Points</b>	<b>Power</b>
1	300 kHz	3 GHz	50	10 dBm

### **E5071B (for serial prefix MY421, or JP1KK)**

- j. Press **[3]** - **[0]** - **[0]** - **[k/m]** to enter 300 kHz as the start frequency. "Stop" frequency will be focused.
- k. Press **[4]** - **[.]** - **[2]** - **[5]** - **[G/n]** to enter 4.25 GHz as the stop frequency. "Points" will be focused.
- l. Press **[5]** - **[0]** - **[x1]** to set the number of sweep points to 50. "Power" will be focused.
- m. Press **[1]** - **[0]** - **[x1]** to set the power level to 10 dBm.
- n. Press **[↓]** - **[←]** - **[←]** - **[←]** to focus on the "Start" frequency of the second segment.
- o. Press **[4]** - **[.]** - **[2]** - **[5]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[1]** - **[G/n]** to enter 4.250000001 GHz as the start frequency. "Stop" frequency will be focused.
- p. Press **[6]** - **[G/n]** to enter 6 GHz as the stop frequency. The "Points" will be focused.
- q. Press **[2]** - **[0]** - **[x1]** to set the number of sweep points to 20. "Power" will be focused.
- r. Press **[8]** - **[x1]** to set the power level to 8 dBm.
- s. Press **[↓]** - **[←]** - **[←]** - **[←]** to focus on the "Start" frequency of the third segment.
- t. Press **[6]** - **[.]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[1]** - **[G/n]** to enter 6.000000001 GHz as the start frequency. "Stop" frequency will be focused.
- u. Press **[8]** - **[.]** - **[5]** - **[G/n]** to enter 8.5 GHz as the stop frequency. "Points" will be focused.
- v. Press **[3]** - **[0]** - **[x1]** to set the number of sweep points to 30. "Power" will be focused.
- w. Press **[6]** - **[x1]** to set the power level to 6 dBm.

## 6. SYSTEM DYNAMIC RANGE TEST

**NOTE**

See Table 2-15 for the entire Segment Table setting for the E5071B (for serial prefix MY421, or JP1KK).

Table 2-15

**E5071B Segment Table setting (for serial prefix MY421, or JP1KK)**

	Start	Stop	Points	Power
1	300 kHz	4.25 GHz	50	10 dBm
2	4.250000001 GHz	6 GHz	20	8 dBm
3	6.000000001 GHz	8.5 GHz	30	6 dBm

**E5071B (for serial prefix MY422, and above)**

- x. Press **[3]** - **[0]** - **[0]** - **[k/m]** to enter 300 kHz as the start frequency. "Stop" frequency will be focused.
- y. Press **[3]** - **[G/n]** to enter 3 GHz as the stop frequency. "Points" will be focused.
- z. Press **[3]** - **[5]** - **[x1]** to set the number of sweep points to 35. "Power" will be focused.
- aa. Press **[1]** - **[0]** - **[x1]** to set the power level to 10 dBm.
- ab. Press **[↓]** - **[←]** - **[←]** - **[←]** to focus on the "Start" frequency of the second segment.
- ac. Press **[3]** - **[.]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[1]** - **[G/n]** to enter 3.000000001 GHz as the start frequency. "Stop" frequency will be focused.
- ad. Press **[4]** - **[.]** - **[2]** - **[5]** - **[G/n]** to enter 4.25 GHz as the stop frequency. "Points" will be focused.
- ae. Press **[1]** - **[5]** - **[x1]** to set the number of sweep points to 15. "Power" will be focused.
- af. Press **[9]** - **[x1]** to set the power level to 9 dBm.
- ag. Press **[↓]** - **[←]** - **[←]** - **[←]** to focus on the "Start" frequency of the third segment.
- ah. Press **[4]** - **[.]** - **[2]** - **[5]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[1]** - **[G/n]** to enter 4.250000001 GHz as the start frequency. "Stop" frequency will be focused.
- ai. Press **[6]** - **[G/n]** to enter 6 GHz as the stop frequency. The "Points" will be focused.
- aj. Press **[2]** - **[0]** - **[x1]** to set the number of sweep points to 20. "Power" will be focused.
- ak. Press **[7]** - **[x1]** to set the power level to 7 dBm.
- al. Press **[↓]** - **[←]** - **[←]** - **[←]** to focus on the "Start" frequency of the fourth segment.
- am. Press **[6]** - **[.]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[0]** - **[1]** - **[G/n]** to enter 6.000000001 GHz as the start frequency. "Stop" frequency will be focused.
- an. Press **[8]** - **[.]** - **[5]** - **[G/n]** to enter 8.5 GHz as the stop frequency. "Points" will be focused.
- ao. Press **[3]** - **[0]** - **[x1]** to set the number of sweep points to 30. "Power" will be focused.



ap. Press **5** - **x1** to set the power level to 5 dBm.

**NOTE**

See Table 2-16 for the entire Segment Table setting for the E5071B (for serial prefix MY422, and above).

**Table 2-16****E5071B Segment Table setting (for serial prefix MY422, and above)**

	Start	Stop	Points	Power
1	300 kHz	3 GHz	35	10 dBm
2	3.000000001 GHz	4.25 GHz	15	9 dBm
3	4.250000001 GHz	6 GHz	20	7 dBm
4	6.000000001 GHz	8.5 GHz	30	5 dBm

**Step 6.** Press **Sweep Setup** - **↓** - **↓** - **↓** - **↓** - **↓** (select **Sweep Type**) - **Enter** to set the **Sweep type** to **Segment**.

**Response (Thru) calibration**

**Step 7.** Press **Cal** - **↓** - **↓** - **↓** - **↓** and **Enter** to select **Cal Kit**.

**Step 8.** Press **↓** - **↓** - **↓** and **Enter** to select **85032F**.

**NOTE**

If **Cal Kit** is set to **85032F\***, press **↓**, **Enter**, **↓** - **↓** - **↓** - **Enter** - **Enter** to select **Restore Cal Kit**.

**Step 9.** Press **Cal** - **↓** and **Enter** to select **Calibrate** function.

**Step 10.** Press **↓** - **↓** and **Enter** to select **Response (Thru)** calibration.

**Step 11.** Press **Enter** to go down to **Select Ports** menu.

**Step 12.** Select **2-1 (21)** for the option 213/214 instruments and **3-2 (S32)** for the option 313/314/413/414 instruments as shown in the first row in Table 2-17.

**Table 2-17****Select Ports settings for response calibration**

	Option		
	213/214	313/314	413/414
1	2-1(S21)	3-2 (S32)	3-2 (S32)
2	1-2 (S12)	2-3 (S23)	2-3 (S23)
3	Not required	2-1 (S21)	4-1 (S41)
4	Not required	1-2 (S12)	1-4 (S14)

**Step 13.** Press **↓** - **↓** and **Enter** to perform **Isolation** calibration. Wait until the calibration is completed.

## 6. SYSTEM DYNAMIC RANGE TEST

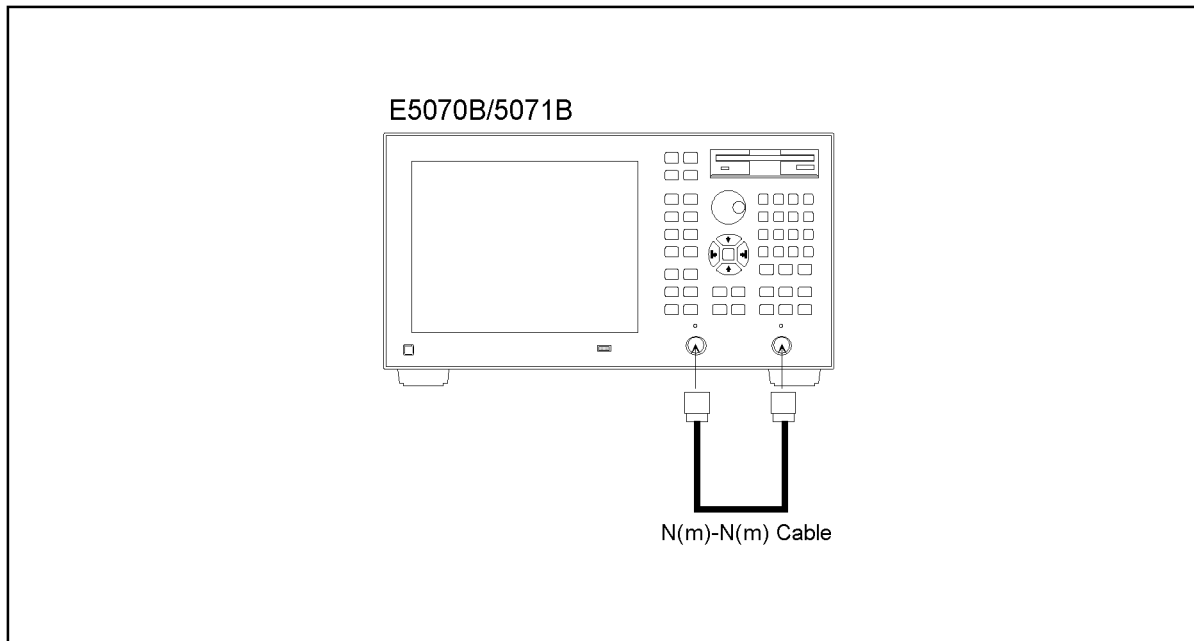
**Step 14.** Disconnect the load and connect the N-N cable as shown in the following figures.

Opt. 213/214: Figure 2-22

Opt. 313/314: Figure 2-23

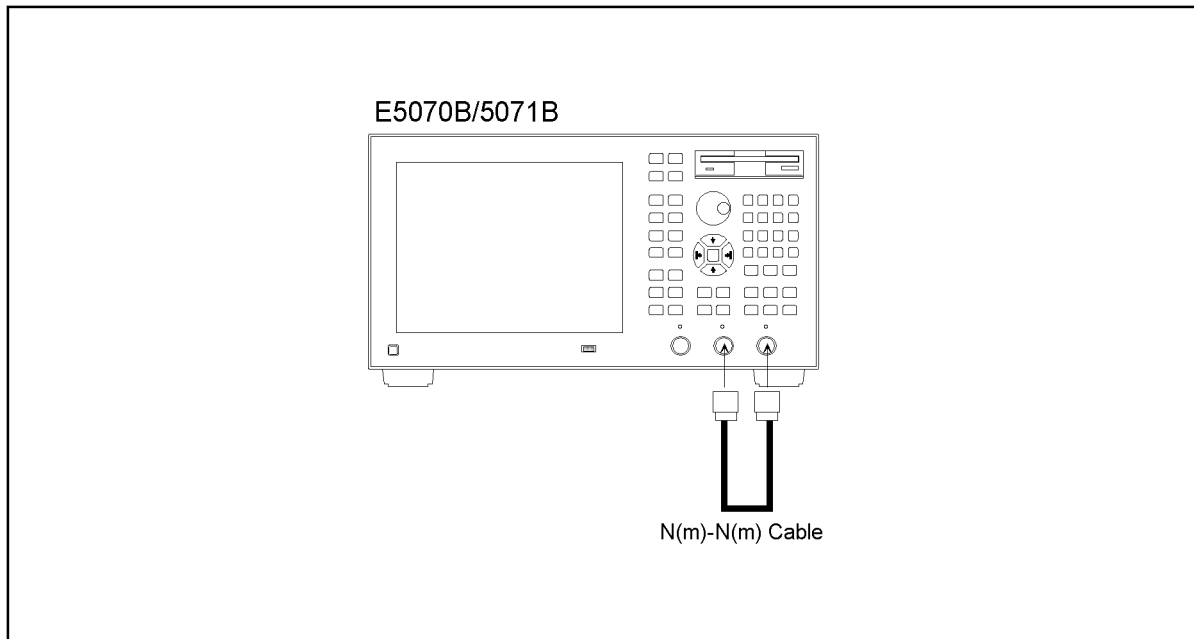
Opt. 413/414: Figure 2-24

**Figure 2-22** Thru calibration setup for system dynamic range test setup (Opt. 213/214)



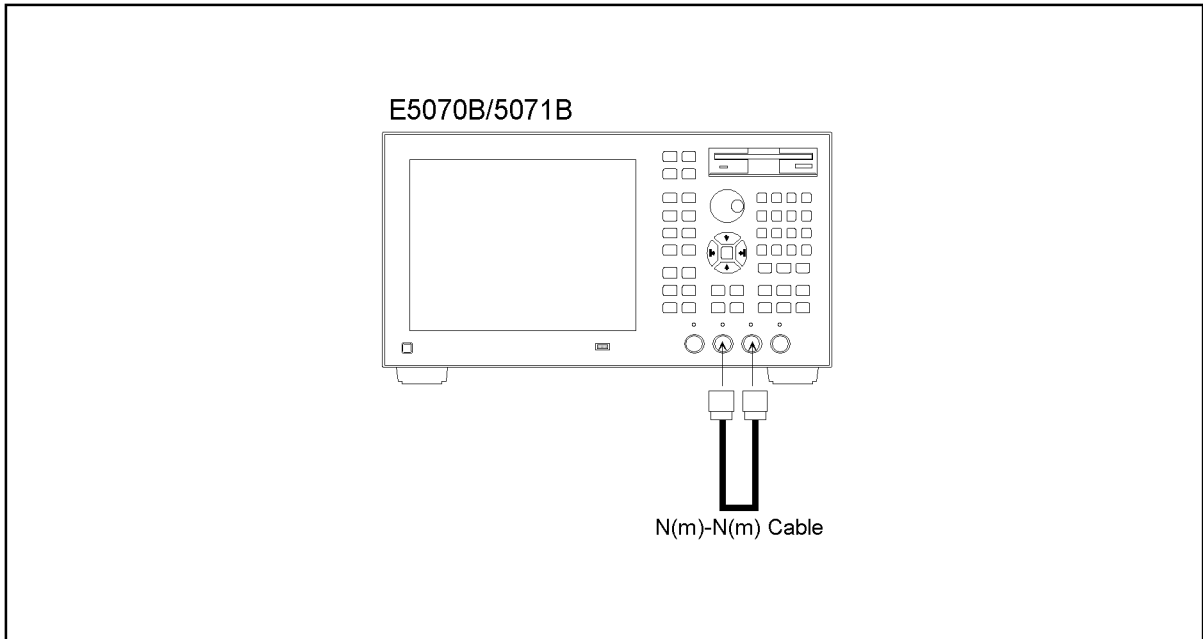
e5070bse006

**Figure 2-23** Thru calibration setup for system dynamic range test setup (Opt. 313/314)



e5070bse009

Figure 2-24 Thru calibration setup for system dynamic range test setup (Opt. 413/414)



e5070bse011

**NOTE** To avoid possible variance in measured values, do not touch or move the N-N cable during measurements.

**Step 15.** Press and to perform **Thru** calibration. Wait until the calibration is completed.

**Step 16.** Press - - to perform **Done**.

**Step 17.** Press - - to select **Select Ports** (in reference to the position of **Done**) and press .

**Step 18.** Change **Select Ports** setting as shown in the second row in Table 2-17.

**Step 19.** Press - to perform **Thru** calibration. Wait until the calibration is completed.

**Step 20.** Disconnect the N-N cable and connect the Load termination to each test port as shown in the following figures.

Opt. 213/214: Figure 2-19

Opt. 313/314: Figure 2-20

Opt. 413/414: Figure 2-21

**Step 21.** Press and to perform **Isolation** calibration.

**Step 22.** Press and to perform **Done**.

**System dynamic rang measurement for select ports setting as shown in the first and second row in Table 2-17**

**Step 23.** Press and verify that **Correction** is set to **ON**.

## 6. SYSTEM DYNAMIC RANGE TEST

**Step 24.** Press **Avg** - **↑** - **↑** - **↑** (select **Averaging**) - **Enter** to set the **Averaging** function to OFF.

---

**NOTE** Be sure to set the **Averaging** function to OFF.

---

**Step 25.** Program or download the test program shown in Program 2-2.

---

**NOTE** Also set a UserForm window to enable the test result output data to be displayed. An example of the UserForm window is shown in Figure 2-25. Refer to the Agilent E5070B/E5071B VBA Programmer's Guide for the UserForm setup procedure.

---

**Step 26.** Press **Meas** and select the following S-parameter from menu:

Option 213/214: **S21**

Option 313/314/413/414: **S32**

These parameters are shown in the first row in Table 2-18.

**Table 2-18**

**S-parameter settings for system dynamic range test**

	Option		
	213/214	313/314	413/414
1	S21	S32	S32
2	S12	S23	S23
3	Not required	S21	S41
4	Not required	S12	S14

**Step 27.** Press **Macro Run** to run the test program. This test program repeats a swept measurement 16 times, calculates the RMS deviation from the 16 measurement values at each sweep frequency point, and extracts the maximum deviation value for each of the following frequency ranges:

E5070B: 3 MHz to 1.5 GHz and 1.5 GHz to 3 GHz (2 ranges)

E5071B: (for serial prefix MY421, or JP1KK)

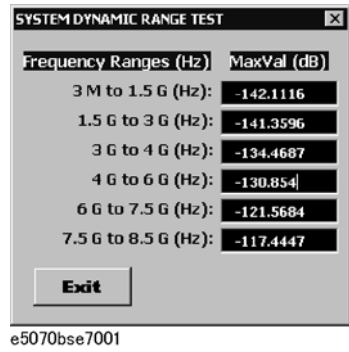
3 MHz to 1.5 GHz, 1.5 GHz to 4 GHz, 4 GHz to 6 GHz, 6 GHz to 7.5 GHz and 7.5 GHz to 8 GHz (5 ranges)

E5071B: (for serial prefix MY422, and above)

3 MHz to 1.5 GHz, 1.5 GHz to 3 GHz, 3 GHz to 4 GHz, 4 GHz to 6 GHz, 6 GHz to 7.5 GHz and 7.5 GHz to 8 GHz (6 ranges)

The maximum deviation value in each frequency range is represented in dB and displayed in the VBA UserForm window as shown in the display example below.

**Figure 2-25 VBA UserForm window display example**



**Step 28.** Record the maximum RMS deviation values in the performance test record ("Test result [dB]" column for the system dynamic range test).

**Step 29.** Press **Exit** button on the SYSTEM DYNAMIC RANGE TEST window.

**Step 30.** Press **Avg** - **Enter** - **3** - **k/m** to change the **IF Bandwidth** setting to 3 kHz and perform Step 27 through 29.

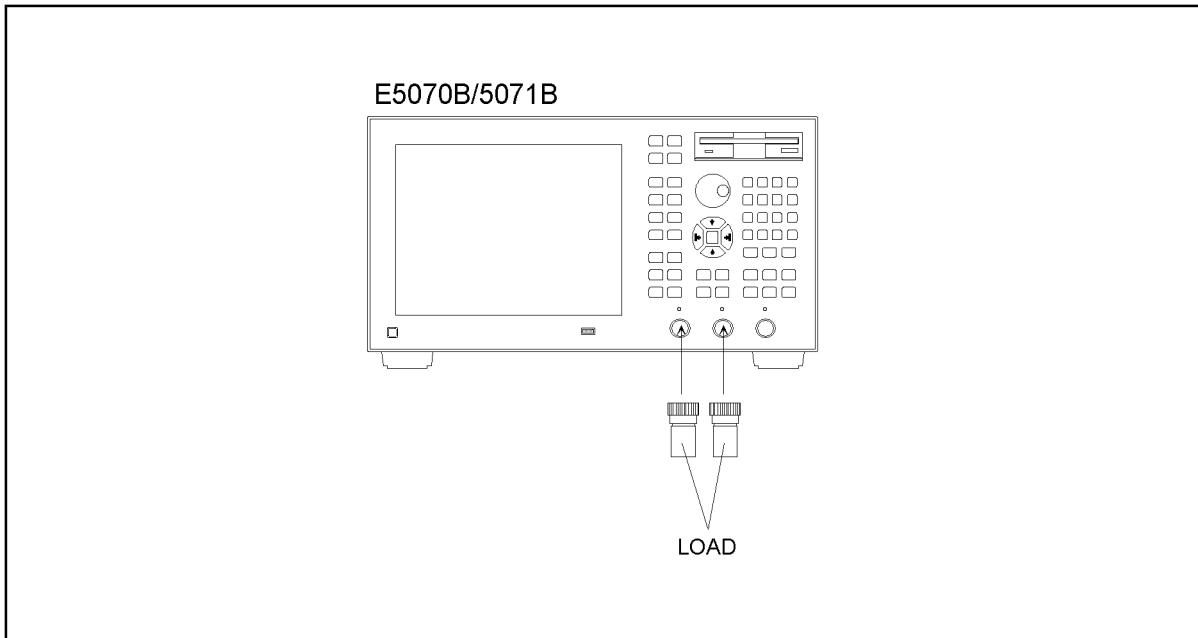
**Step 31.** Press **Avg** - **Enter** - **1** - **0** - **x1** to change the **IF Bandwidth** setting to 10 Hz , change the S-parameter setting as shown in the second row in Table 2-18 and perform Step 27 through 30.

**Step 32.** For the option 313/314/413/414, proceed to Step 33.

**Response (Thru) calibration for options 313, 314, 413 and 414 only**

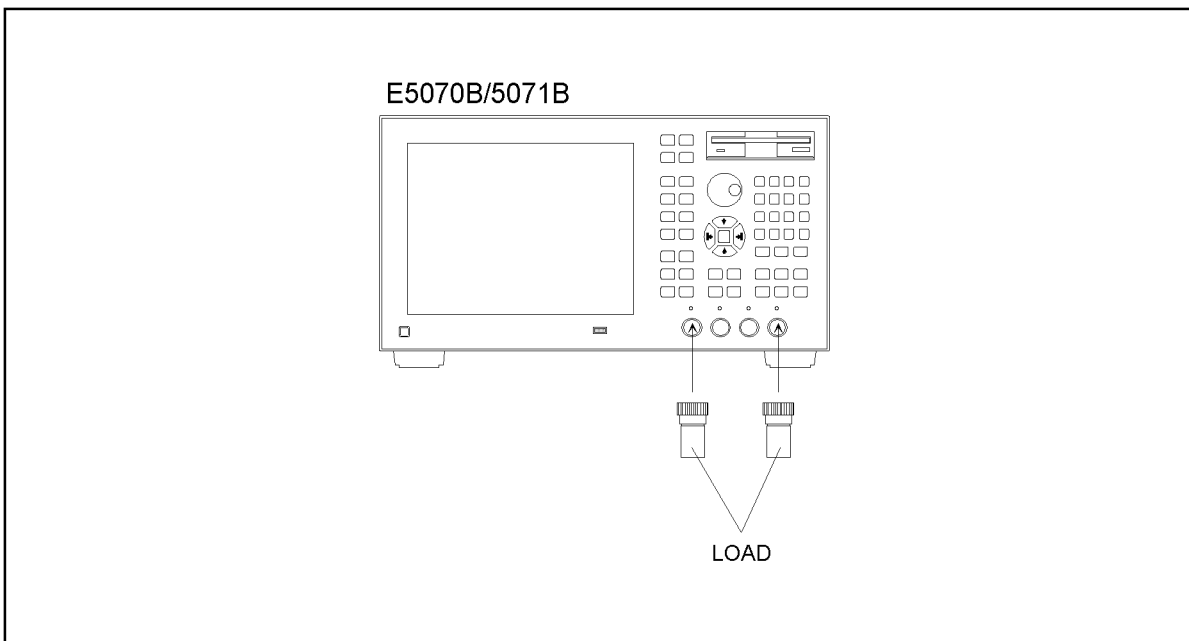
**Step 33.** Connect the Load termination to each test port as shown in Figure 2-26 (Opt. 313/314) and Figure 2-27 (Opt. 413/414).

**Figure 2-26 Isolation calibration setup for system dynamic range test (Opt. 313/314)**



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**Figure 2-27** Isolation calibration setup for system dynamic range test (Opt. 413/414)



e5070bse020

**Step 34.** Set the controls as follows:

Control settings	Key strokes
IF Bandwidth: 10 Hz	<input type="button" value="Avg"/> - IF Bandwidth - <input type="button" value="1"/> - <input type="button" value="0"/> - <input type="button" value="x1"/>
Averaging: ON	<input type="button" value="↑"/> - <input type="button" value="↑"/> - <input type="button" value="↑"/> (select <b>Averaging</b> ) - <input type="button" value="Enter"/>
Averaging factor now is set to 16 (preset value).	

**Step 35.** Press  -  and  to select **Calibrate** function.

**Step 36.** Press  -  and  to select **Response (Thru)** calibration.

**Step 37.** Press  to go down to **Select Ports** menu.

**Step 38.** Select **2-1 (21)** for the option 313/314 instruments and **4-1 (S41)** for the option 413/414 instruments as shown in the third row in Table 2-19.

**Table 2-19** Select Ports settings for response calibration

	Option		
	213/214	313/314	413/414
1	2-1(S21)	3-2 (S32)	3-2 (S32)
2	1-2 (S12)	2-3 (S23)	2-3 (S23)
3	Not required	2-1 (S21)	4-1 (S41)

**Table 2-19**      **Select Ports settings for response calibration**

	Option		
	213/214	313/314	413/414
4	Not required	1-2 (S12)	1-4 (S14)

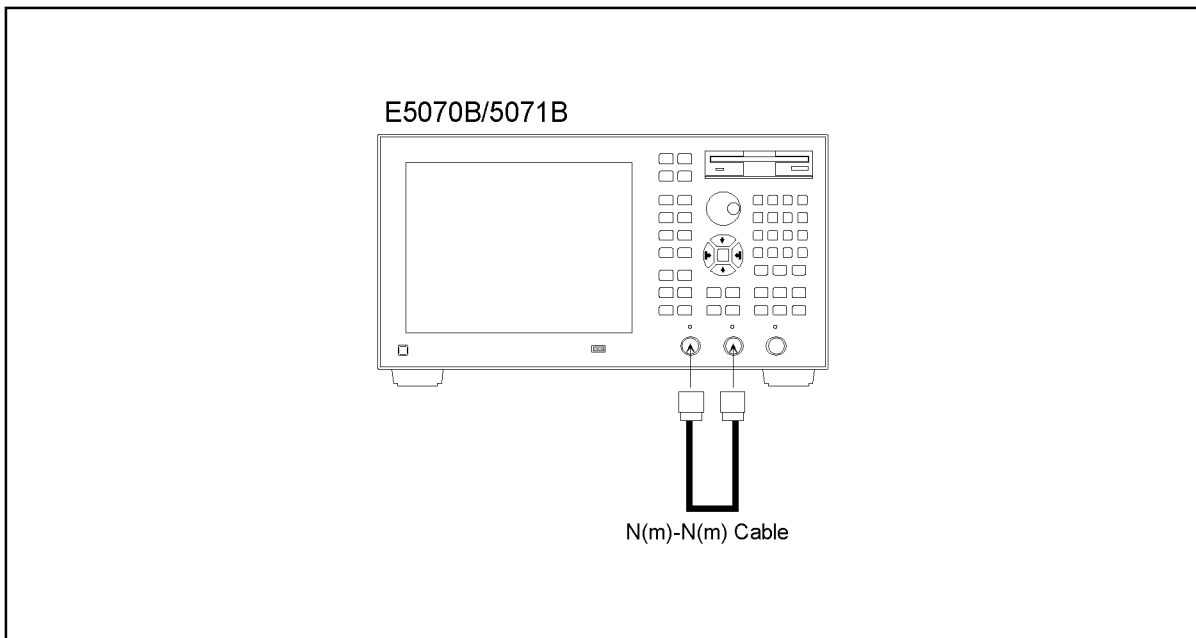
**Step 39.** Press - and **Enter** to perform **Isolation** calibration. Wait until the calibration is completed.

**Step 40.** Disconnect the load and connect the N-N cable as shown in the following figures.

Opt. 313/314: Figure 2-28

Opt. 413/414: Figure 2-29

**Figure 2-28**      **Thru calibration setup for system dynamic range test setup (Opt. 313/314)**

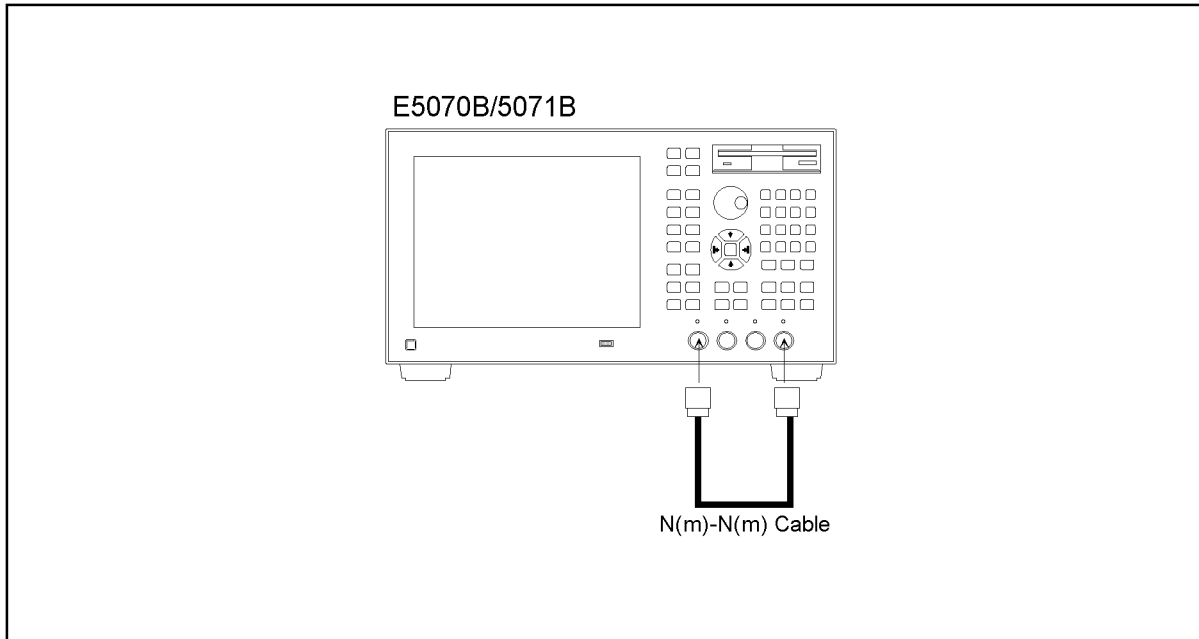


e5070bse007

2. Performance Test

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Figure 2-29 Thru calibration setup for system dynamic range test setup (Opt. 413/414)



e5070bse012

**Step 41.** Press and to perform **Thru** calibration. Wait until the calibration is completed.

**Step 42.** Press - - to perform **Done**.

**Step 43.** Press - - to select **Select Ports** (in reference to the position of **Done**) and press .

**Step 44.** Change **Select Ports** setting as shown in the fourth row in Table 2-19.

**Step 45.** Press - to perform **Thru** calibration.

**Step 46.** Disconnect the N-N cable and connect the Load termination to each test port as shown in the following figures.

Opt. 313/314: Figure 2-26

Opt. 413/414: Figure 2-27

**Step 47.** Press and to perform **Isolation** calibration.

**Step 48.** Press and to perform **Done**.

**System dynamic range measurement for select ports setting as shown in the third and fourth row in Table 2-19**

**Step 49.** Press and verify that **Correction** is set to **ON**.

**Step 50.** Press - - - (select **Averaging**) - to set the **Averaging** function to OFF.

**NOTE**

Be sure to set the **Averaging** function to OFF.



**Step 51.** Press **Meas** and select the following S-parameter from menu:

Option 313/314: **S21**  
Option 413/414: **S41**

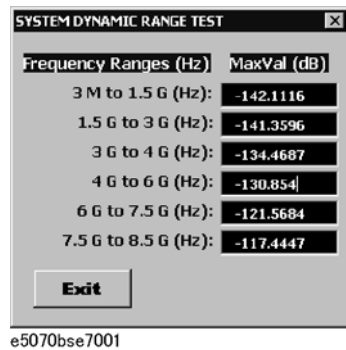
These parameters are shown in the third row in Table 2-20.

**Table 2-20** S-parameter settings for system dynamic range test

	Option		
	213/214	313/314	413/414
1	S21	S32	S32
2	S12	S23	S23
3	Not required	S21	S41
4	Not required	S12	S14

**Step 52.** Press **Macro Run** to run the test program.

**Figure 2-30** VBA UserForm window display example



**Step 53.** Record the maximum RMS deviation values in the performance test record ("Test result [dB]" column for the system dynamic range test).

**Step 54.** Press **Exit** button on the SYSTEM DYNAMIC RANGE TEST window.

**Step 55.** Press **Avg** - **Enter** - **3** - **k/m** to change the **IF Bandwidth** setting to 3 kHz and perform Step 52 through 54.

**Step 56.** Press **Avg** - **Enter** - **1** - **0** - **x1** to change the **IF Bandwidth** setting to 10 Hz , change the S-parameter setting as shown in the fourth row in Table 2-20 and perform Step 52 through 55.

### System Dynamic Range test program

Coding procedure:

**Step 1.** Press **Macro Setup** key.

**Step 2.** Press **Enter** to activate **VBA Editor** function.

**6. SYSTEM DYNAMIC RANGE TEST**

- Step 3.** Click **Insert** and select **Module** from pull-down menu. VBA Project - Module1 [Code] window screen for coding a program will be displayed.
- Step 4.** Create the test program. The sample program is show below. (if serial prefix MY422, and above)
- Step 5.** Save the test program with a proper file name.

**Program 2-2****Test program:**

```

Sub Main()

    Dim Val(15) As Variant, X() As Double, Y() As Double, Rms As Variant

    Dim I As Integer, J As Integer, K As Integer, Dmy As Long
    Dim Ver As String, Buff As String

    Dim MaxValA As Variant, MaxValB As Variant

    Dim MaxValC As Variant, MaxValD As Variant, MaxValE As Variant,
    MaxValF As Variant, MaxValG As Variant, MaxValH As Variant

    Ver = Name

    If Ver = "E5070B" Then
        Count = 99
        ReDim X(Count)
        ReDim Y(Count)

    ElseIf Ver = "E5071B" Then
        Count = 199
        ReDim X(Count)
        ReDim Y(Count)
    End If

    SCPI.TRIGger.SEQuence.Source = "BUS"
    SCPI.INITiate(1).CONTinuous = True

    For I = 0 To 15
        SCPI.TRIGger.SEQuence.SINGLE
        Dmy = SCPI.IEEE4882.OPC
        SCPI.CALCulate(1).PARAmeter(1).SELEct
        Val(I) = SCPI.CALCulate(1).SELEcted.DATA.FDATA
    Next I

```

```

For J = 0 To Count
    X(J) = Val(0)(J) ^ 2
Next J

For J = 0 To Count
    For I = 1 To 15
        X(J) = X(J) + Val(I)(J) ^ 2
    Next I
    Y(J) = Sqr(X(J) / 16)
Next J

SCPI.INITiate(1).CONTinuous = False
Rms = CVar(Y)
SCPI.CALCulate(1).SElected.DATA.FDATA = Rms
SCPI.DISPlay.WINDow(1).TRACe.Y.SCALE.AUTO

If Ver = "E5070B" Then
    SCPI.CALCulate(1).PARAmeter(1).SElect
    SCPI.CALCulate(1).SElected.Function.TYPE = "MAX"
    SCPI.CALCulate(1).SElected.Function.DOMain.START = 3000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 1500000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
    SCPI.CALCulate(1).SElected.Function.EXECute
    MaxValA = SCPI.CALCulate(1).SElected.Function.DATA

    SCPI.CALCulate(1).SElected.Function.DOMain.START = 1500000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 3000000000#
    SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
    SCPI.CALCulate(1).SElected.Function.EXECute
    MaxValB = SCPI.CALCulate(1).SElected.Function.DATA

    frmDynamicRange1.txtVal1.Text = CSng(20 * Log10(MaxValA(0)))
    frmDynamicRange1.txtVal2.Text = CSng(20 * Log10(MaxValB(0)))
    frmDynamicRange1.Show

ElseIf Ver = "E5071B" Then
    SCPI.CALCulate(1).PARAmeter(1).SElect

```

**6. SYSTEM DYNAMIC RANGE TEST**

```
SCPI.CALCulate(1).SElected.Function.TYPE = "MAX"
SCPI.CALCulate(1).SElected.Function.DOMain.START = 3000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 1500000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
SCPI.CALCulate(1).SElected.Function.EXECute
MaxValC = SCPI.CALCulate(1).SElected.Function.DATA

SCPI.CALCulate(1).SElected.Function.DOMain.START = 1500000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 3000000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
SCPI.CALCulate(1).SElected.Function.EXECute
MaxValD = SCPI.CALCulate(1).SElected.Function.DATA

SCPI.CALCulate(1).SElected.Function.DOMain.START = 3000000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 4000000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
SCPI.CALCulate(1).SElected.Function.EXECute
MaxValE = SCPI.CALCulate(1).SElected.Function.DATA

SCPI.CALCulate(1).SElected.Function.DOMain.START = 4000000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 6000000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
SCPI.CALCulate(1).SElected.Function.EXECute
MaxValF = SCPI.CALCulate(1).SElected.Function.DATA

SCPI.CALCulate(1).SElected.Function.DOMain.START = 6000000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 7500000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
SCPI.CALCulate(1).SElected.Function.EXECute
MaxValG = SCPI.CALCulate(1).SElected.Function.DATA

SCPI.CALCulate(1).SElected.Function.DOMain.START = 7500000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STOP = 8500000000#
SCPI.CALCulate(1).SElected.Function.DOMain.STATE = True
SCPI.CALCulate(1).SElected.Function.EXECute
MaxValH = SCPI.CALCulate(1).SElected.Function.DATA

frmDynamicRange2.txtVal1.Text = CSng(20 * Log10(MaxValC(0)))
```

**6. SYSTEM DYNAMIC RANGE TEST**

```
frmDynamicRange2.txtVal2.Text = CSng(20 * Log10(MaxValD(0)))
frmDynamicRange2.txtVal3.Text = CSng(20 * Log10(MaxValE(0)))
frmDynamicRange2.txtVal4.Text = CSng(20 * Log10(MaxValF(0)))
frmDynamicRange2.txtVal5.Text = CSng(20 * Log10(MaxValG(0)))
frmDynamicRange2.txtVal6.Text = CSng(20 * Log10(MaxValH(0)))
frmDynamicRange2.Show

Else

    Buff = MsgBox("Error: This program is designed for the
E5070B/E5071B, then please use the corresponding programs.",
vbOKOnly, "SYSTEM DYNAMIC RANGE TEST")

End If

End Sub
```

## 7. DYNAMIC ACCURACY TEST

### Description

This test checks the dynamic accuracy of the E5070B/E5071B. The dynamic accuracy is tested at 1.195 GHz for each receiver port using the Agilent Z5623A (with option H01) Dynamic Accuracy Test Kit. A block diagram of the Z5623A is shown in Figure 2-31. The 1.195 GHz source signal of the E5070B/E5071B 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.

**Table 2-21** Dynamic accuracy specification: @ 23° ± 5°C

Input level (dBm)	Dynamic accuracy (dB)	Input level (dBm)	Dynamic accuracy (dB)
10	0.207	-50	0.091
5	0.075	-55	0.106
0	0.042	-60	0.125
-5	0.031	-65	0.151
-10	0.024	-70	0.189
-15	0.030	-75	0.248
-20	0.035	-80	0.346
-25	0.040	-85	0.509
-30	0.045	-90	0.785
-35	0.056	-95	1.248
-40	0.067	-100	2.008
-45	0.078		

### Test Equipment

Power meter	Agilent E4419A/B
-------------	------------------

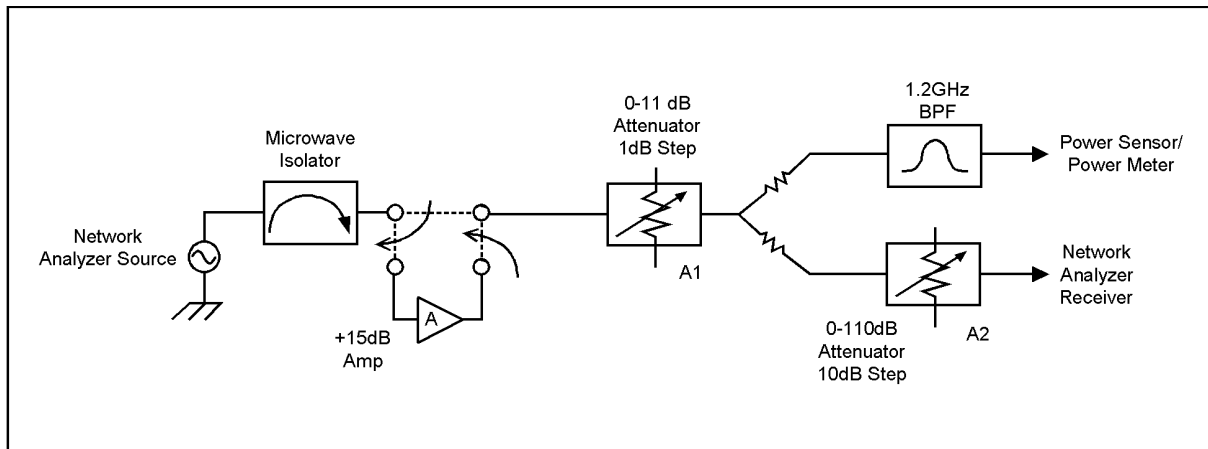
Power sensor	Agilent 8482A
Dynamic Accuracy Test Kit	Agilent Z5623A w/Opt. H01
6 dB fixed attenuator	Agilent 8491A w/Opt. 006 and H60
Coaxial cable with N-type (m) connectors, 61 cm (24 in), 2 ea.	Agilent N6314A (p/n 8120-8862)
GPIB controller (or PC with GPIB Interface Card)	
GPIB Interconnection Cable	Agilent 10833A/B

**Procedure**

- Step 1.** Connect the power sensor to the power meter. Calibrate the power meter for the power sensor used.
- Step 2.** Connect the test equipment as shown in the following figures:

Option 213/214: Figure 2-32  
 Option 313/314: Figure 2-33  
 Option 413/414: Figure 2-34

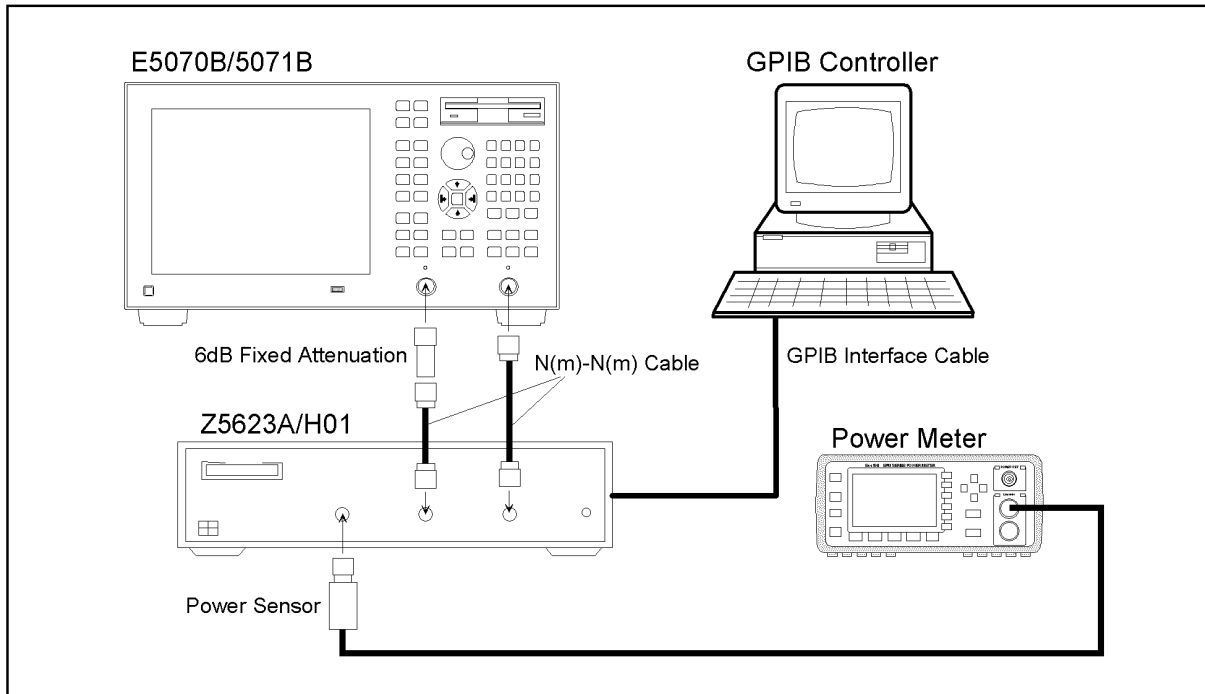
**Figure 2-31** Agilent Z5623A block diagram



e5070ase045

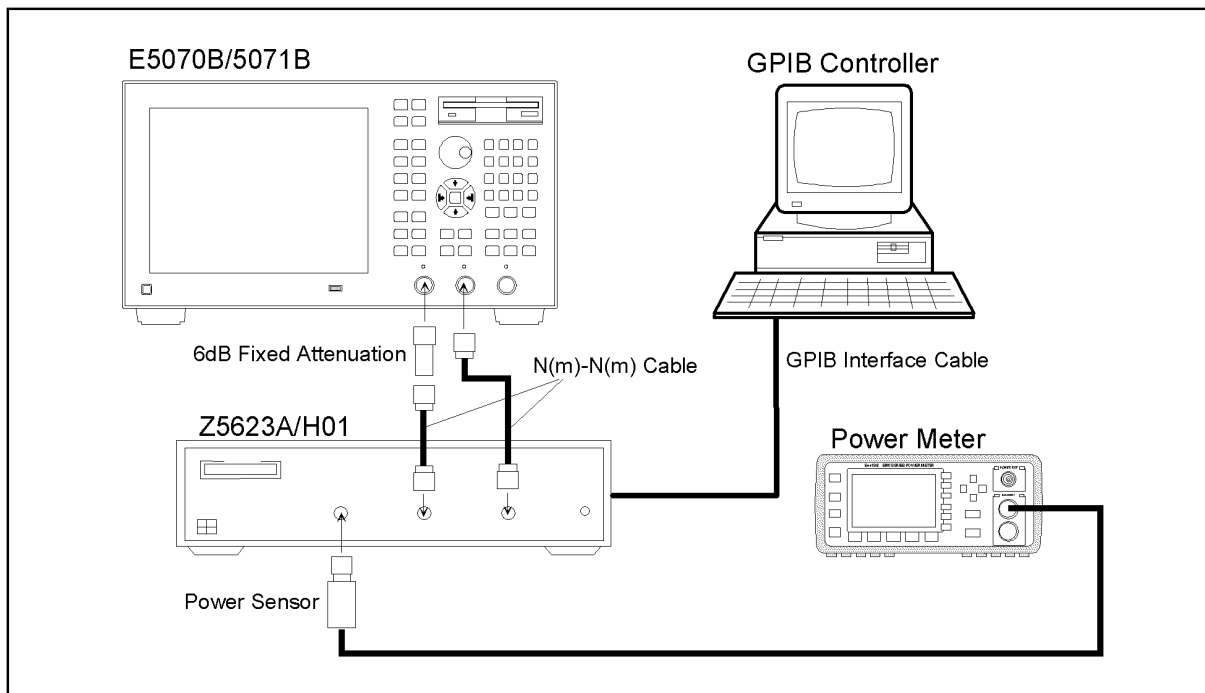
Performance Tests  
7. DYNAMIC ACCURACY TEST

Figure 2-32 Dynamic accuracy test setup (Opt. 213/214)



e5070bse021

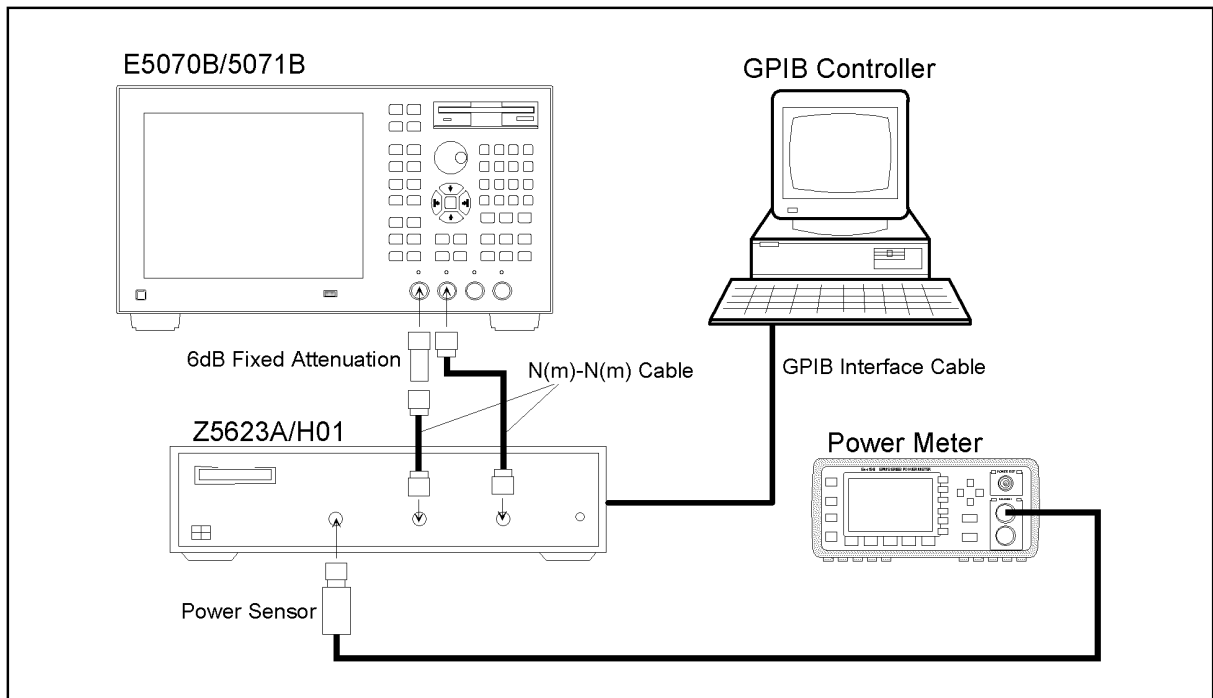
Figure 2-33 Dynamic accuracy test setup (Opt. 313/314)



e5070bse022



**Figure 2-34 Dynamic accuracy test setup (Opt. 413/414)**



e5070bse023

2. Performance Test

**NOTE** To avoid possible variance in measured values, do not touch or move the N-N cable during measurements.

**NOTE** Do not touch the power sensor during measurements.

**Power meter zero adjustment**

**NOTE** This adjustment is required to subtract residual noise power of the Z5623A from the subsequent signal power measurements.

**Step 3.** Set the first attenuator (A1) of the Z5623A to 11 dB and the second attenuator (A2) to 110 dB by executing the following GPIB control command:

```
GPIB:
    OUTPUT 712; "amp_in"
    OUTPUT 712; "at_a=11"
    OUTPUT 712; "at_b=110"
```

**Step 4.** Press **Preset** and **Enter** to initialize the E5070B/E5071B. And press **Sweep Setup** - **Power - Auto Range** to turn off Auto Power Range set function (FW 3.60 and above), and press **System** - **Servise - Init Src Ctrl** to turn off Initial Source Port Control function (FW 3.54 and above).

Performance Tests  
**7. DYNAMIC ACCURACY TEST**

**Step 5.** Set the controls as follows:

Control settings	Key strokes
Center frequency: 50 MHz	<input type="button" value="Center"/> - <input type="button" value="5"/> - <input type="button" value="0"/> - <input type="button" value="M/μ"/>
Frequency span: 0 Hz	<input type="button" value="Span"/> - <input type="button" value="0"/> - <input type="button" value="x1"/>
IF Bandwidth: 10 Hz	<input type="button" value="Avg"/> - <input type="button" value="Enter"/> - <input type="button" value="1"/> - <input type="button" value="0"/> - <input type="button" value="x1"/>
Source power: -4 dBm	<input type="button" value="Sweep Setup"/> - <input type="button" value="Enter"/> - <input type="button" value="+/-"/> - <input type="button" value="5"/> - <input type="button" value="x1"/>

**Step 6.** Wait for the power meter reading to settle and perform zero adjustment of the power meter.

**Dynamic accuracy tests at -10 dBm to -100dBm**

**Step 7.** Press  and select **Log Mag** from display format menu.

**Step 8.** Set the controls as follows:

Control settings	Key strokes
Center frequency: 1.195 GHz	<input type="button" value="Center"/> - <input type="button" value="1"/> - <input type="button" value="."/> - <input type="button" value="1"/> - <input type="button" value="9"/> - <input type="button" value="5"/> - <input type="button" value="G/n"/>
Frequency span: 0 Hz	<input type="button" value="Span"/> - <input type="button" value="0"/> - <input type="button" value="x1"/>
Number of points: 15	<input type="button" value="Sweep Setup"/> - <input type="button" value="↓"/> - <input type="button" value="↓"/> - <input type="button" value="↓"/> - <input type="button" value="↓"/> (select <b>Points</b> ) - <input type="button" value="Enter"/> - <input type="button" value="1"/> - <input type="button" value="5"/> - <input type="button" value="x1"/>

**Step 9.** Press  -  -  -  -  -  -  -  -  to set **Statistics** function to ON.

**Step 10.** Set **Port Char** function to **OFF** in accordance with the following procedure:

- a. Press  -  -  -  -  -  -  -  -  -  -  (select **Service Menu**), .
- b. Press  -  -  -  -  -  -  (select **Service Functions**), .
- c. The E5070B/E5071B will once prompt you a password entry for the access to the **Service Functions**. Enter the password: **kid**
- d. Press  -  (select **System Calibration**), .
- e. Press  -  -  (select **Port Char**),  to set the **Port Char** to **OFF**.

**Step 11.** Perform **Return** and press  -  (select **Measure (SVC)**), .

**Step 12.** Select **T2** from the **Measure (SVC)** menu.

**Step 13.** Press  and select **S21** from S-parameter menu.

**Step 14.** Set the first attenuator (A1) of the Z5623A to 0 dB and the second attenuator (A2) to 10 dB

by executing the following GPIB control command:

GPIB:

```
OUTPUT 712; "amp_in"
OUTPUT 712; "at_a=0"
OUTPUT 712; "at_b=10"
```

- Step 15.** Adjust the source power for 0 dBm on the power meter display. Wait for power meter reading to settle when verifying the adjustment result.

---

**NOTE**

Since the source power resolution is 0.05 dB, adjust for the nearest possible value to 0 dBm.

---

- Step 16.** Press **Trigger** -  - **Enter** to make a **Single** sweep measurement.

- Step 17.** Record the value of the source power setting in the calculation sheet ("Power setting [dB]" column for the dynamic accuracy test). The record starts from DA10 row.

- Step 18.** Record the power meter reading in the calculation sheet ("Pm [dB]" column).

- Step 19.** Read the mean value of the T2(S21) displayed in the upper left corner of the graphic display and record it in the calculation sheet ("Tx [dB]" column).

- Step 20.** Set the first attenuator (A1) of the Z5623A to 5 dB by executing the following GPIB control command:

GPIB:

```
OUTPUT 712; "amp_in"
OUTPUT 712; "at_a=5"
OUTPUT 712; "at_b=10"
```

The total attenuation for the A1 and A2 attenuators is 15 dB.

- Step 21.** Perform Step 16 through 19

- Step 22.** Calculate the dynamic accuracy for -15 dBm using the following equation:

$$D.A. = (Tx @ DA15) - (Tx @ DA10) - (Pm @ DA15) + (Pm @ DA10)$$

---

**NOTE**

The records for -10 dBm are used as the reference values in the dynamic accuracy calculation.

---

- Step 23.** Record the calculated value in the calculation sheet ("Running D.A. [dB]" column for DA15).

- Step 24.** Record the same value in the "True D.A. [dB]" column in the calculation sheet.

- Step 25.** Set the first attenuator (A1) of the Z5623A to 10 dB by executing the following GPIB control command:

GPIB:

```
OUTPUT 712; "amp_in"
OUTPUT 712; "at_a=10"
OUTPUT 712; "at_b=10"
```

## 7. DYNAMIC ACCURACY TEST

The total attenuation for the A1 and A2 attenuators is 20 dB.

**Step 26.** Perform Step 16 through 19.

**Step 27.** Calculate the dynamic accuracy for -20 dBm using the following equation:

$$D.A. = (Tx @ DA20) - (Tx @ DA10) - (Pm @ DA20) + (Pm @ DA10)$$

**Step 28.** Record the calculated value in the calculation sheet ("Running D.A. [dB]" and "True D.A. [dB]" columns for DA20).

**Step 29.** Set the first attenuator (A1) of the Z5623A to 0 dB and the second attenuator (A2) to 20 dB by executing the following GPIB control command:

GPIB:

```
OUTPUT 712; "amp_in"
OUTPUT 712; "at_a=0"
OUTPUT 712; "at_b=20"
```

**NOTE**

This attenuator state is named DA20a. The following Steps 30 through 32 are performed to equalize the receiver port input levels for the DA20 and DA20a.

**Step 30.** Perform Step 13 through 24.

**Step 31.** Calculate the difference in Tx [dB] values for the DA20 and DA20a by using the following equation:

$$\Delta (Tx [dB]) = (Tx [dB] @ DA20a) - (Tx [dB] @ DA20)$$

**Step 32.** Press **Trigger** -  -  - **Enter** to make a **Continuous** sweep measurement.

**Step 33.** Adjust the source power for the following value on the power meter display.

$$\text{Target value} = (Pm [db] @ DA20a) - \Delta (Tx [dB])$$

**NOTE**

It will be possible to promptly approximate the source power to the target value by decreasing the source power setting by  $\Delta (Tx)$  from that for the DA20.

**NOTE**

After this adjustment is performed, the state is named DA20b.

**Step 34.** Perform Step 16 through 19.

**Step 35.** Set the first attenuator (A1) of the Z5623A to 5 dB by executing the following GPIB control command:

GPIB:

```
OUTPUT 712; "amp_in"
OUTPUT 712; "at_a=5"
OUTPUT 712; "at_b=20"
```

**Step 36.** Perform Step 16 through 19.

**Step 37.** Calculate the dynamic accuracy for -25 dBm using the following equation:

$$D.A. = (Tx @ DA25) - (Tx @ DA20b) - (Pm @ DA25) + (Pm @ DA20b)$$

**Step 38.** Record the calculated D.A. in the calculation sheet ("Running D.A. [dB]" column for DA25).

**Step 39.** Calculate the true dynamic accuracy using the following equation:

$$\text{True D.A.} = (\text{Running D.A. [dB] @ DA25}) + (\text{True D.A. [dB] @ DA20})$$

**NOTE**

When the A2 decade attenuator setting is increased from X dB to X+10 dB, calculate the True D.A. value as follows:

$$\text{True D.A. (X+10)} = \text{Running D.A. (X+10)} + \text{True D.A. (X)}$$

Where True D.A. (X+10): True D.A. value when A2=X+10 dB,

Running D.A. (X+10): Running D.A. value when A2=X+10 dB

True D.A. (X): True D.A. value when A1=10 dB and A2=X dB

**Step 40.** Record the true D.A. in the calculation sheet ("True D.A." column for DA25).

**Step 41.** Set the first attenuator (A1) of the Z5623A to 10 dB by executing the following GPIB control command:

GPIB:

```
OUTPUT 712; "amp_in"
OUTPUT 712; "at_a=10"
OUTPUT 712; "at_b=20"
```

**Step 42.** Perform Step 16 through 19.

**Step 43.** Calculate the dynamic accuracy for -30 dBm using the following equation:

$$\text{D.A.} = (\text{Tx @ DA30}) - (\text{Tx @ DA20b}) - (\text{Pm @ DA30}) + (\text{Pm @ DA20b})$$

**Step 44.** Record the calculated D.A. in the calculation sheet ("Running D.A. [dB]" column for DA30).

**Step 45.** Calculate the true dynamic accuracy using the following equation:

$$\text{True D.A.} = (\text{Running D.A. [dB] @ DA30}) + (\text{True D.A. [dB] @ DA20})$$

**Step 46.** Record the true D.A. in the calculation sheet ("True D.A." column for DA30).

**Step 47.** Subsequently perform Step 29 through 45 for the attenuator settings of 35 dB to 100 dB (DA30a to DA100) shown in Table 2-22.

**Table 2-22**

**Z5623A attenuator settings**

	A1 setting [dB]	A2 setting [dB]	GPIB command
DA10	0	10	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=0" OUTPUT 712; "at_b=10"
DA15	5	10	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=5" OUTPUT 712; "at_b=10"

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**7. DYNAMIC ACCURACY TEST**

**Table 2-22 Z5623A attenuator settings**

	<b>A1 setting [dB]</b>	<b>A2 setting [dB]</b>	<b>GPIB command</b>
DA20	10	10	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=10" OUTPUT 712; "at_b=10"
DA20a	0	20	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=0" OUTPUT 712; "at_b=20"
DA25	5	20	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=5" OUTPUT 712; "at_b=20"
DA30	10	20	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=10" OUTPUT 712; "at_b=20"
DA30a	0	30	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=0" OUTPUT 712; "at_b=30"
DA35	5	30	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=5" OUTPUT 712; "at_b=30"
DA40	10	30	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=10" OUTPUT 712; "at_b=30"
DA40a	0	40	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=0" OUTPUT 712; "at_b=40"
DA45	5	40	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=5" OUTPUT 712; "at_b=40"
DA50	10	40	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=10" OUTPUT 712; "at_b=40"
DA50a	0	50	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=0" OUTPUT 712; "at_b=50"
DA55	5	50	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=5" OUTPUT 712; "at_b=50"
DA60	10	50	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=10" OUTPUT 712; "at_b=50"
DA60a	0	60	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=0" OUTPUT 712; "at_b=60"

**Table 2-22 Z5623A attenuator settings**

	A1 setting [dB]	A2 setting [dB]	GPIB command
DA65	5	60	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=5" OUTPUT 712; "at_b=60"
DA70	10	60	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=10" OUTPUT 712; "at_b=60"
DA70a	0	70	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=0" OUTPUT 712; "at_b=70"
DA75	5	70	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=5" OUTPUT 712; "at_b=70"
DA80	10	70	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=10" OUTPUT 712; "at_b=70"
DA80a	0	80	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=0" OUTPUT 712; "at_b=80"
DA85	5	80	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=5" OUTPUT 712; "at_b=80"
DA90	10	80	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=10" OUTPUT 712; "at_b=80"
DA90a	0	90	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=0" OUTPUT 712; "at_b=90"
DA95	5	90	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=5" OUTPUT 712; "at_b=90"
DA100	10	90	OUTPUT 712; "amp_in" OUTPUT 712; "at_a=10" OUTPUT 712; "at_b=90"

**Dynamic accuracy tests at -10 dBm to 10 dBm**

**Step 48.** Set the first attenuator (A1) of the Z5623A to 10 dB and the second attenuator (A2) to 0 dB by executing the following GPIB control command:

GPIB:

```
OUTPUT 712; "amp_in"
OUTPUT 712; "at_a=10"
OUTPUT 712; "at_b=0"
```

**Step 49.** Adjust the source power for -10 dBm on the power meter display. Wait for power meter

## Performance Tests

### 7. DYNAMIC ACCURACY TEST

reading to settle when verifying the adjustment result.

---

**NOTE** Since the source power resolution is 0.05 dB, adjust for the nearest possible value to -10 dBm.

---

**Step 50.** Perform Step 16 through 19.

**Step 51.** Set the first attenuator (A1) of the Z5623A to 5 dB by executing the following GPIB control command:

GPIB:

```
OUTPUT 712; "amp_in"  
OUTPUT 712; "at_a=5"  
OUTPUT 712; "at_b=0"
```

**Step 52.** Perform Step 16 through 19.

**Step 53.** Calculate the dynamic accuracy for -5 dBm using the following equation:

$$\text{D.A.} = (\text{Tx @ DA5}) - (\text{Tx @ DA10}) - (\text{Pm @ DA5}) + (\text{Pm @ DA10})$$

**Step 54.** Record the calculated D.A. in the calculation sheet ("Running D.A. [dB]" and "True D.A. [dB]" columns for DA5).

**Step 55.** Set the first attenuator (A1) of the Z5623A to 0 dB by executing the following GPIB control command:

GPIB:

```
OUTPUT 712; "amp_in"  
OUTPUT 712; "at_a=0"  
OUTPUT 712; "at_b=0"
```

**Step 56.** Perform Step 16 through 19.

**Step 57.** Calculate the dynamic accuracy for 0 dBm using the following equation:

$$\text{D.A.} = (\text{Tx @ DA0}) - (\text{Tx @ DA10}) - (\text{Pm @ DA0}) + (\text{Pm @ DA10})$$

**Step 58.** Record the calculated D.A. in the calculation sheet ("Running D.A. [dB]" and "True D.A. [dB]" columns for DA0).

**Step 59.** Set source power to 1dBm.

**Step 60.** Adjust the source power for 5 dBm on the power meter display. Wait for power meter reading to settle when verifying the adjustment result.

---

**NOTE** Since the source power resolution is 0.05 dB, adjust for the nearest possible value to 5 dBm.

---

**Step 61.** Perform Step 16 through 19.

**Step 62.** Calculate the dynamic accuracy for 5 dBm using the following equation:

$$\text{D.A.} = (\text{Tx @ DA+5}) - (\text{Tx @ DA10}) - (\text{Pm @ DA+5}) + (\text{Pm @ DA10})$$

**Step 63.** Record the true D.A. in the calculation sheet ("True D.A." column for DA+5).



**Step 64.** Set source power to 6dBm.

**Step 65.** Adjust the source power for 10 dBm on the power meter display. Wait for power meter reading to settle when verifying the adjustment result.

**NOTE**

Since the source power resolution is 0.05 dB, adjust for the nearest possible value to 10 dBm.

**Step 66.** Perform Step 16 through 19.

**Step 67.** Calculate the dynamic accuracy for 10 dBm using the following equation:

$$D.A. = (Tx @ DA+10) - (Tx @ DA10) - (Pm @ DA+10) + (Pm @ DA10)$$

**Step 68.** Record the true D.A. in the calculation sheet ("True D.A." column for DA+10).

**Dynamic accuracy tests for other test ports**

**Step 69.** Connect the test equipment and select S-parameter in accordance with Table 2-23.

**Step 70.** Perform Step 10 through 67 for each test setup and S-parameter shown in Table 2-23.

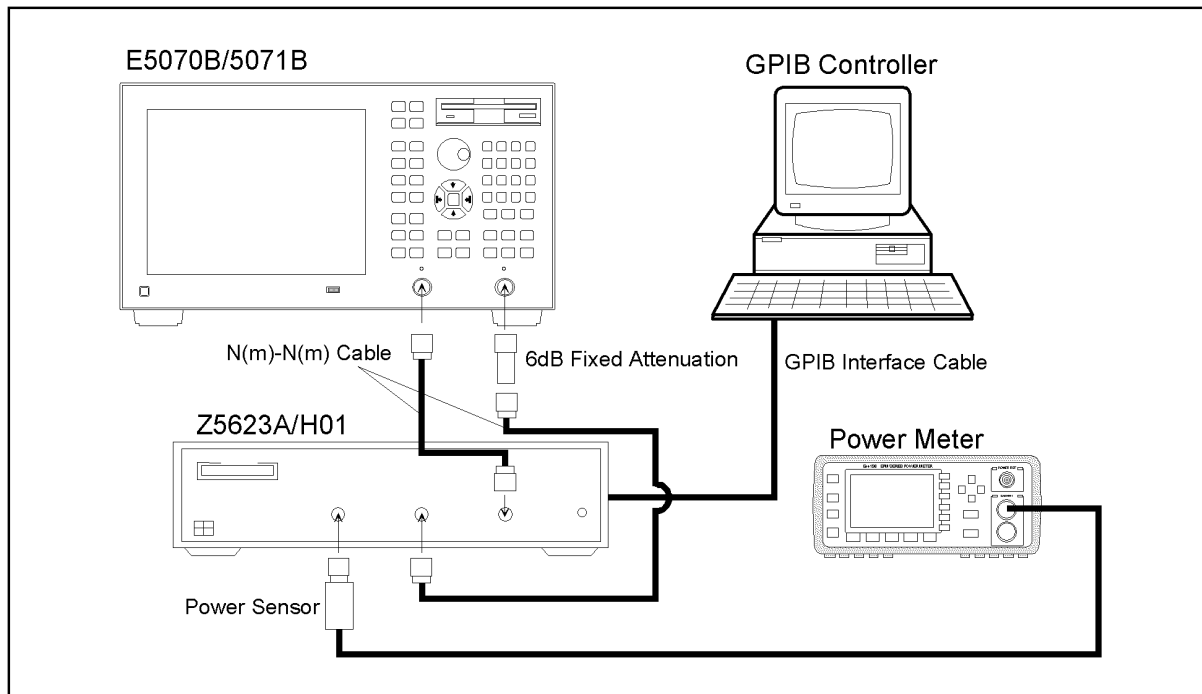
**Table 2-23**

**Dynamic accuracy test setups and S-parameter settings**

S-Parameter setting	Measure (SVC)	Test setup		
		Opt. 213/214	Opt. 313/314	Opt. 413/414
S12	T1	Figure 2-35	Figure 2-36	Figure 2-38
S31	T3	Not required	Figure 2-37	Figure 2-39
S41	T4	Not required	Not required	Figure 2-40

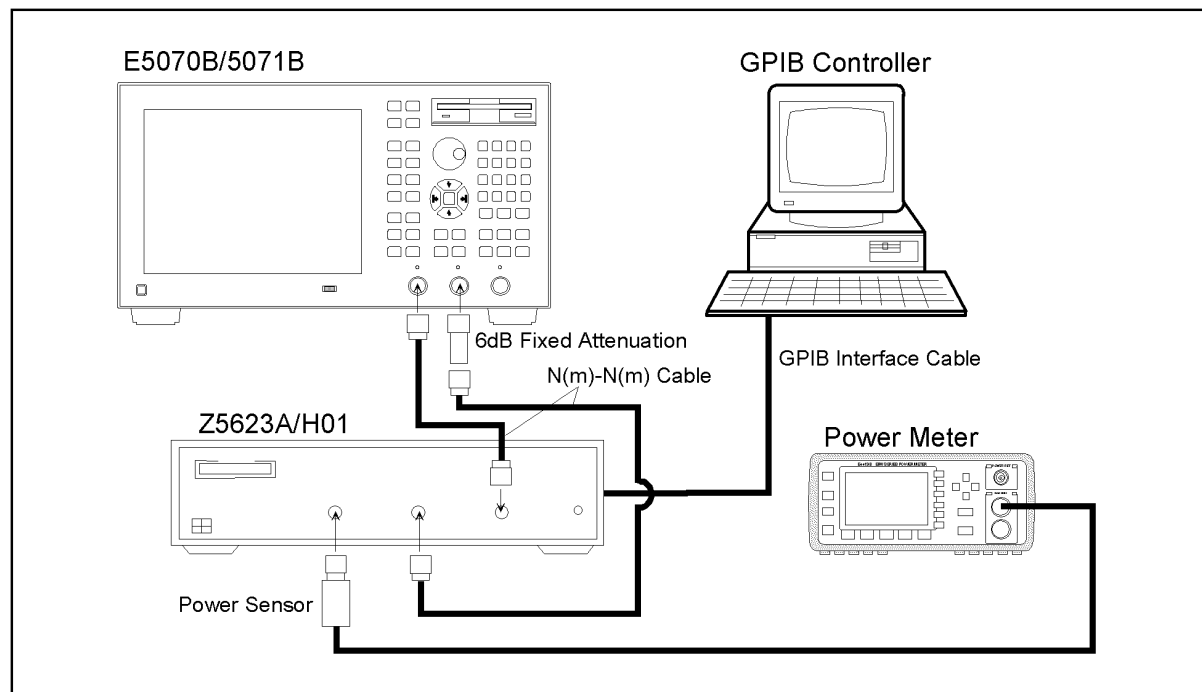
Performance Tests  
7. DYNAMIC ACCURACY TEST

Figure 2-35 Dynamic accuracy test setup (Opt. 213/214)



e5070bse024

Figure 2-36 Dynamic accuracy test setup (Opt. 313/314)



e5070bse025

Figure 2-37 Dynamic accuracy test setup (Opt. 313/314)

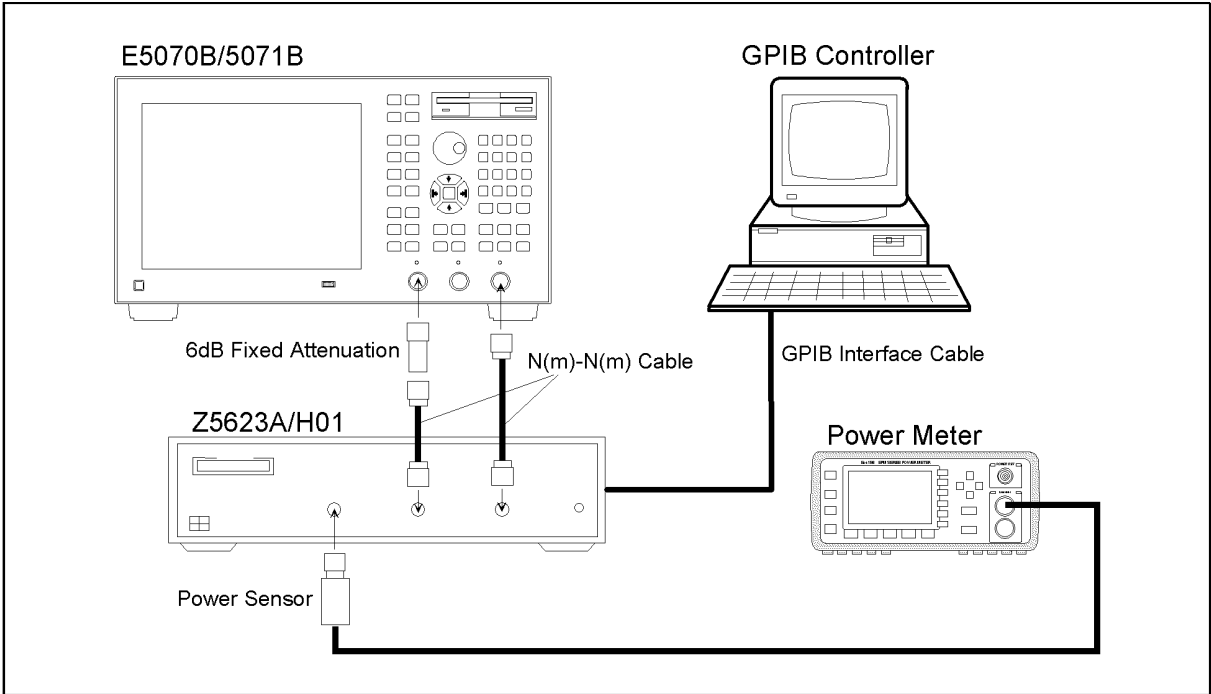
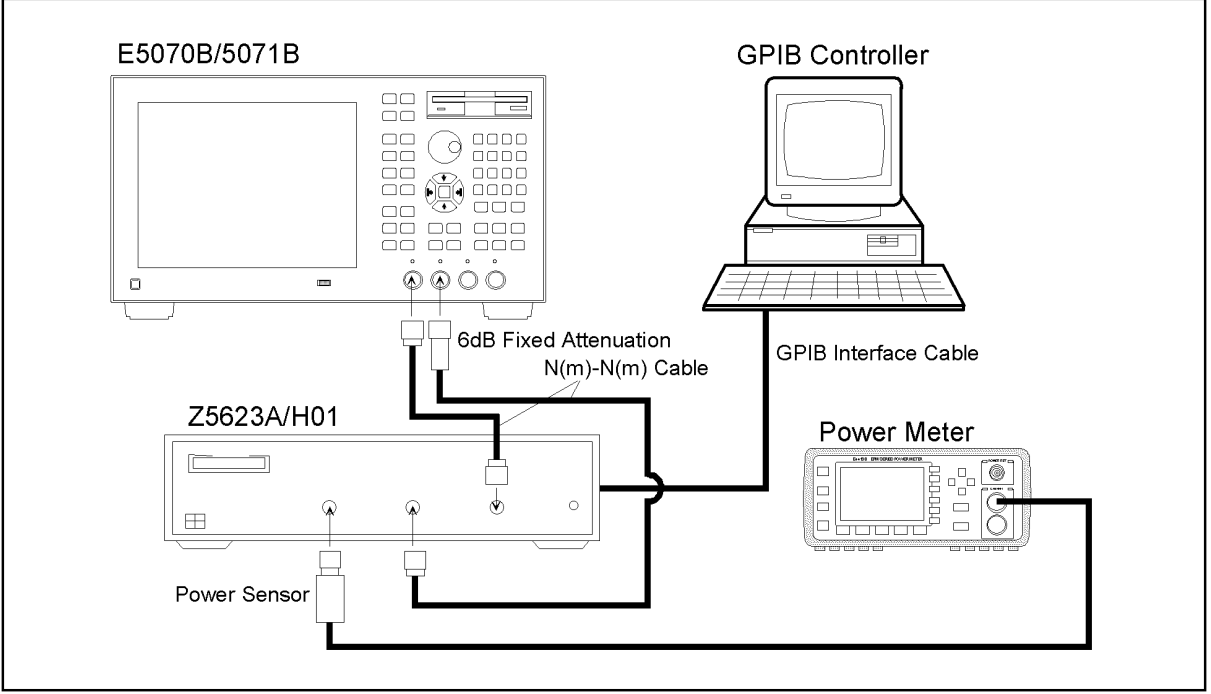


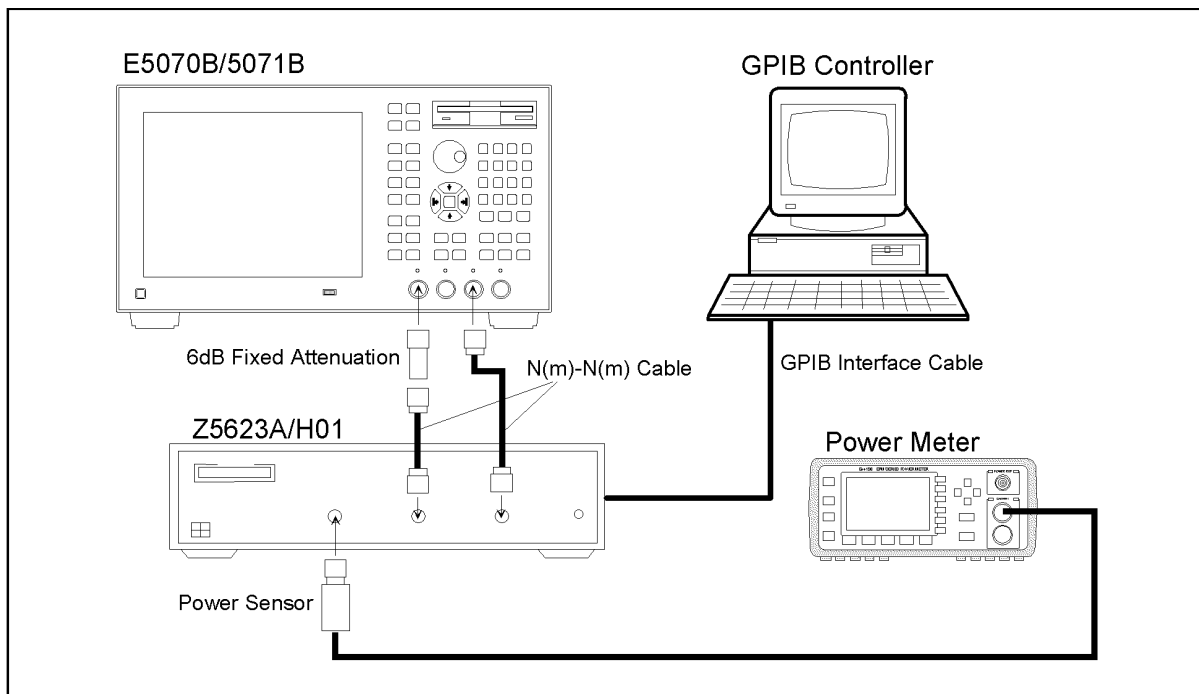
Figure 2-38 Dynamic accuracy test setup (Opt. 413/414)



2. Performance Test

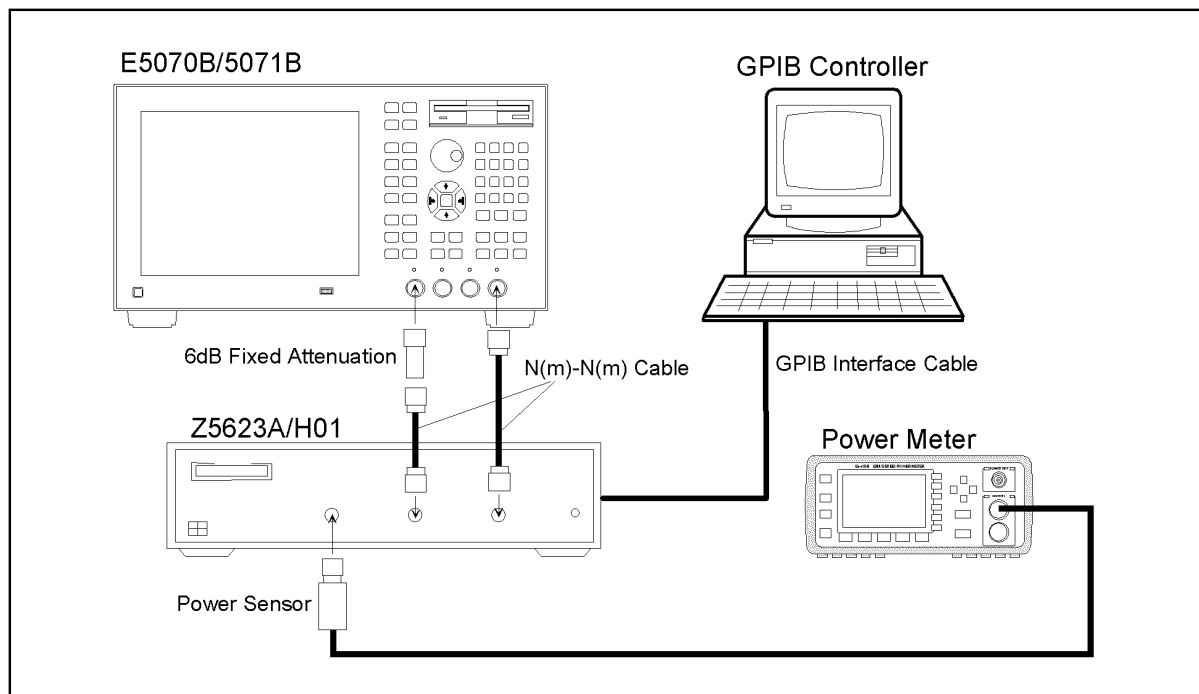
Performance Tests  
7. DYNAMIC ACCURACY TEST

Figure 2-39 Dynamic accuracy test setup (Opt. 413/414)



e5070bse028

Figure 2-40 Dynamic accuracy test setup (Opt. 413/414)



e5070bse029

## 8. 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 3MHz, 10 MHz, as well as 50 MHz increments from 50 MHz to 3 GHz (up to 8.5 GHz for the E5071B). After a full two-port (SOLT) calibration is performed for each test port, VBA test programs are executed to output the directivity, source match, load match, transmission tracking, and reflection tracking data to the display.

### NOTE

The VBA test programs for the Uncorrected System Performance Test are not available in the current version of the E5070B/E5071B test procedure. The test procedure is made effective when the test programs become available.

### Specification

**Table 2-24**      **Uncorrected System Performance (Correction: Off, System Correction: On)**

Description	E5070B/E5071B	E5071B only	
	3 MHz to 3 GHz	3 GHz to 6 GHz	6 GHz to 8.5 GHz
Directivity	25 dB	20 dB	15 dB
Source Match	25 dB	20 dB	15 dB
Load Match	17 dB	12 dB	10 dB
Transmission Tracking	± 1.0 dB	± 1.0 dB	± 1.0 dB
Reflection Tracking	± 1.0 dB	± 1.0 dB	± 1.0 dB

### Test Equipment

Calibration Kit	Agilent 85032F
Coaxial cable with N-type (m) connectors, 61 cm (24 in)	Agilent N6314A (p/n 8120-8862)

### Procedure

**Step 1.** Connect the N-N cable as shown in the following figure:

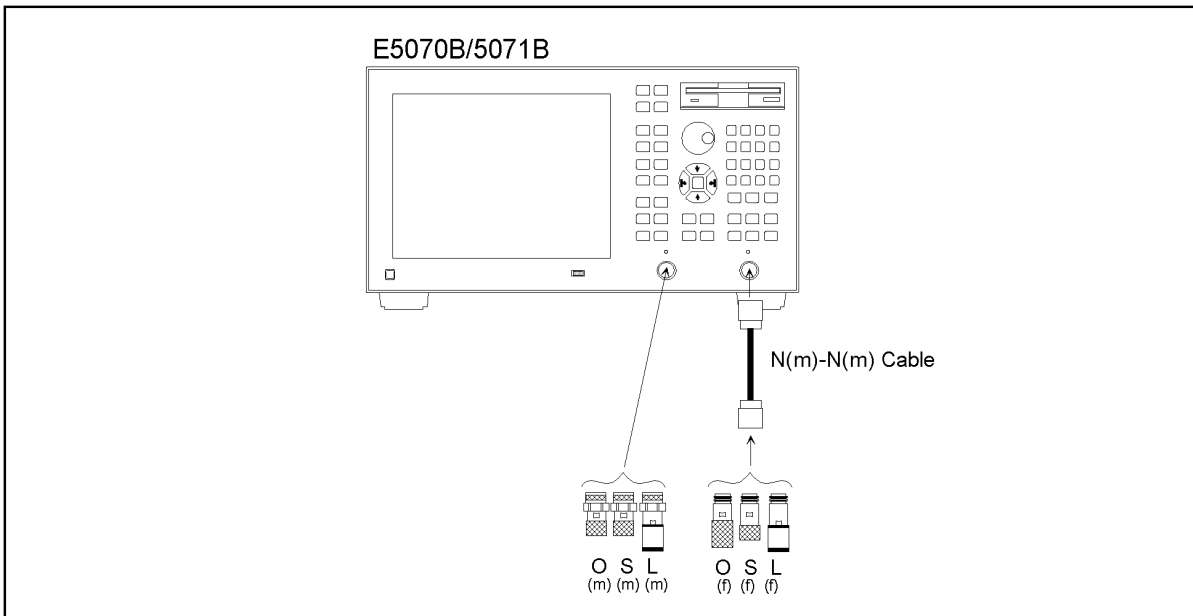
- Option 213/214: Figure 2-41.
- Option 313/314: Figure 2-42.
- Option 413/414: Figure 2-43.

For the connection of the Open, Short and Load terminations, obey the instruction in the

### 8. UNCORRECTED SYSTEM PERFORMANCE TEST

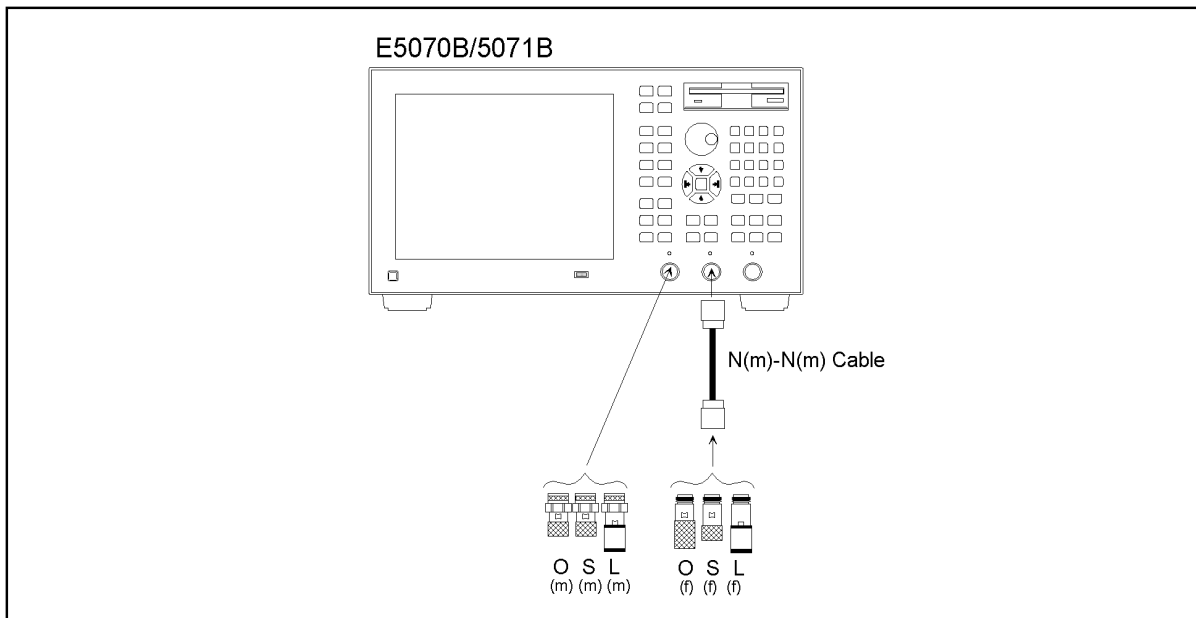
following procedure.

**Figure 2-41** O/S/L calibration setup for uncorrected system performance test (Opt. 213/214)



e5070bse030

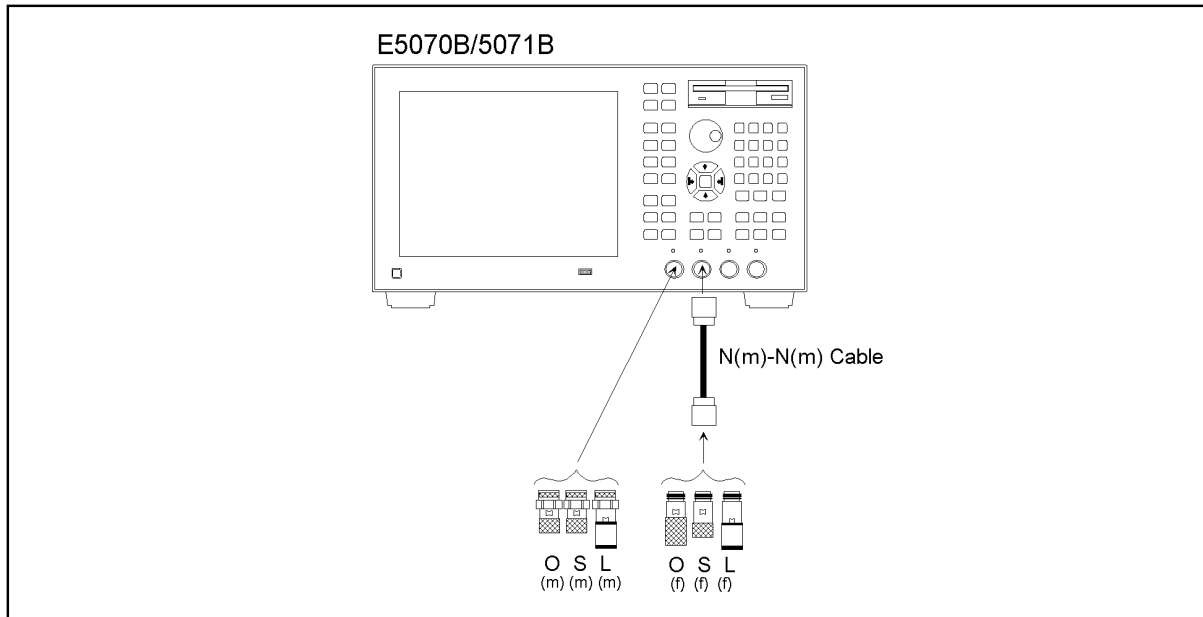
**Figure 2-42** O/S/L calibration setup for uncorrected system performance test (Opt. 313/314)



e5070bse031

## 8. UNCORRECTED SYSTEM PERFORMANCE TEST

Figure 2-43 O/S/L calibration setup for uncorrected system performance test (Opt. 413/414)



e5070bse032

**NOTE**

To avoid possible variance in measured values, do not touch or move the N-N cable during measurements.

**Step 2.** Press **Preset** and **Enter** to initialize the E5070B/E5071B. And press **Sweep Setup** - **Power** - **Auto Range** to turn off Auto Power Range set function (FW 3.60 and above), and press **System** - **Servise** - **Init Src Ctrl** to turn off Initial Source Port Control function (FW 3.54 and above).

**Step 3.** Set **System Correction** function to **ON** in accordance with the following procedure:

- Press **System** - **↓** - **↓** - **↓** - **↓** - **↓** - **↓** - **↓** - **↓** - **↓** - **↓** (select **Service Menu**), **Enter**.
- Confirm that the System Correction is **ON**. If it is **OFF**, proceed to the next c and d.
- Press **↓** (select **System Correction "OFF"**), **Enter**.
- The message box is displayed. Then press **OK** button. The **System Correction** function will be changed to **ON**.

**Step 4.** Press **Format** and select **Log Mag** from display format menu.

**Step 5.** Set the test frequencies using the Segment Table as follows:

- Press **Sweep Setup** - **↓** - **↓** - **↓** - **↓** - **↓** - **↓** (select **Edit Segment Table**) - **Enter**.  
The first "Start" frequency entry box in the Segment Sweep table will be focused.
- Press **3** - **M/μ** to enter 3 MHz as the start frequency. "Stop" frequency will be focused.
- Press **1** - **0** - **M/μ** to enter 10 MHz as the stop frequency. "Points" will be

**8. UNCORRECTED SYSTEM PERFORMANCE TEST**

automatically set to 2.

- d. Press - - to focus on the "Start" frequency of the second segment.
- e. Press - - to enter 50 MHz. The "Stop" frequency will be focused.
- f. For the E5070B, proceed to the next Step g. For the E5071B, skip to Step i.

**E5070B**

- g. Press - to enter 3 GHz as the stop frequency. "Points" will be focused.
- h. Press - - to set the number of sweep points to 60. Then, proceed to step 5.

**NOTE**

The sweep frequency points for the second segment will be aligned in 50 MHz increments from 50 MHz to 3 GHz.

**NOTE**

See Table 2-25 for the entire Segment Table setting for the E5070B.

**Table 2-25****E5070B Segment Table setting**

	Start	Stop	Points
1	3 MHz	10 MHz	2
3	50 MHz	3 GHz	60

**E5071B**

- i. Press - - - to enter 8.5 GHz as the stop frequency. "Points" will be focused.
- j. Press - - - to set the number of sweep points to 170.

**NOTE**

The sweep frequency points for the second segment will be aligned in 50 MHz increments from 50 MHz to 8.5 GHz.

**NOTE**

See Table 2-26 for the entire Segment Table setting for the E5071B.

**Table 2-26****E5071B Segment Table setting**

	Start	Stop	Points
1	3 MHz	10 MHz	2
3	50 MHz	8.5 GHz	170

- Step 6.** Press - - - - - (select **Sweep Type**) - to set the **Sweep type** to **Segment**.








**Full 2-port calibration**

- Step 7.** Press - - - - and to select **Cal Kit**.













































- Step 8.** Press - - and to select **85032F**.










**NOTE**


If **Cal Kit** is set to **85032F\***, press , ,  -  -  -  -  to select **Restore Cal Kit**.

**Step 9.** Set Offset Delay and Offset Loss of the N-N cable in accordance with the following procedure:

- a. Press  -  -  -  -  -  and  to select **Modify Cal kit** function
- b. Press  to select **Define STDs** function.
- c. Press  -  -  -  -  -  -  -  -  -  -  and  to select **11. Thru** function.
- d. Press  -  -  -  -  -  -  -  -  -  -  and , then press  -  -  -  -  to enter 2.68 nsec as the **Offset Delay**.
- e. Press  -  and , then press  -  -  -  to enter 1.1 GΩ/sec as the **Offset Loss**.

**Step 10.** Press  -  and  to select **Calibrate** function.

**Step 11.** Press  -  -  -  and  to select **2-Port Cal**.

**Step 12.** Press  to go down to **Select Ports** menu.

**Step 13.** Select **1-2** (preset ports).

**Step 14.** Press  and  to select **Reflection** calibration and to go down to its menu.

**Step 15.** Connect Open termination to the Port 1 and perform **Port 1 Open** calibration.

**Step 16.** Perform **Port 1 Short** calibration with Short termination connected to the Port 1.

**Step 17.** Perform **Port 1 Load** calibration with Load termination Connected to the Port 1.

**Step 18.** Connect Open termination to the tip of the N-N cable connected to the Port 2 and perform **Port 2 open** calibration.

**Step 19.** Perform **Port 2 Short** calibration with Short termination connected to the tip of the N-N cable.

**Step 20.** Perform **Port 2 Load** calibration with Load termination connected to the tip of the N-N cable.

**Step 21.** Perform **Return**.

**Step 22.** Connect the N-N cable between the selected test ports (Port 1 and Port 2) as shown in the following figures:

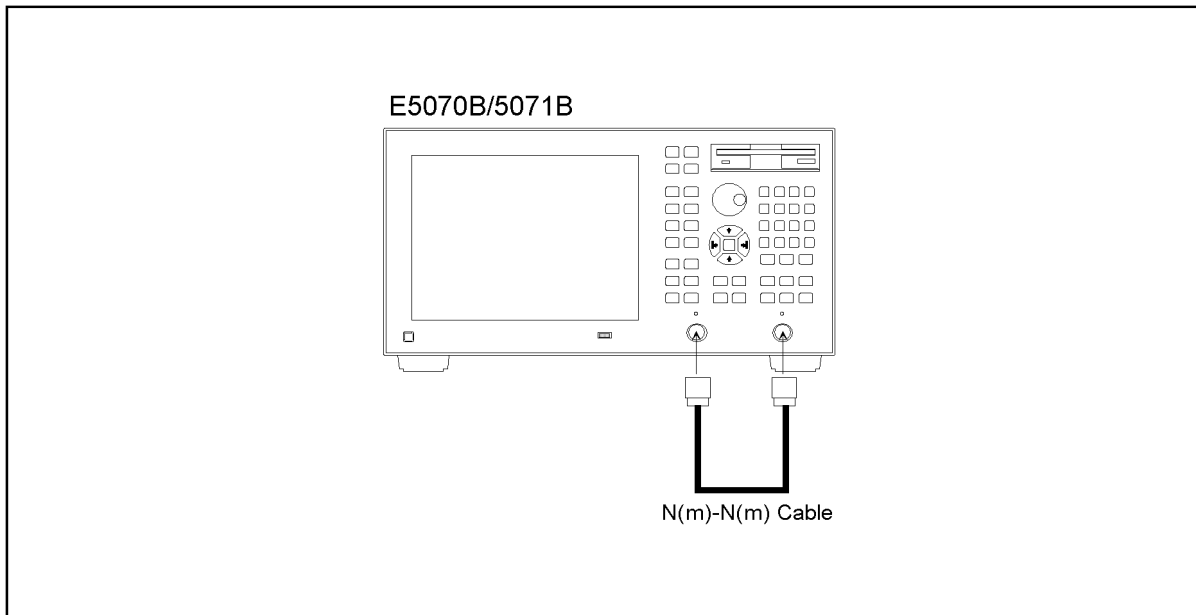
Option 213/214: Figure 2-44.

Option 313/314: Figure 2-45.

Option 413/414: Figure 2-46.

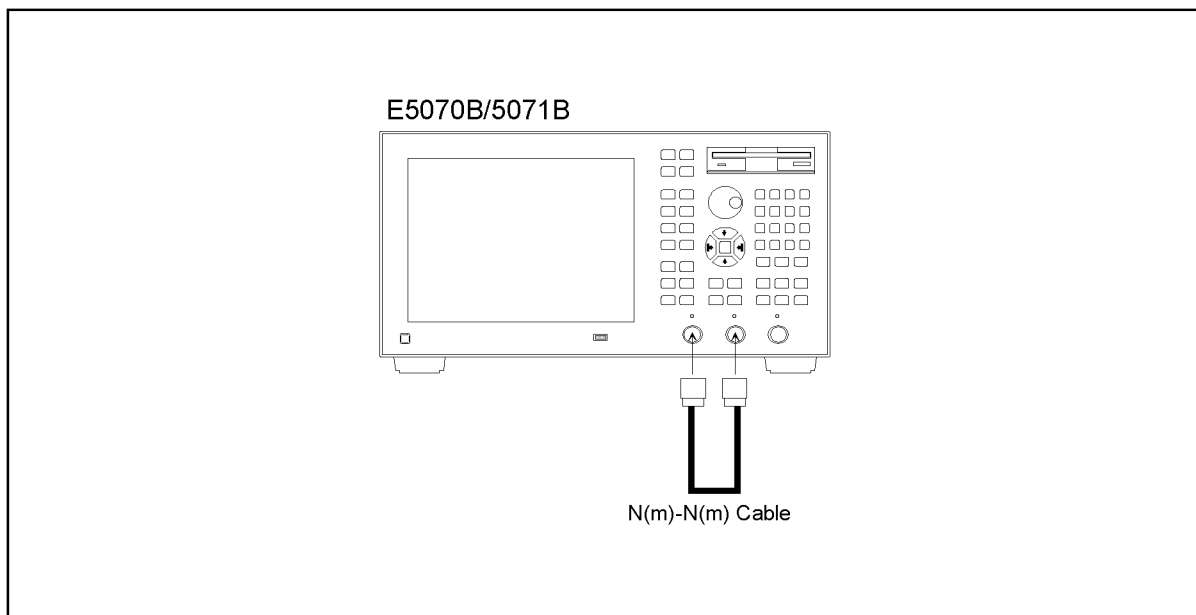
8. UNCORRECTED SYSTEM PERFORMANCE TEST

Figure 2-44 Thru calibration setup for uncorrected system performance test (Opt. 213/214)



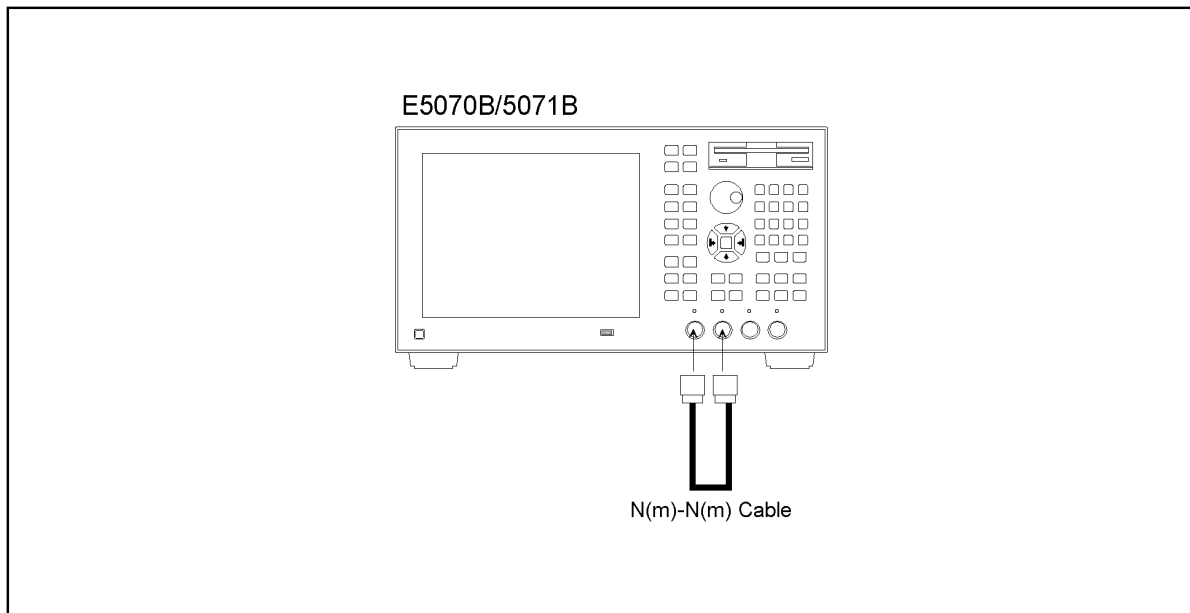
e5070bse006

Figure 2-45 Thru calibration setup for uncorrected system performance test (Opt. 313/314)



e5070bse007

Figure 2-46 Thru calibration setup for uncorrected system performance test (Opt. 413/414)



e5070bse008

**Step 23.** Press and to select **Transmission** calibration and to go down to its menu.

**Step 24.** Press to perform **Port 1-2 Thru** calibration.

**Step 25.** Perform **Return**.

**Step 26.** Press - - to Perform **Done**.

**Step 27.** Press and verify that the **Correction** function is set to ON.

**Directivity, source match, load match, transmission tracking, and reflection tracking test**

**Step 28.** Press - **Load Project**. Open “uncorrected\_system\_test.vba”.

**NOTE**

The program “uncorrected\_system\_test.vba” can be downloaded from Agilent Technologies web site to a floppy disk using you computer’s FDD.

**Step 29.** Press to run the test program. This test program displays the values of the directivity, source match and load match at each sweep frequency point, and extracts the maximum value for each of the following frequency ranges:

E5070B: 3 MHz to 3 GHz (1 range)

E5071B: 3 MHz to 3 GHz, 3 GHz to 6 GHz, 6 GHz to 8.5 GHz (3 ranges)

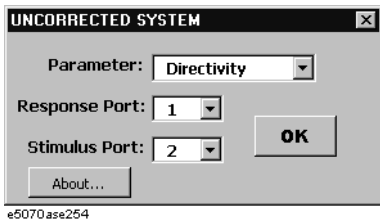
The maximum value in each frequency range is represented in dB and displayed in the VBA UserForm window as shown in the display example below.

**Directivity test for port 1**

a. Set **Parameter, Response Port and Stimulus Port** as shown in Figure 2-47.

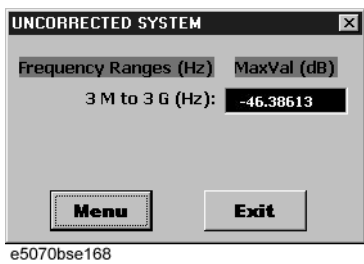
**8. UNCORRECTED SYSTEM PERFORMANCE TEST**

**Figure 2-47** Directivity test window

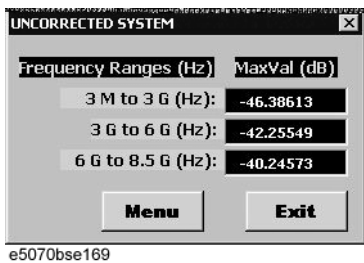


- b. Press **OK** button. The maximum value in each frequency range is displayed as shown in Figure 2-48 or Figure 2-49.

**Figure 2-48** Directivity for E5070B



**Figure 2-49** Directivity for E5071B

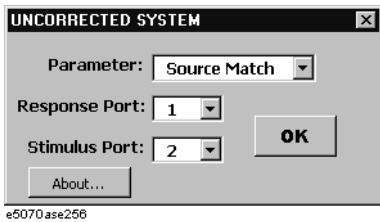


- c. Record the displayed values in the performance test record (“Test results [dB]” column in “Port 1” table for the uncorrected system performance test).

**Source match test for port 1**

- d. Set **Parameter, Response Port and Stimulus Port** as shown in Figure 2-50.

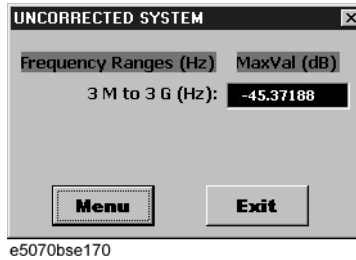
**Figure 2-50** Source match test window



- e. Press **OK** button. The maximum value in each frequency range is displayed as shown in Figure 2-51 or Figure 2-52.

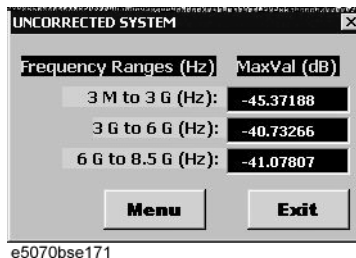
8. UNCORRECTED SYSTEM PERFORMANCE TEST

Figure 2-51 Source match for E5070B



e5070bse170

Figure 2-52 Source match for E5071B



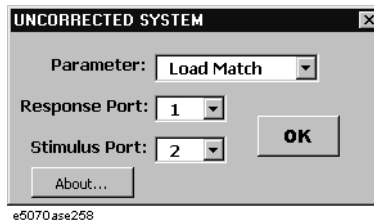
e5070bse171

- f. Record the displayed values in the performance test record (“Test results [dB]” column in “Port 1” table for the uncorrected system performance test).

Load match test for port 1

- g. Set **Parameter**, **Response Port** and **Stimulus Port** as shown in Figure 2-53.

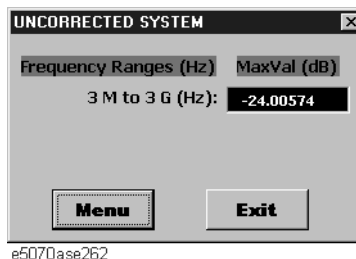
Figure 2-53 Load match test window



e5070ase258

- h. Press **OK** button. The maximum value in each frequency range is displayed as shown in Figure 2-54 or Figure 2-55.

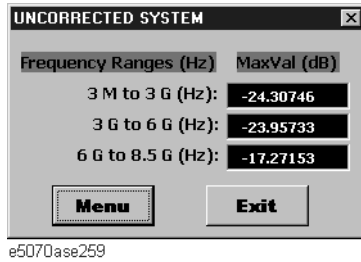
Figure 2-54 Load match for E5070B



e5070ase262

**8. UNCORRECTED SYSTEM PERFORMANCE TEST**

**Figure 2-55** Load match for E5071B

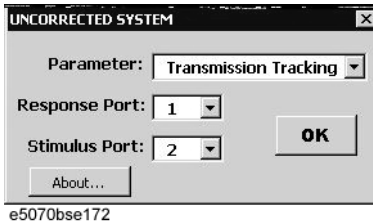


- i. Record the displayed values in the performance test record (“Test results [dB]” column in “Port 1” table for the uncorrected system performance test).

**Transmission Tracking test for port 1**

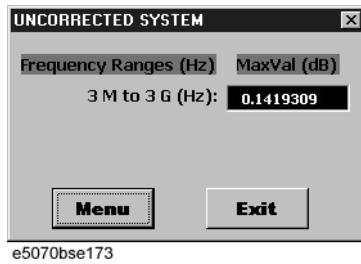
- j. Set **Parameter, Response Port and Stimulus Port** as shown in Figure 2-56.

**Figure 2-56** Transmission Tracking test window

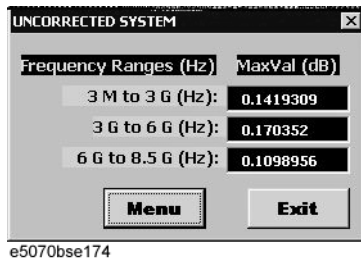


- k. Press **OK** button. The maximum value in each frequency range is displayed as shown in Figure 2-57 or Figure 2-58.

**Figure 2-57** Transmission Tracking for E5070B



**Figure 2-58** Transmission Tracking for E5071B



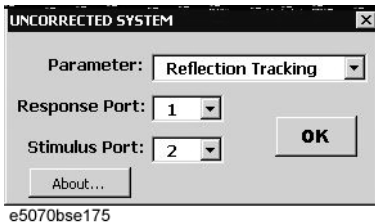
- l. Record the displayed values in the performance test record (“Test results [dB]” column in “Port 1” table for the uncorrected system performance test).

8. UNCORRECTED SYSTEM PERFORMANCE TEST

Reflection Tracking test for port 1

m. Set **Parameter**, **Response Port** and **Stimulus Port** as shown in Figure 2-59.

Figure 2-59 Reflection Tracking test window



n. Press **OK** button. The maximum value in each frequency range is displayed as shown in Figure 2-60 or Figure 2-61.

Figure 2-60 Reflection Tracking for E5070B

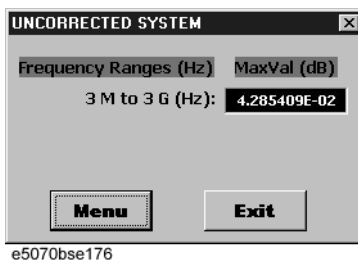
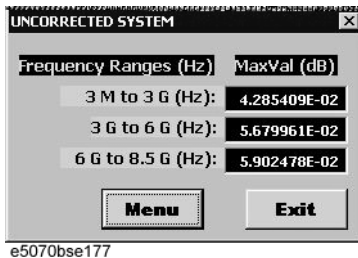


Figure 2-61 Reflection Tracking for E5071B



o. Record the displayed values in the performance test record (“Test results [dB]” column in “Port 1” table for the uncorrected system performance test).

**Test procedure for other test setups**

**Step 30.** Connect the N-N cable as shown in the following figures:

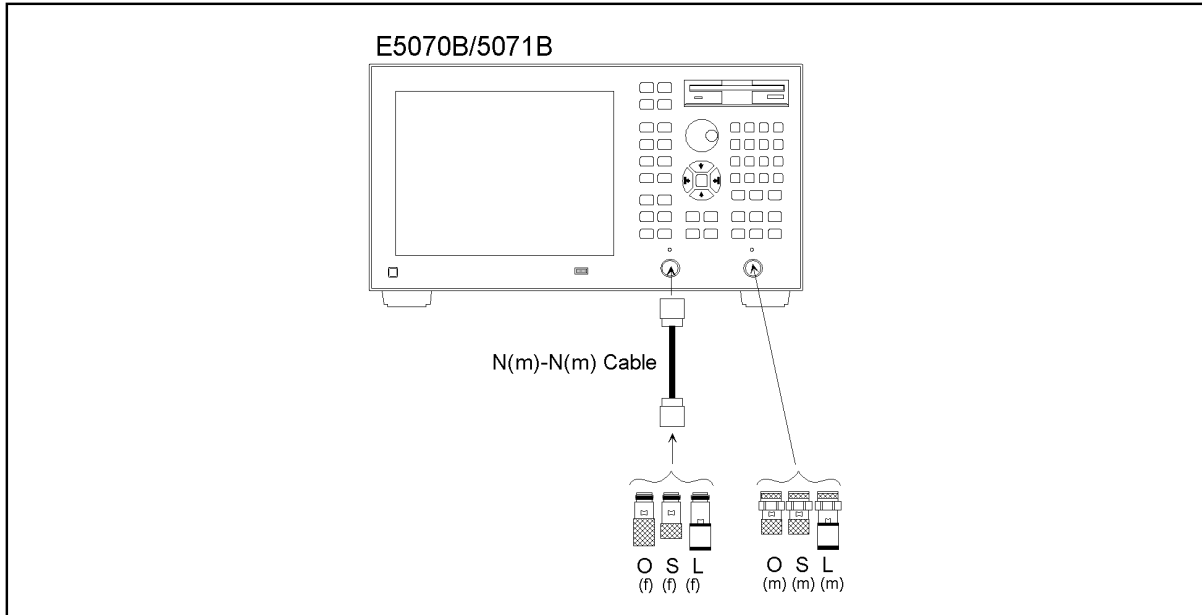
- Option 213/214: Figure 2-62.
- Option 313/314: Figure 2-63.
- Option 413/414: Figure 2-64.

**NOTE**

The test setups and **Select Ports** settings for each option configuration are described in Table 2-27.

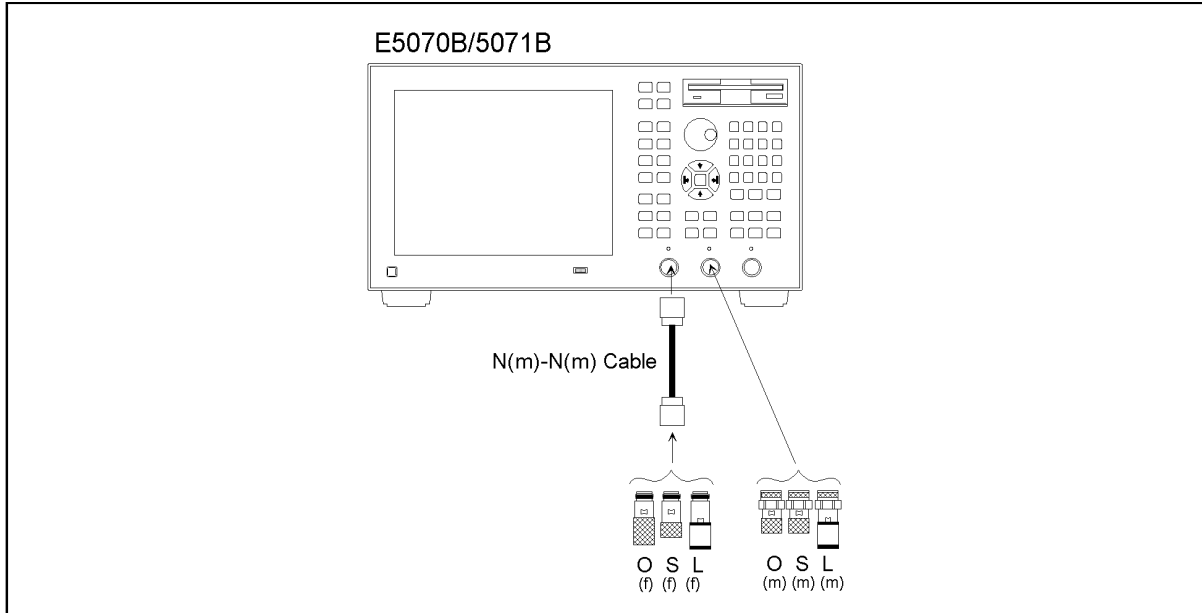
8. UNCORRECTED SYSTEM PERFORMANCE TEST

Figure 2-62 O/S/L calibration setup for uncorrected system performance test (Opt. 213/214)



e5070bse033

Figure 2-63 O/S/L calibration setup for uncorrected system performance test (Opt. 313/314)

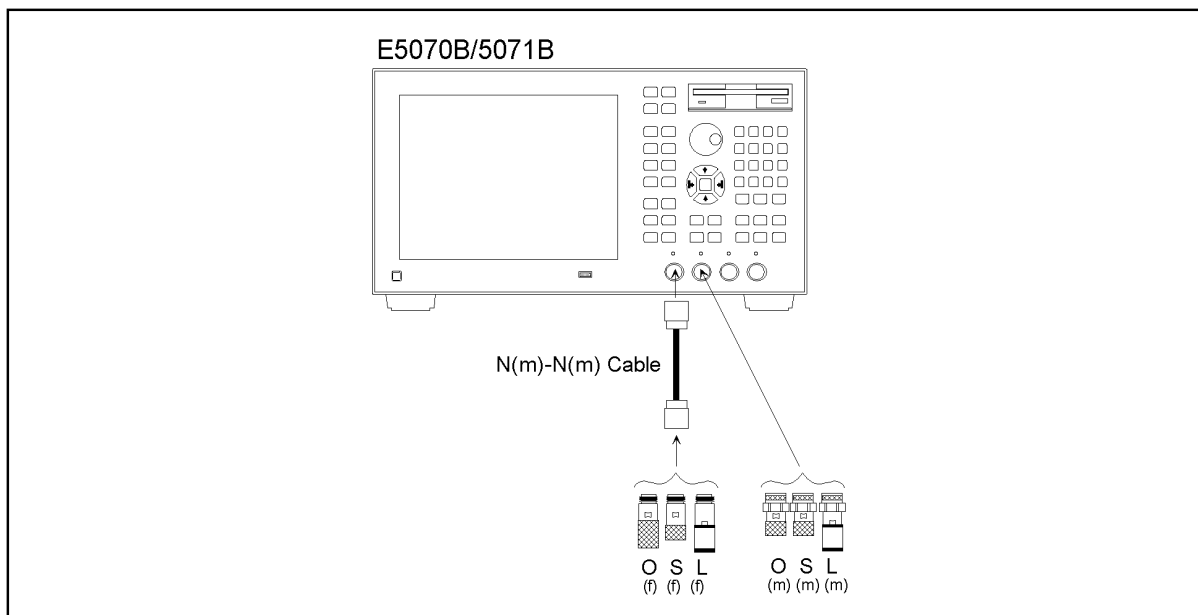


e5070bse034



## 8. UNCORRECTED SYSTEM PERFORMANCE TEST

Figure 2-64 O/S/L calibration setup for uncorrected system performance test (Opt. 413/414)



e5070bse035

- Step 31.** Perform the full 2-port calibration (Step 10 through 27) in accordance with Table 2-27.
- Step 32.** Perform Step 29 and 30. Record the directivity, source match and load match values in the performance test record ("Port 2" table).

**Options 313, 314, 413 and 414 only****NOTE**

Perform Step 33 and 34 for the option 313, 314, 413 and 414 instruments only.

- Step 33.** Perform the full 2-port calibration (Step 6 through 27) in accordance with Table 2-27.
- Step 34.** Perform Step 29 and 30. Record the directivity, source match and load match values in the performance test record ("Port 1" through "Port 3" tables for Option 313/314 and "Port 1" through "Port 4" tables for Option 413/414).

## 8. UNCORRECTED SYSTEM PERFORMANCE TEST

Table 2-27 Test setup, Select Ports settings and calibration sequence

Option	Select Ports	Test setup (Figure)	Calibration	Termination and cable connection for calibration
213/214	1-2	Figure 2-41	Port 1 Open	"Open" to Port 1
			Port 1 Short	"Short" to Port 1
			Port 1 Load	"Load" to Port 1
			Port 2 Open	"Open" to the tip of N-N cable
			Port 2 Short	"Short" to the tip of N-N cable
			Port 2 Load	"Load" to the tip of N-N cable
		Figure 2-44	Thru	N-N cable between Port 1 and Port 2
	Perform Step 29 and 30. Response/Stimulus Port of Directivity/Source match/Load match/Transmission tracking/Reflection tracking test are as follows; <b>Response Port: 1, Stimulus Port : 2</b> Record the test results in the performance test record ("port 1").			
	1-2	Figure 2-62	Port 1 Open	"Open" to the tip of N-N cable
			Port 1 Short	"Short" to the tip of N-N cable
			Port 1 Load	"Load" to the tip of N-N cable
			Port 2 Open	"Open" to Port 2
			Port 2 Short	"Short" to Port 2
			Port 2 Load	"Load" to Port 2
Figure 2-44		Thru	N-N cable between Port 1 and Port 2	
Perform Step 29 and 30. Response/Stimulus Port of Directivity/Source match/Load match/Transmission tracking/Reflection tracking test are as follows; <b>Response Port: 2, Stimulus Port : 1</b> Record the test results in the performance test record ("port 2").				

## 8. UNCORRECTED SYSTEM PERFORMANCE TEST

Table 2-27 Test setup, Select Ports settings and calibration sequence

Option	Select Ports	Test setup (Figure)	Calibration	Termination and cable connection for calibration
313/314	1-2	Figure 2-42	Port 1 Open/Short/Load and Port 2 Open/Short/Load	Same as Opt. 213/214 (N-N cable connected to Port 2)  Refer to Step 10 through 27 for the details.
		Figure 2-45	Thru	N-N cable between Port 1 and Port 2
	Perform Step 29 and 30.  Response/Stimulus Port of Directivity/Source match/Load match/Transmission tracking/Reflection tracking test are as follows;  <b>Response Port: 1, Stimulus Port : 2</b>  Record the test results in the performance test record ("port 1").			
	1-2	Figure 2-63	Port 1 Open/Short/Load and Port 2 Open/Short/Load	Same as Opt. 213/214 (N-N cable connected to Port 1)
		Figure 2-45	Thru	N-N cable between Port 1 and Port 2
	Perform Step 29 and 30.  Response/Stimulus Port of Directivity/Source match/Load match/Transmission tracking/Reflection tracking test are as follows;  <b>Response Port: 2, Stimulus Port : 1</b>  Record the test results in the performance test record ("port 2").			
	1-3	Figure 2-64	Port 1 Open	"Open" to the tip of N-N cable
			Port 1 Short	"Short" to the tip of N-N cable
			Port 1 Load	"Load" to the tip of N-N cable
			Port 3 Open	"Open" to Port 3
			Port 3 Short	"Short" to Port 3
			Port 3 Load	"Load" to Port 3
Figure 2-66		Thru	N-N cable between Port 1 and Port 3	
Perform Step 29 and 30.  Response/Stimulus Port of Directivity/Source match/Load match/Transmission tracking/reflection tracking test are as follows;  <b>Response Port: 3, Stimulus Port : 1</b>  Record the test results in the performance test record ("port 3").				

## 8. UNCORRECTED SYSTEM PERFORMANCE TEST

Table 2-27 Test setup, Select Ports settings and calibration sequence

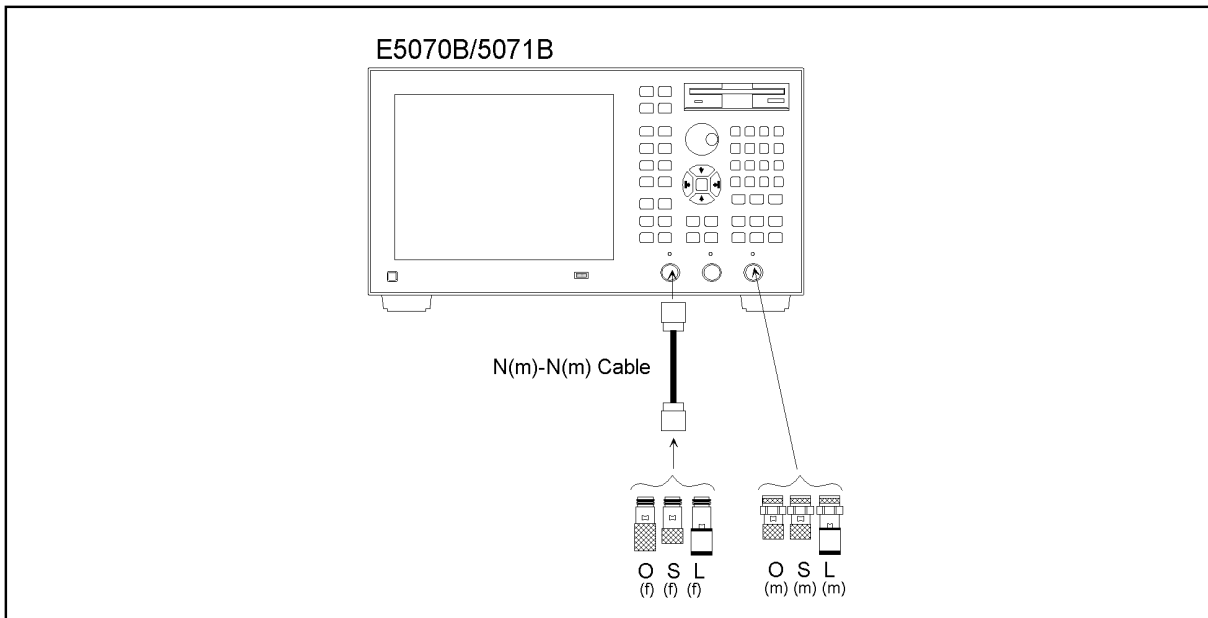
Option	Select Ports	Test setup (Figure)	Calibration	Termination and cable connection for calibration
413/414	1-2	Figure 2-43	Port 1 Open/Short/Load and Port 2 Open/Short/Load	Same as Opt. 213/214 (N-N cable connected to Port 2)  Refer to Step 10 through 27 for the details.
		Figure 2-46	Thru	N-N cable between Port 1 and Port 2
		Perform Step 29 and 30.  Response/Stimulus Port of Directivity/Source match/Load match/Transmission tracking/Reflection tracking test are as follows;  <b>Response Port: 1, Stimulus Port : 2</b>  Record the test results in the performance test record ("port 1").		
	1-2	Figure 2-64	Port 1 Open/Short/Load and Port 2 Open/Short/Load	Same as Opt. 213/214 (N-N cable connected to Port 1)
		Figure 2-46	Thru	N-N cable between Port 1 and Port 2
		Perform Step 29 and 30.  Response/Stimulus Port of Directivity/Source match/Load match/Transmission tracking/Reflection tracking test are as follows;  <b>Response Port: 2, Stimulus Port : 1</b>  Record the test results in the performance test record ("port 2").		
	3-4	Figure 2-67	Port 3 Open	"Open" to Port 3
			Port 3 Short	"Short" to Port 3
			Port 3 Load	"Load" to Port 3
			Port 4 Open	"Open" to the tip of N-N cable
			Port 4 Short	"Short" to the tip of N-N cable
			Port 4 Load	"Load" to the tip of N-N cable
		Figure 2-68	Thru	N-N cable between Port 3 and Port 4
	Perform Step 29 and 30.  Response/Stimulus Port of Directivity/Source match/Load match/Transmission tracking/Reflection tracking test are as follows;  <b>Response Port: 3, Stimulus Port : 4</b>  Record the test results in the performance test record ("port 3").			

8. UNCORRECTED SYSTEM PERFORMANCE TEST

**Table 2-27 Test setup, Select Ports settings and calibration sequence**

Option	Select Ports	Test setup (Figure)	Calibration	Termination and cable connection for calibration
	3-4	Figure 2-69	Port 3 Open	"Open" to the tip of N-N cable
			Port 3 Short	"Short" to the tip of N-N cable
			Port 3 Load	"Load" to the tip of N-N cable
			Port 4 Open	"Open" to Port 4
			Port 4 Short	"Short" to Port 4
			Port 4 Load	"Load" to Port 4
	Figure 2-68	Thru	N-N cable between Port 3 and Port 4	
Perform Step 29 and 30. Record the test results in the performance test record ("port 4") Response/Stimulus Port of Directivity/Source match/Load match/Transmission tracking/Reflection tracking test are as follows; <b>Response Port: 4, Stimulus Port : 3</b> Record the test results in the performance test record ("port 4").				

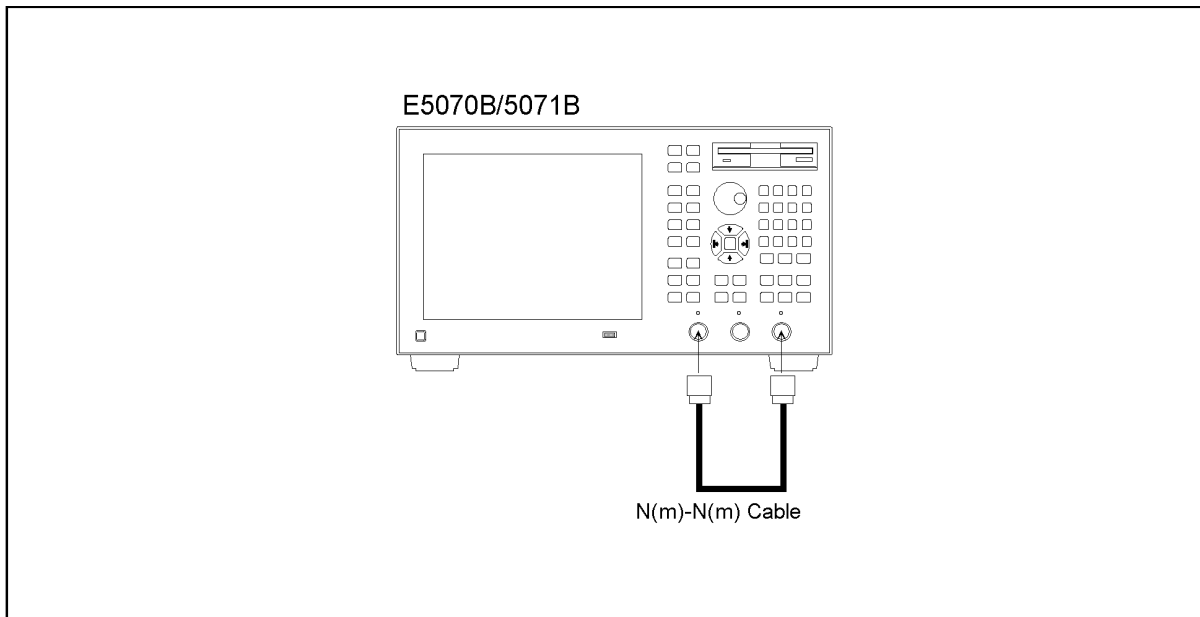
**Figure 2-65 O/S/L calibration setup for uncorrected system performance test (Opt. 313/314)**



e5070bse036

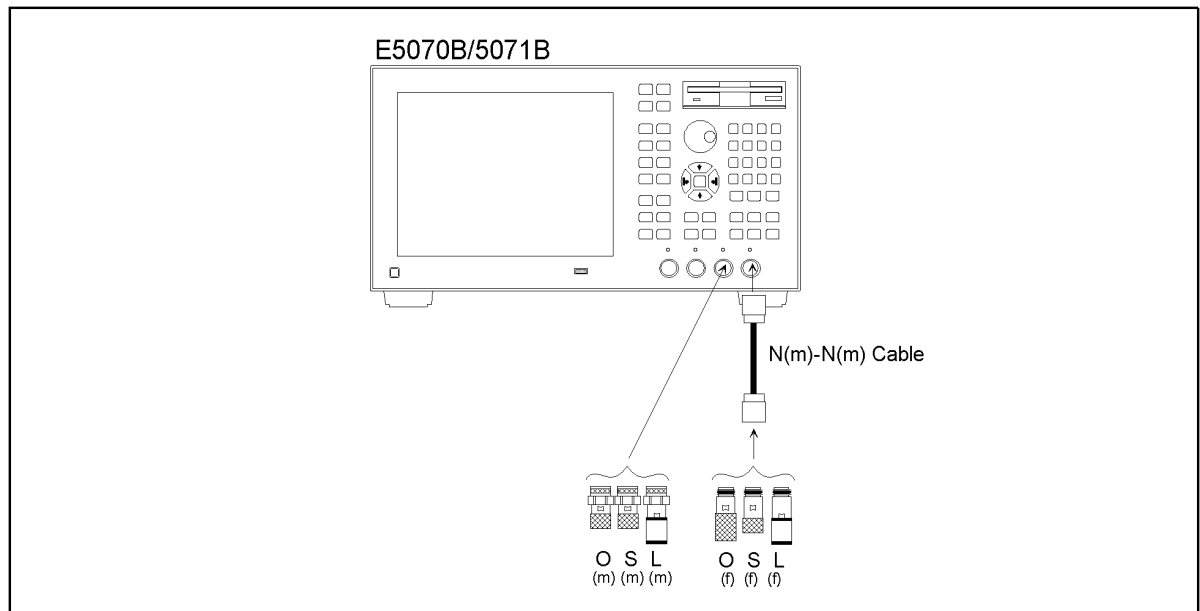
8. UNCORRECTED SYSTEM PERFORMANCE TEST

Figure 2-66 Thru calibration setup for uncorrected system performance test (Opt. 313/314)



e5070bse037

Figure 2-67 O/S/L calibration setup for uncorrected system performance test (Opt. 413/414)



e5070bse038

Figure 2-68 Thru calibration setup for uncorrected system performance test (Opt. 413/414)

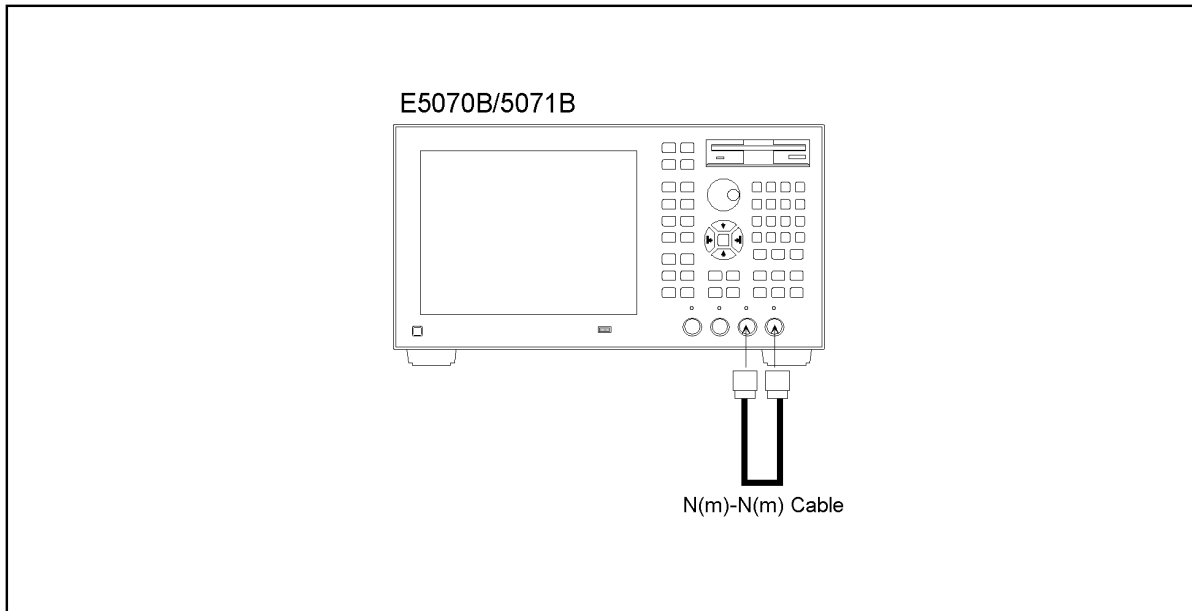
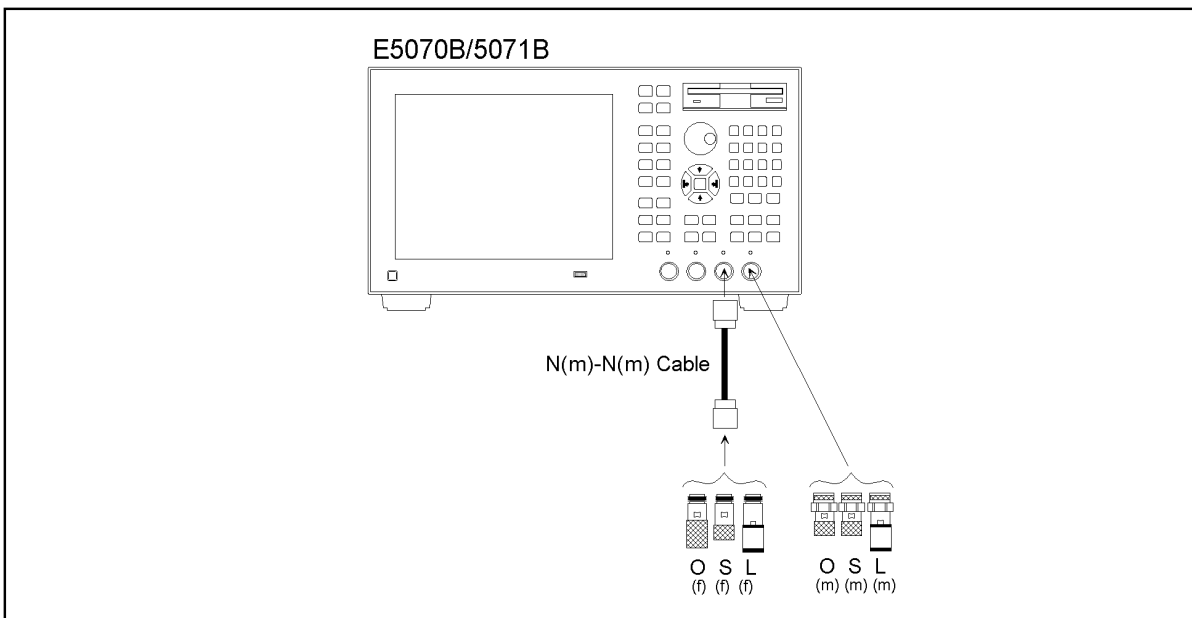


Figure 2-69 O/S/L calibration setup for uncorrected system performance test (Opt. 413/414)



## E5070B/E5071B Performance Test Calculation Sheet

### Introduction

This section contains calculation sheets for each performance test that requires additional calculations to determine the final test result.

Use the calculation sheet in this section as an aid for recording raw measurement data and calculating the performance test results.

Calculation sheet entries are provided only for performance tests in which calculations are required to obtain the test results.

### 2. RF Output Level Accuracy and Flatness Test

Flatness Test (E5070B and E5071B)

Frequency [Hz]	Power meter reading [dBm]		Test result equation
	[a]	[REF]	
50 M	_____		
10 M		_____	a - REF
550 M		_____	a - REF
1.05 G		_____	a - REF
1.55 G		_____	a - REF
2.05 G		_____	a - REF
3.00 G		_____	a - REF

(E5071B only)

Frequency [Hz]	Power meter reading [dBm]		Test result equation
	[a]	[REF]	
4.25 G		_____	a - REF
5.05 G		_____	a - REF
6.05 G		_____	a - REF
7.05 G		_____	a - REF
8.05 G		_____	a - REF
8.5 G		_____	a - REF



### 3. RF Output Level Linearity Test

**Serial Prefix: MY421, or JP1KK**

**NOTE**

Make a copy of the following calculation sheet for each combination of the test frequencies listed below:

E5070B: 10 MHz and 3 GHz

E5071B: 10 MHz, 3 GHz, and 4.25 GHz

for serial prefix: MY421, or JP1KK

CW frequency: \_\_\_\_\_ Hz

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
0	_____		
10		_____	a-REF
9		_____	a-REF
8		_____	a-REF
7		_____	a-REF
6		_____	a-REF
5		_____	a-REF
4		_____	a-REF
3		_____	a-REF
2		_____	a-REF
1		_____	a-REF
-1		_____	a-REF
-2		_____	a-REF
-3		_____	a-REF
-4		_____	a-REF
-5		_____	a-REF
-6		_____	a-REF
-7		_____	a-REF
-8		_____	a-REF
-9		_____	a-REF
-10		_____	a-REF

Performance Tests  
**E5070B/E5071B Performance Test Calculation Sheet**

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
-11		_____	a-REF
-12		_____	a-REF
-13		_____	a-REF
-14		_____	a-REF
-15		_____	a-REF

**NOTE**

Make a copy of the following calculation sheet for each combination of the test frequencies listed below:

E5071B:           6 GHz  
 for serial prefix:   MY421, or JP1KK

CW frequency: \_\_\_\_\_ Hz

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
0	_____		
8		_____	a-REF
7		_____	a-REF
6		_____	a-REF
5		_____	a-REF
4		_____	a-REF
3		_____	a-REF
2		_____	a-REF
1		_____	a-REF
-1		_____	a-REF
-2		_____	a-REF
-3		_____	a-REF
-4		_____	a-REF
-5		_____	a-REF
-6		_____	a-REF
-7		_____	a-REF
-8		_____	a-REF

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
-9		_____	a-REF
-10		_____	a-REF
-11		_____	a-REF
-12		_____	a-REF
-13		_____	a-REF
-14		_____	a-REF
-15		_____	a-REF

**NOTE**

Make a copy of the following calculation sheet for each combination of the test frequencies listed below:

E5071B:                8.5 GHz  
 for serial prefix:    MY421, or JP1KK

CW frequency: \_\_\_\_\_ Hz

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
0	_____		
6		_____	a-REF
5		_____	a-REF
4		_____	a-REF
3		_____	a-REF
2		_____	a-REF
1		_____	a-REF
-1		_____	a-REF
-2		_____	a-REF
-3		_____	a-REF
-4		_____	a-REF
-5		_____	a-REF
-6		_____	a-REF
-7		_____	a-REF
-8		_____	a-REF

Performance Tests  
**E5070B/E5071B Performance Test Calculation Sheet**

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
-9		_____	a-REF
-10		_____	a-REF
-11		_____	a-REF
-12		_____	a-REF
-13		_____	a-REF
-14		_____	a-REF
-15		_____	a-REF

**Serial Prefix: MY422, and above**

**NOTE**

Make a copy of the following calculation sheet for each combination of the test frequencies listed below:

E5070B: 10 MHz and 3 GHz

E5071B: 10 MHz and 3 GHz

for serial prefix: MY422, and above

CW frequency: \_\_\_\_\_ Hz

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
0	_____		
10		_____	a-REF
9		_____	a-REF
8		_____	a-REF
7		_____	a-REF
6		_____	a-REF
5		_____	a-REF
4		_____	a-REF
3		_____	a-REF
2		_____	a-REF
1		_____	a-REF
-1		_____	a-REF

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
-2		_____	a-REF
-3		_____	a-REF
-4		_____	a-REF
-5		_____	a-REF
-6		_____	a-REF
-7		_____	a-REF
-8		_____	a-REF
-9		_____	a-REF
-10		_____	a-REF
-11		_____	a-REF
-12		_____	a-REF
-13		_____	a-REF
-14		_____	a-REF
-15		_____	a-REF

**NOTE**

Make a copy of the following calculation sheet for each combination of the test frequencies listed below:

E5071B:            4.25 GHz  
for serial prefix: MY422, and above

CW frequency: \_\_\_\_\_ Hz

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
0	_____		
9		_____	a-REF
8		_____	a-REF
7		_____	a-REF
6		_____	a-REF
5		_____	a-REF
4		_____	a-REF
3		_____	a-REF

Performance Tests  
**E5070B/E5071B Performance Test Calculation Sheet**

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
2		_____	a-REF
1		_____	a-REF
-1		_____	a-REF
-2		_____	a-REF
-3		_____	a-REF
-4		_____	a-REF
-5		_____	a-REF
-6		_____	a-REF
-7		_____	a-REF
-8		_____	a-REF
-9		_____	a-REF
-10		_____	a-REF
-11		_____	a-REF
-12		_____	a-REF
-13		_____	a-REF
-14		_____	a-REF
-15		_____	a-REF

**NOTE**

Make a copy of the following calculation sheet for each combination of the test frequencies listed below:

E5071B:           6 GHz  
 for serial prefix: MY422, and above

CW frequency: \_\_\_\_\_ Hz

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
0	_____		
7		_____	a-REF
6		_____	a-REF
5		_____	a-REF
4		_____	a-REF

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
3		_____	a-REF
2		_____	a-REF
1		_____	a-REF
-1		_____	a-REF
-2		_____	a-REF
-3		_____	a-REF
-4		_____	a-REF
-5		_____	a-REF
-6		_____	a-REF
-7		_____	a-REF
-8		_____	a-REF
-9		_____	a-REF
-10		_____	a-REF
-11		_____	a-REF
-12		_____	a-REF
-13		_____	a-REF
-14		_____	a-REF
-15		_____	a-REF

**NOTE** Make a copy of the following calculation sheet for each combination of the test frequencies listed below:

E5071B:                8.5 GHz  
for serial prefix:    MY422, and above

CW frequency: \_\_\_\_\_ Hz

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
0	_____		
5		_____	a-REF
4		_____	a-REF
3		_____	a-REF

Performance Tests  
**E5070B/E5071B Performance Test Calculation Sheet**

Power level [dBm]	Power meter reading [dBm]		Test result equation
	[a]	REF	
2		_____	a-REF
1		_____	a-REF
-1		_____	a-REF
-2		_____	a-REF
-3		_____	a-REF
-4		_____	a-REF
-5		_____	a-REF
-6		_____	a-REF
-7		_____	a-REF
-8		_____	a-REF
-9		_____	a-REF
-10		_____	a-REF
-11		_____	a-REF
-12		_____	a-REF
-13		_____	a-REF
-14		_____	a-REF
-15		_____	a-REF



### 4. Trace Noise CW Test

**NOTE**

Make a copy of the following calculation sheet for each combination of the S-parameters Listed below:

Option 212/213: S21 and S12

Option 313/314: S21 and S12, S23 and S32

Option 413/414: S21 and S12, S43 and S34

(One calculation sheet can cover 2 parameters.)

S-parameter: \_\_\_\_\_ (E5070B and E5071B)

CW frequency [Hz]	s.dev [ $\mu$ U]	Trace noise level [dB rms]	Test result equation
3 MHz			Trace noise level = $20 \log (1 + s.dev \times 10^{-6})$
1.3 GHz			
2.1 GHz			
3 GHz			

(E5071B only)

CW frequency [Hz]	s.dev [ $\mu$ U]	Trace noise level [dB rms]	Test result equation
4.25 GHz			Trace noise level = $20 \log (1 + s.dev \times 10^{-6})$
6 GHz			
7.5 GHz			
8.5 GHz			

S-parameter: \_\_\_\_\_ (E5070B and E5071B)

CW frequency [Hz]	s.dev [ $\mu$ U]	Trace noise level [dB rms]	Test result equation
3 MHz			Trace noise level = $20 \log (1 + s.dev \times 10^{-6})$
1.3 GHz			
2.1 GHz			
3 GHz			

Performance Tests  
**E5070B/E5071B Performance Test Calculation Sheet**

(E5071B only)

CW frequency [Hz]	s.dev [ $\mu$ U]	Trace noise level [dB rms]	Test result equation
4.25 GHz			Trace noise level = $20 \log (1 + \text{s.dev} \times 10^{-6})$
6 GHz			
7.5 GHz			
8.5 GHz			

## 7. Dynamic Accuracy Test

Make a copy of the following calculation sheet for each of the S-parameters listed below:

Option 213 and 214: S21 and S12

Option 313 and 314: S21, S12 and S31

Option 413 and 414: S21, S12, S31 and S41

**NOTE**

A dynamic accuracy calculation example is shown at the end of the calculation sheets.

S-Parameter: \_\_\_\_\_ (10 dBm to -100 dBm)

Name	A1	A2	Power setting [dB]	Pm [dB]	Tx [dB] @ Port (Port Char OFF)	Running D.A.	True D.A.
DA10	0	10				REF	REF
DA15	5	10				_____	_____
( Tx @ DA15) - ( Tx @ DA10) - (Pm @ DA15) + (Pm @ DA10) →							
DA20	10	10				_____	_____
( Tx @ DA20) - ( Tx @ DA10) - (Pm @ DA20) + (Pm @ DA10) →							
DA20a	0	20				_____	_____
Adjust source power for (Pm [db] @ DA20a) - ( Tx [dB] @ DA20a) + ( Tx [dB] @ DA20)							
DA20b	0	20				REF20	REF20
DA25	5	20				_____	_____
( Tx @ DA25) - ( Tx @ DA20b) - (Pm @ DA25) + (Pm @ DA20b) → True D.A. = (Running D.A. [dB] @ DA25) + (True D.A. [dB] @ DA20)							
DA30	10	20				_____	_____
( Tx @ DA30) - ( Tx @ DA20b) - (Pm @ DA30) + (Pm @ DA20b) → True D.A. = (Running D.A. [dB] @ DA30) + (True D.A. [dB] @ DA20)							
DA30a	0	30				_____	_____
Adjust source power for (Pm [db] @ DA30a) - ( Tx [dB] @ DA30a) + ( Tx [dB] @ DA30)							
DA30b	0	30				REF30	REF30
DA35	5	30				_____	_____
( Tx @ DA35) - ( Tx @ DA30b) - (Pm @ DA35) + (Pm @ DA30b) → True D.A. = (Running D.A. [dB] @ DA35) + (True D.A. [dB] @ DA30)							
DA40	10	30				_____	_____
( Tx @ DA40) - ( Tx @ DA30b) - (Pm @ DA40) + (Pm @ DA30b) → True D.A. = (Running D.A. [dB] @ DA40) + (True D.A. [dB] @ DA30)							
DA40a	0	40				_____	_____
Adjust source power for (Pm [db] @ DA40a) - ( Tx [dB] @ DA40a) + ( Tx [dB] @ DA40)							

Performance Tests  
**E5070B/E5071B Performance Test Calculation Sheet**

Name	A1	A2	Power setting [dB]	Pm [dB]	Tx [dB] @ Port (Port Char OFF)	Running D.A.	True D.A.
DA40b	0	40				REF40	REF40
DA45	5	40				_____	_____
	(Tx @ DA45) - (Tx @ DA40b) - (Pm @ DA45) + (Pm @ DA40b) → True D.A. = (Running D.A. [dB] @ DA45) + (True D.A. [dB] @ DA40)						
DA50	10	40				_____	_____
	(Tx @ DA50) - (Tx @ DA40b) - (Pm @ DA50) + (Pm @ DA40b) → True D.A. = (Running D.A. [dB] @ DA50) + (True D.A. [dB] @ DA40)						
DA50a	0	50				_____	_____
Adjust source power for (Pm [db] @ DA50a) - (Tx [dB] @ DA50a) + (Tx [dB] @ DA50)							
DA50b	0	50				REF50	REF50
DA55	5	50				_____	_____
	(Tx @ DA55) - (Tx @ DA50b) - (Pm @ DA55) + (Pm @ DA50b) → True D.A. = (Running D.A. [dB] @ DA55) + (True D.A. [dB] @ DA50)						
DA60	10	50				_____	_____
	(Tx @ DA60) - (Tx @ DA50b) - (Pm @ DA60) + (Pm @ DA50b) → True D.A. = (Running D.A. [dB] @ DA60) + (True D.A. [dB] @ DA50)						
DA60a	0	60				_____	_____
Adjust source power for (Pm [db] @ DA60a) - (Tx [dB] @ DA60a) + (Tx [dB] @ DA60)							
DA60b	0	60				REF60	REF60
DA65	5	60				_____	_____
	(Tx @ DA65) - (Tx @ DA60b) - (Pm @ DA65) + (Pm @ DA60b) → True D.A. = (Running D.A. [dB] @ DA65) + (True D.A. [dB] @ DA60)						
DA70	10	60				_____	_____
	(Tx @ DA70) - (Tx @ DA60b) - (Pm @ DA70) + (Pm @ DA60b) → True D.A. = (Running D.A. [dB] @ DA70) + (True D.A. [dB] @ DA60)						
DA70a	0	70				_____	_____
Adjust source power for (Pm [db] @ DA70a) - (Tx [dB] @ DA70a) + (Tx [dB] @ DA70)							
DA70b	0	70				REF70	REF70
DA75	5	70				_____	_____
	(Tx @ DA75) - (Tx @ DA70b) - (Pm @ DA75) + (Pm @ DA70b) → True D.A. = (Running D.A. [dB] @ DA75) + (True D.A. [dB] @ DA70)						
DA80	10	70				_____	_____
	(Tx @ DA80) - (Tx @ DA70b) - (Pm @ DA80) + (Pm @ DA70b) → True D.A. = (Running D.A. [dB] @ DA80) + (True D.A. [dB] @ DA70)						

Name	A1	A2	Power setting [dB]	Pm [dB]	Tx [dB] @ Port (Port Char OFF)	Running D.A.	True D.A.
DA80a	0	80				_____	_____
Adjust source power for (Pm [db] @ DA80a) - ( Tx [dB] @ DA80a) + ( Tx [dB] @ DA80)							
DA80b	0	80				REF80	REF80
DA85	5	80				_____	_____
	(Tx @ DA85) - ( Tx @ DA80b) - (Pm @ DA85) + (Pm @ DA80b) → True D.A. = (Running D.A. [dB] @ DA85) + (True D.A. [dB] @ DA80)						
DA90	10	80				_____	_____
	( Tx @ DA90) - ( Tx @ DA80b) - (Pm @ DA90) + (Pm @ DA80b) True D.A. = (Running D.A. [dB] @ DA90) + (True D.A. [dB] @ DA80)						
DA90a	0	90				_____	_____
Adjust source power for (Pm [db] @ DA90a) - ( Tx [dB] @ DA90a) + ( Tx [dB] @ DA90)							
DA90b	0	90				REF90	REF90
DA95	5	90				_____	_____
	( Tx @ DA95) - ( Tx @ DA90b) - (Pm @ DA95) + (Pm @ DA90b)→ True D.A. = (Running D.A. [dB] @ DA95) + (True D.A. [dB] @ DA90)						
DA100	10	90				_____	_____
	( Tx @ DA100) - ( Tx @ DA90b)- (Pm @ DA100) + (Pm @ DA90b)→ True D.A. = (Running D.A. [dB] @ DA100) + (True D.A. [dB] @ DA90)						
DA10	10	0				REF10	REF10
DA5	5	0				_____	_____
	( Tx @ DA5) - ( Tx @ DA10) - (Pm @ DA5) + (Pm @ DA10)						
DA0	0	0				_____	_____
	( Tx @ DA0) - ( Tx @ DA10) - (Pm @ DA0) + (Pm @ DA10) →						
DA+5	0	0				_____	_____
	( Tx @ DA+5) - ( Tx @ DA10) - (Pm @ DA+5) + (Pm @ DA10) → True D.A. = (Running D.A. [dB] @ DA+5) + (True D.A. [dB] @ DA10)						
DA+10	0	0				_____	_____
	( Tx @ DA+10) - ( Tx @ DA10) - (Pm @ DA+10) + (Pm @ DA10) → True D.A. = (Running D.A. [dB] @ DA+10) + (True D.A. [dB] @ DA10)						

2. Performance Test

## E5070B Performance Test Record for Serial Prefix: MY421, or JP1KK

Agilent Technologies E5070B RF Network Analyzer

Serial Number:		Option:	
Temperature:	°C	Test Date:	
Humidity:	% R.H.	Tested by:	

### Frequency Accuracy Test

Without Option 1E5

Frequency [Hz]	Test limit [Hz]	Test result [Hz]	Measurement uncertainty [Hz]
50 M	± 250		± 11
3 G	± 15 k	k	± 0.64 k

With Option 1E5

Frequency [Hz]	Test limit [Hz]	Test result [Hz]	Measurement uncertainty [Hz]
50 M	± 50		± 11
3 G	± 3.00 k	k	± 0.64 k

### RF Output Level Accuracy and Flatness Test

Level Accuracy Test (@ Port 1)

Power level [dBm]	Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
0	50 M	± 0.65		± 0.16

Level Flatness Test (@ Port 1) (at 0dBm, relative to 50 MHz reference)

Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10 M	± 1.0		± 0.37

Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
550 M	± 1.0		± 0.17
1.05 G	± 1.0		± 0.17
1.55 G	± 1.0		± 0.19
2.05 G	± 1.0		± 0.20
3.00 G	± 1.0		± 0.20

**RF Output Level Linearity Test (@ Port1)**

CW Frequency: 10 MHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.75		± 0.27
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17

2. Performance Test

Performance Tests

E5070B Performance Test Record for Serial Prefix: MY421, or JP1KK

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-10	± 0.75		± 0.17
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

CW Frequency: 3 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.75		± 0.27
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17
-10	± 0.75		± 0.17



Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

**Trace Noise CW Test (Magnitude)**

Direction: S21

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

Direction: S12

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

Direction: S23 (Option 313 and 314 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

## Performance Tests

### E5070B Performance Test Record for Serial Prefix: MY421, or JP1KK

Direction: S32 (Option 313 and 314 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

Direction: S43 (Option 413 and 414 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

Direction: S34 (Option 413 and 414 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

## Crosstalk Test

Direction: S21 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

Direction: S12 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

Direction: S32 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

Direction: S23 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

Direction: S41 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

Direction: S14 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

### System Dynamic Range Test

Direction: S21 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

Direction: S12 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

## Performance Tests

### E5070B Performance Test Record for Serial Prefix: MY421, or JP1KK

Direction: S32 (Options 313, 314, 413, 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

Direction: S23 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

Direction: S41 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

Direction: S14 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

## Dynamic Accuracy Test

@ Reference power level: -10 dBm

Direction: S21

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	±2.008		± 0.032

Direction: S12

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012

2. Performance Test

Performance Tests

E5070B Performance Test Record for Serial Prefix: MY421, or JP1KK

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	± 2.008		± 0.032

Direction: S31 (Options 313, 314, 413 and 414 only)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	±2.008		± 0.032

Direction: S41 (Options 413 and 414 only)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-55	$\pm 0.106$		$\pm 0.022$
-60	$\pm 0.125$		$\pm 0.022$
-65	$\pm 0.151$		$\pm 0.025$
-70	$\pm 0.189$		$\pm 0.025$
-75	$\pm 0.248$		$\pm 0.028$
-80	$\pm 0.346$		$\pm 0.028$
-85	$\pm 0.509$		$\pm 0.030$
-90	$\pm 0.785$		$\pm 0.030$
-95	$\pm 1.248$		$\pm 0.032$
-100	$\pm 2.008$		$\pm 0.032$

### Uncorrected System Performance Test

@ Correction: Off, System Correction: On

Port 1

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Source match	3 M - 3 G	< -25	
Load match	3 M - 3 G	< -17	
Transmission Tracking	3 M - 3G	$\pm 1.0$	
Reflection Tracking	3 M - 3G	$\pm 1.0$	

Port 2

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Source match	3 M - 3 G	< -25	
Load match	3 M - 3 G	< -17	
Transmission Tracking	3 M - 3G	$\pm 1.0$	
Reflection Tracking	3 M - 3G	$\pm 1.0$	



Port 3 (Options 313, 314, 413 and 414 only)

<b>System performance</b>	<b>Frequency range [Hz]</b>	<b>Test limit [dB]</b>	<b>Test result [dB]</b>
Directivity	3 M - 3 G	< -25	
Source match	3 M - 3 G	< -25	
Load match	3 M - 3 G	< -17	
Transmission Tracking	3 M - 3G	± 1.0	
Reflection Tracking	3 M - 3G	± 1.0	

Port 4 (Options 413 and 414 only)

<b>System performance</b>	<b>Frequency range [Hz]</b>	<b>Test limit [dB]</b>	<b>Test result [dB]</b>
Directivity	3 M - 3 G	< -25	
Source match	3 M - 3 G	< -25	
Load match	3 M - 3 G	< -17	
Transmission Tracking	3 M - 3G	± 1.0	
Reflection Tracking	3 M - 3G	± 1.0	

## E5070B Performance Test Record for Serial Prefix: MY422, and above

Agilent Technologies E5070B RF Network Analyzer

Serial Number:		Option:	
Temperature:	°C	Test Date:	
Humidity:	% R.H.	Tested by:	

### Frequency Accuracy Test

Without Option 1E5

Frequency [Hz]	Test limit [Hz]	Test result [Hz]	Measurement uncertainty [Hz]
50 M	± 250		± 11
3 G	± 15 k	k	± 0.64 k

With Option 1E5

Frequency [Hz]	Test limit [Hz]	Test result [Hz]	Measurement uncertainty [Hz]
50 M	± 50		± 11
3 G	± 3.00 k	k	± 0.64 k

### RF Output Level Accuracy and Flatness Test

Level Accuracy Test (@ Port 1)

Power level [dBm]	Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
0	50 M	± 0.65		± 0.16

Level Flatness Test (@ Port 1) (at 0dBm, relative to 50 MHz reference)

Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10 M	± 1.0		± 0.37

Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
550 M	± 1.0		± 0.17
1.05 G	± 1.0		± 0.17
1.55 G	± 1.0		± 0.19
2.05 G	± 1.0		± 0.20
3.00 G	± 1.0		± 0.20

**RF Output Level Linearity Test (@ Port1)**

CW Frequency: 10 MHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.75		± 0.27
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17

2. Performance Test

Performance Tests

**E5070B Performance Test Record for Serial Prefix: MY422, and above**

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-10	± 0.75		± 0.17
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

CW Frequency: 3 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.75		± 0.27
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17
-10	± 0.75		± 0.17

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

**Trace Noise CW Test (Magnitude)**

Direction: S21

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

Direction: S12

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

Direction: S23 (Option 313 and 314 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

## Performance Tests

### E5070B Performance Test Record for Serial Prefix: MY422, and above

Direction: S32 (Option 313 and 314 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

Direction: S43 (Option 413 and 414 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

Direction: S34 (Option 413 and 414 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	

## Crosstalk Test

Direction: S21 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

Direction: S12 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

## E5070B Performance Test Record for Serial Prefix: MY422, and above

Direction: S32 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

Direction: S23 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

Direction: S41 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

Direction: S14 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	

**System Dynamic Range Test**

Direction: S21 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

Direction: S12 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

## Performance Tests

### E5070B Performance Test Record for Serial Prefix: MY422, and above

Direction: S32 (Options 313, 314, 413, 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

Direction: S23 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

Direction: S41 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

Direction: S14 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

### Dynamic Accuracy Test

@ Reference power level: -10 dBm



Direction: S21

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	±2.008		± 0.032

Direction: S12

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012

2. Performance Test

Performance Tests

**E5070B Performance Test Record for Serial Prefix: MY422, and above**

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	±2.008		± 0.032

Direction: S31 (Options 313, 314, 413 and 414 only)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012

## E5070B Performance Test Record for Serial Prefix: MY422, and above

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-35	$\pm 0.056$		$\pm 0.016$
-40	$\pm 0.067$		$\pm 0.016$
-45	$\pm 0.078$		$\pm 0.019$
-50	$\pm 0.091$		$\pm 0.019$
-55	$\pm 0.106$		$\pm 0.022$
-60	$\pm 0.125$		$\pm 0.022$
-65	$\pm 0.151$		$\pm 0.025$
-70	$\pm 0.189$		$\pm 0.025$
-75	$\pm 0.248$		$\pm 0.028$
-80	$\pm 0.346$		$\pm 0.028$
-85	$\pm 0.509$		$\pm 0.030$
-90	$\pm 0.785$		$\pm 0.030$
-95	$\pm 1.248$		$\pm 0.032$
-100	$\pm 2.008$		$\pm 0.032$

Direction: S41 (Options 413 and 414 only)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	$\pm 0.207$		$\pm 0.060$
5	$\pm 0.075$		$\pm 0.022$
0	$\pm 0.042$		$\pm 0.012$
-5	$\pm 0.031$		$\pm 0.012$
-15	$\pm 0.030$		$\pm 0.0087$
-20	$\pm 0.035$		$\pm 0.0087$
-25	$\pm 0.040$		$\pm 0.012$
-30	$\pm 0.045$		$\pm 0.012$
-35	$\pm 0.056$		$\pm 0.016$
-40	$\pm 0.067$		$\pm 0.016$
-45	$\pm 0.078$		$\pm 0.019$
-50	$\pm 0.091$		$\pm 0.019$

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-55	$\pm 0.106$		$\pm 0.022$
-60	$\pm 0.125$		$\pm 0.022$
-65	$\pm 0.151$		$\pm 0.025$
-70	$\pm 0.189$		$\pm 0.025$
-75	$\pm 0.248$		$\pm 0.028$
-80	$\pm 0.346$		$\pm 0.028$
-85	$\pm 0.509$		$\pm 0.030$
-90	$\pm 0.785$		$\pm 0.030$
-95	$\pm 1.248$		$\pm 0.032$
-100	$\pm 2.008$		$\pm 0.032$

### Uncorrected System Performance Test

@ Correction: Off, System Correction: On

Port 1

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Source match	3 M - 3 G	< -25	
Load match	3 M - 3 G	< -17	
Transmission Tracking	3 M - 3G	$\pm 1.0$	
Reflection Tracking	3 M - 3G	$\pm 1.0$	

Port 2

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Source match	3 M - 3 G	< -25	
Load match	3 M - 3 G	< -17	
Transmission Tracking	3 M - 3G	$\pm 1.0$	
Reflection Tracking	3 M - 3G	$\pm 1.0$	

**E5070B Performance Test Record for Serial Prefix: MY422, and above**

Port 3 (Options 313, 314, 413 and 414 only)

<b>System performance</b>	<b>Frequency range [Hz]</b>	<b>Test limit [dB]</b>	<b>Test result [dB]</b>
Directivity	3 M - 3 G	< -25	
Source match	3 M - 3 G	< -25	
Load match	3 M - 3 G	< -17	
Transmission Tracking	3 M - 3G	$\pm 1.0$	
Reflection Tracking	3 M - 3G	$\pm 1.0$	

Port 4 (Options 413 and 414 only)

<b>System performance</b>	<b>Frequency range [Hz]</b>	<b>Test limit [dB]</b>	<b>Test result [dB]</b>
Directivity	3 M - 3 G	< -25	
Source match	3 M - 3 G	< -25	
Load match	3 M - 3 G	< -17	
Transmission Tracking	3 M - 3G	$\pm 1.0$	
Reflection Tracking	3 M - 3G	$\pm 1.0$	

## E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK

Agilent Technologies E5071B RF Network Analyzer

Serial Number:		Option:	
Temperature:	°C	Test Date:	
Humidity:	% R.H.	Tested by:	

### Frequency Accuracy Test

Without Option 1E5

Frequency [Hz]	Test limit [Hz]	Test result [Hz]	Measurement uncertainty [Hz]
50 M	± 250		± 11
3 G	± 15 k	k	± 0.64 k

With Option 1E5

Frequency [Hz]	Test limit [Hz]	Test result [Hz]	Measurement uncertainty [Hz]
50 M	± 50		± 11
3 G	± 3.00 k	k	± 0.64 k

### RF Output Level Accuracy and Flatness Test

Level Accuracy Test (@ Port 1)

Power level [dBm]	Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
0	50 M	± 0.65		± 0.16

Level Flatness Test (@ Port 1) (at 0dBm, relative to 50 MHz reference)

Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10 M	± 1.0		± 0.37
550 M	± 1.0		± 0.17

Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
1.05 G	± 1.0		± 0.17
1.55 G	± 1.0		± 0.19
2.05 G	± 1.0		± 0.20
3.00 G	± 1.0		± 0.20
4.25 G	± 1.0		± 0.36
5.05 G	± 1.0		± 0.36
6.05 G	± 1.0		± 0.36
7.05 G	± 1.0		± 0.36
8.05 G	± 1.0		± 0.36
8.50 G	± 1.0		± 0.36

2. Performance Test

**RF Output Level Linearity Test (@ Port1)**

CW Frequency: 10 MHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.75		± 0.27
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17

Performance Tests

E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17
-10	± 0.75		± 0.17
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

CW Frequency: 3 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.75		± 0.27
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17



Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK**

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17
-10	± 0.75		± 0.17
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

CW Frequency: 4.25 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.75		± 0.27
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17

Performance Tests

E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-7	$\pm 0.75$		$\pm 0.17$
-8	$\pm 0.75$		$\pm 0.17$
-9	$\pm 0.75$		$\pm 0.17$
-10	$\pm 0.75$		$\pm 0.17$
-11	$\pm 0.75$		$\pm 0.17$
-12	$\pm 0.75$		$\pm 0.17$
-13	$\pm 0.75$		$\pm 0.17$
-14	$\pm 0.75$		$\pm 0.17$
-15	$\pm 0.75$		$\pm 0.17$

CW Frequency: 6 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
8	$\pm 0.75$		$\pm 0.24$
7	$\pm 0.75$		$\pm 0.23$
6	$\pm 0.75$		$\pm 0.21$
5	$\pm 0.75$		$\pm 0.20$
4	$\pm 0.75$		$\pm 0.19$
3	$\pm 0.75$		$\pm 0.18$
2	$\pm 0.75$		$\pm 0.18$
1	$\pm 0.75$		$\pm 0.17$
-1	$\pm 0.75$		$\pm 0.17$
-2	$\pm 0.75$		$\pm 0.17$
-3	$\pm 0.75$		$\pm 0.17$
-4	$\pm 0.75$		$\pm 0.17$
-5	$\pm 0.75$		$\pm 0.17$
-6	$\pm 0.75$		$\pm 0.17$
-7	$\pm 0.75$		$\pm 0.17$
-8	$\pm 0.75$		$\pm 0.17$
-9	$\pm 0.75$		$\pm 0.17$

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK**

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-10	± 0.75		± 0.17
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

CW Frequency: 8.5 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17
-10	± 0.75		± 0.17
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-15	$\pm 0.75$		$\pm 0.17$

**Trace Noise CW Test (Magnitude)**

Direction: S21

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.001	
6 G	3 k	< 0.003	
7.5 G	3 k	< 0.003	
8.5 G	3 k	< 0.005	

Direction: S12

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.001	
6 G	3 k	< 0.003	
7.5 G	3 k	< 0.003	
8.5 G	3 k	< 0.005	

Direction: S23 (Option 313 and 314 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	

## E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.001	
6 G	3 k	< 0.003	
7.5 G	3 k	< 0.003	
8.5 G	3 k	< 0.005	

Direction: S32 (Option 313 and 314 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.001	
6 G	3 k	< 0.003	
7.5 G	3 k	< 0.003	
8.5 G	3 k	< 0.005	

Direction: S43 (Option 413 and 414 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.001	
6 G	3 k	< 0.003	
7.5 G	3 k	< 0.003	
8.5 G	3 k	< 0.005	

## Performance Tests

### E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK

Direction: S34 (Option 413 and 414 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.001	
6 G	3 k	< 0.003	
7.5 G	3 k	< 0.003	
8.5 G	3 k	< 0.005	

### Crosstalk Test

Direction: S21 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -110	
6 G - 7.5 G	10	< -100	
7.5 G - 8.5 G	10	< -90	

Direction: S12 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -110	
6 G - 7.5 G	10	< -100	
7.5 G - 8.5 G	10	< -90	

Direction: S32 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -110	
6 G - 7.5 G	10	< -100	

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
7.5 G - 8.5 G	10	< -90	

Direction: S23 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -110	
6 G - 7.5 G	10	< -100	
7.5 G - 8.5 G	10	< -90	

Direction: S41 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -110	
6 G - 7.5 G	10	< -100	
7.5 G - 8.5 G	10	< -90	

Direction: S14 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -110	
6 G - 7.5 G	10	< -100	
7.5 G - 8.5 G	10	< -90	

### System Dynamic Range Test

Direction: S21 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 4 G	10	< -122	
4 G - 6 G	10	< -118	
6 G - 7.5 G	10	< -113	
7.5 G - 8.5 G	10	< -106	

Performance Tests

E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	3 k	< -95	
1.5 G - 4 G	3 k	< -97	
4 G - 6 G	3 k	< -93	
6 G - 7.5 G	3 k	< -88	
7.5 G - 8.5 G	3 k	< -81	

Direction: S12 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 4 G	10	< -122	
4 G - 6 G	10	< -118	
6 G - 7.5 G	10	< -113	
7.5 G - 8.5 G	10	< -106	
3 M - 1.5 G	3 k	< -95	
1.5 G - 4 G	3 k	< -97	
4 G - 6 G	3 k	< -93	
6 G - 7.5 G	3 k	< -88	
7.5 G - 8.5 G	3 k	< -81	

Direction: S32 (Options 313, 314, 413, 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 4 G	10	< -122	
4 G - 6 G	10	< -118	
6 G - 7.5 G	10	< -113	
7.5 G - 8.5 G	10	< -106	
3 M - 1.5 G	3 k	< -95	
1.5 G - 4 G	3 k	< -97	
4 G - 6 G	3 k	< -93	
6 G - 7.5 G	3 k	< -88	
7.5 G - 8.5 G	3 k	< -81	



Direction: S23 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 4 G	10	< -122	
4 G - 6 G	10	< -118	
6 G - 7.5 G	10	< -113	
7.5 G - 8.5 G	10	< -106	
3 M - 1.5 G	3 k	< -95	
1.5 G - 4 G	3 k	< -97	
4 G - 6 G	3 k	< -93	
6 G - 7.5 G	3 k	< -88	
7.5 G - 8.5 G	3 k	< -81	

Direction: S41 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 4 G	10	< -122	
4 G - 6 G	10	< -118	
6 G - 7.5 G	10	< -113	
7.5 G - 8.5 G	10	< -106	
3 M - 1.5 G	3 k	< -95	
1.5 G - 4 G	3 k	< -97	
4 G - 6 G	3 k	< -93	
6 G - 7.5 G	3 k	< -88	
7.5 G - 8.5 G	3 k	< -81	

Direction: S14 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 4 G	10	< -122	
4 G - 6 G	10	< -118	
6 G - 7.5 G	10	< -113	

## Performance Tests

### E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
7.5 G - 8.5 G	10	< -106	
3 M - 1.5 G	3 k	< -95	
1.5 G - 4 G	3 k	< -97	
4 G - 6 G	3 k	< -93	
6 G - 7.5 G	3 k	< -88	
7.5 G - 8.5 G	3 k	< -81	

### Dynamic Accuracy Test

@ Reference power level: -10 dBm

Direction: S21

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK**

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	±2.008		± 0.032

Direction: S12

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	±2.008		± 0.032

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK**

Direction: S31 (Options 313, 314, 413 and 414 only)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	± 2.008		± 0.032

Direction: S41 (Options 413 and 414 only)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	±2.008		± 0.032

### Uncorrected System Performance Test

@ Correction: Off, System Correction: On

Port 1

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Directivity	3 G - 6 G	< -20	
Directivity	6 G - 8.5 G	< -15	
Source match	3 M - 3 G	< -25	
Source match	3 G - 6 G	< -20	
Source match	6 G - 8.5 G	< -15	

Performance Tests

E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Load match	3 M - 3 G	< -17	
Load match	3 G - 6 G	< -12	
Load match	6 G - 8.5 G	< -10	
Transmission Tracking	3 M - 3 G	± 1.0	
Transmission Tracking	3 G - 6 G	± 1.0	
Transmission Tracking	6 G - 8.5 G	± 1.0	
Reflection Tracking	3 M - 3 G	± 1.0	
Reflection Tracking	3 G - 6 G	± 1.0	
Reflection Tracking	6 G - 8.5 G	± 1.0	

Port 2

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Directivity	3 G - 6 G	< -20	
Directivity	6 G - 8.5 G	< -15	
Source match	3 M - 3 G	< -25	
Source match	3 G - 6 G	< -20	
Source match	6 G - 8.5 G	< -15	
Load match	3 M - 3 G	< -17	
Load match	3 G - 6 G	< -12	
Load match	6 G - 8.5 G	< -10	
Transmission Tracking	3 M - 3 G	± 1.0	
Transmission Tracking	3 G - 6 G	± 1.0	
Transmission Tracking	6 G - 8.5 G	± 1.0	
Reflection Tracking	3 M - 3 G	± 1.0	
Reflection Tracking	3 G - 6 G	± 1.0	

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Reflection Tracking	6 G - 8.5 G	± 1.0	

Port 3 (Options 313, 314, 413 and 414 only)

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Directivity	3 G - 6 G	< -20	
Directivity	6 G - 8.5 G	< -15	
Source match	3 M - 3 G	< -25	
Source match	3 G - 6 G	< -20	
Source match	6 G - 8.5 G	< -15	
Load match	3 M - 3 G	< -17	
Load match	3 G - 6 G	< -12	
Load match	6 G - 8.5 G	< -10	
Transmission Tracking	3 M - 3 G	± 1.0	
Transmission Tracking	3 G - 6 G	± 1.0	
Transmission Tracking	6 G - 8.5 G	± 1.0	
Reflection Tracking	3 M - 3 G	± 1.0	
Reflection Tracking	3 G - 6 G	± 1.0	
Reflection Tracking	6 G - 8.5 G	± 1.0	

Port 4 (Options 413 and 414 only)

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Directivity	3 G - 6 G	< -20	
Directivity	6 G - 8.5 G	< -15	
Source match	3 M - 3 G	< -25	
Source match	3 G - 6 G	< -20	

2. Performance Test

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY421, or JP1KK**

<b>System performance</b>	<b>Frequency range [Hz]</b>	<b>Test limit [dB]</b>	<b>Test result [dB]</b>
Source match	6 G - 8.5 G	< -15	
Load match	3 M - 3 G	< -17	
Load match	3 G - 6 G	< -12	
Load match	6 G - 8.5 G	< -10	
Transmission Tracking	3 M - 3 G	$\pm 1.0$	
Transmission Tracking	3 G - 6 G	$\pm 1.0$	
Transmission Tracking	6 G - 8.5 G	$\pm 1.0$	
Reflection Tracking	3 M - 3 G	$\pm 1.0$	
Reflection Tracking	3 G - 6 G	$\pm 1.0$	
Reflection Tracking	6 G - 8.5 G	$\pm 1.0$	



## E5071B Performance Test Record for Serial Prefix: MY422, and above

Agilent Technologies E5071B RF Network Analyzer

Serial Number:		Option:	
Temperature:	°C	Test Date:	
Humidity:	% R.H.	Tested by:	

### Frequency Accuracy Test

Without Option 1E5

Frequency [Hz]	Test limit [Hz]	Test result [Hz]	Measurement uncertainty [Hz]
50 M	± 250		± 11
3 G	± 15 k	k	± 0.64 k

With Option 1E5

Frequency [Hz]	Test limit [Hz]	Test result [Hz]	Measurement uncertainty [Hz]
50 M	± 50		± 11
3 G	± 3.00 k	k	± 0.64 k

### RF Output Level Accuracy and Flatness Test

Level Accuracy Test (@ Port 1)

Power level [dBm]	Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
0	50 M	± 0.65		± 0.16

Level Flatness Test (@ Port 1) (at 0dBm, relative to 50 MHz reference)

Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10 M	± 1.0		± 0.37
550 M	± 1.0		± 0.17

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY422, and above**

Frequency [Hz]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
1.05 G	± 1.0		± 0.17
1.55 G	± 1.0		± 0.19
2.05 G	± 1.0		± 0.20
3.00 G	± 1.0		± 0.20
4.25 G	± 1.0		± 0.36
5.05 G	± 1.0		± 0.36
6.05 G	± 1.0		± 0.36
7.05 G	± 1.0		± 0.36
8.05 G	± 1.0		± 0.36
8.50 G	± 1.0		± 0.36

**RF Output Level Linearity Test (@ Port1)**

CW Frequency: 10 MHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.75		± 0.27
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17
-10	± 0.75		± 0.17
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

CW Frequency: 3 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.75		± 0.27
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17

Performance Tests

E5071B Performance Test Record for Serial Prefix: MY422, and above

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17
-10	± 0.75		± 0.17
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

CW Frequency: 4.25 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
9	± 0.75		± 0.26
8	± 0.75		± 0.24
7	± 0.75		± 0.23
6	± 0.75		± 0.21
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17

## E5071B Performance Test Record for Serial Prefix: MY422, and above

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-8	$\pm 0.75$		$\pm 0.17$
-9	$\pm 0.75$		$\pm 0.17$
-10	$\pm 0.75$		$\pm 0.17$
-11	$\pm 0.75$		$\pm 0.17$
-12	$\pm 0.75$		$\pm 0.17$
-13	$\pm 0.75$		$\pm 0.17$
-14	$\pm 0.75$		$\pm 0.17$
-15	$\pm 0.75$		$\pm 0.17$

CW Frequency: 6 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
7	$\pm 0.75$		$\pm 0.23$
6	$\pm 0.75$		$\pm 0.21$
5	$\pm 0.75$		$\pm 0.20$
4	$\pm 0.75$		$\pm 0.19$
3	$\pm 0.75$		$\pm 0.18$
2	$\pm 0.75$		$\pm 0.18$
1	$\pm 0.75$		$\pm 0.17$
-1	$\pm 0.75$		$\pm 0.17$
-2	$\pm 0.75$		$\pm 0.17$
-3	$\pm 0.75$		$\pm 0.17$
-4	$\pm 0.75$		$\pm 0.17$
-5	$\pm 0.75$		$\pm 0.17$
-6	$\pm 0.75$		$\pm 0.17$
-7	$\pm 0.75$		$\pm 0.17$
-8	$\pm 0.75$		$\pm 0.17$
-9	$\pm 0.75$		$\pm 0.17$
-10	$\pm 0.75$		$\pm 0.17$
-11	$\pm 0.75$		$\pm 0.17$

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY422, and above**

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

CW Frequency: 8.5 GHz (relative to 0 dBm reference)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
5	± 0.75		± 0.20
4	± 0.75		± 0.19
3	± 0.75		± 0.18
2	± 0.75		± 0.18
1	± 0.75		± 0.17
-1	± 0.75		± 0.17
-2	± 0.75		± 0.17
-3	± 0.75		± 0.17
-4	± 0.75		± 0.17
-5	± 0.75		± 0.17
-6	± 0.75		± 0.17
-7	± 0.75		± 0.17
-8	± 0.75		± 0.17
-9	± 0.75		± 0.17
-10	± 0.75		± 0.17
-11	± 0.75		± 0.17
-12	± 0.75		± 0.17
-13	± 0.75		± 0.17
-14	± 0.75		± 0.17
-15	± 0.75		± 0.17

**Trace Noise CW Test (Magnitude)**

Direction: S21

<b>CW frequency [Hz]</b>	<b>IF bandwidth [Hz]</b>	<b>Test limit [dB rms]</b>	<b>Test result [dB rms]</b>
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.0012	
6 G	3 k	< 0.0036	
7.5 G	3 k	< 0.0036	
8.5 G	3 k	< 0.006	

Direction: S12

<b>CW frequency [Hz]</b>	<b>IF bandwidth [Hz]</b>	<b>Test limit [dB rms]</b>	<b>Test result [dB rms]</b>
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.0012	
6 G	3 k	< 0.0036	
7.5 G	3 k	< 0.0036	
8.5 G	3 k	< 0.006	

Direction: S23 (Option 313 and 314 only)

<b>CW frequency [Hz]</b>	<b>IF bandwidth [Hz]</b>	<b>Test limit [dB rms]</b>	<b>Test result [dB rms]</b>
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.0012	

2. Performance Test

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY422, and above**

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
6 G	3 k	< 0.0036	
7.5 G	3 k	< 0.0036	
8.5 G	3 k	< 0.006	

Direction: S32 (Option 313 and 314 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.0012	
6 G	3 k	< 0.0036	
7.5 G	3 k	< 0.0036	
8.5 G	3 k	< 0.006	

Direction: S43 (Option 413 and 414 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.0012	
6 G	3 k	< 0.0036	
7.5 G	3 k	< 0.0036	
8.5 G	3 k	< 0.006	

Direction: S34 (Option 413 and 414 only)

CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
3 M	3 k	< 0.001	



CW frequency [Hz]	IF bandwidth [Hz]	Test limit [dB rms]	Test result [dB rms]
1.3 G	3 k	< 0.001	
2.1 G	3 k	< 0.001	
3 G	3 k	< 0.001	
4.25 G	3 k	< 0.0012	
6 G	3 k	< 0.0036	
7.5 G	3 k	< 0.0036	
8.5 G	3 k	< 0.006	

### Crosstalk Test

Direction: S21 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -109	
6 G - 7.5 G	10	< -99	
7.5 G - 8.5 G	10	< -89	

Direction: S12 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -109	
6 G - 7.5 G	10	< -99	
7.5 G - 8.5 G	10	< -89	

Direction: S32 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -109	
6 G - 7.5 G	10	< -99	
7.5 G - 8.5 G	10	< -89	

## Performance Tests

### E5071B Performance Test Record for Serial Prefix: MY422, and above

Direction: S23 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -109	
6 G - 7.5 G	10	< -99	
7.5 G - 8.5 G	10	< -89	

Direction: S41 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -109	
6 G - 7.5 G	10	< -99	
7.5 G - 8.5 G	10	< -89	

Direction: S14 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 3 G	10	< -120	
3 G - 6 G	10	< -109	
6 G - 7.5 G	10	< -99	
7.5 G - 8.5 G	10	< -89	

## System Dynamic Range Test

Direction: S21 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 G - 4 G	10	< -121	
4 G - 6 G	10	< -117	
6 G - 7.5 G	10	< -112	
7.5 G - 8.5 G	10	< -105	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	

## E5071B Performance Test Record for Serial Prefix: MY422, and above

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 G - 4 G	3 k	< -96	
4 G - 6 G	3 k	< -92	
6 G - 7.5 G	3 k	< -87	
7.5 G - 8.5 G	3 k	< -80	

Direction: S12 (Options 213, 214, 313 and 314 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 G - 4 G	10	< -121	
4 G - 6 G	10	< -117	
6 G - 7.5 G	10	< -112	
7.5 G - 8.5 G	10	< -105	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	
3 G - 4 G	3 k	< -96	
4 G - 6 G	3 k	< -92	
6 G - 7.5 G	3 k	< -87	
7.5 G - 8.5 G	3 k	< -80	

Direction: S32 (Options 313, 314, 413, 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 G - 4 G	10	< -121	
4 G - 6 G	10	< -117	
6 G - 7.5 G	10	< -112	
7.5 G - 8.5 G	10	< -105	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	
3 G - 4 G	3 k	< -96	

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY422, and above**

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
4 G - 6 G	3 k	< -92	
6 G - 7.5 G	3 k	< -87	
7.5 G - 8.5 G	3 k	< -80	

Direction: S23 (Options 313, 314, 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 G - 4 G	10	< -121	
4 G - 6 G	10	< -117	
6 G - 7.5 G	10	< -112	
7.5 G - 8.5 G	10	< -105	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	
3 G - 4 G	3 k	< -96	
4 G - 6 G	3 k	< -92	
6 G - 7.5 G	3 k	< -87	
7.5 G - 8.5 G	3 k	< -80	

Direction: S41 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 G - 4 G	10	< -121	
4 G - 6 G	10	< -117	
6 G - 7.5 G	10	< -112	
7.5 G - 8.5 G	10	< -105	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	
3 G - 4 G	3 k	< -96	
4 G - 6 G	3 k	< -92	

## E5071B Performance Test Record for Serial Prefix: MY422, and above

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
6 G - 7.5 G	3 k	< -87	
7.5 G - 8.5 G	3 k	< -80	

Direction: S14 (Options 413 and 414 only)

Frequency range [Hz]	IF bandwidth [Hz]	Test limit [dB]	Test result [dB]
3 M - 1.5 G	10	< -120	
1.5 G - 3 G	10	< -122	
3 G - 4 G	10	< -121	
4 G - 6 G	10	< -117	
6 G - 7.5 G	10	< -112	
7.5 G - 8.5 G	10	< -105	
3 M - 1.5 G	3 k	< -95	
1.5 G - 3 G	3 k	< -97	
3 G - 4 G	3 k	< -96	
4 G - 6 G	3 k	< -92	
6 G - 7.5 G	3 k	< -87	
7.5 G - 8.5 G	3 k	< -80	

### Dynamic Accuracy Test

@ Reference power level: -10 dBm

Direction: S21

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	$\pm 0.207$		$\pm 0.060$
5	$\pm 0.075$		$\pm 0.022$
0	$\pm 0.042$		$\pm 0.012$
-5	$\pm 0.031$		$\pm 0.012$
-15	$\pm 0.030$		$\pm 0.0087$
-20	$\pm 0.035$		$\pm 0.0087$
-25	$\pm 0.040$		$\pm 0.012$
-30	$\pm 0.045$		$\pm 0.012$

Performance Tests

E5071B Performance Test Record for Serial Prefix: MY422, and above

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	± 2.008		± 0.032

Direction: S12

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019

## E5071B Performance Test Record for Serial Prefix: MY422, and above

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-55	$\pm 0.106$		$\pm 0.022$
-60	$\pm 0.125$		$\pm 0.022$
-65	$\pm 0.151$		$\pm 0.025$
-70	$\pm 0.189$		$\pm 0.025$
-75	$\pm 0.248$		$\pm 0.028$
-80	$\pm 0.346$		$\pm 0.028$
-85	$\pm 0.509$		$\pm 0.030$
-90	$\pm 0.785$		$\pm 0.030$
-95	$\pm 1.248$		$\pm 0.032$
-100	$\pm 2.008$		$\pm 0.032$

Direction: S31 (Options 313, 314, 413 and 414 only)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	$\pm 0.207$		$\pm 0.060$
5	$\pm 0.075$		$\pm 0.022$
0	$\pm 0.042$		$\pm 0.012$
-5	$\pm 0.031$		$\pm 0.012$
-15	$\pm 0.030$		$\pm 0.0087$
-20	$\pm 0.035$		$\pm 0.0087$
-25	$\pm 0.040$		$\pm 0.012$
-30	$\pm 0.045$		$\pm 0.012$
-35	$\pm 0.056$		$\pm 0.016$
-40	$\pm 0.067$		$\pm 0.016$
-45	$\pm 0.078$		$\pm 0.019$
-50	$\pm 0.091$		$\pm 0.019$
-55	$\pm 0.106$		$\pm 0.022$
-60	$\pm 0.125$		$\pm 0.022$
-65	$\pm 0.151$		$\pm 0.025$
-70	$\pm 0.189$		$\pm 0.025$

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY422, and above**

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030
-95	± 1.248		± 0.032
-100	±2.008		± 0.032

Direction: S41 (Options 413 and 414 only)

Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
10	± 0.207		± 0.060
5	± 0.075		± 0.022
0	± 0.042		± 0.012
-5	± 0.031		± 0.012
-15	± 0.030		± 0.0087
-20	± 0.035		± 0.0087
-25	± 0.040		± 0.012
-30	± 0.045		± 0.012
-35	± 0.056		± 0.016
-40	± 0.067		± 0.016
-45	± 0.078		± 0.019
-50	± 0.091		± 0.019
-55	± 0.106		± 0.022
-60	± 0.125		± 0.022
-65	± 0.151		± 0.025
-70	± 0.189		± 0.025
-75	± 0.248		± 0.028
-80	± 0.346		± 0.028
-85	± 0.509		± 0.030
-90	± 0.785		± 0.030



Power level [dBm]	Test limit [dB]	Test result [dB]	Measurement uncertainty [dB]
-95	± 1.248		± 0.032
-100	±2.008		± 0.032

### Uncorrected System Performance Test

@ Correction: Off, System Correction: On

Port 1

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Directivity	3 G - 6 G	< -20	
Directivity	6 G - 8.5 G	< -15	
Source match	3 M - 3 G	< -25	
Source match	3 G - 6 G	< -20	
Source match	6 G - 8.5 G	< -15	
Load match	3 M - 3 G	< -17	
Load match	3 G - 6 G	< -12	
Load match	6 G - 8.5 G	< -10	
Transmission Tracking	3 M - 3 G	± 1.0	
Transmission Tracking	3 G - 6 G	± 1.0	
Transmission Tracking	6 G - 8.5 G	± 1.0	
Reflection Tracking	3 M - 3 G	± 1.0	
Reflection Tracking	3 G - 6 G	± 1.0	
Reflection Tracking	6 G - 8.5 G	± 1.0	

Port 2

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	< -25	
Directivity	3 G - 6 G	< -20	

2. Performance Test

Performance Tests

**E5071B Performance Test Record for Serial Prefix: MY422, and above**

<b>System performance</b>	<b>Frequency range [Hz]</b>	<b>Test limit [dB]</b>	<b>Test result [dB]</b>
Directivity	6 G - 8.5 G	< -15	
Source match	3 M - 3 G	< -25	
Source match	3 G - 6 G	< -20	
Source match	6 G - 8.5 G	< -15	
Load match	3 M - 3 G	< -17	
Load match	3 G - 6 G	< -12	
Load match	6 G - 8.5 G	< -10	
Transmission Tracking	3 M - 3 G	± 1.0	
Transmission Tracking	3 G - 6 G	± 1.0	
Transmission Tracking	6 G - 8.5 G	± 1.0	
Reflection Tracking	3 M - 3 G	± 1.0	
Reflection Tracking	3 G - 6 G	± 1.0	
Reflection Tracking	6 G - 8.5 G	± 1.0	

Port 3 (Options 313, 314, 413 and 414 only)

<b>System performance</b>	<b>Frequency range [Hz]</b>	<b>Test limit [dB]</b>	<b>Test result [dB]</b>
Directivity	3 M - 3 G	< -25	
Directivity	3 G - 6 G	< -20	
Directivity	6 G - 8.5 G	< -15	
Source match	3 M - 3 G	< -25	
Source match	3 G - 6 G	< -20	
Source match	6 G - 8.5 G	< -15	
Load match	3 M - 3 G	< -17	
Load match	3 G - 6 G	< -12	
Load match	6 G - 8.5 G	< -10	
Transmission Tracking	3 M - 3 G	± 1.0	

## E5071B Performance Test Record for Serial Prefix: MY422, and above

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Transmission Tracking	3 G - 6 G	$\pm 1.0$	
Transmission Tracking	6 G - 8.5 G	$\pm 1.0$	
Reflection Tracking	3 M - 3 G	$\pm 1.0$	
Reflection Tracking	3 G - 6 G	$\pm 1.0$	
Reflection Tracking	6 G - 8.5 G	$\pm 1.0$	

Port 4 (Options 413 and 414 only)

System performance	Frequency range [Hz]	Test limit [dB]	Test result [dB]
Directivity	3 M - 3 G	$< -25$	
Directivity	3 G - 6 G	$< -20$	
Directivity	6 G - 8.5 G	$< -15$	
Source match	3 M - 3 G	$< -25$	
Source match	3 G - 6 G	$< -20$	
Source match	6 G - 8.5 G	$< -15$	
Load match	3 M - 3 G	$< -17$	
Load match	3 G - 6 G	$< -12$	
Load match	6 G - 8.5 G	$< -10$	
Transmission Tracking	3 M - 3 G	$\pm 1.0$	
Transmission Tracking	3 G - 6 G	$\pm 1.0$	
Transmission Tracking	6 G - 8.5 G	$\pm 1.0$	
Reflection Tracking	3 M - 3 G	$\pm 1.0$	
Reflection Tracking	3 G - 6 G	$\pm 1.0$	
Reflection Tracking	6 G - 8.5 G	$\pm 1.0$	

Performance Tests  
**E5071B Performance Test Record for Serial Prefix: MY422, and above**

---

## 3 Adjustment

This chapter provides the adjustment information for the E5070B/E5071B ENA Series Network Analyzer to ensure that the it is within its specifications. The adjustment must be performed Agilent's qualified service personnel. If you need the adjustment for your E5070B/E5071B, 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 E5070B/E5071B 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 24 lists the equipment required to perform the Adjustment procedures described in this chapter. Use only calibrated test equipment when adjusting the E5070B/E5071B.

## 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 Agilent's qualified service personnel. If you need the adjustment for your E5070B/E5071B, it should be sent to the nearest Agilent Technologies service office.

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

Replaced Assembly	Adjustment Item					
	Writing ID	Frequency Reference Adjustment	Oven Reference Adjustment (Opt. 1E5)	IF Range Gain/Phase Adjustment	Source Power Adjustment	Test Ports Characteristics Adjustment
Source Board		√			√	√
Receiver (RF) Board					√	√
Receiver (IF) Board				√	√	√
RF Switch					√	√
Crystal Oven (Opt. 1E5)			√			
Attenuator (Opt.214, 314 and 414)					√	√
Hard Disk Drive						
Analog Interface Board	√					
Level Vernier					√	√
Power Amp Module					√	√

### Writing ID

This item writes the serial number and the option structure into the E5070B/E5071B.

### Required equipment for the writing ID

None

### Frequency Reference Adjustment

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

## Adjustment

### Required Adjustment after Replacing Assembly

#### Required equipment for frequency reference adjustment

Description	Recommended Model
Frequency Counter	Agilent 53181A Opt. 010
Frequency Standard	Agilent 5071A
BNC(m)-BNC(m) Cable, 61 cm	Agilent p/n 8120-1839

#### 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 the oven reference adjustment

Description	Recommended Model
Frequency Counter	Agilent 53181A Opt. 010
Frequency Standard	Agilent 5071A
BNC(m)-BNC(m) Cable, 61 cm	Agilent p/n 8120-1839

#### IF Range Gain/Phase Adjustment

The purpose of this procedure is to adjust difference of the gain and phase between neighbor IF ranges.

#### Required equipment for the F rang gain/phase adjustment

Description	Recommended Model
6 dB Attenuator	Agilent 8491A w/Opt. 006 and H60
N(m)-N(m) Cable, 61 cm	Agilent N6314A ( p/n 8120-8862)

#### Source Power Adjustment

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



**Required equipment for the source power adjustment**

<b>Description</b>	<b>Recommended Model</b>
Power Meter	Agilent E4419A/B
Power Sensor	Agilent E4412A
Power Sensor	Agilent 8482A

**Test Ports Characteristics Adjustment**

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

**Required equipment for the test port characteristics adjustment**

<b>Description</b>	<b>Recommended Model</b>
Calibration Kit	Agilent 85052F
N(m)-N(m) Cable	Agilent N6314A (p/n 8120-8862)

Adjustment  
**Required Adjustment after Replacing Assembly**

---

# 4 Troubleshooting

This chapter provides procedure to isolate a faulty assembly in the E5070B/E5071B Network Analyzer

## 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.

---

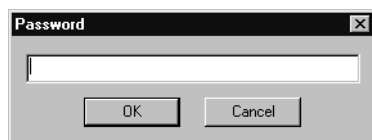
## How to exit from the E5070B/E5071B Measurement View

You need to exit from the E5070B/E5071B Measurement View to perform some troubleshooting. The following is the procedure to exit from the E5070B/E5071B Measurement View.

- Step 1.** Connect the mouse and external keyboard to the connectors on the E5070B/E5071B rear panel.
- Step 2.** Turn the instrument on.
- Step 3.** Press **System** key.
- Step 4.** Click **Service Menu - Service Function**. Password dialog box opens as shown in Figure 4-1.

Figure 4-1

Password dialog box



- Step 5.** Enter the password **kid** in the Password box and then click "OK" button.
- Step 6.** Click **Exit** in Service Functions Menu. Then the E5070B/E5071B exit the Measurement View, then windows desktop screen appears with 4 icons (My Computer, Recycle Bin, My Network Places, and Network Analyzer.)

---

### NOTE

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

---

### NOTE

If you need to shut down the E5070B/E5071B 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 E5070B/E5071B. 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 E5070B/E5071B. Figure 4-2 shows the trouble isolation flow chart.

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

About a few minutes after the E5070B/E5071B 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 213.

**Step 2.** Check the display

- If no display appears on the LCD after the E5070B/E5071B is turned on, go to “No Display troubleshooting” on page 204.
- If the E5070B/E5071B stops in booting process despite something being displayed on the LCD, go to “Boot Process Troubleshooting for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 207.
- The power-on self test is performed once automatically after the E5070B/E5071B measurement view is displayed. If the power-on self test fails, go to “Troubleshooting Using Internal Test” on page 219.

**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 227.

**Step 4.** Check the measurement function

If the instrument fails performance tests, go to “Performance test failure troubleshooting” on page 260.

If the measurement function does not work correctly, perform the internal test and external test provided in the E5070B/E5071B's service function. When the internal test fails, go to “Internal Test Failure Troubleshooting” on page 222. When the external test fails, go to “External Test Failure Troubleshooting” on page 254.

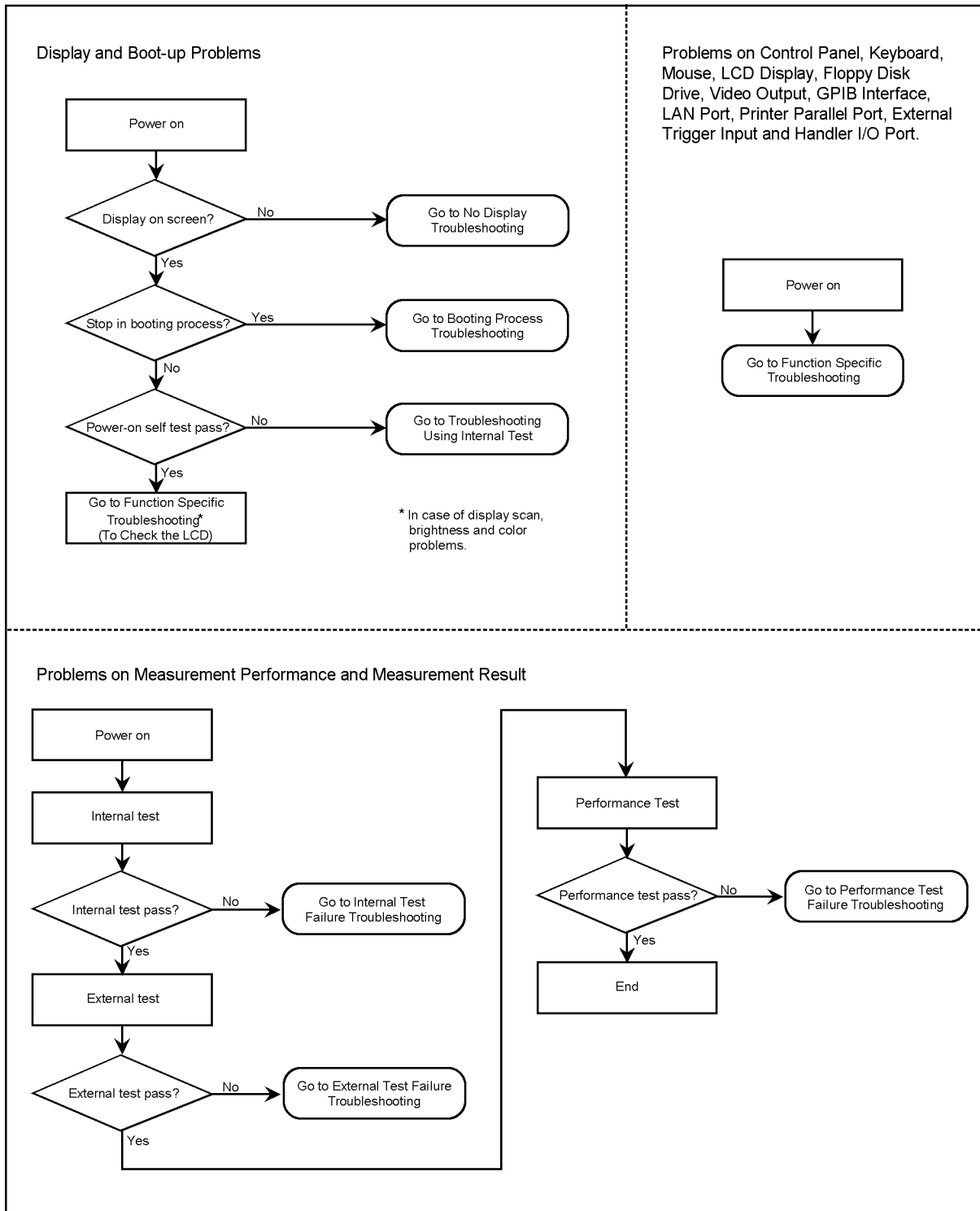
---

**NOTE**

The internal 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 internal test even if the power-on self test passed.

---

Figure 4-2 Primary trouble isolation flowchart



e5070bse179

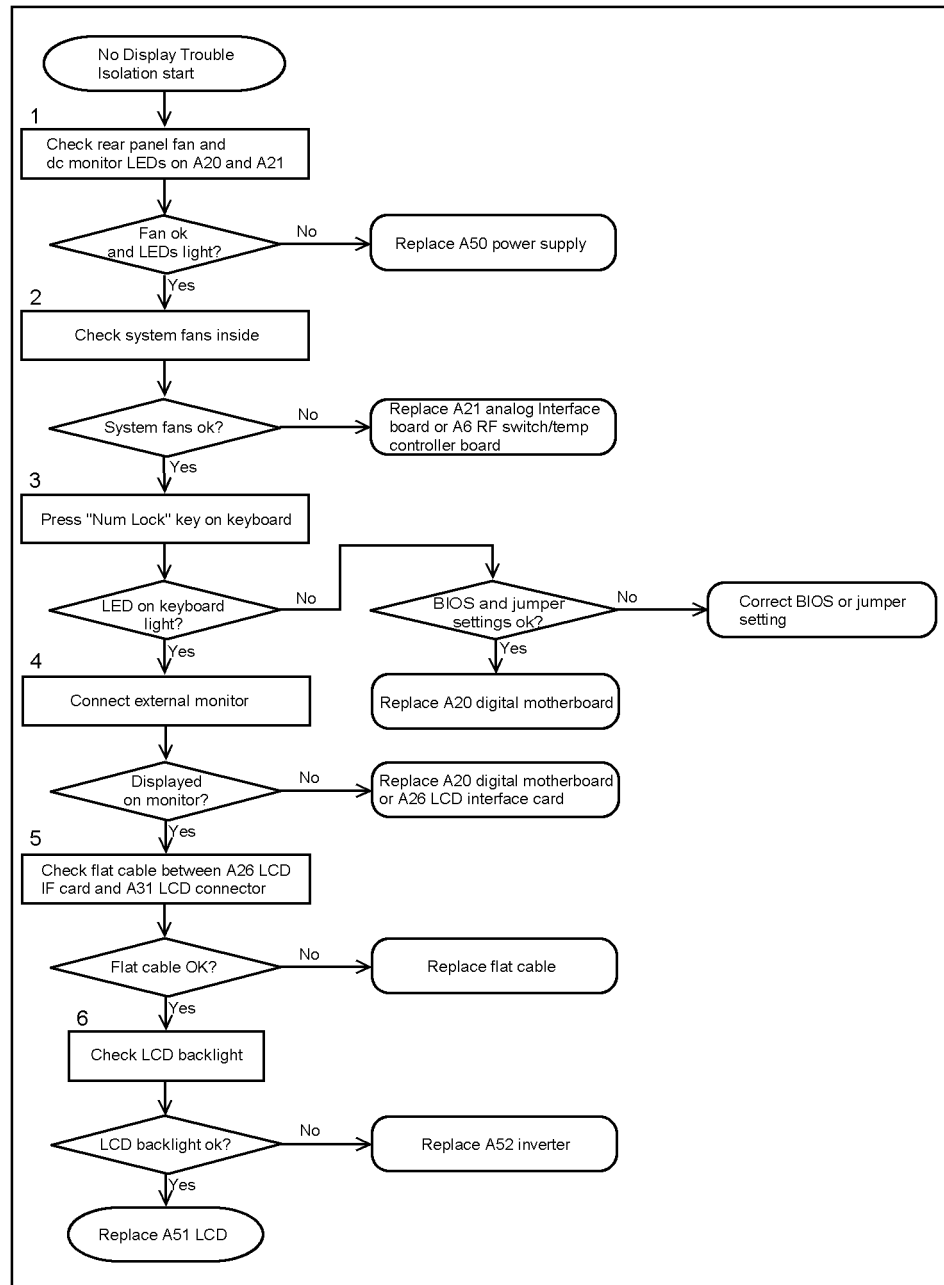
## No Display troubleshooting

If the E5070B/E5071B 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 E5070B/E5071B rear panel connector, turn the power on and start trouble isolation. The methods of trouble isolation are described in the procedural step 1 to 5.

Figure 4-3

### No display trouble isolation procedure



e5070ase156



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

If the rear panel fan (blower) doesn't run, a failure in A50 ATX power supply is assumed. Remove the E5070B/E5071B outer cover and check if the following LEDs light:

- +3.3 V and +5 V dc monitor LEDs on A21 analog interface board
- +5 V dc monitor LED on A20 digital motherboard

---

**NOTE**

To check all the outputs of the A50, 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 A50.

---

**Step 2.** Check system fans inside.

If the system fans on the chassis inside the E5070B/E5071B don't run, problem seems in the A21 analog interface board or the flat cable between the A21 and the A22 front panel keyboard. In this case, remove the E5070B/E5071B outer cover and make sure whether the fans run or not.

If a beep and a power shutdown occur immediately after power is turned on, there is a possibility that either of the fans won't run. There are three system fans, which are independently controlled by A6 RF switch/temperature controller board. These fans initially run fast after the power is turned on, and usually stop after a while. One or some of them restart running when the instrument warms up. The power shutdown occurs the moment the system fan stops by any anomaly. In this case, check the A6 board and the fan that doesn't run.

---

**NOTE**

If the power shutdown occurs without a beep, the problem seems in the A21 or the A20 board. Check BIOS status of A20 is correct as described in "Configure the Motherboard" on page 262.

Before replacing the board, check if the jumper setting on the A20 is correct as described in "Configure the Motherboard" on page 262.

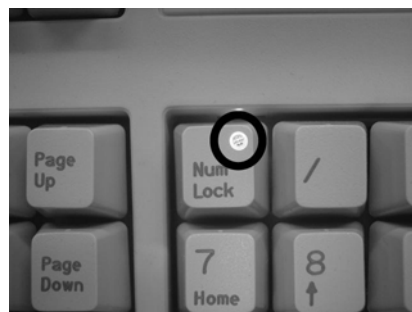
---

**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 4-4, a problem seems in the A20 digital motherboard.

**Figure 4-4**

**LED of the Num Lock key**



Make sure the followings before replacing the A20 board.

## Troubleshooting

### No Display troubleshooting

- Whether all the connections to the A20 are normal or not. Check if there is any disconnection or connection working loose.
- Whether the jumper setting on the A20 is correct or not as described in “Configure the Motherboard” on page 262.
- Whether BIOS options are correct or not as described in “To Confirm or Set the BIOS Options” on page 264.

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

Connect an external VGA monitor to the VIDEO output on the E5070B/E5071B rear panel.

- If something is displayed on the external monitor, the problem is present around the LCD. Also check the A21 and A22 because the ON/OFF setting of the LCD backlight is controlled by the A21 through the A22 front interface board.
- If nothing is displayed even on the external monitor, the problem seems in the A20 digital motherboard or A26 LCD interface card.

---

#### NOTE

Check if the A26 board is securely connected to the A20 board.

#### Step 5. Checking flat cable

Check a flat cable between the A26 and A31 LCD connector.

#### Step 6. Check around the backlight

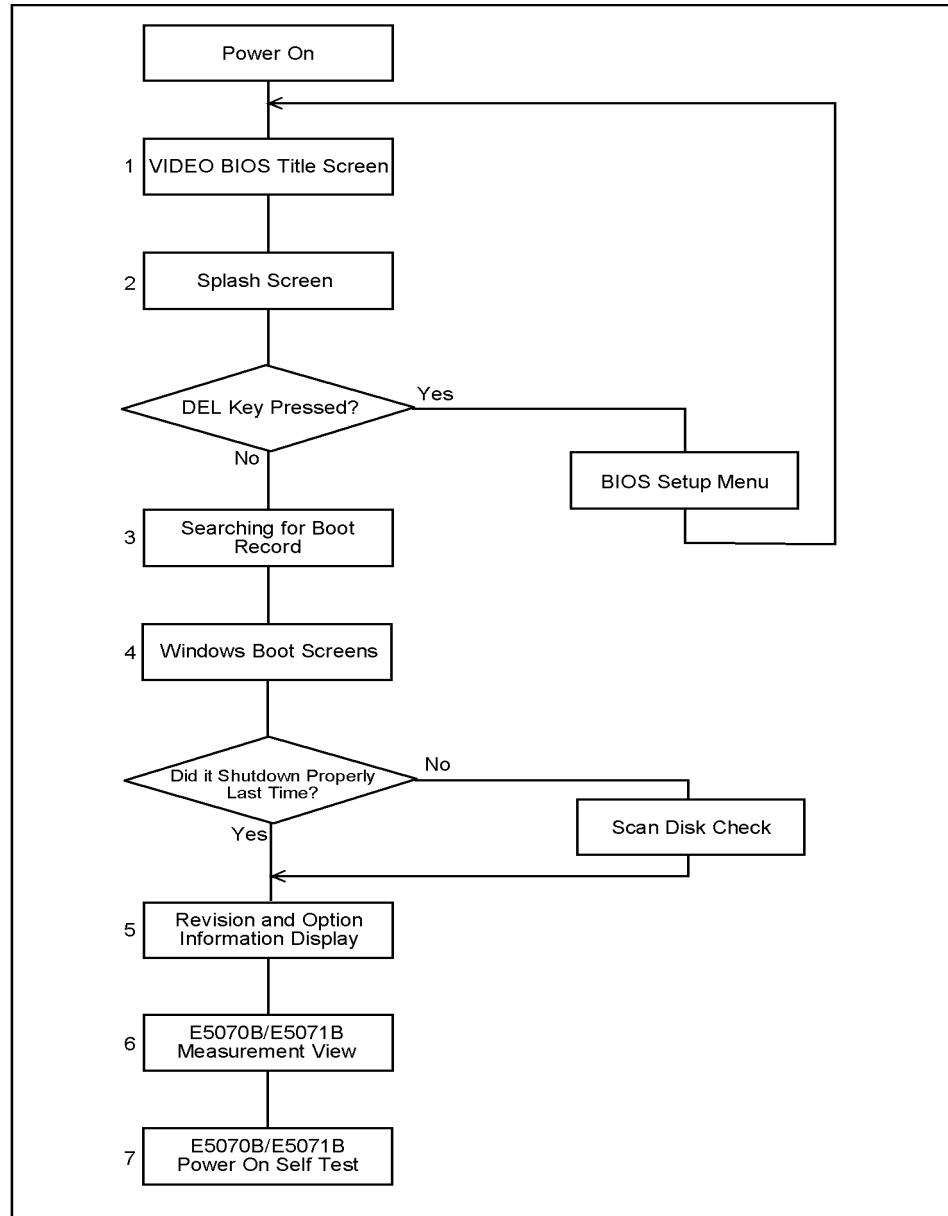
Check A52 inverter board and a cable between the A52 and A26. Also check the cables between the A51 LCD and A52. If the cables are normal, check the A51 LCD.

## Boot Process Troubleshooting for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Figure 4-5 represents the booting process flow in the E5070B/E5071B. If the E5070B/E5071B stops in the booting process, troubleshoot using the following step-by-step procedure.

Figure 4-5

Booting process flowchart



e5070bse141

## Troubleshooting

### Boot Process Troubleshooting for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

#### Step 1. Video BIOS booting

Video BIOS title screen shown in Figure 4-6 is displayed first, when the E5070B/E5071B is turned on. If this screen doesn't appear (nothing appears), go to “No Display troubleshooting” on page 204.

---

#### NOTE

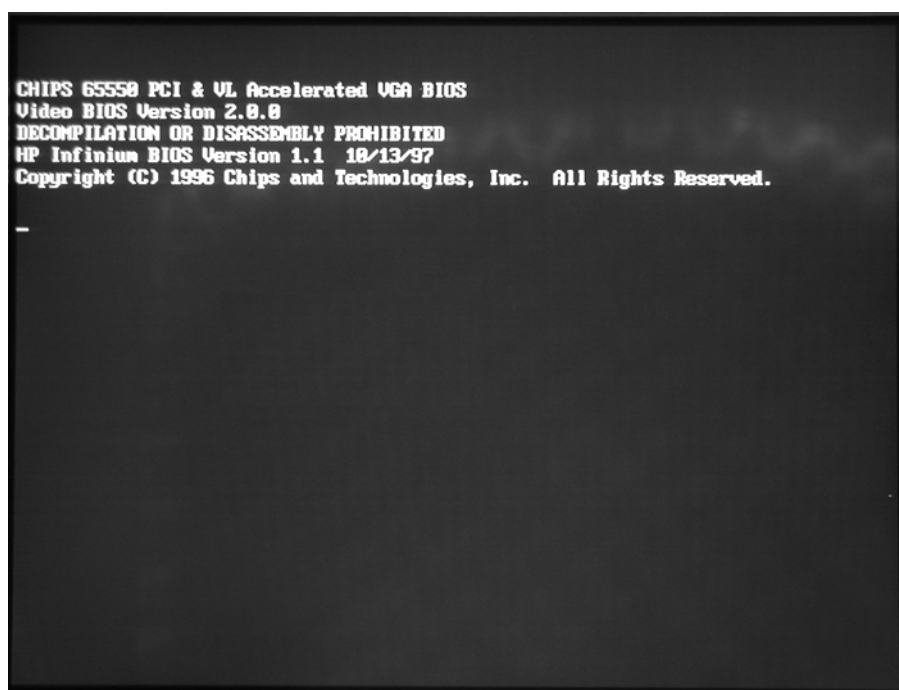
If the power shutdown occurs without a beep, the problem seems in the A21 or the A20 board. Check BIOS status of A20 is correct as described in “Configure the Motherboard” on page 262.

Before replacing the board, check if the jumper setting on the A20 is correct as described in “Configure the Motherboard” on page 262.

---

Figure 4-6

#### Video BIOS title screen



#### Step 2. Splash Screen

The splash screen is displayed with Agilent logo as shown in Figure 4-7.

If the splash screen is displayed, you can assume that the A20 digital motherboard is functioning correctly.

---

#### NOTE

While the splash screen is displayed. If you want to run the BIOS setup utility, push Delete key as soon as the message of "Press TAB to show POST screen, DEL to enter SETUP, F12 to select BOOT DEVICE" in the splash screen.

Key	Action
TAB	Show the POST(Power-on Self Test) screen for BIOS.

Key	Action
DEL	Run the BIOS Setup Utility. For details of how to run the BIOS setup utility, refer to “Run the BIOS setup utility” on page 264.
F12	Select the boot device. This menu is used for system recovery. For the detail of the recovery, refer to Appendix B, “System Recovery,” on page 473.

**Figure 4-7**

**Splash Screen**

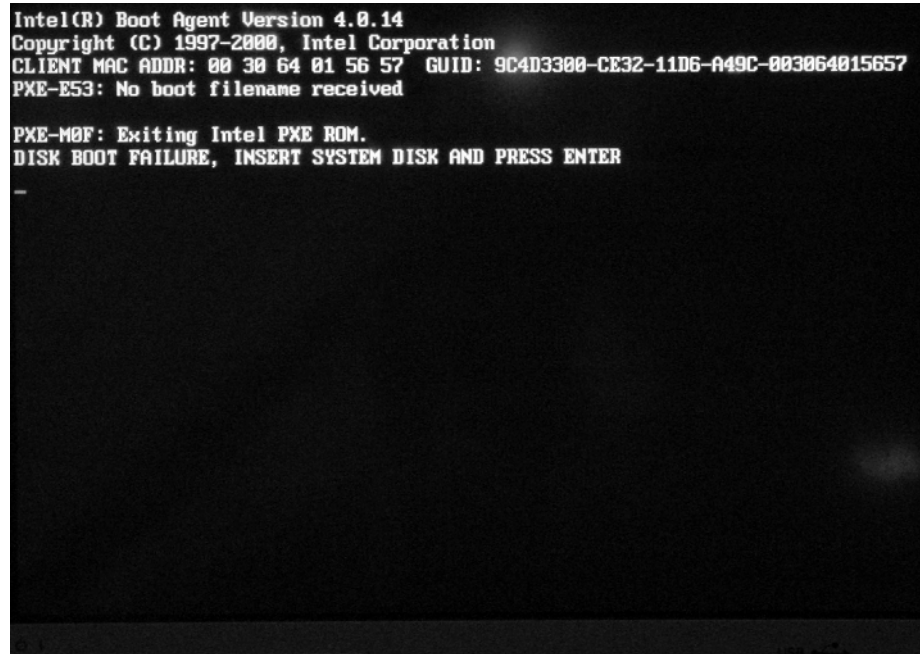


**Step 3.** Searching for boot record

E5070B/E5071B starts booting from A27 mass storage (IDE-0) after the splash screen appears. However, if the E5070B/E5071B cannot boot from the A27, a message of "Boot Failure" is displayed as shown in Figure 4-8. In this case, the E5070B/E5071B may have a problem around the A27.

Figure 4-8

Message of Boot Failure



Check whether the A27 has a problem or is not using BIOS setup utility as shown in Figure 4-9. For details of how to run the BIOS setup utility, refer to “Run the BIOS setup utility” on page 264.





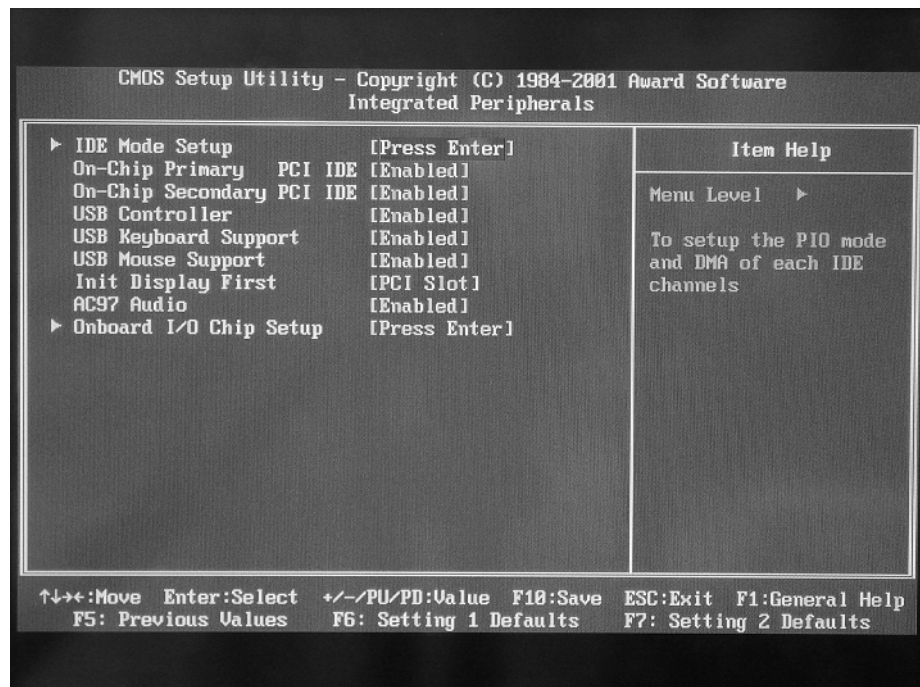
Move the cursor to "Integrated Peripherals" using     keys on the keyboard and press Enter key at the BIOS setup utility main menu. .

Figure 4-9

Auto-Detect Hard Disk page



**Boot Process Troubleshooting for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**

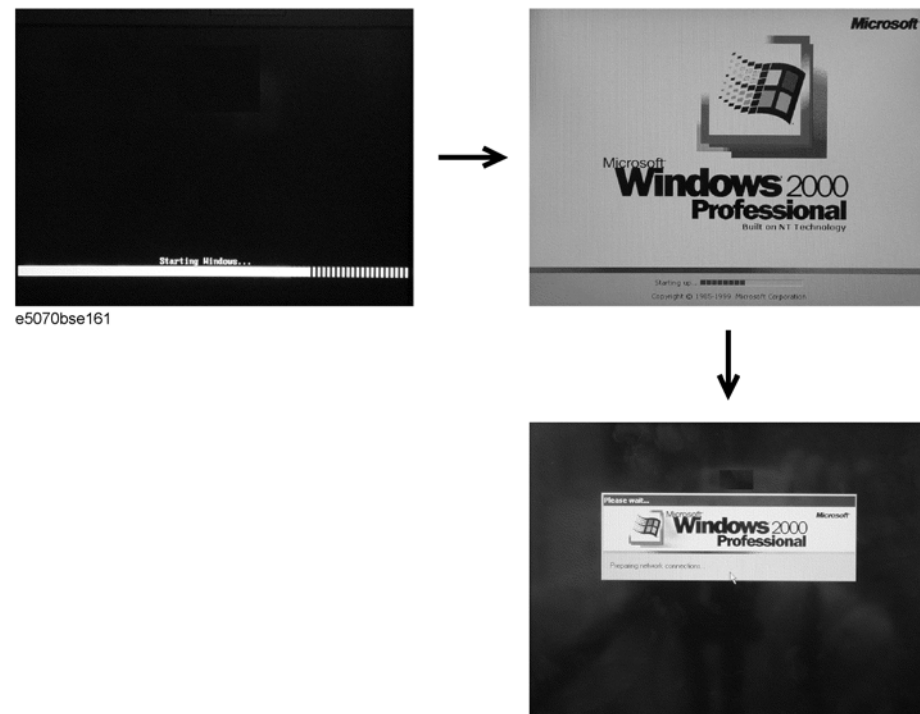
When the mass storage is detected, the HDD model name is displayed as shown in Figure 4-9 in the Standard CMOS Features window under the BIOS setup utility. If the mass storage is not detected, "None" is displayed. The A27 mass storage is connected to the IDE connector on the A20 digital motherboard via A30 3.5"-2.5" adapter and a flat cable. Check the flat cable first. If it has no problem, replace the A27 mass storage.

**Step 4. Windows boot screens**

The Windows boot screens are displayed. The Windows boot screens consists of three screens. Each screens is display in the order as shown in Figure 4-10. If the Windows boot screens are displayed, it is assumed that the A27 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 A27.

- "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 E5070B/E5071B 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 473. If the operating system still doesn't boot up properly after reinstallation, replace the A27.



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**NOTE**

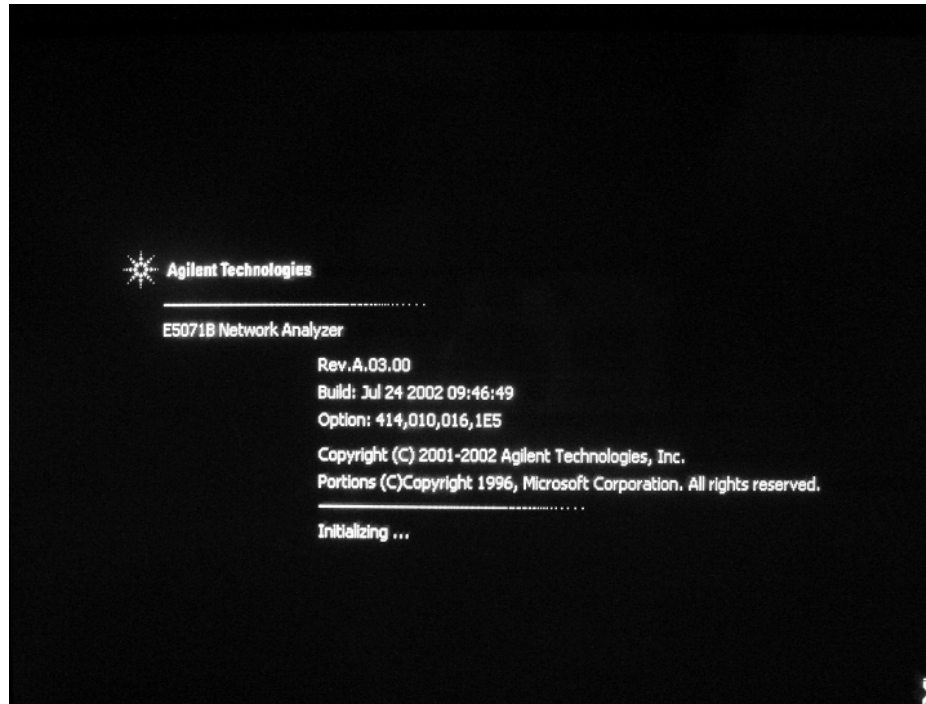
The operating system automatically checks the device drivers, which are necessary to use the E5070B/E5071B functions and are installed in the system before the E5070B/E5071B is shipped from Agilent factory. If the operating system doesn't detect them, a message box is displayed. In this case, install the device driver.

---

**Step 5.** Revision and option information

The firmware revision and hardware option information along with copyright declaration is displayed as shown in Figure 4-11. The E5070B/E5071B 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 A21 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 A21 board doesn't work or is not properly connected to the A20.

"Fatal Error: Failed to Update DSP Code":



**Boot Process Troubleshooting for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**

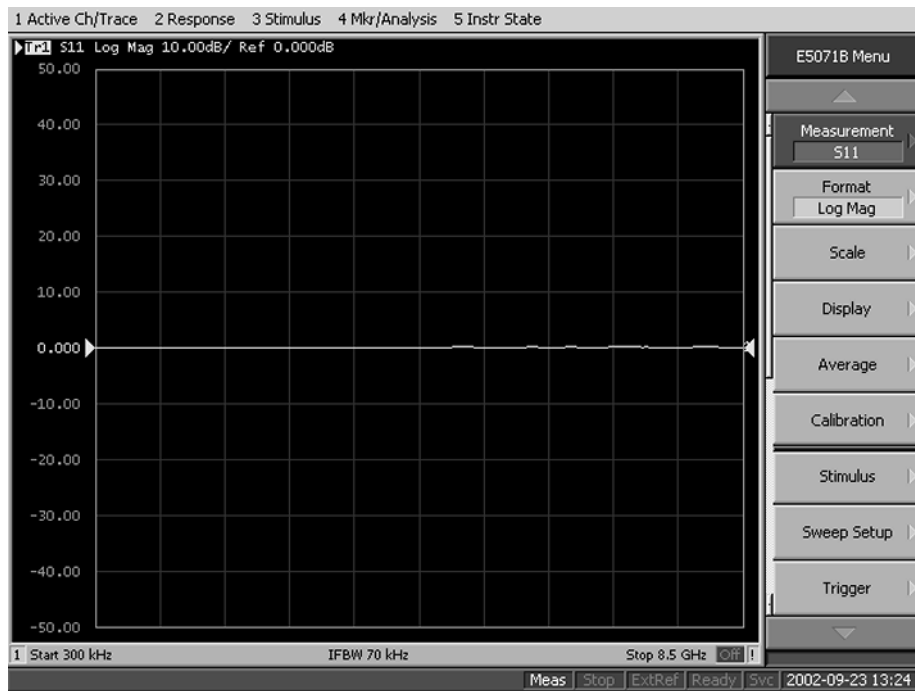
If this happened, the A21 board failed in writing DSP program into flash ROM when the firmware was installed first or updated to the newest version. A problem in the A21 or A20 is suspected.

**Step 6. 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 7. Power-on self test**

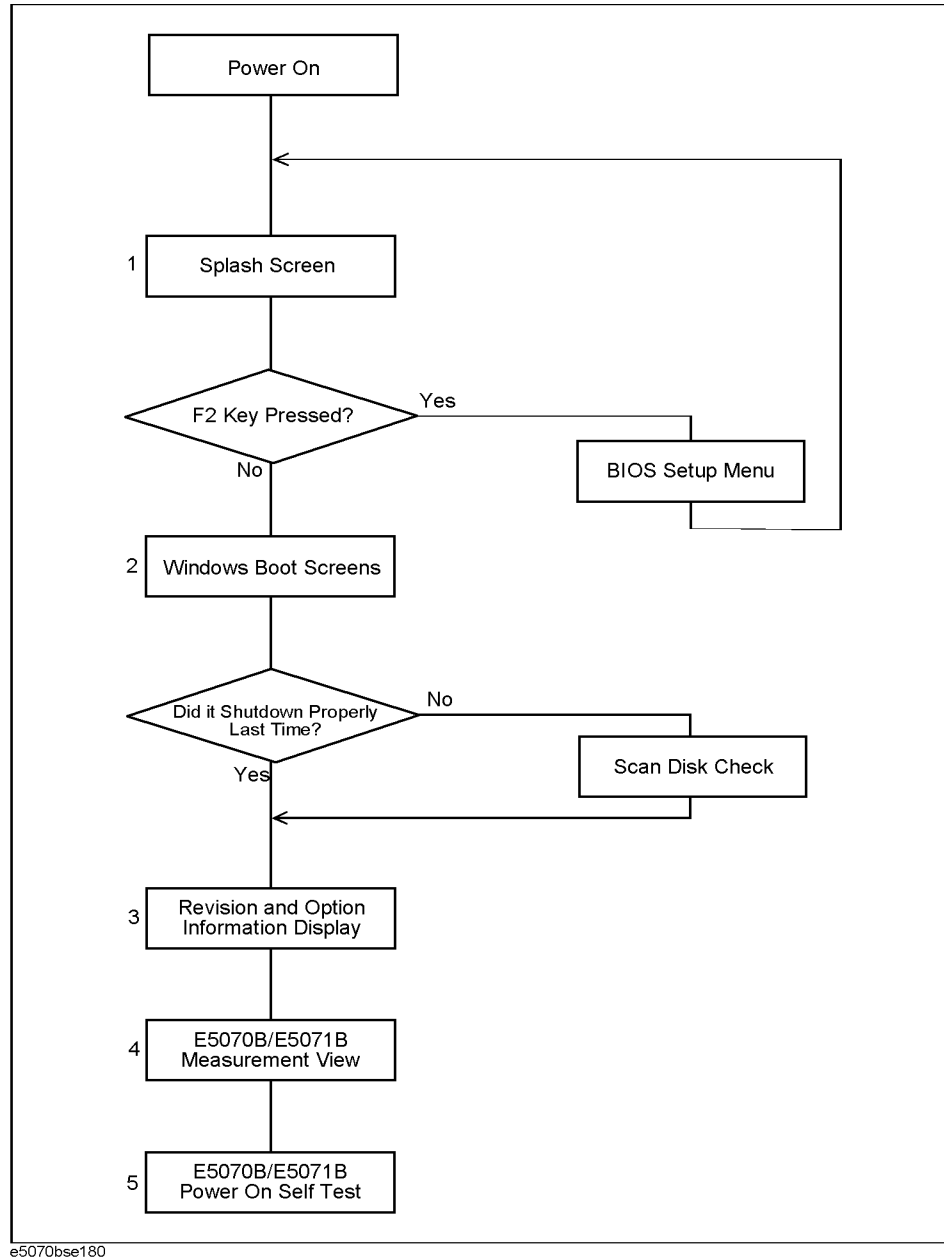
The power-on self test is executed once automatically before the measurement starts. While the power-on self test is in progress, "Power on test" is displayed at the left in the instrument status bar. If the power-on test fails, an error message is displayed there. For more details, refer to "Troubleshooting Using Internal Test" on page 219.

## Boot Process Troubleshooting for E5070B : MY42300633 and above, E5071B : MY42301397 and above

Figure 4-13 represents the booting process flow in the E5070B/E5071B. If the E5070B/E5071B stops in the booting process, troubleshoot using the following step-by-step procedure.

Figure 4-13

Booting process flowchart



Step 1. Splash Screen

**Boot Process Troubleshooting for E5070B : MY42300633 and above, E5071B : MY42301397 and above**

The splash screen is displayed with Agilent logo as shown in Figure 4-14.

If the splash screen is displayed, you can assume that the A20 digital motherboard 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 4-14**      **Splash Screen**

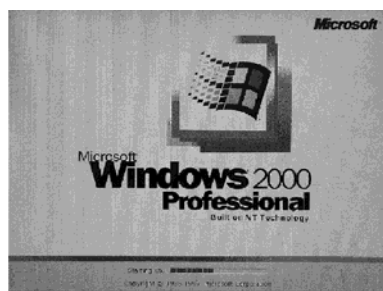


**Step 2.** Windows boot screens

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 4-15. If the Windows boot screens are displayed, it is assumed that the A27 HDD works. While the Window screens are displayed, Windows operating system is starting up.

Figure 4-15

**Windows boot screens**



e5061ase051

If you encounter the following problems, try to reinstall the operating system before replacing the A27.

- "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 E5070B/E5071B 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 473. If the operating system still doesn't boot up properly after reinstallation, replace the A27.

---

**NOTE**

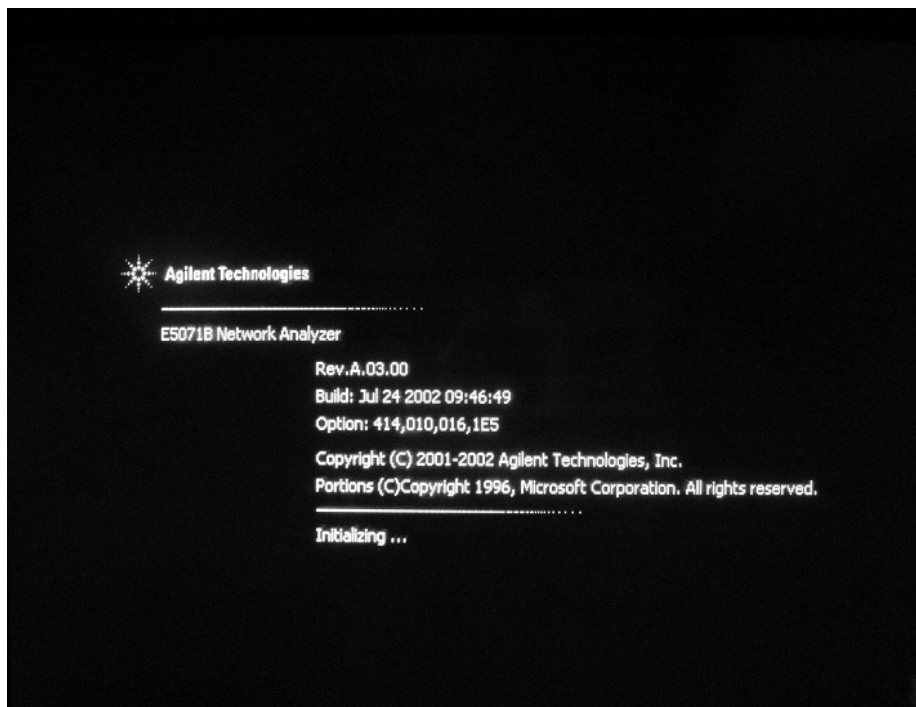
The operating system automatically checks the device drivers, which are necessary to use the E5070B/E5071B functions and are installed in the system before the E5070B/E5071B is shipped from Agilent factory. If the operating system doesn't detect them, a message box is displayed. In this case, install the device driver.

**Step 3.** Revision and option information

The firmware revision and hardware option information along with copyright declaration is displayed as shown in Figure 4-16. The E5070B/E5071B 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 4-16

## 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 A21 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 A21 board doesn't work or is not properly connected to the A20.

"Fatal Error: Failed to Update DSP Code":

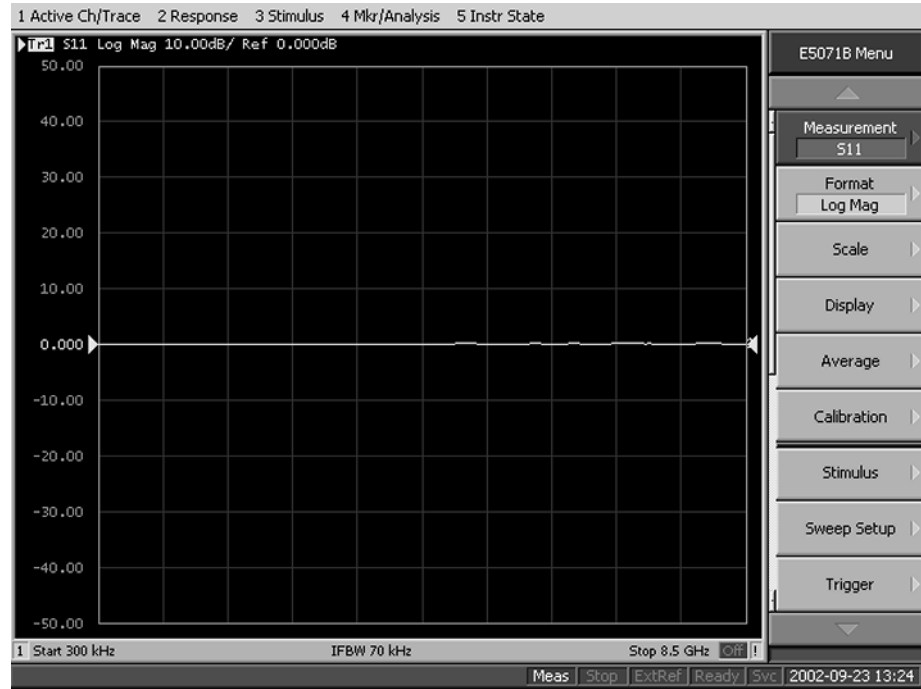
If this happened, the A21 board failed in writing DSP program into flash ROM when the firmware was installed first or updated to the newest version. A problem in the A21 or A20 is suspected.

**Step 4.** Measurement view

The measurement view as shown in Figure 4-17 is displayed after the system initialization is completed without problem.

Figure 4-17

Measurement view



**Step 5.** 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 Internal Test" on page 219.

---

## Troubleshooting Using Internal Test

The Agilent E5070B/E5071B has an internal test function to diagnose the analog measurement section and internal dc power supply voltages. The internal test makes it possible to isolate a faulty board assembly without need of external test equipment. The following paragraphs describe the procedure to perform the internal test.

---

### NOTE

There are cases where the internal test is ineffective (insufficient) for trouble isolation because the test objects are limited to the circuit blocks and functions that can be tested with nothing connected to the test ports. In such cases, refer to external test to perform the diagnosis for the range uncovered with the internal test.

---

### Power On Self Test

Power-on self-test always takes place once after the E5070B/E5071B is turned on. When a failure is detected, a message of the "Power on self test failed" is displayed. The content of the power-on self-test is the same as a portion of the internal test program and includes the dc power supply voltage, source PLL synthesizer and level controller (ALC) tests. When the self-test failed, perform the internal 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 board may be faulty. (There is also a low possibility that A17 ADC part of A2 Receiver board is faulty).

### External reference signal phase unlock (Opt. 1E5)

If the "ExtRef" in the instrument status bar is displayed in gray, not turning blue, in using the high stability time base (Opt. 1E5), A5 Crystal Oven board or the interconnection cable between rear panel Ref Oven and Ref In connectors may be faulty. Also check whether the "Ready" in the instrument status bar is displayed in blue (the warm-up in the instrument is completed). If it is in gray, wait until the "Ready" turns blue.

### To Execute the Internal Test

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

## Troubleshooting

### Troubleshooting Using Internal Test

---

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

1. Environmental temperature:  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$
2. Warm-up status indicator in the instrument status bar exhibits "Ready" in blue.

---

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

---

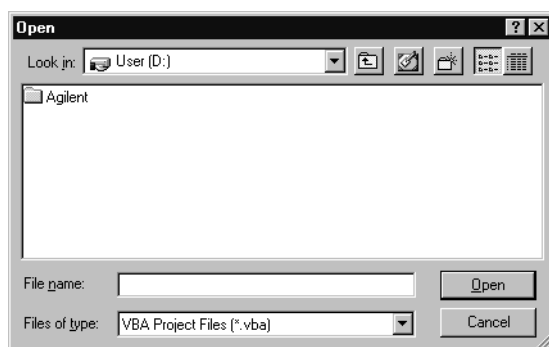
**Step 1.** Connect a mouse to the rear panel connector

**Step 2.** Press **Macro Setup** key.

**Step 3.** Press **↓** - **↓** - **Enter** keys (or click **Load Project**) to select **Load Project** function. "Open" dialog box will be displayed as shown in Figure 4-18.

**Figure 4-18**

**Open dialog box**



**Step 4.** Select "User [D]" (preset state) from menu in the "Lock in:" box.

**Step 5.** Double-click "Agilent" folder to open it and to access its menu.

**Step 6.** Double-click "Service" folder to open it.

**Step 7.** Click "Internal Test. VBA" program file to select it from program menu.

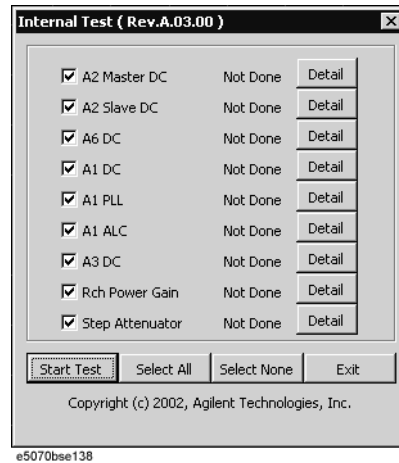
**Step 8.** Click "Open" button to download the internal test program.

**Step 9.** Press **↓** - **↓** - **↓** - **Enter** (or click **Select Macro**) to select **Select Macro** function.

**Step 10.** Press **Enter** (or click **Module1 main**) to open the **Module1 main** program file. "Internal Test" dialog box will appear as shown in Figure 4-19. The dialog box shows the menu of test groups to choose from.



**Figure 4-19** Internal Test dialog box



**Step 11.** All the test groups are preset to take effect. If it is necessary to perform a specific test group or some test groups only, check in (click) the check boxes for the desired test group(s) and clear the other check boxes.

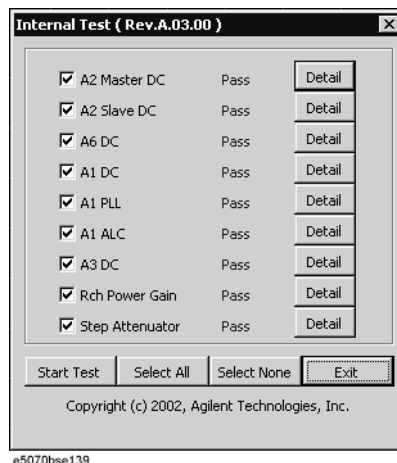
**NOTE**

Clicking "Select None" button clears all the check boxes. Clicking "Detail" button displays the names of individual tests included in each test group. Click "Exit" to return to the Internal Test dialog box.

**Step 12.** Click "Start Test" button to run the internal test program. The dialog box displays "Now testing ..." while the internal test is in progress.

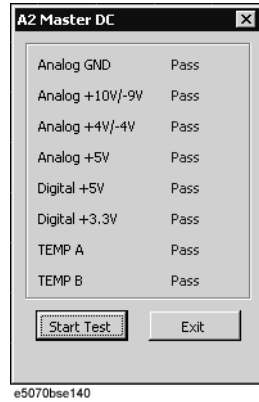
**Step 13.** When the internal test is completed, the dialog box displays Pass or Fail for each test group as an example shown in Figure 4-20.

**Figure 4-20** Internal test result display example



If any of the test groups failed, click "Detail" button of that test group to look into the breakdown of the test results. Figure 4-21 shows a breakdown test result example.

**Figure 4-21** Breakdown test result display example



**Step 14.** To exit the internal test, click "Exit" button.

**NOTE** Clicking "Select None" button clears all the check boxes, but it does not clear the test results.

### Internal Test Failure Troubleshooting

Table 4-1 represents the contents of the internal tests and the relationships of failed tests to probable faulty board assemblies. If the instrument fails the internal test, replace the faulty board assembly as shown in Table 4-1.

**Table 4-1** Internal tests failure troubleshooting information

Test No.	Test group	First failed test	Test point / objective	Probable faulty board assembly						
				A1 Src	A3 Lvl Vern	A4 Amp Mod	A6 Sw/T ctrl	A2 Receiver		A7 Att
								A15	A17	
1	A2 Master DC	Analog GND	DC bus on A2 (master)						###	
2		Analog +10V/-9V	+10V and -9V on A2						###	
3		Analog +4V/-4V	+4V and -4V on A2						###	
4		Analog +5V	+5V for analog on A2						###	
5		Digital +5V	+5V for digital on A2						###	
6		Digital +3.3V	+3.3V on A2						###	
7		TEMPA	Thermometer A					##	###	
8		TEMPB	Thermometer B					##	###	

**Table 4-1 Internal tests failure troubleshooting information**

Test No.	Test group	First failed test	Test point / objective	Probable faulty board assembly						
				A1 Src	A3 Lvl Vern	A4 Amp Mod	A6 Sw/T ctrl	A2 Receiver		A7 Att
								A15	A17	
9	A2 Slave DC(Opt. 313/314/413/414 only)	Analog GND	DC bus on A2 (slave)						###	
10		Analog +10V/-9V	+10V and -9V on A2	###					###	
11		Analog +4V/-4V	+4V and -4V on A2						###	
12		Analog +5V	+5V for analog on A2						###	
13		Digital +5V	+5V for digital on A2						###	
14		Digital +3.3V	+3.3V on A2						###	
15		TEMPA	Thermometer A on A2					##	###	
16		TEMPB	Thermometer B on A2					##	###	
17	A6 DC	Analog GND	DC bus on A6				###		#	
18		Analog +11V	+11V on A6				###		#	
19		AP5V	+5V on A6				###		#	
20		FAN1	Blower control 1 on A6				###		#	
21		FAN2	Blower control 2 on A6				###		#	
22		FAN3	Blower control 3 on A6				###		#	
23	A1 DC	RVT	DC bus on A1	###					#	
24		VTEMP	Thermometer on A1	###					#	
25	A1 PLL	FVT(2.80000GHz)	Fixed synthesizer on A1	###					#	
26		FVT(2.84375GHz)	Fixed synthesizer on A1	###					#	
27		SVT(2.11GHz)	Source swept synthe on A1	###					#	
28		LVT(2.11GHz)	Local swept synthe on A1	###					#	
29		SVT(4.25GHz)	Source swept synthe on A1	###					#	
30		LVT(4.25GHz)	Local swept synthe on A1	###					#	

4. Troubleshooting

**Table 4-1 Internal tests failure troubleshooting information**

Test No.	Test group	First failed test	Test point / objective	Probable faulty board assembly							
				A1 Src	A3 Lvl Vern	A4 Amp Mod	A6 Sw/T ctrl	A2 Receiver		A7 Att	
								A15	A17		
31	A1 ALC	SAV(DAC100)	Source level control on A1	###					#		
32		SAV(DAC2000)	Source level control on A1	###					#		
33		SOP(f=300k)	Source ALC on A1	###					#		
34		LOP(f=300k)	Local ALC on A1	###					#		
35		SOP(f=1.3G)	Source ALC on A1	###					#		
36		LOP(f=1.3G)	Local ALC on A1	###					#		
37		SOP(f=1.31G)	Source ALC on A1	###					#		
38		LOP(f=1.31G)	Local ALC on A1	###					#		
39		SOP(f=2.1G)	Source ALC on A1	###					#		
40		LOP(f=2.1G)	Local ALC on A1	###					#		
41		SOP(f=2.11G)	Source ALC on A1	###					#		
42		LOP(f=2.11G)	Local ALC on A1	###					#		
43		SOP(f=4.25G)	Source ALC on A1	###					#		
44		LOP(f=4.25G)	Local ALC on A1	###					#		
45		A3 DC	VTEMP	Thermometer on A3		###					
46			VCNTL	ATT Control Voltage		###					
47	VDET(300kHz)		ALC Loop	#	###						
48	VDET(10MHz)		ALC Loop	#	###						
49	VDET(1GHz)		ALC Loop	#	###						
50	VDET(8.5GHz)		ALC Loop	#	###						

**Table 4-1 Internal tests failure troubleshooting information**

Test No.	Test group	First failed test	Test point / objective	Probable faulty board assembly						
				A1 Src	A3 Lvl Vern	A4 Amp Mod	A6 Sw/T ctrl	A2 Receiver		A7 Att
								A15	A17	
51	Power Gain (A1 and A2)	S11(50MHz)	Source power and Ref channel receiver gain for Port 1	##	##	##		##	##	
52		S11(3GHz)	Source power and Ref channel receiver gain for Port 1	##	##	##		##	##	
53		S11(6GHz)	Source power and Ref channel receiver gain for Port 1 (E5071B)	##	##	##		##	##	
54		S22(50MHz)	Source power and Ref channel receiver gain for Port 2	##	##	##		##	##	
55		S22(3GHz)	Source power and Ref channel receiver gain for Port 2	##	##	##		##	##	
56		S22(6GHz)	Source power and Ref channel receiver gain for Port 2 (E5071B)	##	##	##		##	##	
57		S33(50MHz)	Source power and Ref channel receiver gain for Port 3 (Opt.313/314/413/414)	##	##	##		##	##	
58		S33(3GHz)	Source power and Ref channel receiver gain for port 3 (Opt.313/314/413/414)	##	##	##		##	##	
59		S33(6GHz)	Source power and Ref channel receiver gain for Port 3 (E5071B Opt.313/314/413/44)	##	##	##		##	##	
60		S44(50MHz)	Source power and Ref channel receiver gain for Port 4 (Opt.413/414)	##	##	##		##	##	
61		S44(3GHz)	Source power and Ref channel receiver gain for Port 4 (Opt.413/414)	##	##	##		##	##	
62		S44(6GHz)	Source power and Ref channel receiver gain for Port 4 (E5071B Opt.413/414)	##	##	##		##	##	

4. Troubleshooting

**Table 4-1 Internal tests failure troubleshooting information**

Test No.	Test group	First failed test	Test point / objective	Probable faulty board assembly						
				A1 Src	A3 Lvl Vern	A4 Amp Mod	A6 Sw/T ctrl	A2 Receiver		A7 Att
								A15	A17	
63	ATT (A7)(Opt. 214/314/414 only)	R(5dB)-R(0dB)	Source attenuator on A7	#	#	#	##			###
64		R(10dB)-R(0dB)	Source attenuator on A7	#	#	#	##			###
65		R(15dB)-R(0dB)	Source attenuator on A7	#	#	#	##			###
66		R(20dB)-R(0dB)	Source attenuator on A7	#	#	#	##			###
67		R(25dB)-R(0dB)	Source attenuator on A7	#	#	#	##			###
68		R(30dB)-R(0dB)	Source attenuator on A7	#	#	#	##			###
69		R(35dB)-R(0dB)	Source attenuator on A7	#	#	#	##			###

###: Most suspicious assembly

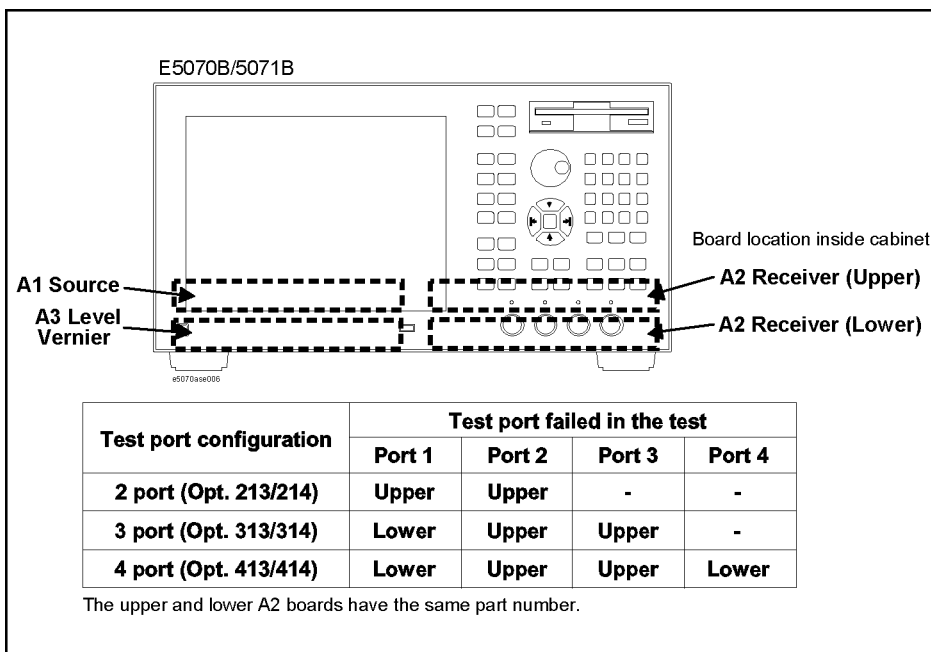
##: Suspicious assembly

#: Possible faulty assembly

**NOTE** Internal tests from item number 1 to 50 are common to the power on self test.

**NOTE** When the internal test for a specific receiver port fails, identify the faulty A2 receiver board as shown in Figure 4-22.

**Figure 4-22 Test port configuration**



e5070bse047

## Function Specific Troubleshooting

If the E5070B/E5071B 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 E5070B/E5071B and the troubleshooting procedure for each function are shown in Table 4-2.

**Table 4-2 Major functions and troubleshooting procedures**

Function	Description	Troubleshooting
Front panel keys	All the E5070B/E5071B 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 230.
Touch panel	The E5070B/E5071B 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 (Option 016 only)” on page 231.
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 231.
External keyboard	The external keyboard can be used for the entry of numerical and character data when it is connected to the keyboard interface connector (PS-2) on the rear panel.	Refer to “To Check the External Keyboard” on page 232.
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 the mouse interface connector (PS-2) on the rear panel.	Refer to “To Check the Mouse” on page 232.
Floppy disk drive	The 3.5-inch floppy disk drive on the front panel is used to save the E5070B/E5071B setup state and measurement data in a 3.5-inch, 1.4 MB floppy disk in MS-DOS compatible format.	Refer to “To Check the FDD” on page 232.
Video output	An external color monitor can be used to display the same information as the E5070B/E5071B 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 233.
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 233.

**Table 4-2 Major functions and troubleshooting procedures**

Function	Description	Troubleshooting
LAN port	The LAN interface port on the rear panel allows the E5070B/E5071B to be connected to 10/100 Base-T Ethernet.	Refer to “To Check the LAN” on page 233.
Printer parallel port	A specified printer can be used to print the E5070B/E5071B measurement display, setup display and others, when it is connected to the Printer port (36-pin D-Sub) on the rear panel.	Refer to “To Check the Printer Parallel Port” on page 237.
GPIB interface	The GPIB compatibility allows the E5070B/E5071B to be operated as a talker/listener or system controller on IEEE 488 interface bus.	Refer to “To Check the GPIB” on page 238.
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.	Perform “[7] Handler I/O Board tests” in “Troubleshooting Using External Test” on page 239 .

### To Check the Device Driver

Make sure first whether the E5070B/E5071B device drivers are installed properly or not by the following procedure, if a function of specific device in the E5070B/E5071B doesn't work.

- Step 1.** Exit from the E5070B/E5071B measurement view in accordance with the procedure described in “How to exit from the E5070B/E5071B Measurement View” on page 201. Then, Windows desktop screen is displayed.
- Step 2.** Click "My Computer" with the right button and select "Properties" as shown in Figure 4-23. Then, the System Properties(Figure 4-24) will appear.

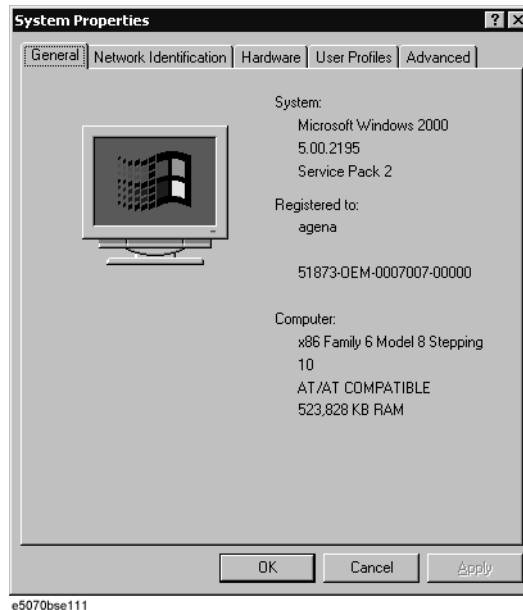
**Figure 4-23 Opening System Property Window**





Figure 4-24

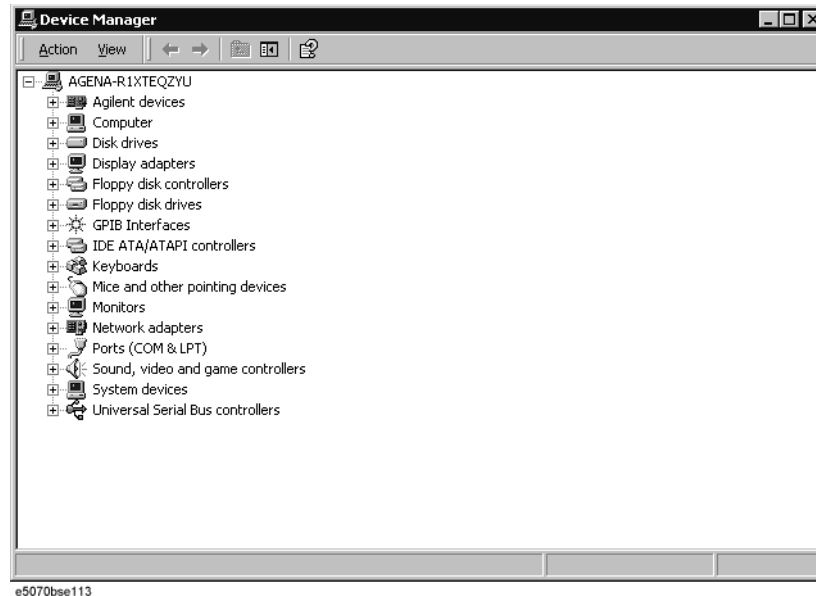
System Properties Window (General)



**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 4-25.

Figure 4-25

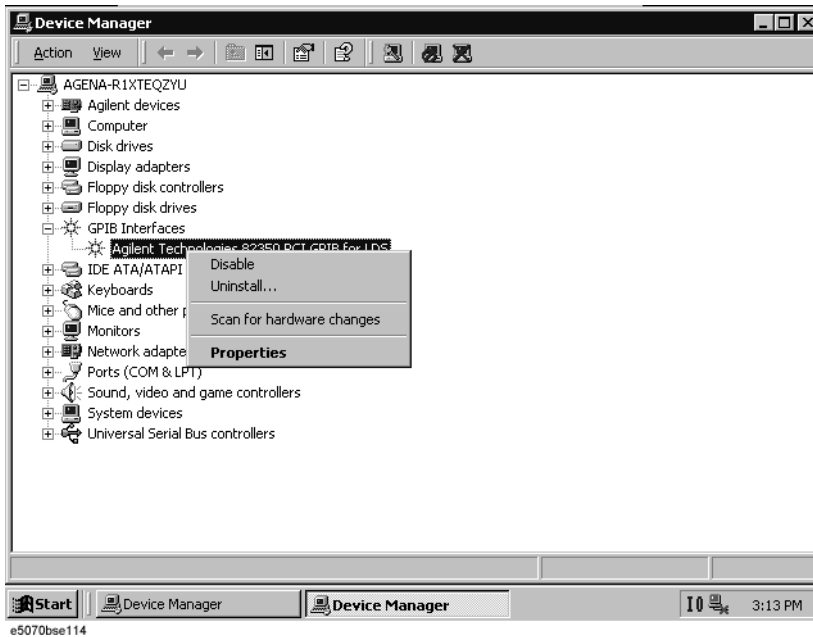
System Properties Window (Hardware)



Click the icon with the right button and click Property to show the detail of the status. as shown in Figure 4-26.

Figure 4-26

### Opening Device Driver Property



### To Check the Front Panel

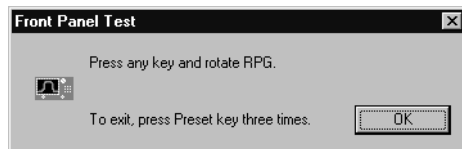
#### Procedure

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

- 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 4-27.

Figure 4-27

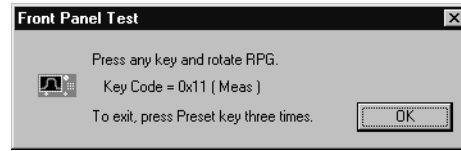
### Front Panel Test dialog box



- 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 4-28. Turn the rotary knob clockwise or counterclockwise. The dialog box indicates the direction of the turned knob and a count of RPG output.

Figure 4-28

**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 A22 front interface board or A21 analog interface board is suspected. Also check the flat cable between the A21 and A22.
- 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 A22 board involving the RPG.

**To Check the Touch Panel (Option 016 only)**

**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 A20 digital motherboard.
- If no problem is found in the above checks, a failure in the A20 digital motherboard 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 E5070B/E5071B rear panel.

- If the monitor screen view is the same as the LCD display, the problem seems in the A26 LCD interface card. Check first if the A26 board is securely connected to the A20 board.
- If only the LCD display has a problem, check the flat cable between the A26 and A31 LCD connector.

## Troubleshooting

### Function Specific Troubleshooting

- If the LCD is not illuminated with backlight, check A52 inverter board and the cable between the A52 and A26. Also check the cables between the A51 LCD and A52.
- If the cables are normal, check the A51 LCD.

### To Check the External Keyboard

#### Procedure

- Step 1.** Connect the external keyboard to the E5070B/E5071B rear panel connector.
- 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 A20 digital motherboard may be faulty.

### To Check the Mouse

#### Procedure

- Step 1.** Connect the mouse to the E5070B/E5071B rear panel connector.
- Step 2.** Turn the instrument on.
- Step 3.** Move the mouse and verify that the mouse pointer moves 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 A20 digital motherboard is suspected.

### To Check the FDD

#### Procedure

- Step 1.** Connect the external keyboard to the E5070B/E5071B rear panel connector.
- Step 2.** Turn the instrument on.
- Step 3.** Insert a 1.44 MB floppy disk, formatted in DOS format, into the FDD slot.
- Step 4.** Press **Save/Recall** key, and click **Save State** in the menu bar.
- Step 5.** Click **File Dialog...** to open the "Save As" dialog box.
- Step 6.** Select 3 1/2 Floppy [A:] from "Save in" pull-down menu.
- Step 7.** Enter **e5070b** in the file name box from the keyboard.
- Step 8.** Click "Save" button.
- Step 9.** Press **Save/Recall** key, and click **Recall State** in the menu bar.

**Step 10.** Click **File Dialog...** to open the "Open" dialog box.

**Step 11.** Select 3 1/2 Floppy [A:] from "Look in" pull-down menu.

**Step 12.** Select e5070b file from the file menu or enter **e5070b** in the file name box.

**Step 13.** Click "Open" button.

If the file save or recall operation fails, a failure in the A28 FDD or the flat cable between the A28 and A20 digital motherboard is suspected.

### To Check the Video output

#### Procedure

**Step 1.** Connect an external VGA color monitor to the Video output port on the E5070B/E5071B 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 A26 LCD interface card.

### To Check the External Trigger Input

#### Procedure

**Step 1.** Press **Preset** and **Enter** to initialize the E5070B/E5071B.

**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 A21 analog interface board is suspected.

### To Check the LAN

#### Procedure

**Step 1.** Connect a LAN cable between the LAN port on the rear panel and an external computer (PC).

---

#### NOTE

Use a crossed LAN cable to enable the peer-to-peer communication between the E5070B/E5071B and the PC. If the E5070B/E5071B needs to be connected to the PC via a multi port Hub, use a straight LAN cable.

---

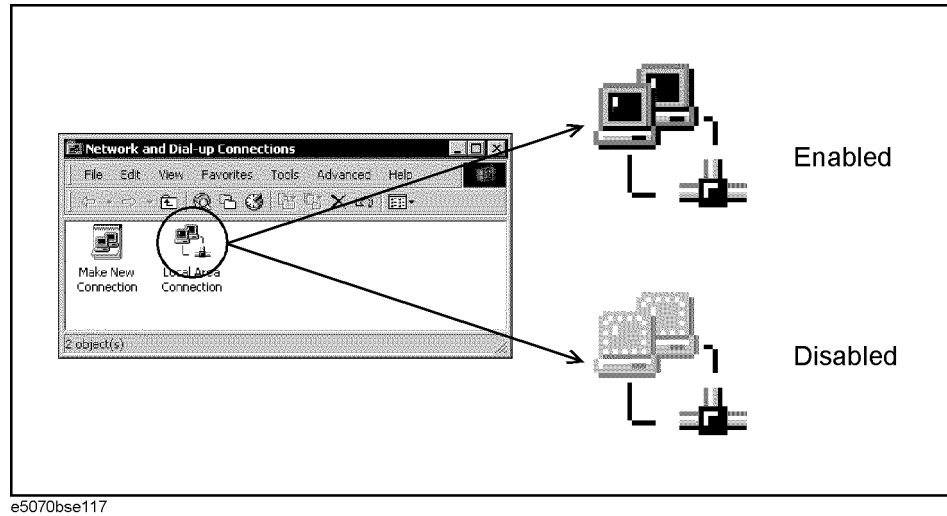
**Step 2.** Press **System** key.

**Step 3.** Click - **Misc Setup** - **Network Setup** - **Network Configuration** in the softkey menu to

Troubleshooting  
Function Specific Troubleshooting

show the Network and Dial-up Connections window as shown in the left of Figure 4-29.

**Figure 4-29** Network and Dial-up Connections window

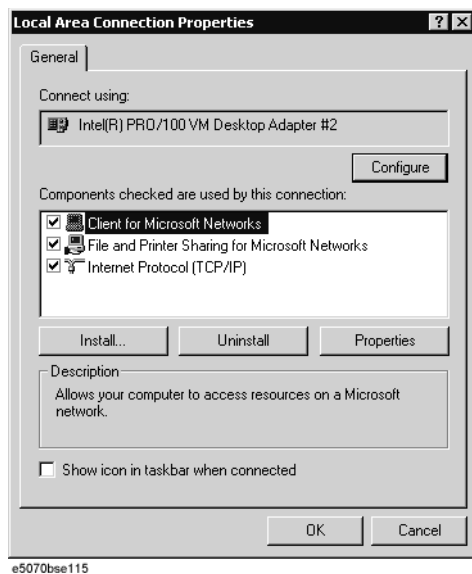


**Step 4.** Check the Local Area Connection icon to confirm whether the network connection is enabled or disabled. The meaning of the icon is shown in the right of Figure 4-29. If the connection is disabled, Double-click the Local Area Connection icon.

**Step 5.** Set up the IP address/subnet mask as follows.

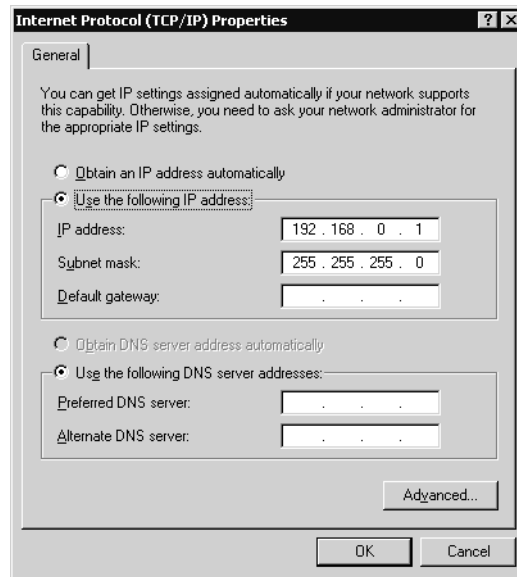
- a. Click the Local Area Connection icon with the right button and click "Property". This opens the "Local Area Connection Property" dialog box as shown in Figure 4-30.

**Figure 4-30** Network dialog box



- b. Click "Internal Protocol (TCP/IP)" icon.
- c. Click the "Properties" button. This opens the "TCP/IP Properties" dialog box as shown in Figure 4-31.

Figure 4-31 TCP/IP Properties dialog box (IP Address tab)



- d. If the IP Address and the Subnet Mask are already assigned, go to Step 6. If they are not assigned yet, enter them as follows:

IP Address 192.168.0.1  
Subnet Mask 255.255.255.0  
Default Gateway blank

To enter a specific IP Address and Subnet Mask, click "Use the following IP address" option button to select it. Input your IP address in the "IP Address" box and your subnet mask in the Subnet Mask box (overwrite the initial values).

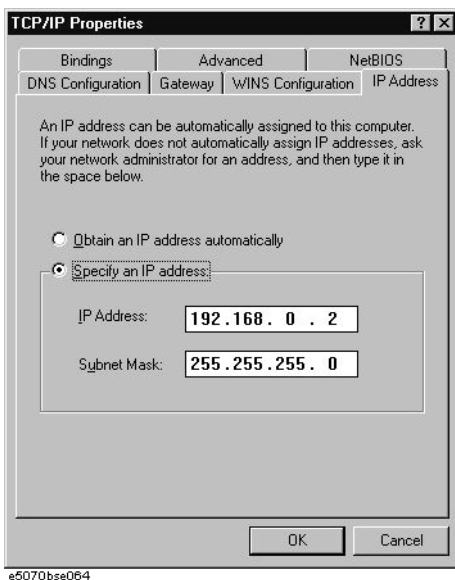
- e. Double-click "My Computer" icon on Windows desktop of the external PC. And double-click **Control Panel**. The Control Panel window will appear.

**NOTE**

From Step e to Step h are procedures for Windows

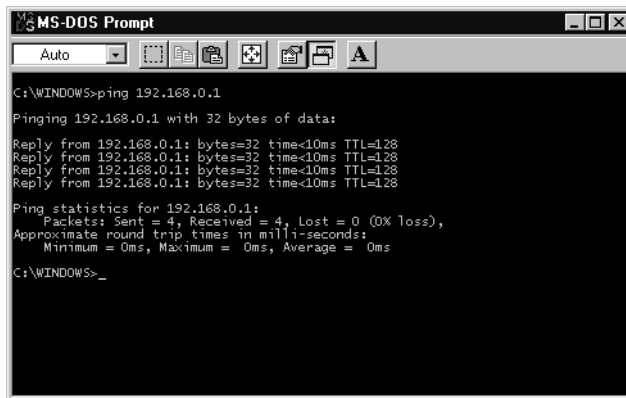
- f. In the Control Panel window, double-click **Network**. The Network dialog box shown in fig will appear. In the **Configuration** tab, select **TCP/IP** (display it in reverse video) and press the **Properties** button.
- g. The dialog box appears. If **Specify an IP address** has been selected, record the IP address and subnet mask.
- h. If the **Obtain an IP address automatically** has been selected, select the **Specify an IP address**. Enter the IP address xxx.xxx.xxx.y and subnet mask xxx.xxx.xxx.xxx as shown in Figure 4-32. The letters x represent the IP address and subnet mask of the E5070B/E5071B. The letter y is different from the IP address of the E5070B/E5071B. Press the **OK** button.

Figure 4-32 Network Dialog Box (“IP Address” Tab)



- Step 6.** By clicking “OK” button, the network settings take effect. Verify the E5070B/E5071B LAN settings and response to a command from the external computer as follows:
- On the external computer, click "Start" button in the Windows Start menu bar using a mouse.
  - Click "Programs" and "MS-DOS Prompt" (or "Command Prompt") to open the DOS (Command) Prompt window.
  - Type a ping command followed by the E5070B/E5071B IP address as "ping xxx.xxx.xxx.xxx" (where, xxx.xxx.xxx.xxx is the IP address such as 192.168.0.1 assigned in step 3-d.) Press  key on the keyboard.
  - The external computer displays a message of ping command response from the E5070B/E5071B. Figure 4-33 shows an example of normal result that indicates the IP address, packet size, and a response time counted by the computer. The ping command is repeated 4 times.

Figure 4-33 Example of normal ping command test result

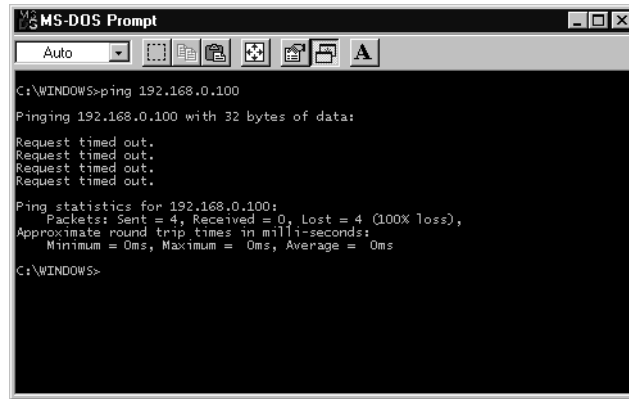


If the E5070B/E5071B doesn't return the response, the external computer displays a



message of "Request timed out" as shown in Figure 4-34. In this case, a failure in the A20 digital motherboard is suspected.

**Figure 4-34** Example of no response for ping command



## To Check the Printer Parallel Port

### Test equipment

- Supported printer: Please refer [http://www.agilent.com/find/ctdkobe\\_printers](http://www.agilent.com/find/ctdkobe_printers) for the latest supported printers.
- Printer cable: Parallel cable

### Procedure

- Step 1.** Connect the printer cable between the printer and the E5070B/E5071B printer parallel port. Turn the printer on.
- Step 2.** Press **Preset** and **Enter** to initialize the E5070B/E5071B.
- Step 3.** Press **System** key.
- Step 4.** Click **Printer Setup** in the softkey menu.
- Step 5.** Depending on the printer used, Click proper icon with the right button in the Property window. Then, click "Set as Default Printer" button.
- Step 6.** Click **Print** in the softkey menu. Confirm the printout of the display image.
- Step 7.** If the printer fails to work, the problem seems in the A20 digital motherboard, printer driver or connection of the printer cable.

### **To Check the GPIB**

#### **Procedure**

Perform the E5070B/E5071B performance test program. If the controller cannot detect the E5070B/E5071B, the problem seems in the A24 GPIB card or the connection of the GPIB cable.

### **To Check the USB (USBTMC) Interface Card**

#### **Procedure**

Connect the USB cable between the controller PC and the E5070B/E5071B. Turn the controller PC on. If the E5070B/E5071B cannot detect the controller PC, the problem seems in the USB (USBTMC) Interface Card or the A20 digital motherboard is suspected.

## Troubleshooting Using External Test

External test is the diagnostic test function to supplement the internal test. To enable a diagnosis for the analog measurement blocks uncovered with the internal test, the external test is performed using a coaxial cable, a fixed attenuator, coaxial terminations, a calibration kit and a handler I/O test kit. The following paragraphs describe the procedure to perform the external test.

### Contents of the external test

The external test contains 7 test groups shown in Table 4-3. Each test group can be performed independently and verifies one of various operating characteristics of the analog measurement section.

**Table 4-3 External test group menu**

1	Tch Power Gain
2	IF Ranging
3	Receiver Linearity
4	Dynamic Range
5	Trace Noise
6	Error Term
7	Handler I/O Board

### Test equipment required for external test

Table 4-4 shows the equipment required for performing the external test.

**Table 4-4 Required equipment**

Required test equipment	Qty	Recommended model
Coaxial cable with N type (m) connectors, 61 cm (24 in)	1	N6314A
Fixed attenuator, 10 dB, N(m) - N(f)	1	8491A/B/C
Calibration kit	1	85032F
Type-N coaxial Short termination	3	part of 85032F/85054D or part of 85033E/85050D with Type-N adapter
Handler I/O test kit	1	E5070-65001

**NOTE** Required quantity of Short termination is 3 in addition to one included in the calibration kit.

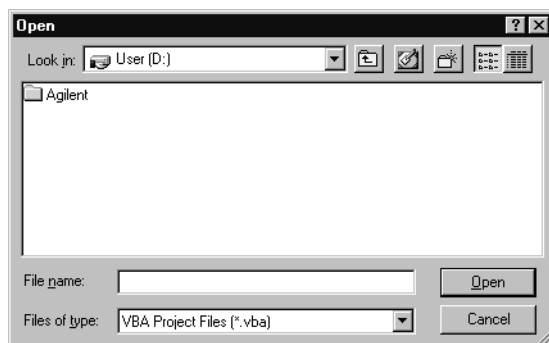
### To Execute the External Test

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

- 
- NOTE** To perform the external test properly, the following conditions must be met:
1. Environmental temperature:  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$
  2. Warm-up status indicator in the instrument status bar exhibits "Ready" in blue.
- 
- NOTE** Do not operate front panel keys, keyboard and mouse during the external test. Changing the instrument settings while the external test is in progress will cause incorrect test results.
- 

- Step 1.** Connect a mouse to the rear panel connector
- Step 2.** Press **Macro Setup** key.
- Step 3.** Press **↓** - **↓** - **Enter** keys (or click **Load Project**) to select **Load Project** function. "Open" dialog box will be displayed as shown in Figure 4-35.

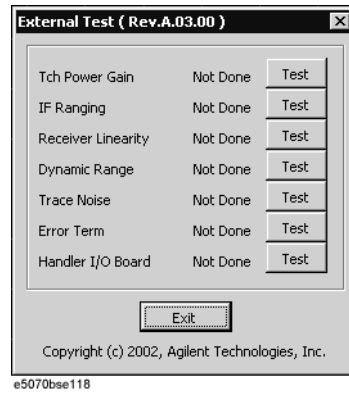
Figure 4-35 Open dialog box



- Step 4.** Select "User [D]" (preset state) from menu in the "Lock in:" box.
- Step 5.** Double-click "Agilent" folder to open it and to access its menu.
- Step 6.** Double-click "Service" folder to open it.
- Step 7.** Click "External Test. VBA" program file to select it from program menu.
- Step 8.** Click "Open" button to download the external test program.
- Step 9.** Press **↓** - **↓** - **↓** - **Enter** (or click **Select Macro**) to select **Select Macro** function.
- Step 10.** Press **Enter** (or click **Module1 main**) to open the **Module1 main** program file. "External Test" window will be displayed as shown in Figure 4-36. This window shows the test items and their results.

Figure 4-36

External Test Window



**Step 11.** To perform the individual tests in each test group, refer to the procedure described below.

**Step 12.** To end the external test, click "Exit" button in the dialog box.

[1] Tch Power Gain tests

These tests check the source output power along with the test channel receiver gain for each test port.

**Required equipment:**

Description	Recommended model
Coaxial cable with N type (m) connectors, 61 cm (24 in)	N6314A

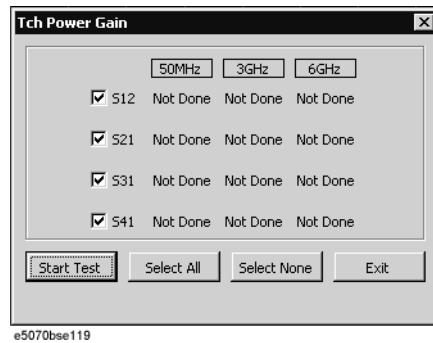
**Procedure:**

Perform the following procedure after Step 11.

- a. Click "Test" button in the right of "Tch Power Gain" in the window to open the "Tch Power Gain" window. The window displays the S parameters and frequencies as the test points. Their results are displayed in the matrix.(Figure 4-37)

Figure 4-37

Tch Power Gain tests dialog box example (E5071B Opt. 413/414)



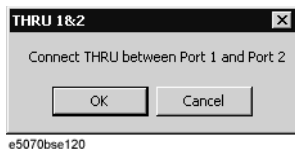
- b. Select the S parameter for the test by clicking the check boxes. Click the "Start Test" button.The instruction dialog box opens as shown in Figure 4-38. Follow the instruction.

---

**NOTE** Clicking “Select All” button checks all the check box. Clicking "Select None" button clears all the check boxes. Click "Exit" to return to the External Test dialog box

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**Figure 4-38 THRU 1&2 dialog box**



c. Connect an type-N (m) coaxial cable to the test ports in accordance with Table 4-5.

**Table 4-5 Tch Power Gain tests setups**

Test name	Objective of the test	Connect an N cable between	Freq and IFBW settings (Automatic)
S12	Source power for port 2 and test channel receiver gain for port 1	Port 1 and Port2	50 MHz/3 GHz/6GHz, 10 kHz BW
S21	Source power for port 1 and test channel receiver gain for port 2	Port 1 and Port 2	50 MHz/3 GHz/6GHz, 10 kHz BW
S31	Source power for port 1 and test channel receiver gain for port 3 (Opt. 313/314/413/414)	Port 1 and Port 3	50 MHz/3 GHz/6GHz, 10 kHz BW
S41	Source power for port 1 and test channel receiver gain for port 4 (Opt. 413/414)	Port 1 and Port 4	50 MHz/3 GHz/6GHz, 10 kHz BW

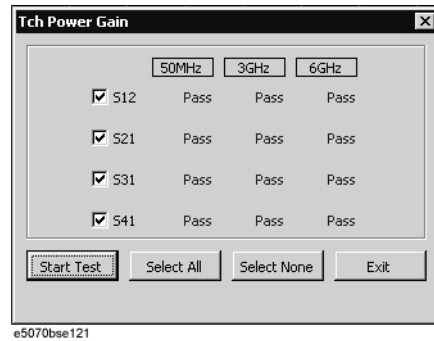
---

**NOTE** RF output power is 5 dBm and Nop is 101 for all the tests shown in the table.

---

- d. Click "OK" button to run the test program. The dialog box displays "Now testing..." while the Tch Power Gain tests are in progress.
- e. When the tests are completed, the dialog box displays Pass or Fail for each test as shown in Figure 4-39.

Figure 4-39 Power Gain test results display example (E5071B Opt. 413/414)



- f. If at least one of the Tch Power Gain tests failed, refer to Table 4-11 External Test Failure Troubleshooting Information.
- g. To return to the External Test dialog box, click "Exit" button.

**[2] Tch IF Ranging tests**

These tests check the IF signal level ranging operation of test channel receiver for each test port.

**Required equipment:**

Description	Recommended model
Fixed attenuator, 10 dB, N(m) - N(f)	8491A/B/C

Figure 4-40 IF Ranging tests dialog box example (E5070B/E5071B Opt. 413/414)

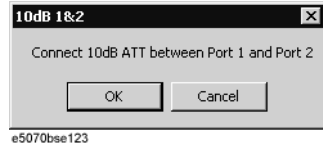


- b. Select the port numbers for the test by clicking the check boxes. Then, click "Start Test" button. The instruction dialog box opens as shown in Figure 4-41. Follow the instruction.

**NOTE**

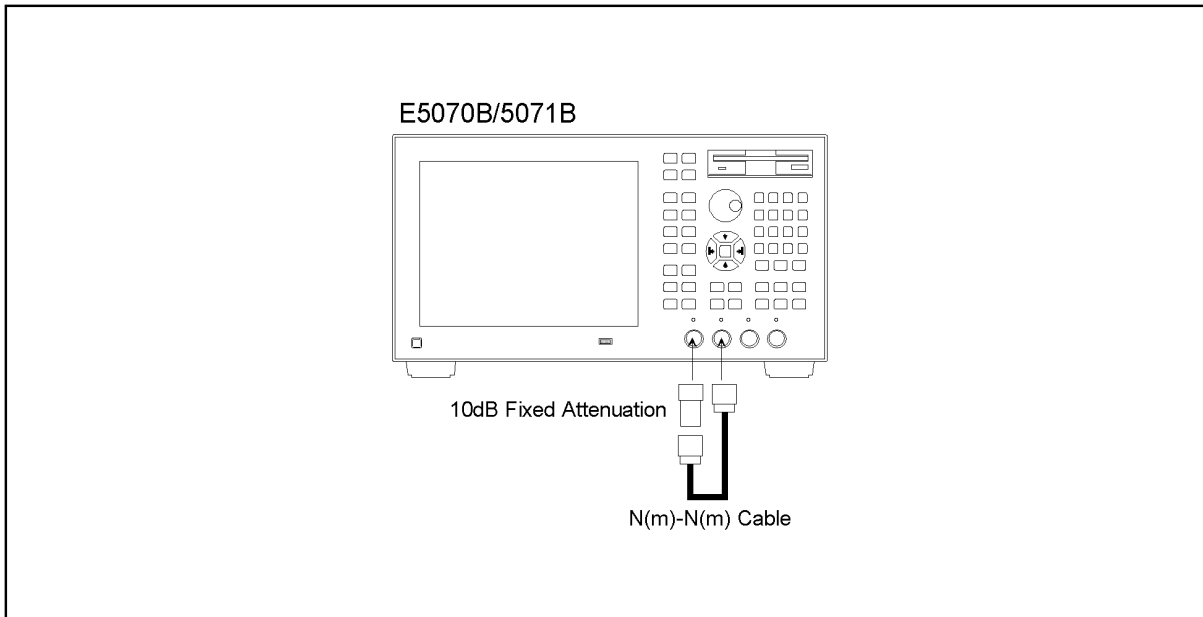
Clicking "Select All" button checks all the check boxes. Clicking "Select None" button clears all the check boxes. Click "Exit" to return to the External Test dialog box

**Figure 4-41** 10dB 1&2 dialog box



- c. Connect a 10 dB fixed attenuator and an type-N (m) coaxial cable in series between the test ports in accordance with Table 4-6. Make the connection as shown in Figure 4-42.

**Figure 4-42** 10 dB attenuator and cable connection (E5070B/E5071B Opt. 413/414)



e5070bse048

**Table 4-6** Tch IF Ranging tests setups

Test name	Objective of the test	Connect a 10 dB attenuator and an N cable between	Center/Span freq, IFBW, Nop and RF power settings (Automatic)
Port 1	IF signal level ranging operation of test channel receiver for Port 1	Port 1 and Port 2	50 MHz/0 Hz, 1 kHz BW, 101, -5 dBm
Port 2	IF signal level ranging operation of test channel receiver for Port 2	Port 1 and Port 2	50 MHz/0 Hz, 1 kHz BW, 101, -5 dBm
Port 3	IF signal level ranging operation of test channel receiver for Port 3 (Opt. 313/314/413/414)	Port 1 and Port 3	50 MHz/0 Hz, 1 kHz BW, 101, -5 dBm
Port 4	IF signal level ranging operation of test channel receiver for Port 4 (Opt. 413/414)	Port 1 and Port 4	50 MHz/0 Hz, 1 kHz BW, 101, -5 dBm

- d. Click "OK" button to run the test program. The dialog box displays "Now testing..." while the Tch IF Ranging tests are in progress.



- e. When the tests are completed, the dialog box displays Pass or Fail for each test as shown in Figure 4-43.

**Figure 4-43 Tch IF Ranging test results display example (E5070B/E5071B Opt. 413/414)**



- f. If at least one of the Tch IF Ranging tests failed, refer to Table 4-11 External Test Failure Troubleshooting Information.
- g. To return to the External Test dialog box, click "Exit" button.

**[3] Receiver Linearity tests**

These tests check the linearity (gain compression) of test channel receiver for each test port.

**Required equipment:**

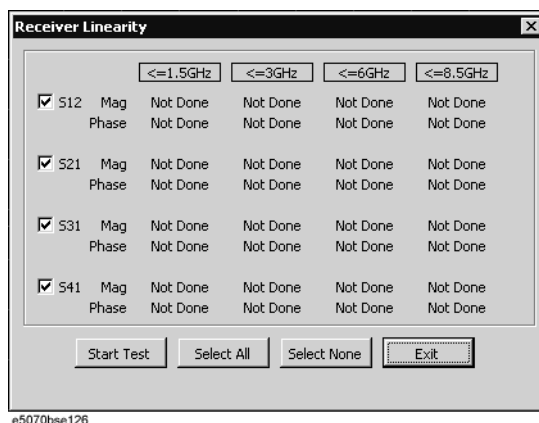
Description	Recommended model
Coaxial cable with type-N (m) connectors, 61 cm (24 in)	N6314A

**Procedure:**

Perform the following procedure after Step 11.

- a. Click "Test" button in the right of "Receiver Linearity" in the window to open the "Receiver Linearity" window. The window displays the port number and receiver channel as the test points. The result for each S parameter is displayed as the 4x2 matrix.(Figure 4-44).

**Figure 4-44 Receiver Linearity tests dialog box example (E5070B/E5071B Opt. 413/414)**

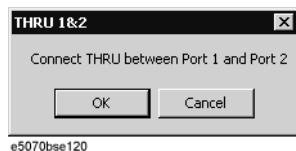


- b. Select the S parameters for the test by clicking the check boxes. Then, click “Start Test” button. The instruction dialog box opens as shown in Figure 4-45. Follow the instruction.

**NOTE**

Clicking “Select All” button checks all the check boxes. Clicking "Select None" button clears all the check boxes. Click "Exit" to return to the External Test dialog box

**Figure 4-45 THRU 1&2 dialog box**



- c. Connect an type-N (m) coaxial cable between the test ports in accordance with Table 4-7.

**Table 4-7 Receiver Linearity test setups**

Test name	Objective of the test	Connect an N cable between	Sweep freq span, IFBW, Nop and RF power settings (Automatic)
S12	Receiver linearity for Port 1	Port 1 and Port 2	Full span, 10 kHz BW, 201, max. source power and -10 dBm below max..
S21	Receiver linearity for Port 2	Port 1 and Port 2	Full span, 10 kHz BW, 201, max. source power and -10 dBm below max..
S31	Receiver linearity for Port 3 (Opt. 313/314/413/414)	Port 1 and Port 3	Full span, 10 kHz BW, 201, max. source power and -10 dBm below max..
S41	Receiver linearity for Port 4 (Opt. 413/414)	Port 1 and Port 4	Full span, 10 kHz BW, 201, max. source power and -10 dBm below max..

- d. Click "OK" button to run the test program. The dialog box displays "Now testing..." while the Receiver Linearity tests are in progress.
- e. When the tests are completed, the dialog box displays Pass or Fail for each test as shown in Figure 4-46.

**Figure 4-46 Receiver Linearity test results example (E5070B/E5071B Opt. 413/414)**



- f. If at least one of the Receiver Linearity tests failed, refer to Table 4-11 External Test Failure Troubleshooting Information.
- g. To return to the External Test dialog box, click "Exit" button.

**[4] Dynamic Range tests**

These tests check the dynamic range of test channel receiver for each test port.

**Required equipment:**

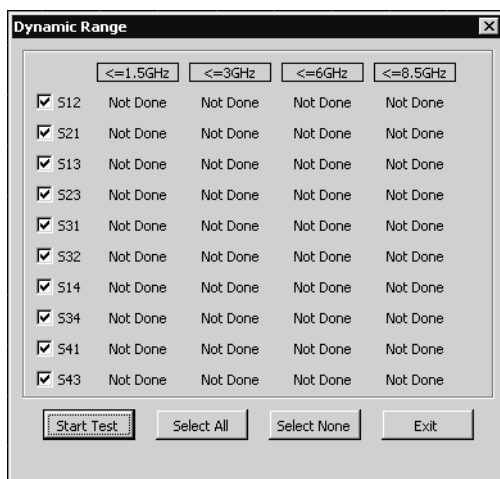
Description	Recommended model
Type-N coaxial Short termination (4 ea.)	part of 85032F/85054D or part of 85033E/85050D with Type-N adapter

**Procedure:**

Perform the following procedure after Step 11.

- a. Click "Test" button in the right of "Dynamic Range" in the window to open the "Dynamic Range" window. The window displays the S parameters and frequency as the test points. The results are displayed as matrix.(Figure 4-47).

**Figure 4-47** Dynamic Range tests dialog box example (E5071B Opt. 413/414)



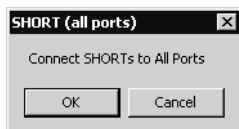
e5070bse127

- b. Select the S parameters for the test by clicking the check boxes. Then, click “Start Test” button. The instruction dialog box opens as shown in Figure 4-48. Follow the instruction.

**NOTE**

Clicking “Select All” button checks all the check boxes. Clicking "Select None" button clears all the check boxes. Click "Exit" to return to the External Test dialog box

**Figure 4-48** SHORT (all ports) dialog box



e5070bse128

- c. Connect type-N Short terminations to all the test ports.

**NOTE**

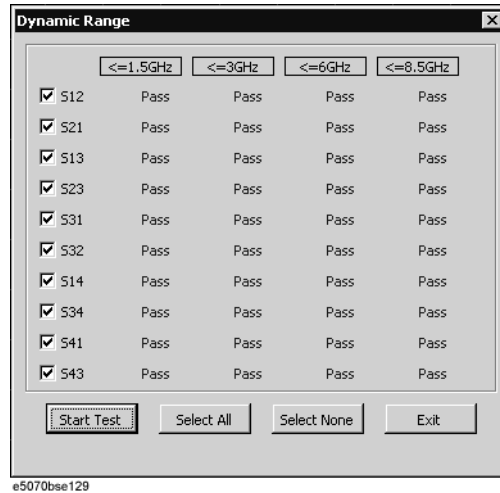
For more information on the Dynamic Range tests setup, see Table 4-8.

**Table 4-8** Dynamic Range tests setup

Test parameter	Connect Short terminations to	Sweep freq span, IFBW, Nop and RF power settings (Automatic)
S12 S13 (Opt. 313/314/413/414) S14 (Opt. 413/414) S21 S23 (Opt. 313/314/413/414) S31 (Opt. 313/314/413/414) S32 (Opt. 313/314/413/414) S34 (Opt. 413/414) S41 (Opt. 413/414) S43 (Opt. 413/414)	All the test ports	3 MHz to 3 GHz (E5070B), 3 MHz to 8.5 GHz (E5071B), 3 kHz BW, 101, max. source power

- d. Click "OK" button to run the test program. The dialog box displays "Now testing..." while the Dynamic Range tests are in progress.
- e. When the tests are completed, the dialog box displays Pass or Fail for each test as shown in Figure 4-49.

**Figure 4-49 Dynamic Range test results example (E5071B Opt. 413/414)**



- f. If at least one of the Dynamic Range tests failed, refer to Table 4-11 External Test Failure Troubleshooting Information.
- g. To return to the External Test dialog box, click "Exit" button.

**[5] Trace Noise tests**

These tests check the trace noise levels for the selected test ports.

**Required equipment:**

Description	Recommended model
Type-n coaxial Short termination. (4 ea)	part of 85032F/85054D or part of 85033E/85050D with Type-N adapter

**Procedure:**

Perform the following procedure after Step 11.

- a. Click "Test" button in the right of "Trace Noise" in the window to open the "Trace Noise" window. The window displays the S parameters and frequencies as the test points. The result for each S parameter is displayed as the 9x2 matrix.(Figure 4-50).

**Figure 4-50** Trace Noise tests dialog box example (E5071B)



- b. Select the S parameter for the test by clicking the check boxes. Then, click “Start Test” button. The instruction dialog box opens as shown in Figure 4-51. Follow the instruction.

**NOTE**

Clicking “Select All” button checks all the check boxes. Clicking "Select None" button clears all the check boxes. Click "Exit" to return to the External Test dialog box

**Figure 4-51** SHORT (all ports) dialog box



- c. Connect an type-N Short termination to all the test ports.

**NOTE**

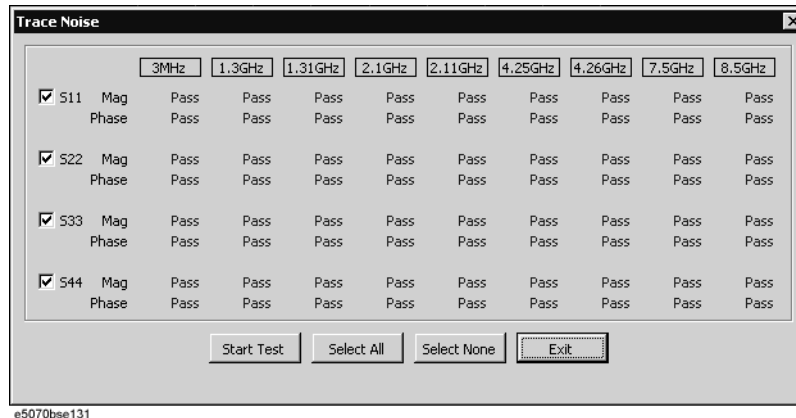
For more information on the Trace Noise tests setup, see Table 4-9.

**Table 4-9** Trace Noise tests setup

Test parameter	Connect Short termination to	Test frequency points, IFBW, Nop, RF power settings and Sweep delay(Automatic)
S11	All test ports	3 MHz, 1.3 GHz, 1.31 GHz, 2.1 GHz and 2.11 GHz (E5070B), 3 MHz, 1.3 GHz, 1.31 GHz, 2.1 GHz, 2.11 GHz, 4.25 GHz, 4.26 GHz, 7.5 GHz and 8.5 GHz (E5071B), 3 kHz BW, 101, max. source power, 100 ms
S22		
S33		
S44		

- d. Click "OK" button to run the test program. The dialog box displays "Now testing..." while the Trace Noise (port 1) tests are in progress.
- e. When the tests are completed, the dialog box displays Pass or Fail for each test as shown in Figure 4-52.

Figure 4-52 Trace Noise test results example (E5071B)



- f. If at least one of the Trace Noise tests failed, refer to Table 4-11 External Test Failure Troubleshooting Information.
- g. To return to the External Test dialog box, click "Exit" button.

**[6] Error Term tests**

These tests check the reflection tracking, directivity and source match for all test ports.

**Required equipment:**

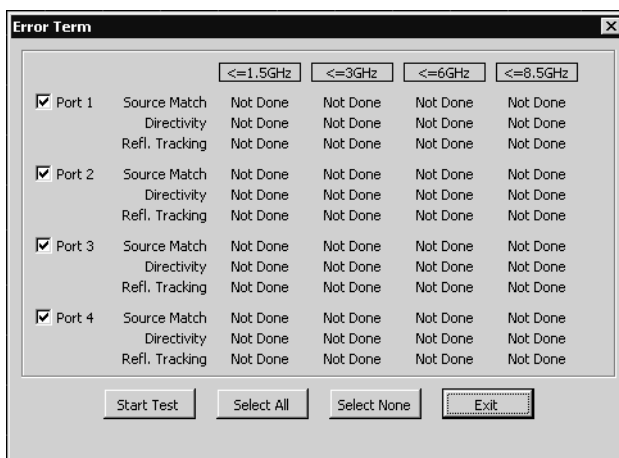
Description	Recommended model
Calibration kit (type-N Open, Short and 50Ω Load terminations)	85032F

**Procedure:**

Perform the following procedure after Step 11.

- a. Click "Test" button in the right of "Error Term" in the window to open the "Error Term" window. The window displays the port number and frequencies as the test points. The result for each test port is displayed as the 4x3 matrix.(Figure 4-53).

**Figure 4-53** Error Term (port 1) tests dialog box example (E5071B)

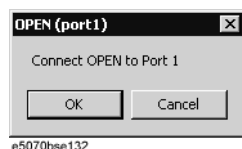


- b. Select the test ports for the test by clicking the check boxes. Then, click “Start Test” button. The instruction dialog box opens as shown in Figure 4-54. Follow the instruction.

**NOTE**

Clicking “Select All” button checks all the check boxes. Clicking "Select None" button clears all the check boxes. Click "Exit" to return to the External Test dialog box

**Figure 4-54** OPEN (port 1) dialog box



- c. Connect an type-N Open termination to the specified port.

**NOTE**

For more information on Error Term tests setup, see Table 4-10.

**Table 4-10** Error Term tests setup

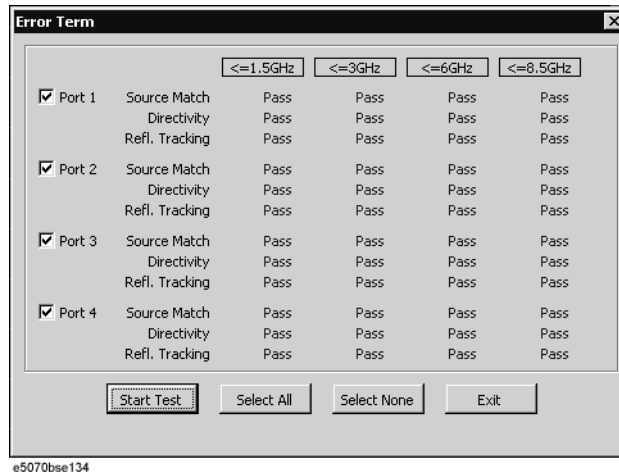
Test parameter	Connect	Sweep freq span, IFBW, Nop and RF power settings, System correction (Automatic)
Source match	Open	Full span, 1 kHz BW, 201, 5 dBm , System correction ON
Directivity	Short	
Reflection tracking	Load	

- d. Click "OK" button to continue the test. The "Error Term" dialog box displays "Now calibrating..." for a few seconds. Wait until "SHORT" dialog box opens.
- e. Connect an type-N Short termination to the specified test port.
- f. Click "OK" button to continue the test and wait until "LOAD" dialog box opens.



- g. Connect a 50 Ω Load termination to the specified test port.
- h. Click "OK" button to continue the test and wait for a few seconds.
- i. Repeat step form c to h for all of the selected test ports.
- j. When the tests are completed, the "Error Term" dialog box displays Pass or Fail for each test as shown in Figure 4-55.

**Figure 4-55 Error Term test results example (E5071B)**



- k. If at least one of the Error Term tests failed, refer to Table 4-11 External Test Failure Troubleshooting Information.
- l. To return to the External Test dialog box, click "Exit" button.

**[7] Handler I/O Board tests**

These tests check the function of Handler I/O board for interfacing with an external component handler. The tests are performed using a handler I/O test kit as a substitute for the handler.

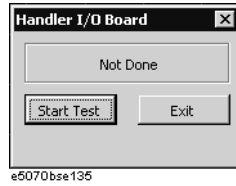
**Required equipment:**

Description	Recommended model
Handler I/O test kit	E5070-65001

**Procedure:**

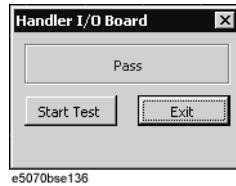
- Perform the following procedure after Step 11.
- a. Click "Handler I/O Board" in the pull down menu of the Test List box.
- b. Click "Test" button in the dialog box. Then "Handler I/O Board" tests dialog box opens as shown in Figure 4-56.

**Figure 4-56** Handler I/O Board tests dialog box



- c. Click the "Test" button in the dialog box. A message of "Connect Handler I/O Test Kit" will be displayed.
- d. Connect the handler I/O test kit to the Handler I/O connector on the rear panel.
- e. Click "OK" button. The dialog box displays "Now testing..." while the Handler I/O Board test is in progress.
- f. When the tests are completed, the dialog box displays Pass or Fail of test result as shown in Figure 4-57.

**Figure 4-57** Handler I/O Board test result example



- g. If the Handler I/O Board test failed, refer to Table 4-11 External Test Failure Troubleshooting Information.
- h. To return to the External Test dialog box, click "Exit" button.

---

**NOTE**

To end the external test, click "Exit" button in the "External Test" dialog box.

### External Test Failure Troubleshooting

Table 4-11 represents the contents of the external tests, test objectives and the relationships of failed tests to probable faulty board assemblies. If the instrument fails an external test,

replace the faulty board assembly as shown in Table 4-11.

**Table 4-11 External test failure troubleshooting information**

Test No.	Test group	First failed test	Test objective	Probable faulty board assembly						
				A1 Src	A3 Lev Vern	A4 Pow Amp	A6 Sw/T cont	A2 Receiver		A23 Hnd
								A15	A17	
1	Power Gain (A1 and A2)	S12(50MHz)	Source power for Port 2 and receiver gain for Port 1	##	##	##		##	##	
2		S12(3GHz)	Source power for Port 2 and receiver gain for Port 1	##	##	##		##	##	
3		S12(6GHz)	Source power for Port 2 and receiver gain for Port 1 (E5071B)	##	##	##		##	##	
4		S21(50MHz)	Source power for Port 1 and receiver gain for Port 2	##	##	##		##	##	
5		S21(3GHz)	Source power for Port 1 and receiver gain for Port 2	##	##	##		##	##	
6		S21 (6GHz)	Source power for Port 1 and receiver gain for Port 2 (E5071B)	##	##	##		##	##	

**Table 4-11 External test failure troubleshooting information**

Test No.	Test group	First failed test	Test objective	Probable faulty board assembly						
				A1 Src	A3 Lev Vern	A4 Pow Amp	A6 Sw/T cont	A2 Receiver		A23 Hnd
								A15	A17	
7		S31(50MHz)	Source power for Port 1 and receiver gain for Port 3 (Opt. 313/314/413/414)	##	##	##		##	##	
8		S31(3GHz)	Source power for Port 1 and receiver gain for Port 3 (Opt. 313/314/413/414)	##	##	##		##	##	
9		S31(6GHz)	Source power for Port 1 and receiver gain for Port 3 (E5071B Opt. 313/314/413/414)	##	##	##		##	##	
10		S41(50MHz)	Source power for Port 1 and receiver gain for port 4 (Opt. 413/414)	##	##	##		##	##	
11		S41(3GHz)	Source power for Port 1 and receiver gain for port 4 (Opt. 413/414)	##	##	##		##	##	
12		S41(6GHz)	Source power for Port 1 and receiver gain for Port 4 (E5071B Opt. 413/414)	##	##	##		##	##	

**Table 4-11 External test failure troubleshooting information**

Test No.	Test group	First failed test	Test objective	Probable faulty board assembly						
				A1 Src	A3 Lev Vern	A4 Pow Amp	A6 Sw/T cont	A2 Receiver		A23 Hnd
								A15	A17	
13	Tch IF Ranging(A2)	S12(T1, Mag) S12(T1, Phase) S21(R1, Mag) S21(R1, Phase)	IF signal level ranging operation of receiver for Port 1	#	#	#		#	###	
14		S21(T2, Mag) S21(T2, Phase) S12(R2, Mag) S12(R2, Phase)	IF signal level ranging operation of receiver for Port 2	#	#	#		#	###	
15		S31(T3, Mag) S31(T3, Phase) S13(R3, Mag) S13(R3, Phase)	IF signal level ranging operation of receiver for Port 3 (Opt. 313/314/413/414)	#	#	#		#	###	
16		S41(T4, Mag) S41(T4, Phase) S14(R4, Mag) S14(R4, Phase)	IF signal level ranging operation of receiver for Port 4 (Opt. 413/414)	#	#	#		#	###	
17	Receiver Linearity	S12(Mag.) S12(Phase)	Receiver gain linearity for Port 1	#	#	#		###	#	
18		S21(Mag.) S21(Phase)	Receiver gain linearity for Port 2	#	#	#		###	#	
19		S31(Mag.) S31(Phase)	Receiver gain linearity for Port 3 (Opt. 313/314/413/414)	#	#	#		###	#	
20		S41(Mag.) S41(Phase)	Receiver gain linearity for Port 4 (Opt. 413/414)	#	#	#		###	#	
21	Dynamic Range	S12, S13, S14, S21, S23, S31, S32, S34 (Opt. 313/314/413/414), S41, S43 (Opt. 413/414)	Dynamic range for all test ports	##	#	#		##	#	

4. Troubleshooting

**Table 4-11 External test failure troubleshooting information**

Test No.	Test group	First failed test	Test objective	Probable faulty board assembly						
				A1 Src	A3 Lev Vern	A4 Pow Amp	A6 Sw/T cont	A2 Receiver		A23 Hnd
								A15	A17	
22	Trace Noise (port 1)	S11(Mag./Phase)	Trace noise for Port 1	###	#			##	##	
23	Trace Noise (port 2)	S22(Mag./Phase)	Trace noise for Port 2	###	#			##	##	
24	Trace Noise (port 3)	S33(Mag./Phase)	Trace noise for Port 3 (Opt. 313/314/413/414)	###	#			##	##	
25	Trace Noise (port 4)	S44(Mag./Phase)	Trace noise for Port 4 (Opt. 413/414)	###	#			##	##	
26	Error Term (port 1)	-	Source match, directivity and reflection tracking for Port 1	#	#	#		###		
27	Error Term (port 2)	-	Source match, directivity and reflection tracking for Port 2	#	#	#		###		
28	Error Term (port 3)	-	Source match, directivity and reflection tracking for Port 3 (Opt. 313/314/413/414)	#	#	#		###		
29	Error Term (port 4)	-	Source match, directivity and reflection tracking for Port 4 (Opt. 413/414)	#	#	#		###		
30	Handler I/O Board	-	Handler interface I/O signals							###

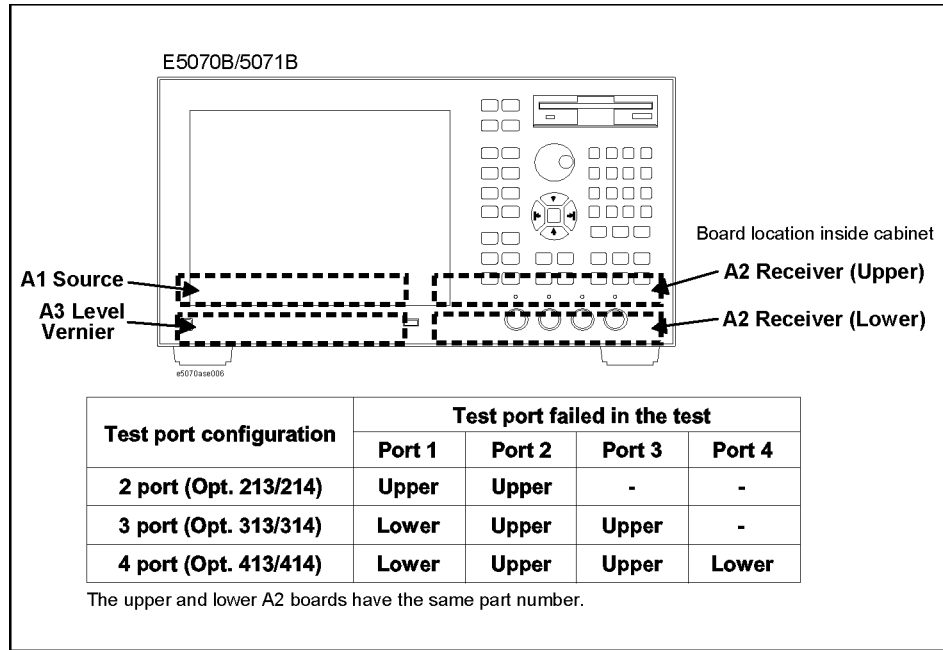
###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

**NOTE** When the external test for a specific receiver port fails, identify the faulty A2 receiver board as shown in Figure 4-58.

**Figure 4-58** Test port configuration



e5070bse047

## Performance test failure troubleshooting

This section describes the adjustment and troubleshooting procedures used when the E5070B/E5071B 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 4-12 shows the recommended adjustments when the performance test fails. Select the adjustment program corresponding to the recommended adjustment and perform the adjustment.

**NOTE** There are no adjustment related to the crosstalk, system dynamic range and uncorrected system performance.

**Table 4-12 Recommended adjustment for performance test failure**

Test Num.	First failed test	Recommended adjustment			
		X'tal oven (A5)	Source (A1)	Receiver RF (A15)	Receiver IF (A17)
1	Frequency accuracy test (Standard)		√		
1A	Frequency accuracy test (Opt. 1E5 only)	√			
2	RF output level accuracy and flatness test		√		
3	RF output level linearity test		√		
4	CW trace noise test				√
5	Crosstalk test				
6	System dynamic range test				
7	Dynamic accuracy test				√
8	Uncorrected system performance test				

### Performance test failure troubleshooting

Table 4-13 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 internal test and external 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 4-13 Performance test failure troubleshooting information**

Test Num	First failed test	Probable faulty board assembly						
		A1 Src	A3 Lev. Vern.	A4 Amp Mod.	A5 Xtl Oven	A2 Receiver		A8 Src Swt
						A15	A17	
1	Frequency accuracy test (Standard)	###						
1A	Frequency accuracy test (Opt. 1E5 only)	##			###			
2	RF output level accuracy and flatness test	###	###	###				
3	RF output level linearity test	###	###	##				
4	CW trace noise test	###				##	##	
5	Crosstalk test	#		##		##	#	###
6	System dynamic range test	##		##		##	#	###
7	Dynamic accuracy test					###	##	
8	Uncorrected system performance test	#		##		##	#	###

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

## **To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**

When you replace the A20 digital motherboard, you need to confirm the jumper settings for the specific CPU installed. The jumper settings information is provided in “Configure the Motherboard” on page 262.

You also need to confirm the BIOS options using the BIOS setup utility procedure. Since the BIOS detects the A27 mass storage and displays the profile of the disk drive, it is a useful tool to verify whether the A27 has a problem or not. The BIOS setup procedure is described in “To Confirm or Set the BIOS Options” on page 264.

### **To Identify the Motherboard Installed**

Confirm the splash screen is displayed in the beginning of the boot process as shown in Figure 4-7.

### **Configure the Motherboard**

There is a jumper on the A20 digital motherboard that must be configured to the correct setting. Confirm the jumper settings and set the jumpers correctly as shown in Figure 4-59.

---

#### **NOTE**

When the power shutdown occurs without a beep, clear A20 CMOS and set BIOS according to the following procedure.


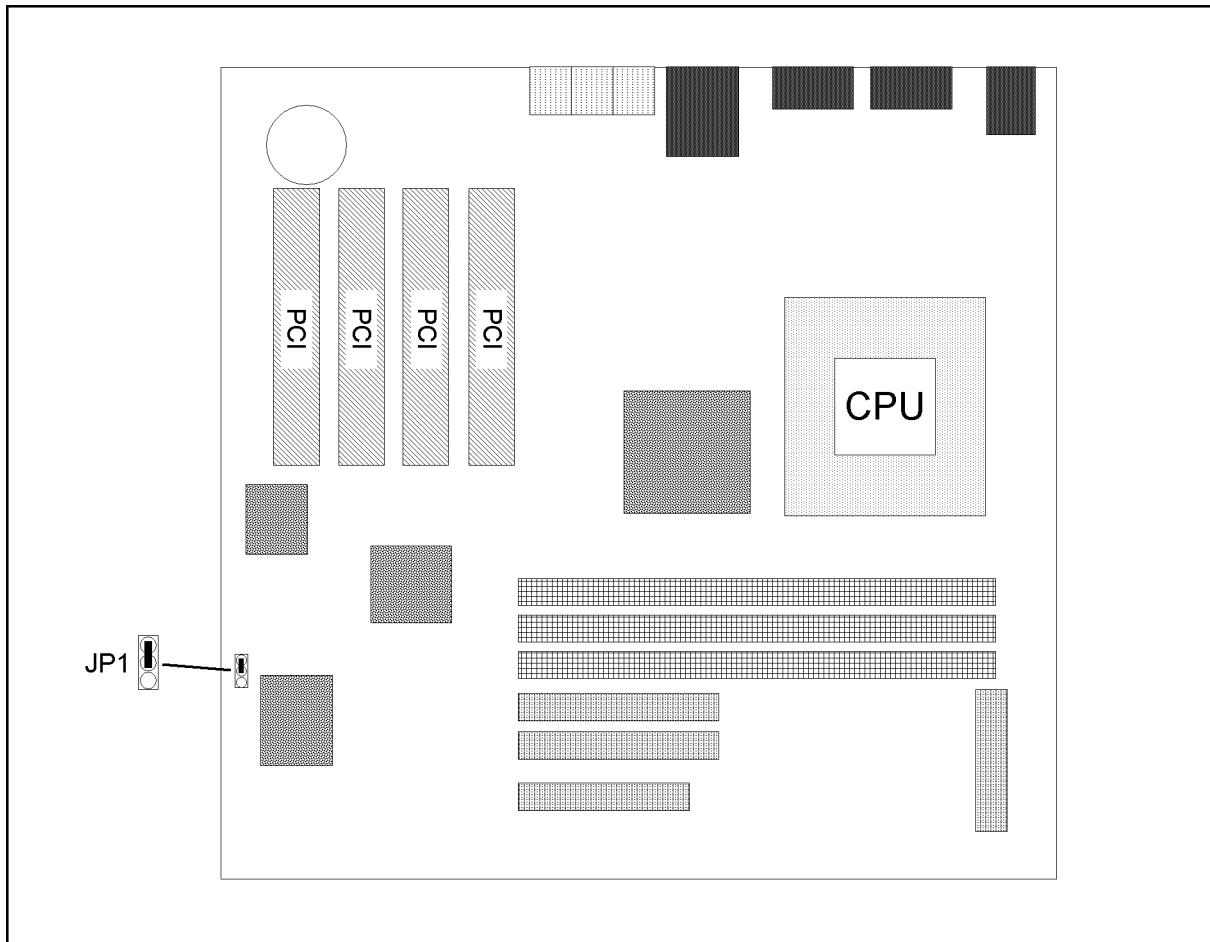
- To clear A20 CMOS
  1. Power off the system.
  2. Remove jumper from JP1 pins 1-2 and put on JP1 pins 2-3. Wait for a few seconds and set JP1 back to its default setting, pins 1-2.
  3. Power on the system.
  4. After powering on the system, press  to enter the BIOS setup utility.

Figure 4-59 A20 digital motherboard jumpers location and settings



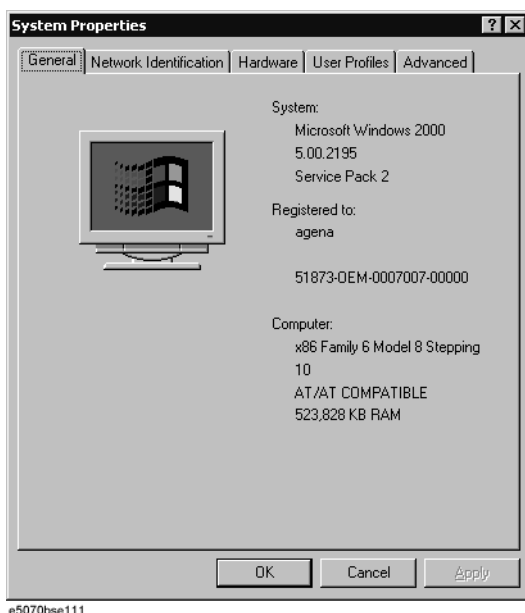
e5070bse162

### Testing DRAM on the Motherboard

When the A20 digital motherboard is replaced with a new one, it is advisable to perform the DRAM test before proceeding to the BIOS setup utility procedure. Confirm the DRAM count in accordance with the following procedure.

- Step 1.** Connect the external keyboard and mouse to the E5070B/E5071B rear panel connectors.
- Step 2.** Turn the instrument on. Wait until the E5070B/E5071B boots up. Do not press any key until the E5070B/E5071B measurement view appears.
- Step 3.** Press **[System]** key on the front panel.
- Step 4.** Click **Misc Setup** in the softkey menu.
- Step 5.** Click **Control Panel...** in the softkey menu.
- Step 6.** Scroll the function viewer to find "System" icon and double-click "System". This opens "System Properties" window as shown in Figure 4-60.

Figure 4-60



**Step 7.** Verify that "523,828 KB RAM" is displayed in the Computer profile as shown in Figure 4-60. If it is not correct, the A20 board is faulty.

**Step 8.** Click "OK" button to close the window.

**Step 9.** Turn the E5070B/E5071B off before proceeding to the next step "To Confirm or Set the BIOS Options".

### To Confirm or Set the BIOS Options

BIOS is the PC's built-in program describing the standard procedure of basic inputs and outputs for the system hardware. BIOS involves the system BIOS, start-up program and BIOS setup utility. The E5070B/E5071B starts up first with the BIOS when the power is turned on. Use the following procedure to confirm or set the BIOS options, known as the BIOS setup utility.

#### Run the BIOS setup utility

Use the external keyboard to select and set various options in the BIOS setup utility. Do not operate the E5070B/E5071B front panel until you exit the BIOS option setup procedure.

**Procedure Step 1.** Connect the external keyboard to the E5070B/E5071B rear panel connector.

**Step 2.** Turn the instrument on.

**Step 3.** Press **Del** key as soon as the message "Press TAB to show POST screen, DEL to enter SETUP, F12 to select BOOT DEVICE" is displayed. Wait a few seconds until the message "Enter CURRENT Password:" appears.

**Step 4.** Press **Num Lock** key (The LED in the key lights.)

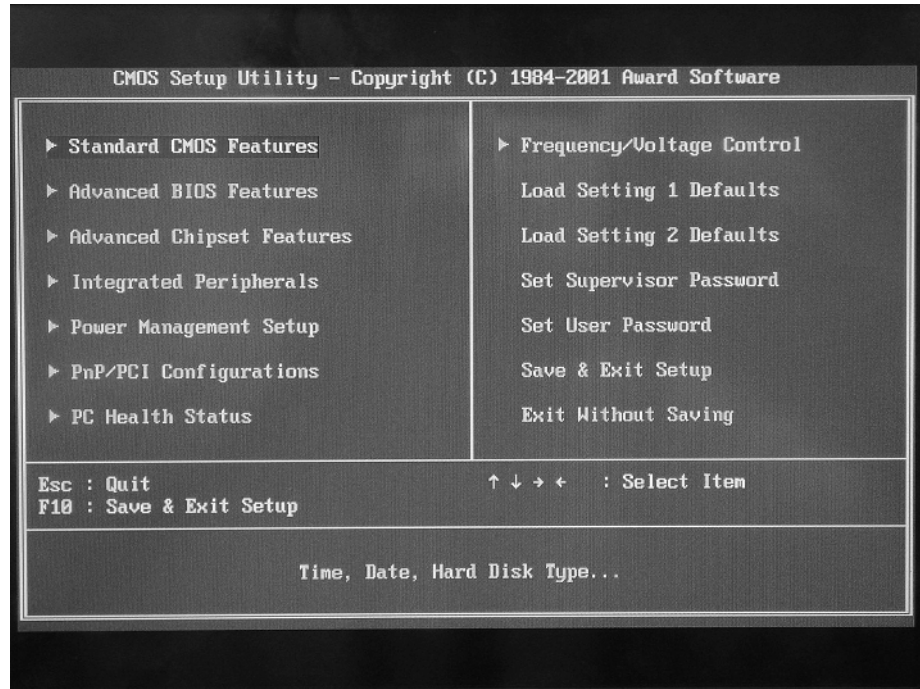
**Step 5.** Enter password "e507xa" and press **Enter**. Then BIOS setup utility main menu is

To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

displayed as shown in Figure 4-61.

Figure 4-61

BIOS setup utility main menu



**Step 6.** The BIOS setup utility has 14 selectable windows. Brief descriptions and reference pages for these windows are provided in Table 4-14. The details of the BIOS option settings in each window are described on the page listed in the table.

**Step 7.** Select a desired window using     keys. To perform an operation, use  key.

**NOTE**

If you want to quit the BIOS option setting and exit the BIOS setup utility without saving changes in the setup, select "Exit Without Saving" and press .

Table 4-14

BIOS setup utility windows and references

Window name	Contents of setup utility	Ref. page
Standard CMOS Features	The default settings of all the Standard CMOS Setup options. The procedure to set date or time is also described.	on page 267
Advanced CMOS Features	The default settings of all the advanced CMOS Setup options	on page 268
Advanced Chipset Features	The default settings of all the Advanced Chipset Setting options	on page 270
Integrated Peripherals	The default settings of all the Peripheral Setup options	on page 271

Table 4-14

Window name	Contents of setup utility	Ref. page
Power Management Setup	The default settings of all the Power Management Setup options	on page 273
PnP/PCI Configurations	The default settings of all the PCI/Plug and Play Setup options	on page 275
PC Health Status	The default setting of the CPU temperature the system beeps for a warning alarm.	on page 276
Frequency/Voltage Control	The default settings of the CPU's clock frequency and voltage.	on page 276
Change Supervisor Password	The method to assign a password (This option is used only when the password has not been set in the E5070B/E5071B.)	on page 277
Change User Password	None (This option is unnecessary for the E5070B/E5071B.)	
Load Setting 1 Defaults	None (This option is unnecessary for the E5070B/E5071B.)	
Load Setting 2 Defaults	The procedure to initialize BIOS option settings (This option is used only when the A20 digital motherboard is replaced with a new one.)	on page 266
Save & Exit Setup	The procedure to save the option settings and exit from BIOS setup utility.	on page 277
Exit Without Saving	The procedure to exit from BIOS setup utility without saving the option settings.	on page 278

**Load Setting 2 Defaults**

**NOTE**

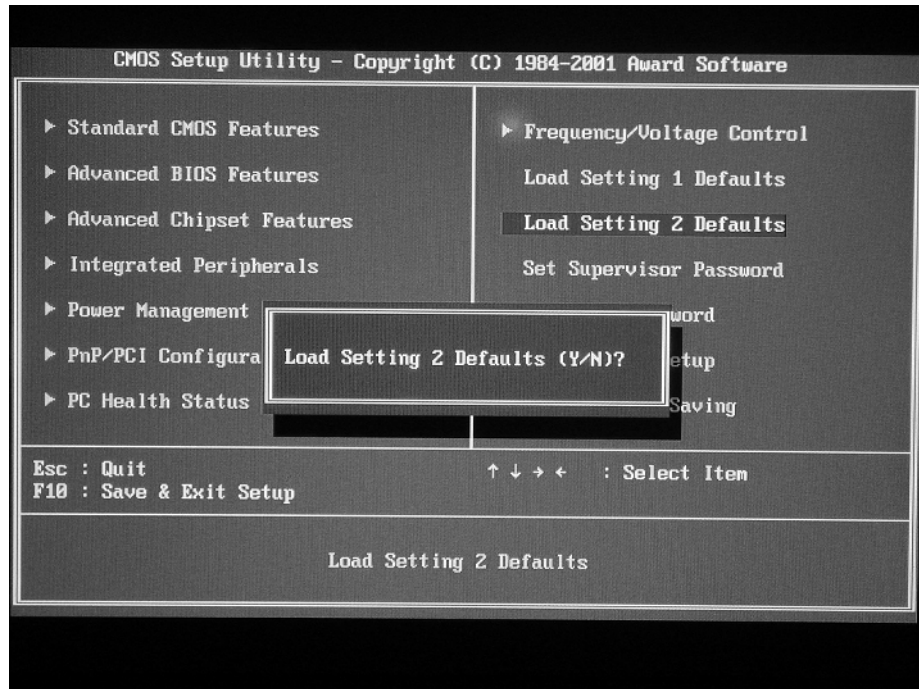
Perform the following procedure only when the A20 digital motherboard is replaced. Jump to "Standard CMOS Features" when you check whether the BIOS options are correctly set or not.

Load Setting 2 dialog box is displayed by choosing "Load Setting 2 Defaults" using     keys and by pressing  key at the BIOS Setup Utility main menu. The dialog box prompts you to select Y (Yes) or N (No) about "Load Setting 2 Defaults (Y/N) ?" as shown in Figure 4-62. Press  and  to load the setting 2 stored in the BIOS ROM. As a result, almost of all the BIOS options are automatically configured to the optimal settings for the E5070B/E5071B.

To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Figure 4-62

Load Setting 2 dialog box



**Standard CMOS Features**

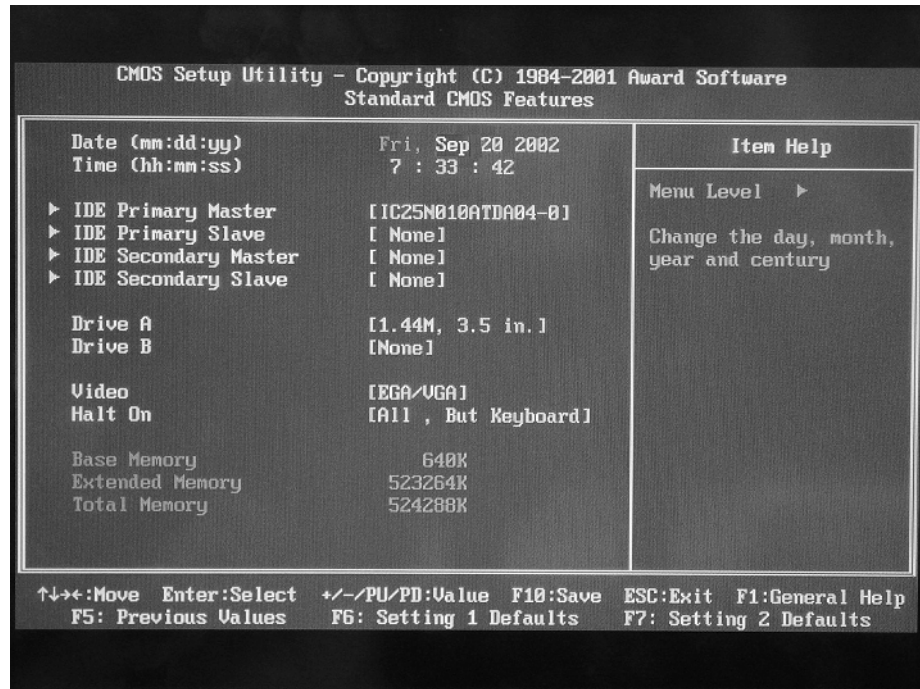
Standard CMOS Setup options are displayed by choosing "Standard CMOS Setup" using **↑** **↓** **←** **→** keys and by pressing **Enter** key at the BIOS Setup Utility main menu. The current setup states are displayed as shown in Figure 4-63. If date or time is incorrect, select it using **↑** **↓** **←** **→** keys, and change the setting by pressing **+** **-** or **Page Up** **Page Down** keys.

If you want to exit from this page and return to main menu, press **Esc** key.



To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Figure 4-63 Standard CMOS Features window



### Advanced BIOS Features

Advanced CMOS Features options are displayed by choosing "Advanced CMOS Features" using keys and by pressing key at the BIOS Setup Utility main menu. Then the window as shown in Figure 4-64 appears. Compare the actual BIOS option settings with the default settings shown in Table 4-15. If there is any difference, select it using and keys, and change the option setting by pressing or keys so that it becomes the same as the default setting.

If you want to exit from this page and return to main menu, press key.



To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Figure 4-64

Advanced BIOS Features window

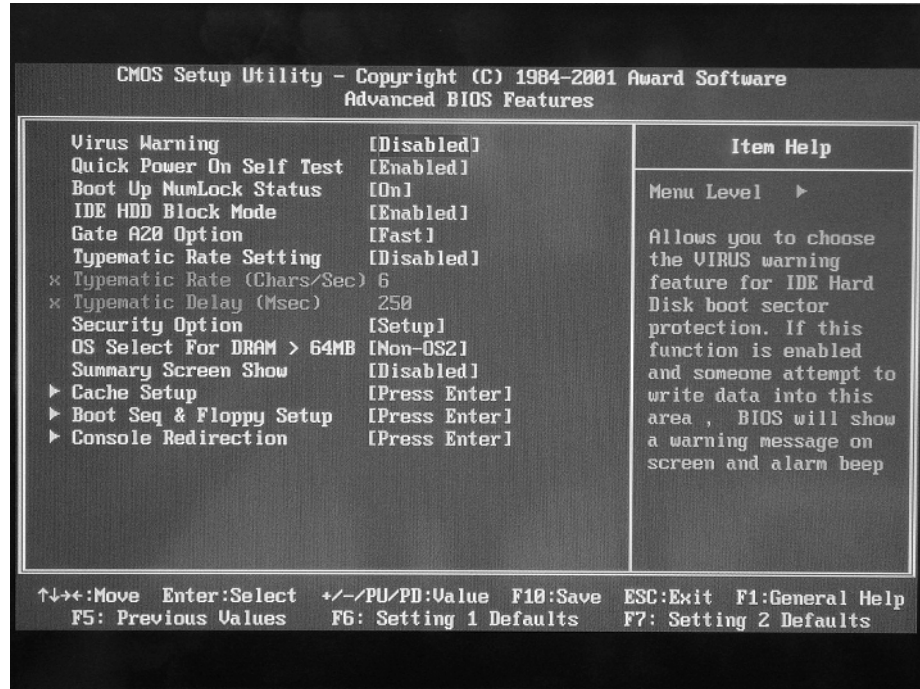


Table 4-15

Virus Warning	Disabled
Quick Power On Self Test	Enabled
Boot Up NumLock Status	On*1
IDE HDD Block Mode	Enabled
Gate A20 Option	Fast
Typematic Rate Setting	Disabled
Security Option	Setup
OS Select For DRAM > 64MB	Non-OS2
Summary Screen Show	
▶ CPU Internal Cache(L1)	Enabled
▶ CPU L2 Cache	Enabled
▶ CPU L2 Cache ECC Checking	Enabled
Boot Sequence & Floppy Setup	
▶ First Boot Device	1st IDE-HDD*1
▶ Second Boot Device	Disabled*1
▶ Third Boot Device	Disabled*1

Table 4-15












➤ Other Boot Devices	Disabled*1
➤ Swap Floppy Drive	Disabled
➤ Boot Up Floppy Seek	Disabled
Console Redirection	
➤ Console Redirection	Disabled
➤ Agent Connect Via	NULL
➤ Agent Wait Time(min)	1
➤ Agent After Boot	Disabled


\*1. The setting is different from that of "Load Setting 2 Defaults" on page 266

**NOTE**

➤ means sub-menu.

**Advanced Chipset Features**

Advanced Chipset Features options are displayed by choosing "Advanced Chipset Features" using     keys and by pressing  key at the BIOS Setup Utility main menu. Then the window as shown in Figure 4-65 appears. Compare the actual BIOS option settings with the default settings shown in Table 4-16. If there is any difference, select it using  and  keys, and change the option setting by pressing   or   keys so that it becomes the same as the default setting.

If you want to exit from this page and return to main menu, press  key.

To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Figure 4-65

Advanced Chipset Features window

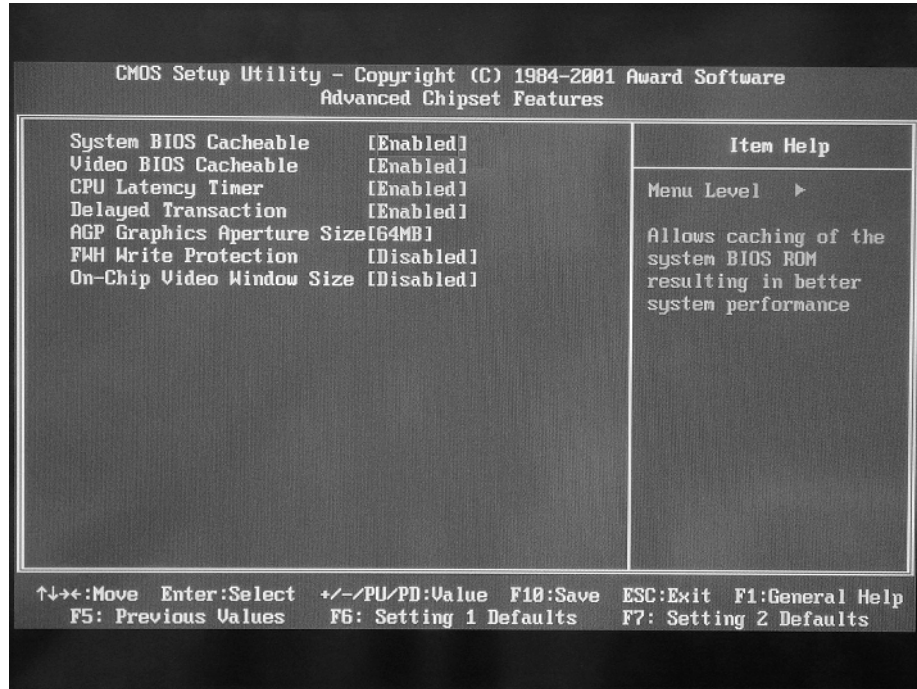


Table 4-16

System BIOS Cacheable	Enabled
Video BIOS Cacheable	Enabled
CPU Latency Timer	Enabled
Delayed Transaction	Enabled
AGP Graphics Aperture Size	64MB
FW Write Protection	Disabled
On Chip Video Window Size	Disabled*1

\*1. The setting is different from that of “Load Setting 2 Defaults” on page 266

**Integrated Peripherals**

Integrated Peripherals options are displayed by choosing "Integrated Peripherals " using keys and by pressing key at the BIOS Setup Utility main menu. Then the window as shown in Figure 4-66 appears. Compare the actual BIOS option settings with the default settings shown in Table 4-17. If there is any difference, select it using and keys, and change the option setting by pressing or keys so that it becomes the same as the default setting.

If you want to exit from this page and return to main menu, press key.

To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Figure 4-66 Integrated Peripheral window

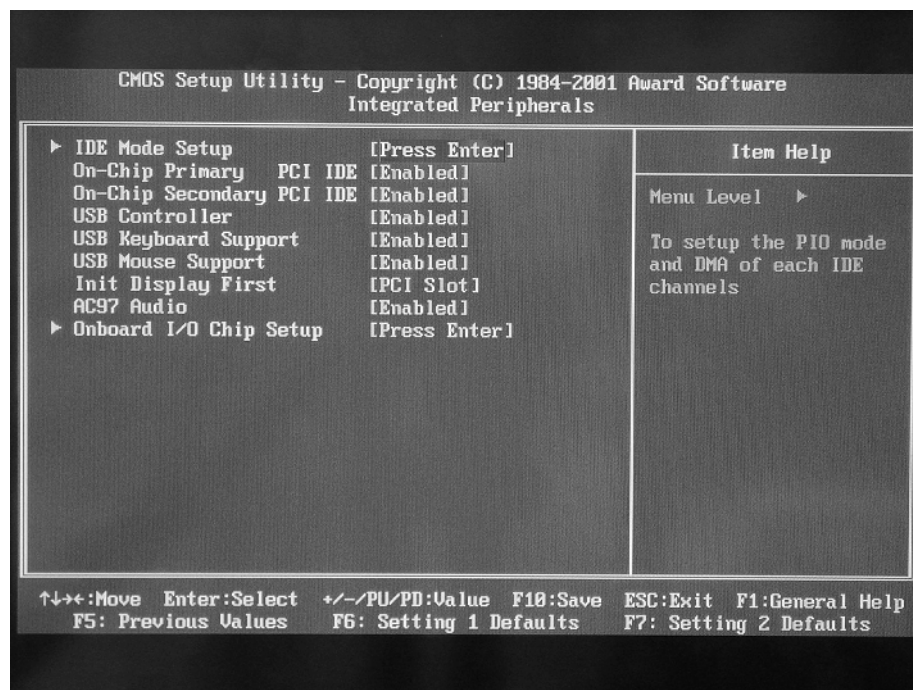


Table 4-17

IDE Mode Setup	
➤ IDE Primary Master PIO	Auto
➤ IDE Primary Slave PIO	Auto
➤ IDE Secondary Master PIO	Auto
➤ IDE Secondary Slave PIO	Auto
➤ IDE Primary Master UDMA	Disabled
➤ IDE Primary Slave UDMA	Disabled
➤ IDE Secondary Master UDMA	Disabled
➤ IDE Secondary Slave UDMA	Disabled
On-Chip Primary PCI IDE	Enabled
On-Chip Secondary PCI IDE	Enabled
USB Controller	Enabled
USB Keyboard Support	Enabled
USB Mouse Support	Enabled
Init Display First	PCI Slot
AC97 Audio	Enabled
Onboard I/O Chip Setup	

**To configure the A20 Digital Motherboard and BIOS for E5070B :  
JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396  
and below**












**Table 4-17**


➤ Onboard FDC Controller	Enabled
➤ Onboard Serial Port 1	3F8/IRQ4
➤ Onboard Serial Port 2	2F8/IRQ3
➤ UART Mode Select	Normal
➤ Onboard Parallel Port	378/IRQ7
➤ Parallel Port Mode	ECP+EPP
➤ EPP Mode Select	EPP1.9
➤ ECP Mode Use DMA	3

**NOTE**

➤ means sub-menu.

**Power Management Setup**

Power Management Setup options are displayed by choosing "Power Management Setup" using     keys and by pressing  key at the BIOS Setup Utility main menu. Then the window as shown in Figure 4-67 appears. Compare the actual BIOS option settings with the default settings shown in Table 4-18. If there is any difference, select it using  and  keys, and change the option setting by pressing   or   keys so that it becomes the same as the default setting.

If you want to exit from this page and return to main menu, press  key.

**CAUTION**

If the Power Management Setup options are set incorrectly, the E5070B/E5071B may not be turned on. In this case, perform the following procedure.

1. Turn the instrument on.
2. Set the jumper to the setting different from Figure 4-59 on page 263.
3. Turn the instrument off and turn it on again.
4. Restore jumper setting in Figure 4-59 on page 263.
5. Turn the instrument off and turn it on again.
6. Configure the BIOS from the beginning.



## Troubleshooting

To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Figure 4-67 Power Management Setup window

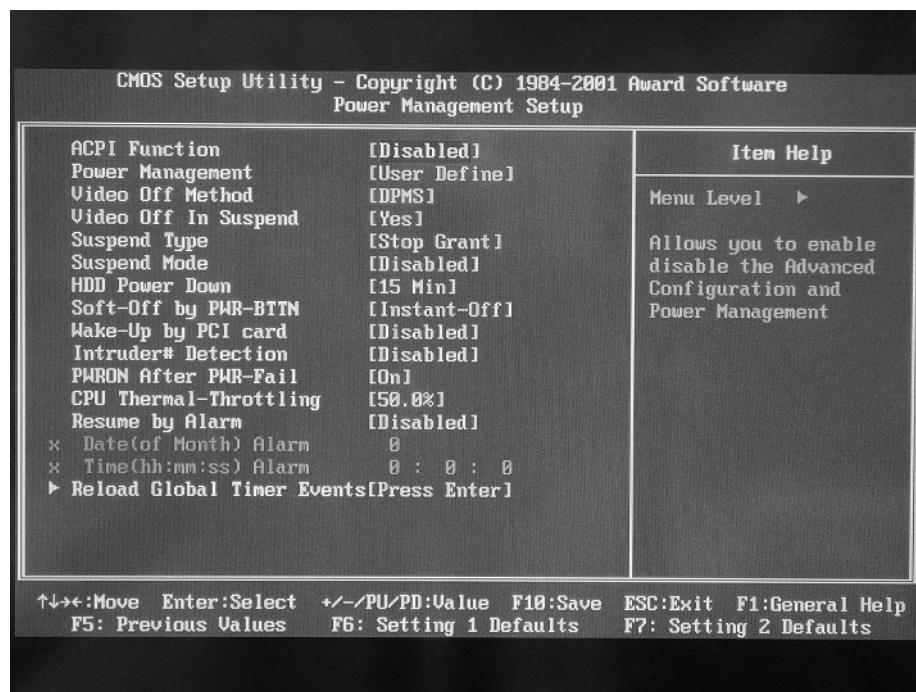


Table 4-18

ACPI Function	Disabled*1
Power Management	User Define
Video Off Method	DPMS
Video Off In Suspend	Yes
Suspend Type	Stop Grant
HDD Power Down	15 Min
Soft Off By Power Bttn	Instant-Off
Wake-Up by PCI Card	Disabled
Intruder# Detection	Disabled
PWRON After PWR-Fail	On*1
CPU Thermal Throttling	50.0%
Resume by Alarm	Disabled
Reload Global Timer Events	
▶ Primary IDE 0	Disabled
▶ Primary IDE 1	Disabled
▶ Secondary IDE 0	Disabled

To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Table 4-18

➤ Secondary IDE 1	Disabled
➤ FDD, COM, LPT Port	Disabled
➤ PCI PIRQ[A-D]#	Disabled

\*1. The setting is different from that of "Load Setting 2 Defaults" on page 266

**NOTE**

➤ means sub-menu.

**PnP/PCI Configurations**

PnP/PCI Configurations options are displayed by choosing "PnP/PCI Configurations" using keys and by pressing key at the BIOS Setup Utility main menu. Then the window as shown in Figure 4-68 appears. Compare the actual BIOS option settings with the default settings shown in Table 4-19. If there is any difference, select it using and keys, and change the option setting by pressing or keys so that it becomes the same as the default setting.

If you want to exit from this page and return to main menu, press key.

Figure 4-68

PnP/PCI Configurations window

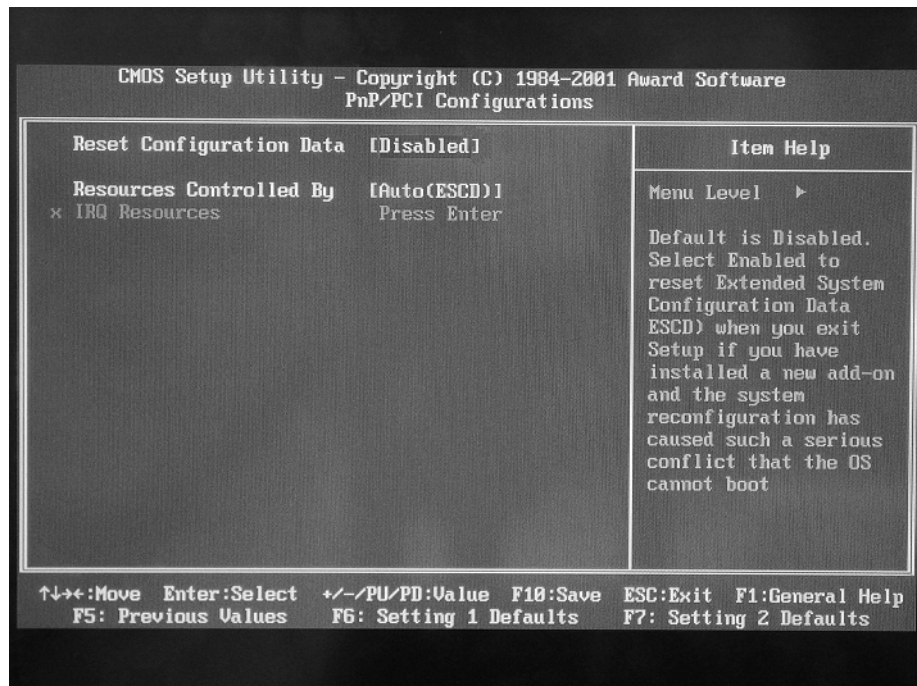











Table 4-19

Reset Configuration Data	Disabled
Resources Controlled By	Auto(ESCD)

## Troubleshooting

To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

### PC Health Status

PC Health Status options are displayed by choosing "PC Health Status" using     keys and by pressing  key at the BIOS Setup Utility main menu. Then the window as shown in Figure 4-69 appears. Compare the actual BIOS option settings with the default settings shown in Table 4-20. If there is any difference, change the option setting by pressing   or   keys so that it becomes the same as the default setting.


If you want to exit from this page and return to main menu, press  key.

Figure 4-69

### PC Health Status window

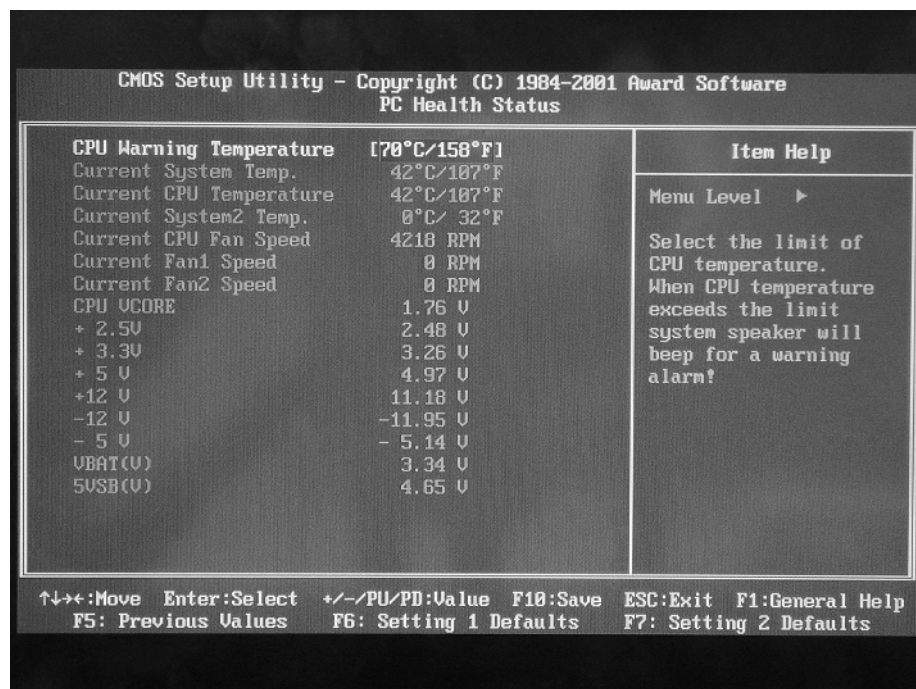














Table 4-20

CPU Warning Temperature	70°C/158°F
-------------------------	------------

### Frequency/Voltage Control

Frequency/Voltage Control options are displayed by choosing "Frequency/Voltage Control" using     keys and by pressing  key at the BIOS Setup Utility main menu. Then the window as shown in Figure 4-70 appears. Compare the actual BIOS option settings with the default settings shown in Table 4-21. If there is any difference, select it using  and  keys, and change the option setting by pressing   or   keys so that it becomes the same as the default setting.

If you want to exit from this page and return to main menu, press  key.



To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Figure 4-70

Frequency/Voltage Control window

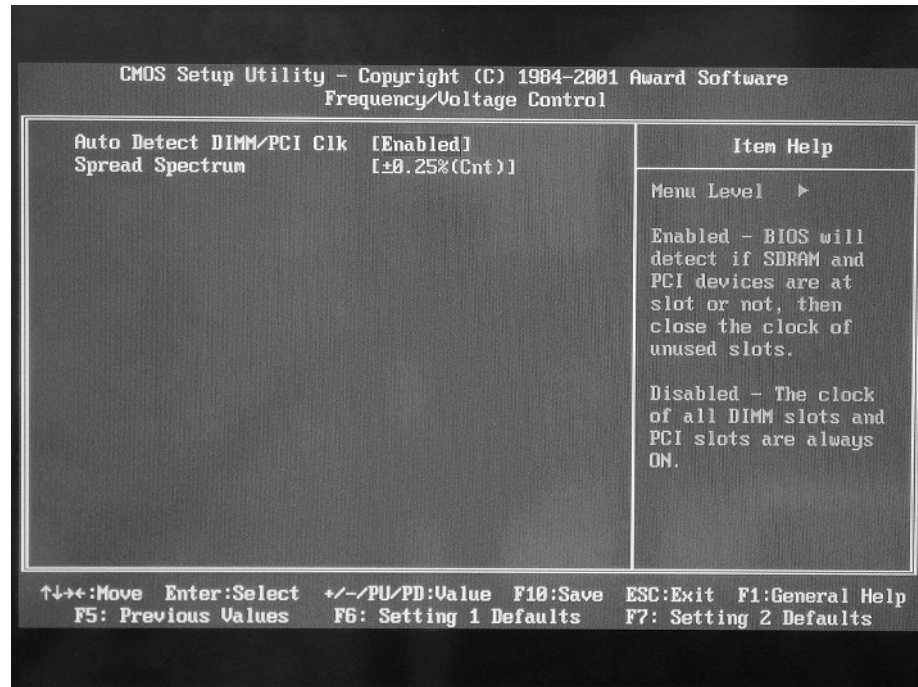


Table 4-21

Auto Detect DIMM / PCI Clock	Enabled
Spread Spectrum	±0.2%(Cnt)

**Change Supervisor Password**

A password needs to be entered to execute the BIOS setup utility. If a password has not been assigned in the E5070B/E5071B, set the password using this BIOS setup utility as follows.

- Select "Change Supervisor Password" using     keys at the BIOS Setup Utility main menu and press  key.
- Enter the password of "e507xa". Never set another password.
- Press  key.
- If a message of "New supervisor password installed. Press any key to continue" is displayed, press  key.








**Save & Exit Setup**

When you want to change and save a BIOS option, Select "Save Settings and Exit" using     keys at the BIOS Setup Utility main menu and press  key. Then, a message of "SAVE to CMOS and EXIT (Y/N)?" is displayed. Press  and  keys. The BIOS setup utility is closed after the current settings are saved.

## Troubleshooting

**To configure the A20 Digital Motherboard and BIOS for E5070B :  
JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396  
and below**

### **Exit Without Saving**

If you cancel the changes in the BIOS option settings, select "Exit Without Saving" using     keys at the BIOS Setup Utility main menu and press  key. Then, a message of "Quit Without Saving (Y/N)?" is displayed. Press  and  keys.

The BIOS setup utility is closed without saving the current settings.

## To configure the A20 Digital Motherboard and BIOS for E5070B : MY42300633 and above, E5071B : MY42301397 and above

When you replace the A20 digital motherboard, you need to confirm the jumper settings for the specific CPU installed. The jumper settings information is provided in “Configure the Motherboard” on page 279.

You also need to confirm the BIOS options using the BIOS setup utility procedure. The BIOS setup procedure is described in “To Confirm or Set the BIOS Options” on page 280.

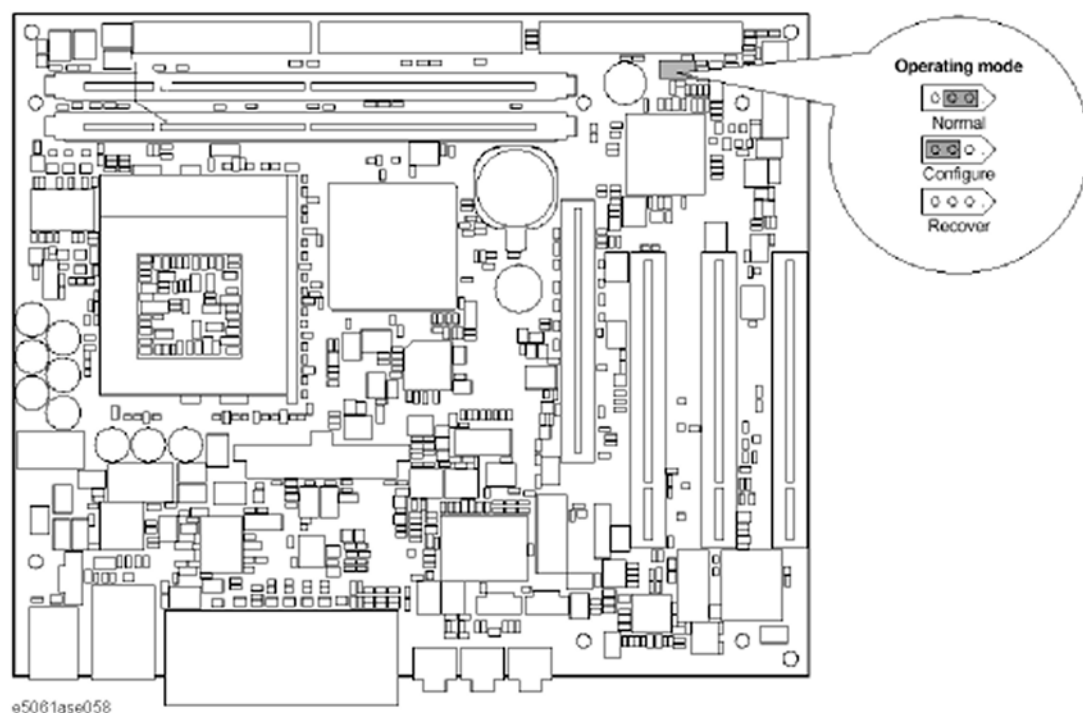
### To Identify the Motherboard Installed

Confirm the splash screen is displayed in the beginning of the boot process as shown in Figure 4-14.

### Configure the Motherboard

There is a jumper on the A20 digital motherboard that must be configured to the correct setting. Confirm that the jumper setting is “Normal” as shown in Figure 4-71.

**Figure 4-71** A20 digital motherboard jumpers location and settings



### Testing DRAM on the Motherboard

When the A20 digital motherboard is replaced with a new one, it is advisable to perform

## Troubleshooting

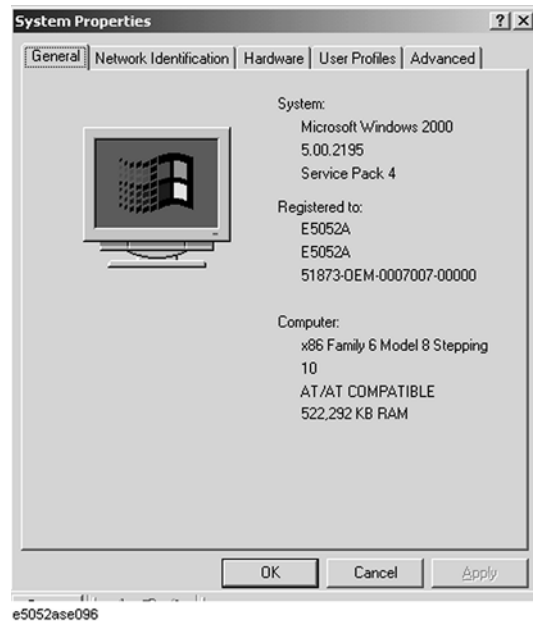
### To configure the A20 Digital Motherboard and BIOS for E5070B : MY42300633 and above, E5071B : MY42301397 and above

the DRAM test before proceeding to the BIOS setup utility procedure. Confirm the DRAM count in accordance with the following procedure.

- Step 1.** Connect the external keyboard and mouse to the E5070B/E5071B rear panel connectors.
- Step 2.** Turn the instrument on. Wait until the E5070B/E5071B boots up. Do not press any key until the E5070B/E5071B measurement view appears.
- Step 3.** Press **[System]** key on the front panel.
- Step 4.** Click **Misc Setup** in the softkey menu.
- Step 5.** Click **Control Panel...** in the softkey menu.
- Step 6.** Scroll the function viewer to find "System" icon and double-click "System". This opens "System Properties" window as shown in Figure 4-72.

Figure 4-72

#### System Properties window



- Step 7.** Verify that "522,292 KB RAM" is displayed in the Computer profile as shown in Figure 4-72. If it is not correct, the A20 board is faulty.
- Step 8.** Click "OK" button to close the window.
- Step 9.** Turn the E5070B/E5071B off before proceeding to the next step "To Confirm or Set the BIOS Options".



#### To Confirm or Set the BIOS Options

BIOS is the PC's built-in program describing the standard procedure of basic inputs and outputs for the system hardware. BIOS involves the system BIOS, start-up program and BIOS setup utility. The E5070B/E5071B starts up first with the BIOS when the power is turned on. Use the following procedure to confirm or set the BIOS options, known as the BIOS setup utility.

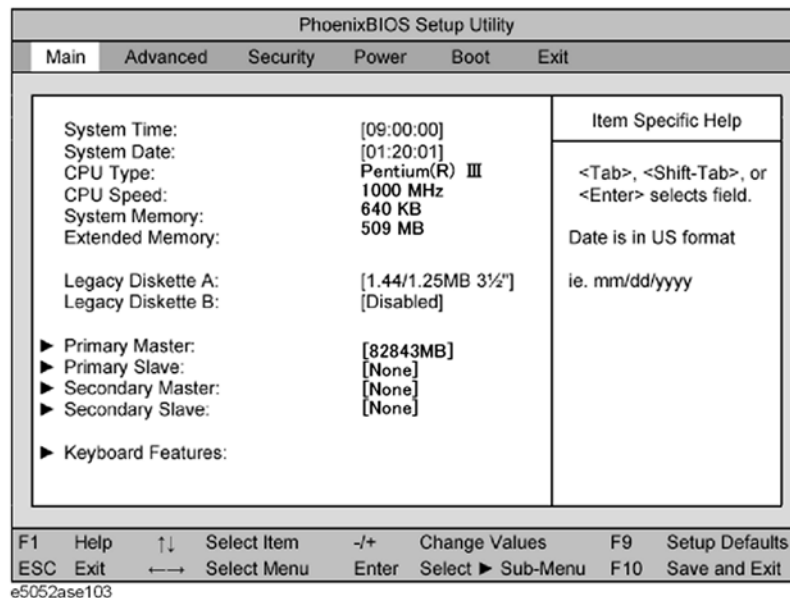
**To configure the A20 Digital Motherboard and BIOS for E5070B : MY42300633 and above, E5071B : MY42301397 and above**






**Run the BIOS setup utility**


Use the external keyboard to select and set various options in the BIOS setup utility. Do not operate the E5070B/E5071B front panel until you exit the BIOS option setup procedure.

- Procedure**
- Step 1.** Connect the external keyboard to the E5070B/E5071B rear panel connector.
  - Step 2.** Turn the instrument on.
  - Step 3.** Press **[F2]** key as soon as the splash screen as shown in Figure 4-14 is displayed. Wait a few seconds until the message "Enter CURRENT Password:" appears.
  - Step 4.** Press  key (The LED in the key lights.)
  - Step 5.** Enter password "e507xa" and press . Then BIOS setup utility main menu is displayed as shown in Figure 4-73.

**Figure 4-73 BIOS setup utility main menu**



- Step 6.** The BIOS setup utility has primary menus, most of which have sub-menus. Brief descriptions and reference pages for these menus are provided in Table 4-22. The details of the BIOS option settings in each menu and sub-menus are described on the page listed in the table.
- Step 7.** Select a desired menu using   keys. Select an item in the menu or sub-menu window using   keys. To perform an operation, use  key.

**NOTE** If you want to exit the BIOS option setting and exit the BIOS setup utility without saving changes in the setup, select "Exit Discarding Changes" and press  key at the Exit Menu.

**Table 4-22 BIOS setup utility primary menus and references**

Menu	Options	Ref. page
Main	Product description including processor and memory fitted Date and time IDE disks found and sub-menus for extra configuration	on page 281
Advanced	Start-up display mode (silent-boot etc.) Operating system type (ACPI etc.) Advanced chipset configuration Processor cache control PCI space configuration I/O devices configuration Advanced hard disk drive options System monitoring Version information	on page 283
Security	Passwords and permissions	on page 286
Power	Action after AC-reconnect Power savings modes and timers	-
Boot	Selects device boot order	on page 283
Exit	Save with or without changes Load/save default settings (from flash ROM)	on page 286

**Load Setup Defaults**

**NOTE**

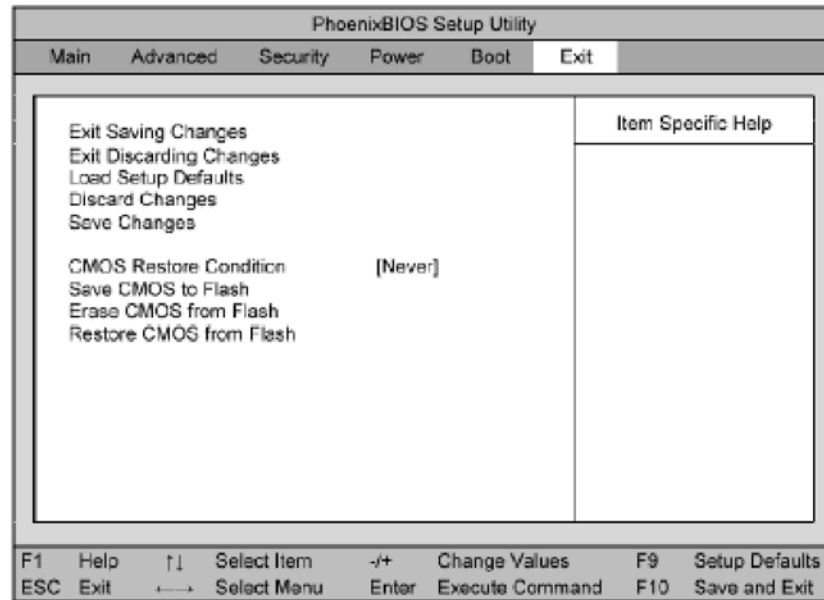
Perform the following procedure only when the A20 digital motherboard is replaced. Jump to “Advanced Menu” when you check whether the BIOS options are correctly set or not.

Exit menu shown below is displayed by choosing "Exit" using   keys and by pressing  key at the BIOS Setup Utility main menu. Select “Load Setup Default” using   keys. The dialog box “Setup Confirmation” prompts you to select Y (Yes) or N (No). Press  and  to load the manufacture Setup Defaults into the BIOS ROM. As a result, almost all of the BIOS options are automatically configured to the optimal settings for the E5070B/E5071B.

To configure the A20 Digital Motherboard and BIOS for E5070B : MY42300633 and above, E5071B : MY42301397 and above

Figure 4-74

Exit menu (for Load Setup Defaults)



e5081ase057

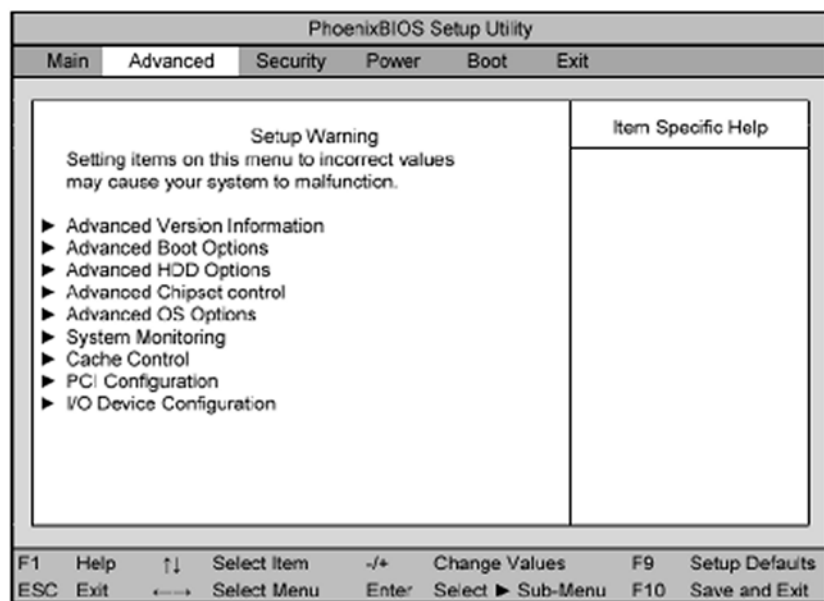
Advanced Menu

The Advanced Menu shown below is displayed by choosing "Advanced" using keys and by pressing key at the BIOS Setup Utility main menu.

If you want to exit from this page and return to main menu, press key.

Figure 4-75

Advanced Menu



e5081ase054

- Advanced Chipset Control (for PCI Video Card)

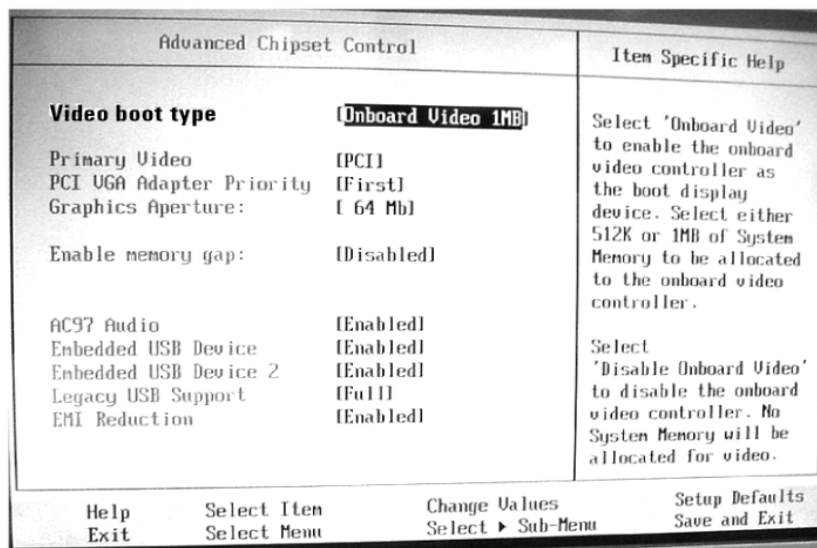
## Troubleshooting

### To configure the A20 Digital Motherboard and BIOS for E5070B : MY42300633 and above, E5071B : MY42301397 and above

Select “Advanced Chipset Control” using  $\uparrow$   $\downarrow$  keys. The current chipset control states are displayed as shown in Figure 4-76.

Select “Video boot type” using  $\uparrow$   $\downarrow$  keys, and change the setting to “Disable Onboard Video” by pressing  $+$   $-$  keys, and then, return to “Advanced Menu” as shown in Figure 4-75.

**Figure 4-76** Advanced Chipset Control Sub-menu



e5070bse3017

## NOTE

When PCI Video Card has not been installed, do not set Advanced Chipset Control.

- Advanced OS Options

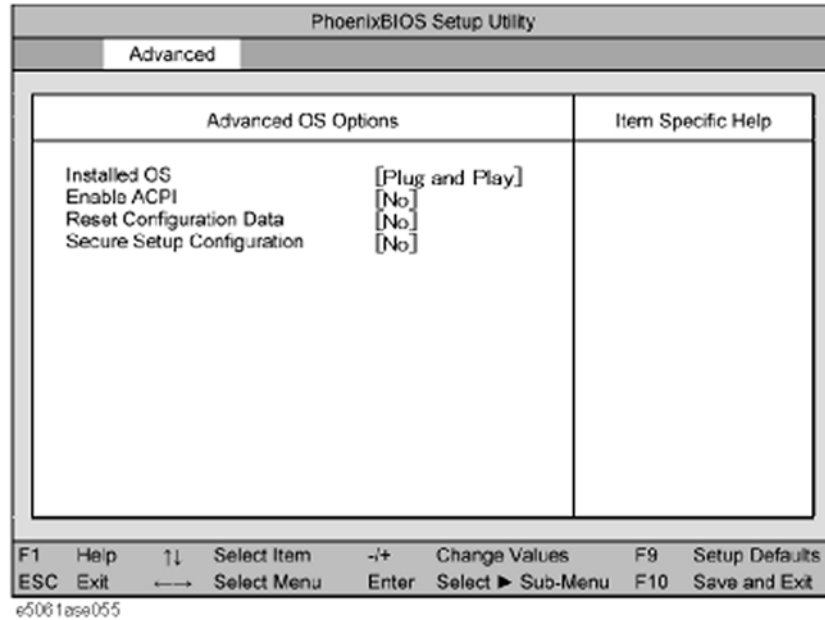
Select “Advanced OS Options” using  $\uparrow$   $\downarrow$  keys. The current setup states are displayed as shown in Figure 4-77.

Select “Installed OS” using  $\uparrow$   $\downarrow$  keys, and change the setting to “Plug and Play” by pressing  $+$   $-$  keys. Next step as, select “Enable ACPI” using  $\uparrow$   $\downarrow$  keys, and change the setting to “No” by pressing  $+$   $-$  keys. And then, return to “Advanced Menu” as shown in Figure 4-75.



To configure the A20 Digital Motherboard and BIOS for E5070B : MY42300633 and above, E5071B : MY42301397 and above

Figure 4-77 Advanced OS Options Sub-menu

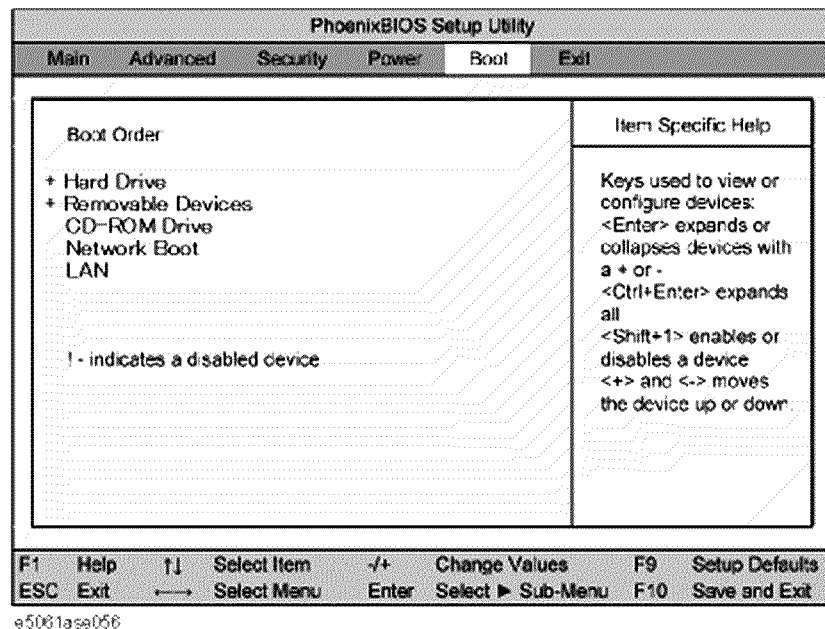


**Boot Menu**

The Boot Menu shown below is displayed by choosing "Boot" using   keys and by pressing  key at the BIOS Setup Utility main menu. The current setup states are displayed as shown in Figure 4-78. If the setup is incorrect, select it using   keys, and change the setting by pressing   keys.

If you want to exit from this page and return to main menu, press  key.

Figure 4-78 Boot Menu



4. Troubleshooting

## Troubleshooting

### To configure the A20 Digital Motherboard and BIOS for E5070B : MY42300633 and above, E5071B : MY42301397 and above

#### Change Supervisor Password

A password needs to be entered to execute the BIOS setup utility. If a password has not been assigned in the E5070B/E5071B, set the password using this BIOS setup utility as follows.

- a. Select "Security" using   keys at the BIOS Setup Utility main menu and press  key.
- b. Select "Set Supervisor password" using   keys and press  key.
- c. Enter the password of "e507xa". Never set another password.
- d. Press  key.
- e. If a message of "New supervisor password installed. Press any key to continue" is displayed, press  key.

#### Save & Exit Setup

When you want to change and save a BIOS option, Select "Exit" using   keys at the BIOS Setup Utility main menu and press  key. Select "Save CMOS to Flash" using   and press  key. Then select "Exit Saving Changes" using   and press  key. A message of "SAVE to CMOS and EXIT (Y/N)?" is displayed. Press  and  keys.

The BIOS setup utility is closed after the current settings are saved.

#### Exit Without Saving

If you cancel the changes in the BIOS option settings, select "Exit Discarding Change" using   keys at the Exit Menu and press  key. Then, a message of "Quit Without Saving (Y/N)?" is displayed. Press  and  keys.

The BIOS setup utility is closed without saving the current settings.

---

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

This chapter contains information for ordering replacement parts for the E5070B/E5071B ENA Series RF Network Analyzers.

## Ordering Information

To order part listed in the replaceable part lists, quote the Agilent part number (with a check digit), indicate the quantity required, and address the order to the nearest Agilent office. The check digit will ensure accurate and timely processing of the order.

To order a part not listed in the replaceable part table, 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 office.

## Direct Mail Order System

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

- Direct ordering and shipping from the Agilent Parts Center in Mountain View, California.
- No maximum or minimum on any mail order (there is a minimum order amount for parts ordered through a local Agilent 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 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 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 a 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

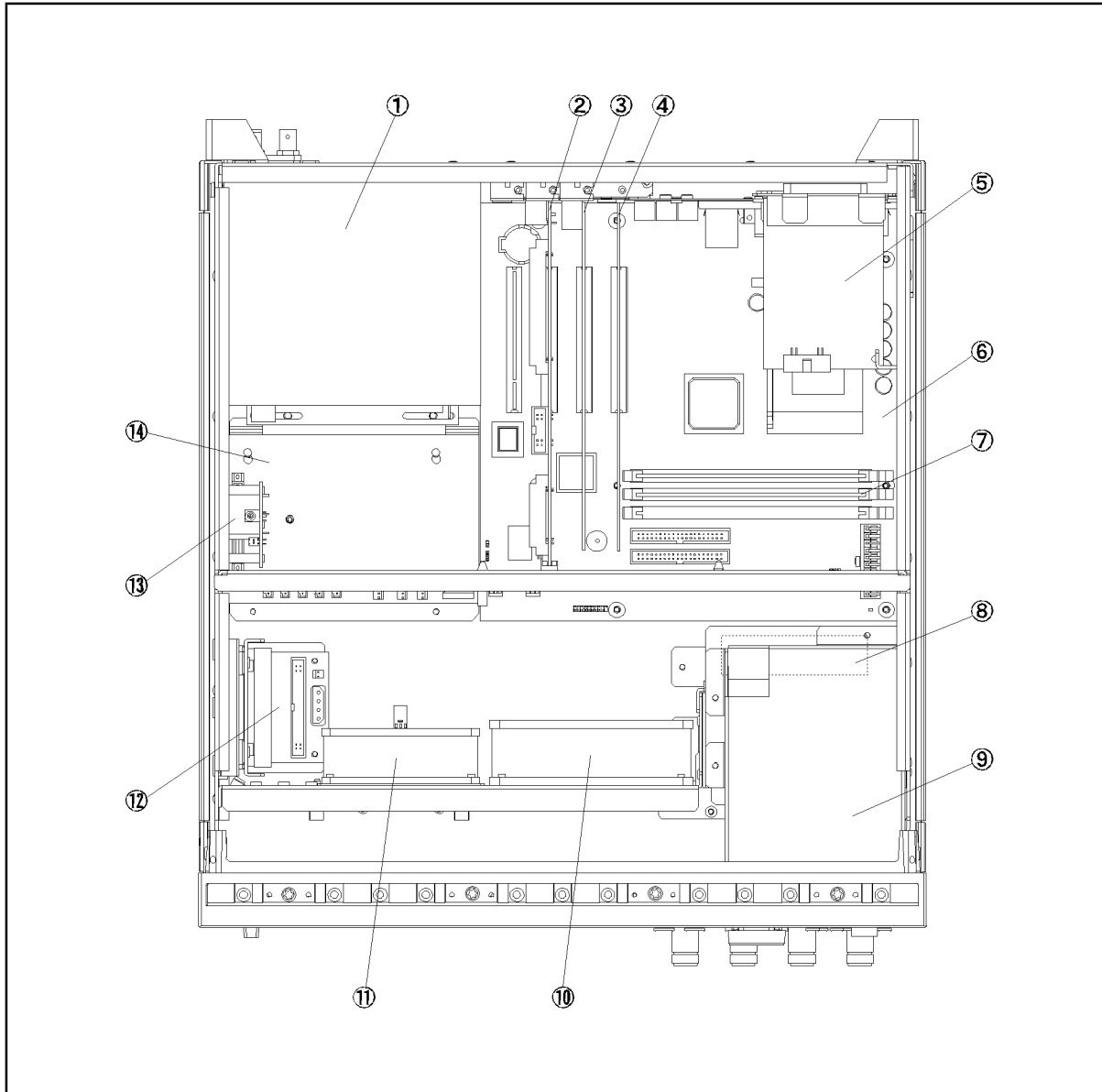
Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

**Replaceable Parts List (Top View) for E5070B :  
JP1KKxxxxx, MY42300632 and below, E5071B :  
JP1KKxxxxx, MY42301396 and below**

**Top View (Major Assemblies)**

Figure 5-1

Top View (Major Assemblies)



e5070bse056

**Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632  
and below, E5071B : JP1KKxxxxx, MY42301396 and below**

**Table 5-1 Top View (Major Assemblies)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	0950-4773	3	1	A50 POWER SUPPLY
2	E5070-66521	5	1	A21 ANALOG INTERFACE BOAR
3	5185-3792	9	1	A24 GPIB CARD
4	54810-66525	1	1	A26 LCD INTERFACE CARD
5	E5070-66523	7	1	A23 HANDLER I/O BOARD
6	See service note E5070B-02D / E5071B-02D	1	1	A20 DIGITAL MOTHERBOARD
7	1818-8783	8	1	DIMM 32MX64
8	04287-61001	8	1	FAN ASSY
9	See Table 5-37	-	1	A28 FDD ASSEMBLY
10	E5070-61004	9	1	FAN ASSY
11	E5070-61005	0	1	FAN ASSY
12	See Table 5-38	-	1	A27 MASS STORAGE DISK DRIVE ASSEMBLY
13	E4991-66505	7	1	A5 CRYSTAL OVEN (Opt. 1E5)
14	See Table 5-46	-	1	A6 RF SWITCH/TEMP. CONTROLLER ASSEMBLY

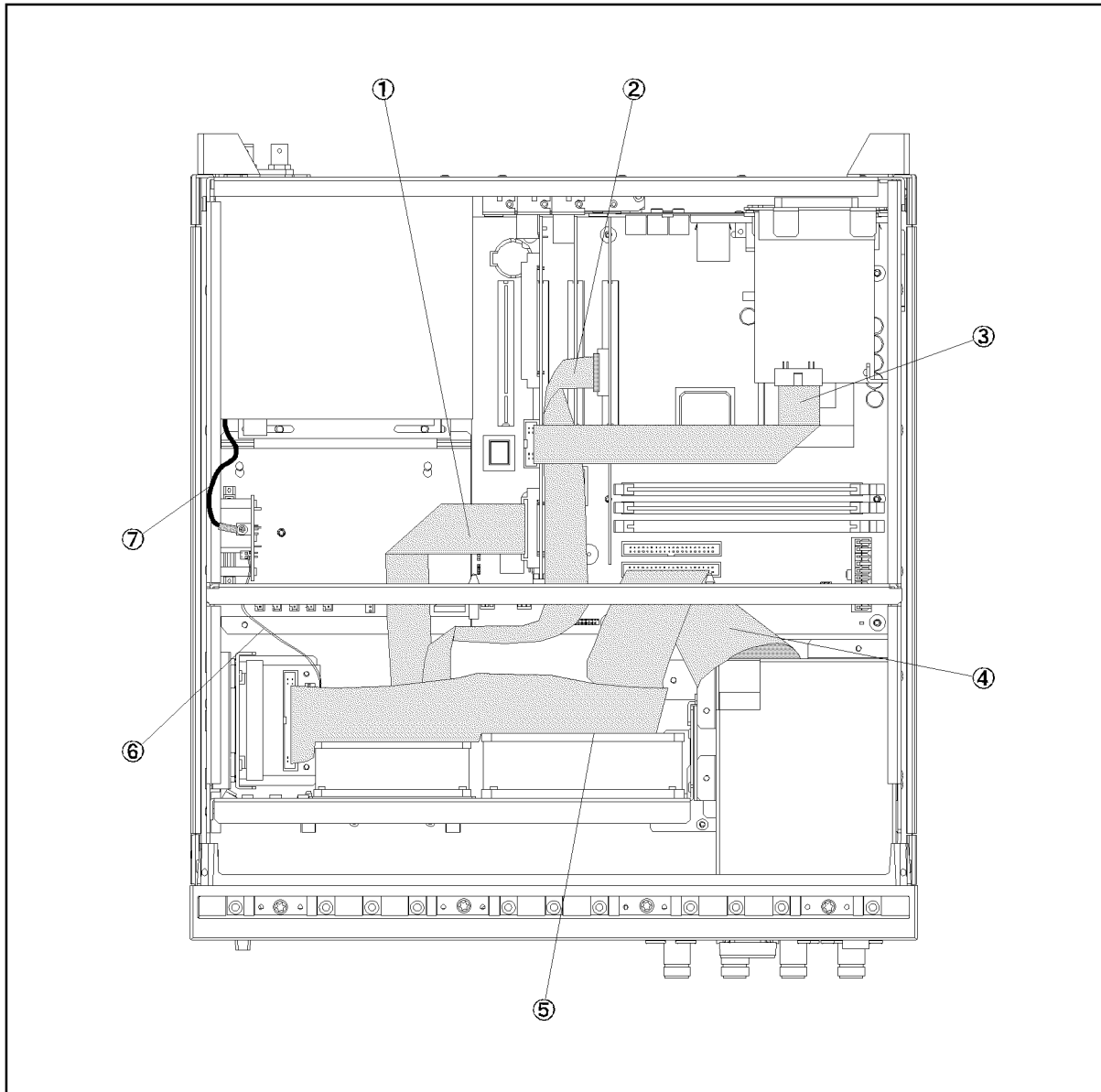
Replaceable Parts

Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632  
and below, E5071B : JP1KKxxxxx, MY42301396 and below

Top View (Cables)

Figure 5-2

Top View (Cables)



e5070bse057



**Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632  
and below, E5071B : JP1KKxxxxx, MY42301396 and below**

**Table 5-2 Top View (Cables)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61622	7	1	FLAT CABLE ASSY
2	04287-61607	0	1	FLAT CABLE
3	E5070-61616	9	1	FLAT CABLE ASSY
4	E5070-61623	8	1	FLAT CABLE ASSY
5	E5070-61624	9	1	FLAT CABLE ASSY
6	E5070-61692	2	1	WIRE ASSY (Opt. 1E5)
7	E5070-61692	1	1	RF CABLE ASSY (Opt. 1E5)
	1400-1334	6	1	CLAMP CABLE

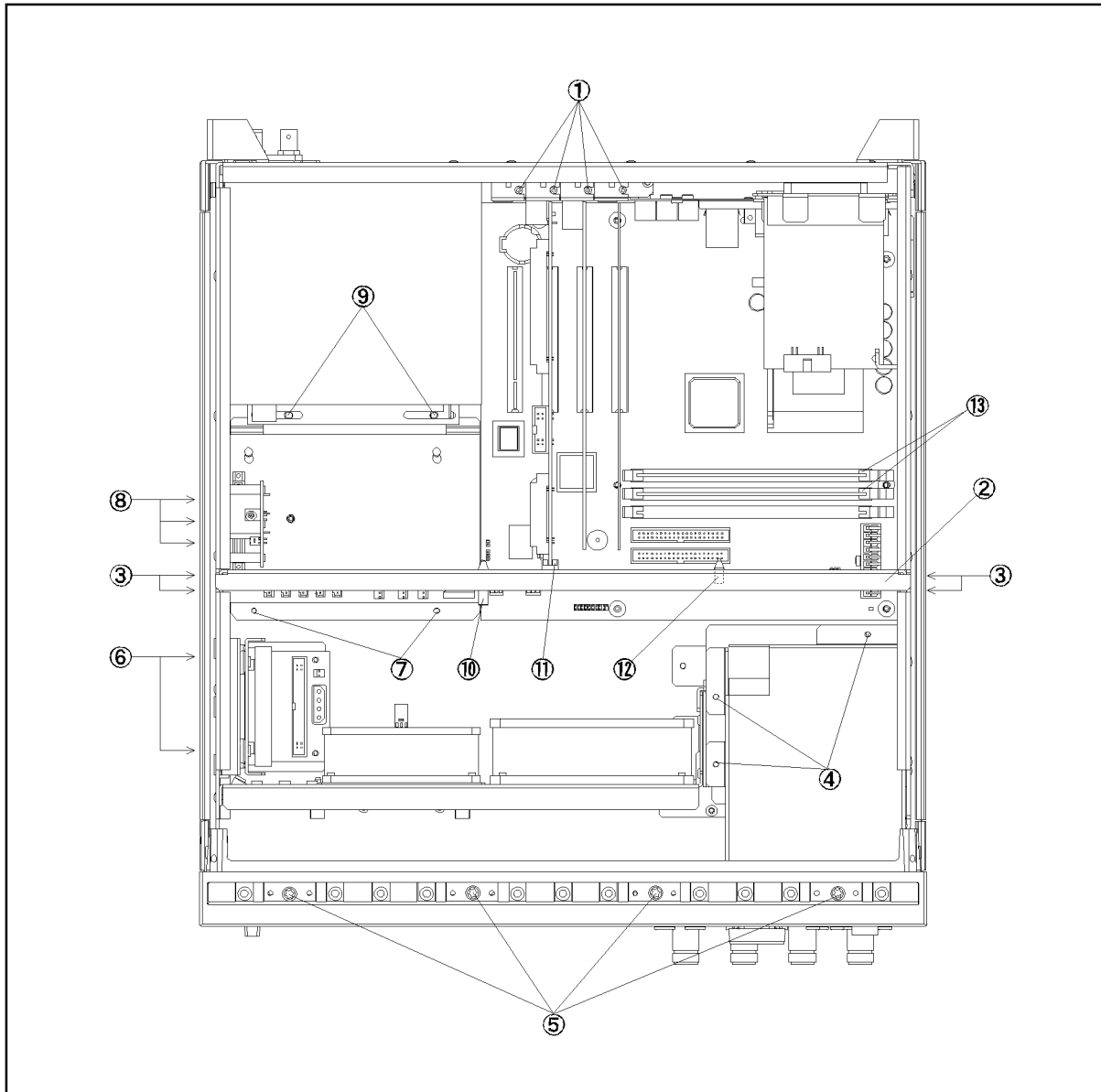
Replaceable Parts

Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632  
and below, E5071B : JP1KKxxxxx, MY42301396 and below

Top View (Miscellaneous Parts)

Figure 5-3

Top View (Miscellaneous Parts)



e5070bse058

**Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632  
and below, E5071B : JP1KKxxxxx, MY42301396 and below**

**Table 5-3 Top View (Miscellaneous Parts)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	0515-0430	3	4	SCREW-MACH M3.0 x 6 PN T10
2	E5070-01229	4	1	ANGLE
3	0515-1946	8	4	SCREW
4	0515-0430	3	3	SCREW-MACH M3.0 x 6 PN T10
5	0515-1382	6	4	SCREW-MACH M3.5 x 6 FL T15
6	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
7	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
8	0515-1946	8	3	SCREW-MACH M3.0 x 6 FL T10
9	0515-1402	1	2	SCREW-MACH M3.5 x 8 PN T15
10	1400-1051	4	1	SADDLE-WIRE
11	0403-1143	0	1	GUIDE-PC BD
12	1400-0866	7	1	CLAMP-CABLE
13	1400-3207	6	2	CABLE TIE

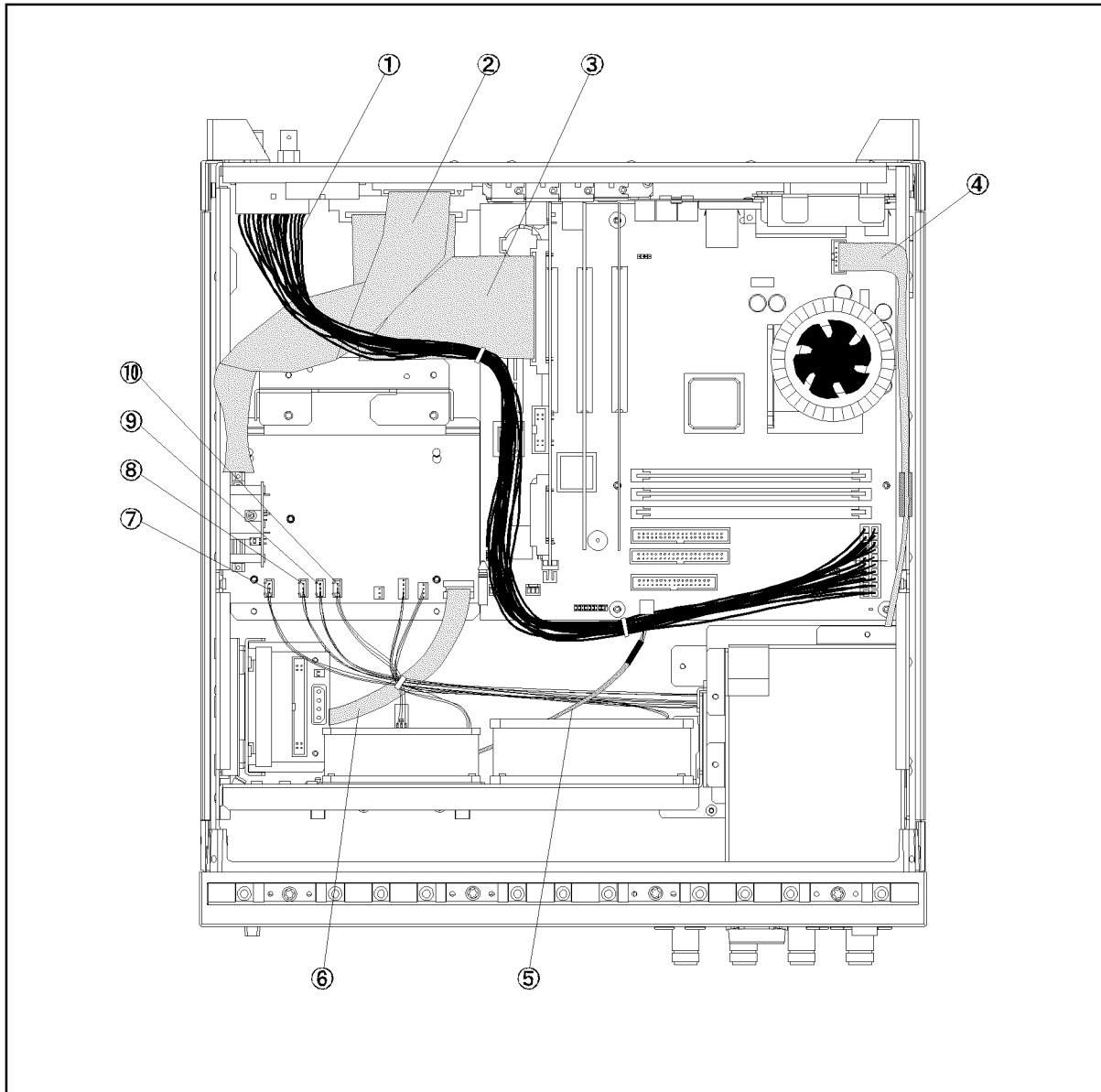
Replaceable Parts

Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632  
and below, E5071B : JP1KKxxxxx, MY42301396 and below

Top View (Under Power Supply)

Figure 5-4

Top View (Under Power Supply)



e5070bse059

**Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632  
and below, E5071B : JP1KKxxxxx, MY42301396 and below**

**Table 5-4 Top View (Under Power Supply)**

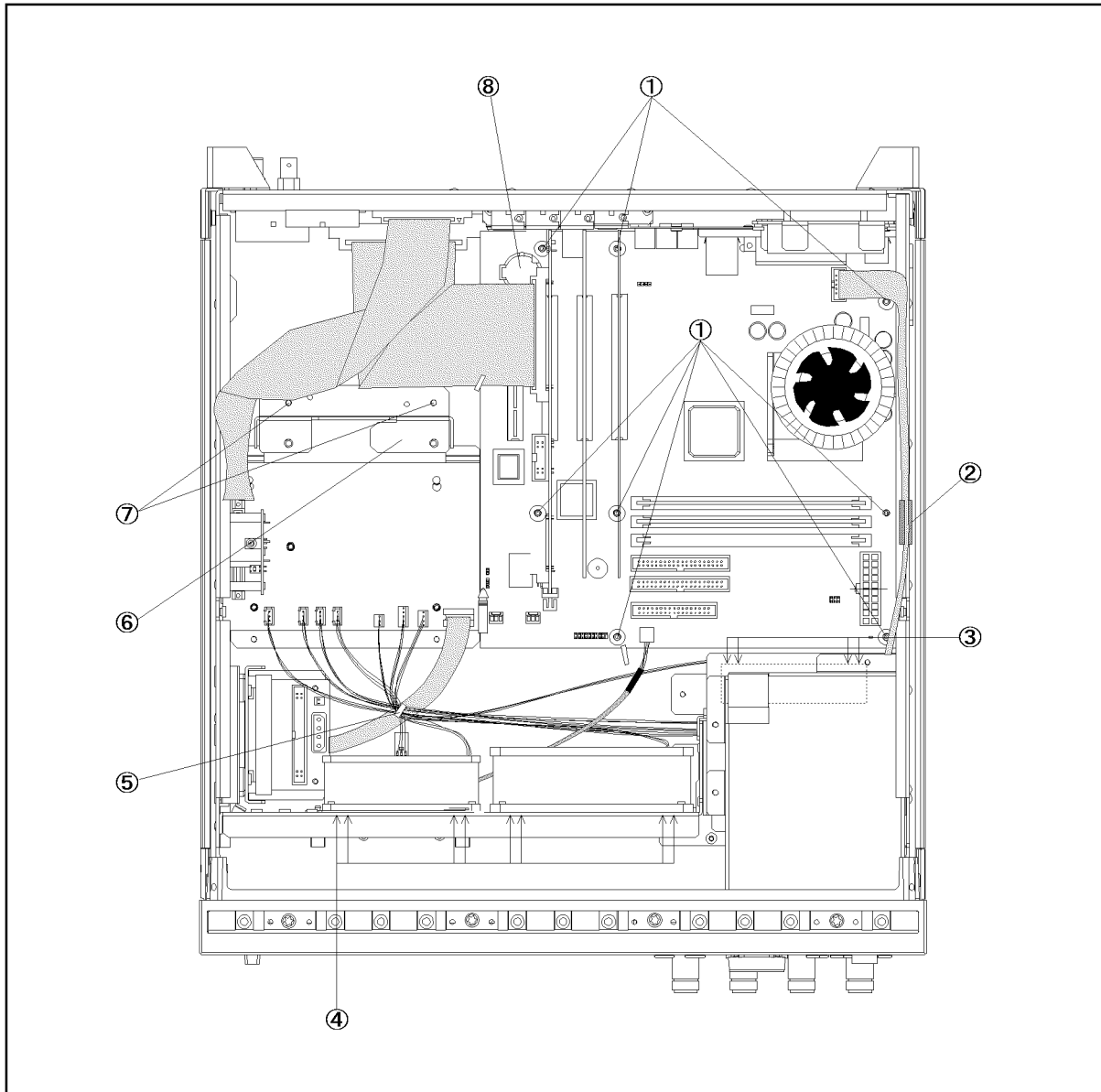
<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61661	4	1	WIRE ASSY
2	E5070-61663	6	1	FLAT CBL ASSY
3	E5070-61662	5	1	FLAT CBL ASSY
4	E5070-61664	7	1	FLAT CBL ASSY (Opt. 016)
5	E5070-61665	8	1	USB CABLE ASSY
6	E5070-61617	0	1	FLAT CABLE ASSY (Opt. x14)
7	E5070-61614	7	1	WIRE ASSY (YELLOW)
8	E5070-61613	6	1	WIRE ASSY (ORANGE) (Opt. 31x, 41x)
9	E5070-61612	5	1	WIRE ASSY (RED) (Opt. 31x, 41x)
10	E5070-61615	8	1	WIRE ASSY (BROWN) (Opt. 21x)
	E5070-61611	4	1	WIRE ASSY (BROWN) (Opt. 31x, 41x)

Replaceable Parts

Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Top View (Motherboard and Other Parts)

Figure 5-5 Top View (Motherboard and Other Parts)



e5070bse4014

**Replaceable Parts List (Top View) for E5070B : JP1KKxxxxx, MY42300632  
and below, E5071B : JP1KKxxxxx, MY42301396 and below**

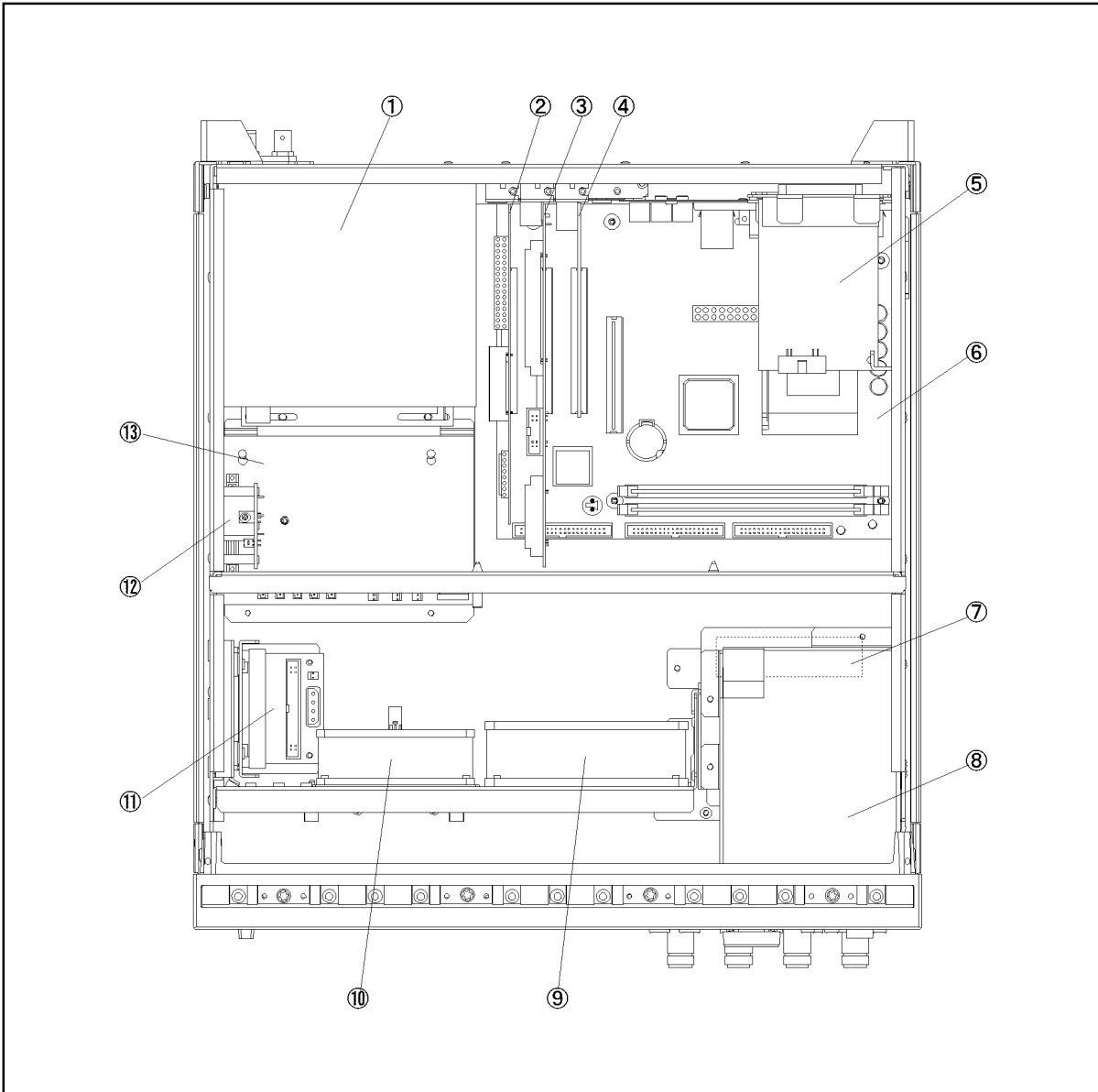
**Table 5-5 Top View (Motherboard and Other Parts)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	0515-0372	2	8	SCREW-MACH M3.0 x 8 PN T10
2	1400-0611	0	1	CLAMP-CABLE
3	0515-2216	7	4	SCREW-MACH M4.0 x 40 PN T20
4	0361-1875	5	8	RIVET (PLASTIC)
5	1400-1334	6	1	CLAMP-CABLE
6	E5070-01267	7	1	BRACKET PS
7	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
8	1420-0356	-	1	BATTERY LITHIUM (CR2032), 3V, .22A-HR

**Replaceable Parts List (Top View) for E5070B :  
MY42300633 and above, E5071B : MY42301397 and above  
(A27 mass storage disk drive model)**

**Top View (Major Assemblies)**

**Figure 5-6** Top View (Major Assemblies)



e5070bse3001



**Replaceable Parts List (Top View) for E5070B : MY42300633 and above,  
E5071B : MY42301397 and above (A27 mass storage disk drive model)**

**Table 5-6 Top View (Major Assemblies)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	0950-4773	3	1	A50 POWER SUPPLY
2	54810-66525	1	1	A26 LCD INTERFACE CARD
3	E5070-66521	5	1	A21 ANALOG INTERFACE BOAR
4	E5070-61007	9	1	A24 GPIB CARD
5	E5070-61006	7	1	A23 HANDLER I/O BOARD
6	0960-2432	1	1	A20 DIGITAL MOTHERBOARD
7	04287-61001	8	1	FAN ASSY
8	See Table 5-37	-	1	A28 FDD ASSEMBLY
9	E5070-61004	9	1	FAN ASSY
10	E5070-61005	0	1	FAN ASSY
11	See Table 5-37	-	1	A27 MASS STORAGE DISK DRIVE ASSEMBLY
12	E4991-66505	7	1	A5 CRYSTAL OVEN (Opt. 1E5)
13	See Table 5-46	-	1	A6 RF SWITCH/TEMP. CONTROLLER ASSEMBLY

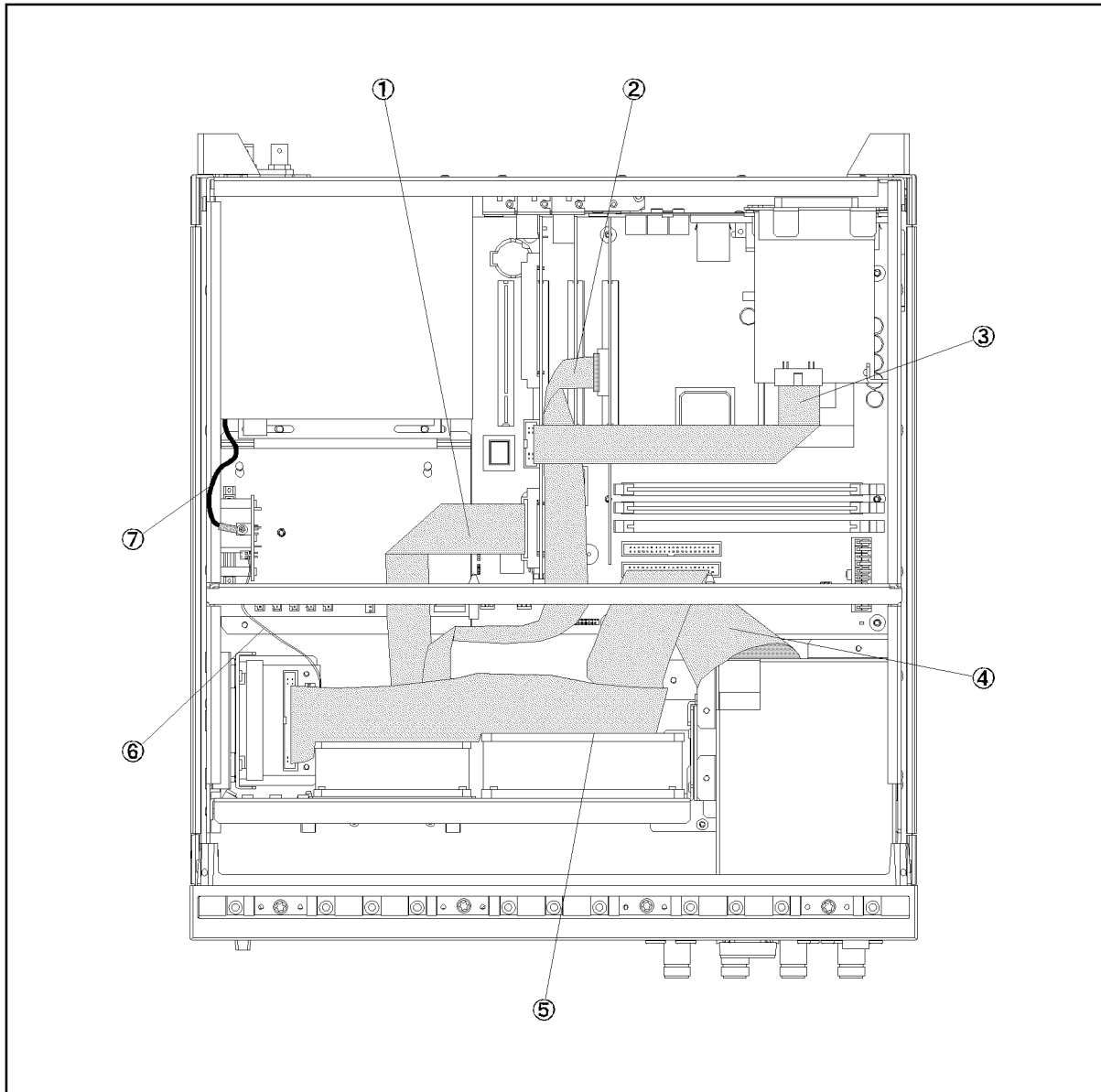
Replaceable Parts

Replaceable Parts List (Top View) for E5070B : MY42300633 and above,  
E5071B : MY42301397 and above (A27 mass storage disk drive model)

Top View (Cables)

Figure 5-7

Top View (Cables)



e5070bse057

**Replaceable Parts List (Top View) for E5070B : MY42300633 and above,  
E5071B : MY42301397 and above (A27 mass storage disk drive model)**

**Table 5-7                      Top View (Cables)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61622	7	1	FLAT CABLE ASSY
2	04287-61607	0	1	FLAT CABLE
3	E5070-61616	9	1	FLAT CABLE ASSY
4	E5070-61623	8	1	FLAT CABLE ASSY
5	E5070-61624	9	1	FLAT CABLE ASSY
6	E5070-61692	2	1	WIRE ASSY (Opt. 1E5)
7	E5070-61692	1	1	RF CABLE ASSY (Opt. 1E5)
	1400-1334	6	1	CLAMP CABLE

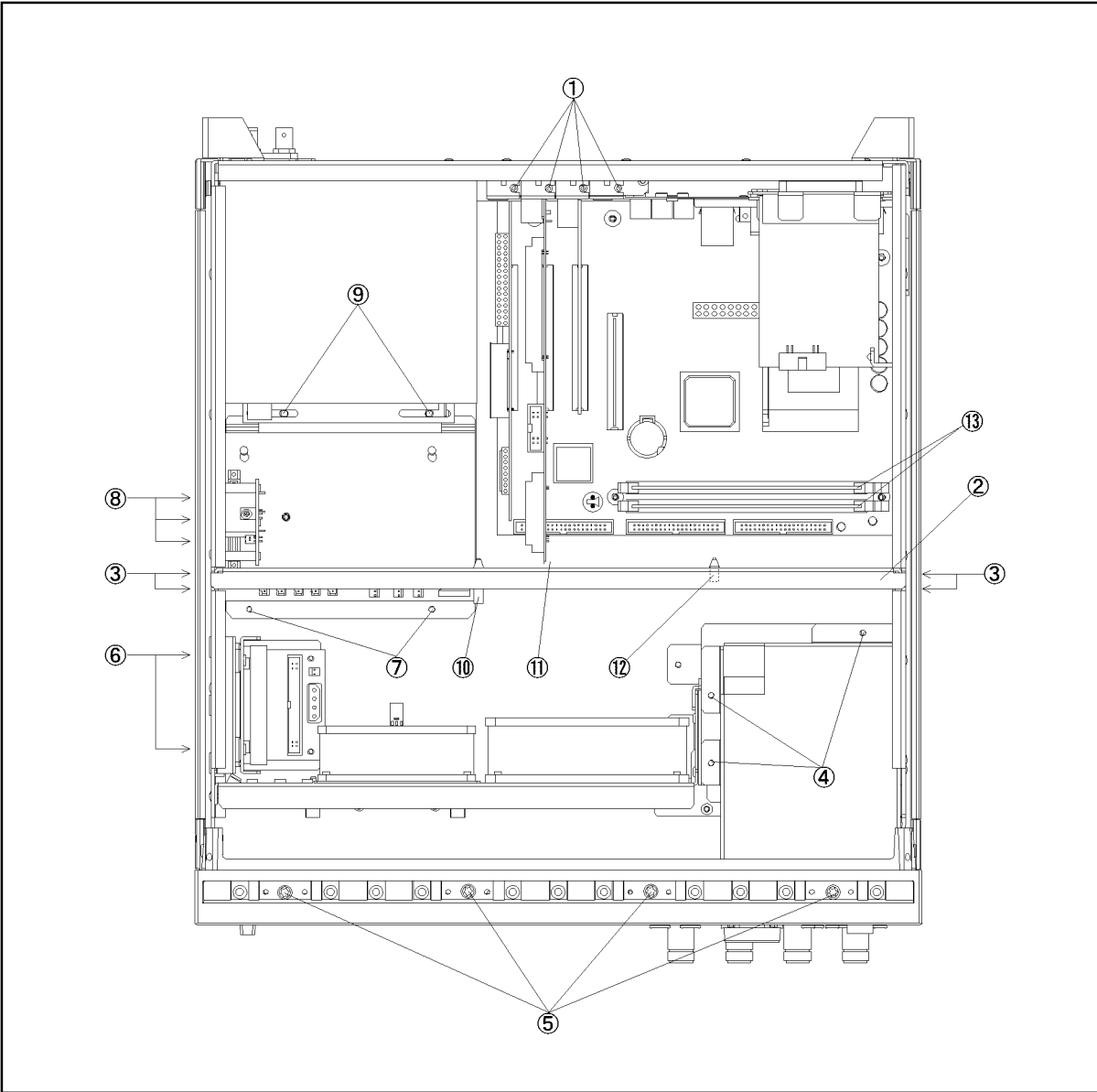
Replaceable Parts

Replaceable Parts List (Top View) for E5070B : MY42300633 and above,  
E5071B : MY42301397 and above (A27 mass storage disk drive model)

Top View (Miscellaneous Parts)

Figure 5-8

Top View (Miscellaneous Parts)



e5070bse3002

**Replaceable Parts List (Top View) for E5070B : MY42300633 and above,  
E5071B : MY42301397 and above (A27 mass storage disk drive model)**

**Table 5-8 Top View (Miscellaneous Parts)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	0515-0430	3	4	SCREW-MACH M3.0 x 6 PN T10
2	E5070-01229	4	1	ANGLE
3	0515-1946	8	4	SCREW
4	0515-0430	3	3	SCREW-MACH M3.0 x 6 PN T10
5	0515-1382	6	4	SCREW-MACH M3.5 x 6 FL T15
6	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
7	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
8	0515-1946	8	3	SCREW-MACH M3.0 x 6 FL T10
9	0515-1402	1	2	SCREW-MACH M3.5 x 8 PN T15
10	1400-1051	4	1	SADDLE-WIRE
11	0403-1143	0	1	GUIDE-PC BD
12	1400-0866	7	1	CLAMP-CABLE
13	1400-3207	6	2	CABLE TIE

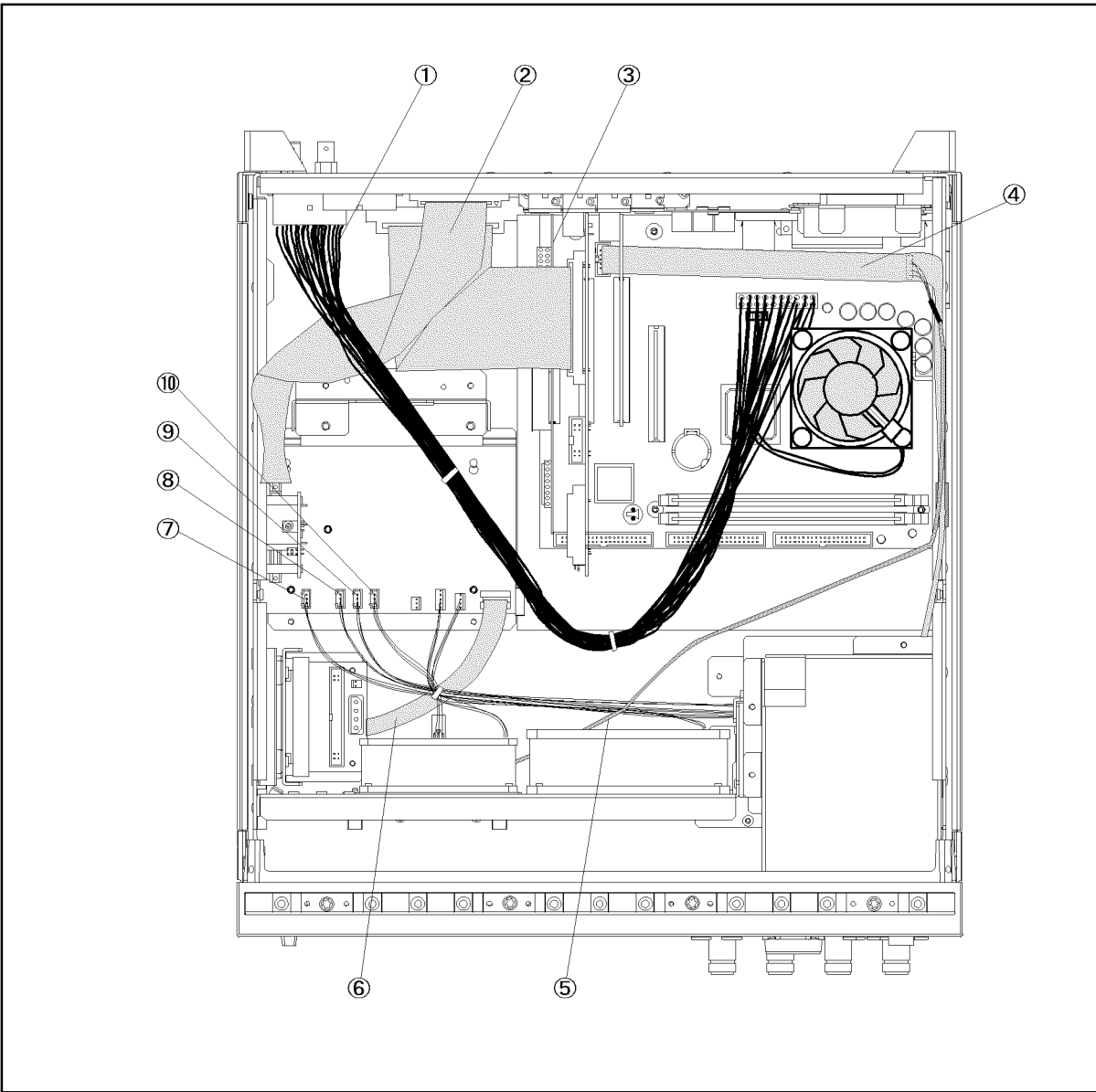
Replaceable Parts

Replaceable Parts List (Top View) for E5070B : MY42300633 and above,  
E5071B : MY42301397 and above (A27 mass storage disk drive model)

Top View (Under Power Supply)

Figure 5-9

Top View (Under Power Supply)



e5070bse3004

**Replaceable Parts List (Top View) for E5070B : MY42300633 and above,  
E5071B : MY42301397 and above (A27 mass storage disk drive model)**

**Table 5-9 Top View (Under Power Supply)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61661	4	1	WIRE ASSY
	1400-0493		2	CLAMP-CABLE
2	E5070-61663	6	1	FLAT CBL ASSY
3	E5070-61662	5	1	FLAT CBL ASSY
4	E5070-61664	7	1	FLAT CBL ASSY (Opt. 016)
5	E5070-61667		1	USB CABLE ASSY
6	E5070-61617	0	1	FLAT CABLE ASSY (Opt. 214)
	E5070-61618		1	FLAT CABLE ASSY (Opt. 314, 414)
7	E5070-61614	7	1	WIRE ASSY (YELLOW)
8	E5070-61613	6	1	WIRE ASSY (ORANGE) (Opt. 31x, 41x)
9	E5070-61612	5	1	WIRE ASSY (RED) (Opt. 31x, 41x)
10	E5070-61615	8	1	WIRE ASSY (BROWN) (Opt. 21x)
	E5070-61611		4	1

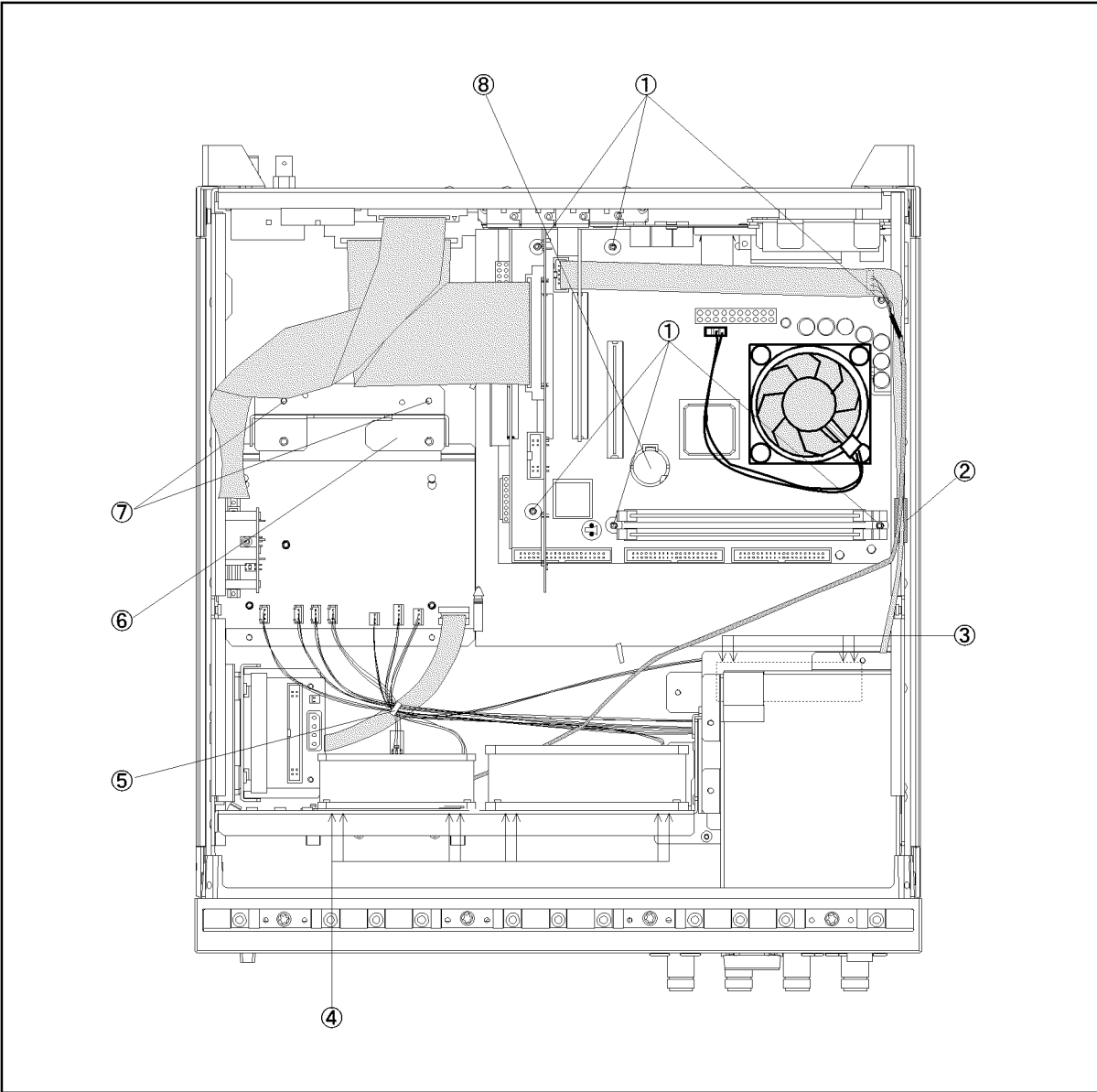
Replaceable Parts

Replaceable Parts List (Top View) for E5070B : MY42300633 and above,  
E5071B : MY42301397 and above (A27 mass storage disk drive model)

Top View (Motherboard and Other Parts)

Figure 5-10

Top View (Motherboard and Other Parts)



e5070bse3003



**Replaceable Parts List (Top View) for E5070B : MY42300633 and above,  
E5071B : MY42301397 and above (A27 mass storage disk drive model)**

**Table 5-10 Top View (Motherboard and Other Parts)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	0515-0430	2	6	SCREW-MACH M3.0 x 8 PN T10
2	1400-0611	0	1	CLAMP-CABLE
3	0515-2216	7	4	SCREW-MACH M4.0 x 40 PN T20
4	0361-1875	5	8	RIVET (PLASTIC)
5	1400-1391	6	1	CLAMP-CABLE
6	E5070-01267	7	1	BRACKET PS
7	0515-1402	2	2	SCREW-MACH M3.5 x 8 PN
8	1420-0356	-	1	BATTERY LITHIUM (CR2032), 3V, .22A-HR

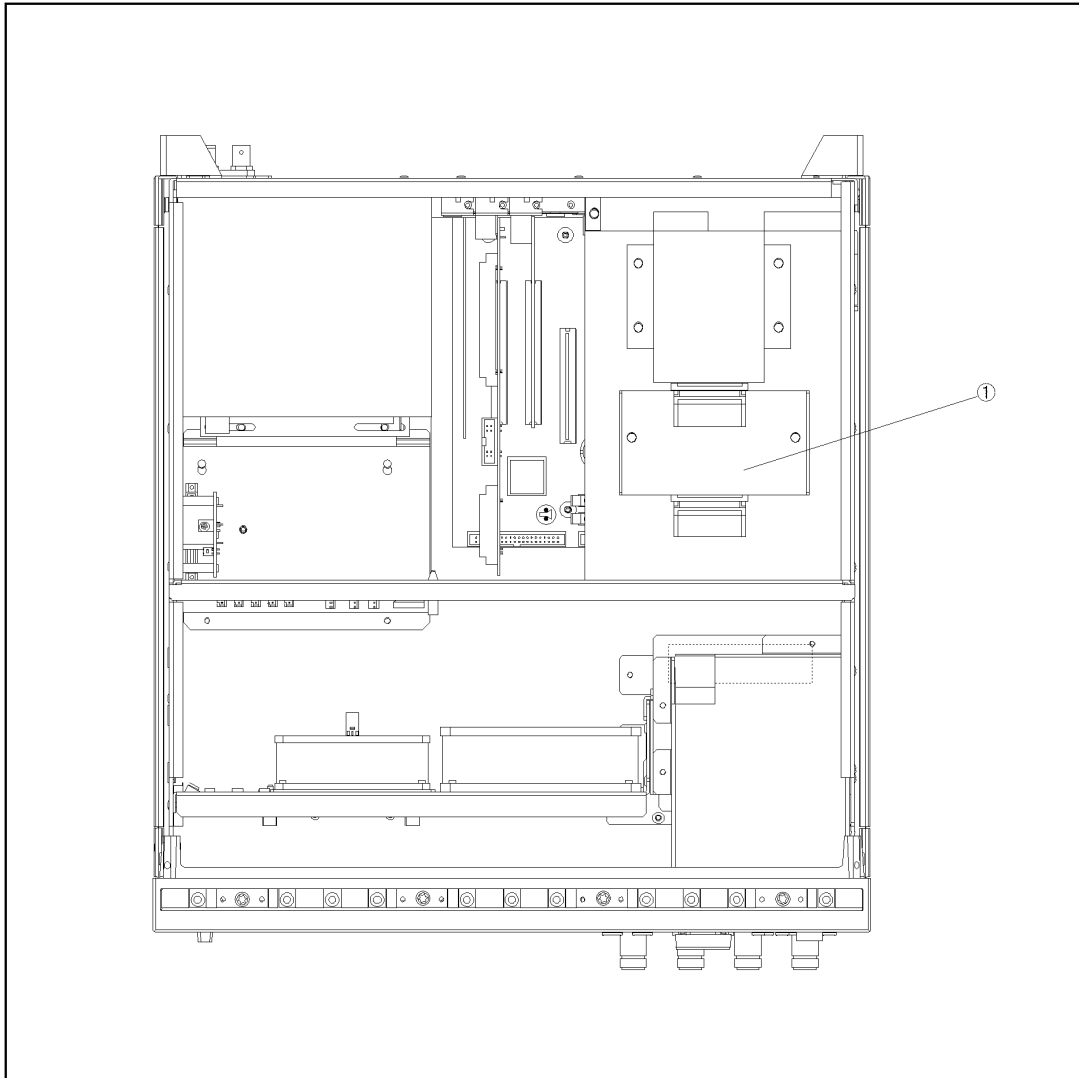
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## Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above

### Top View (Removable Hard Disk Assemblies)

Figure 5-11

### Top View (Removable Hard Disk Assemblies)



e5070bse4002

**Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above****Table 5-11 Top View (Removable Hard Disk Assemblies)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	See Table 5-56	-	1	REMOVABLE HARD DISK ASSEMBLY

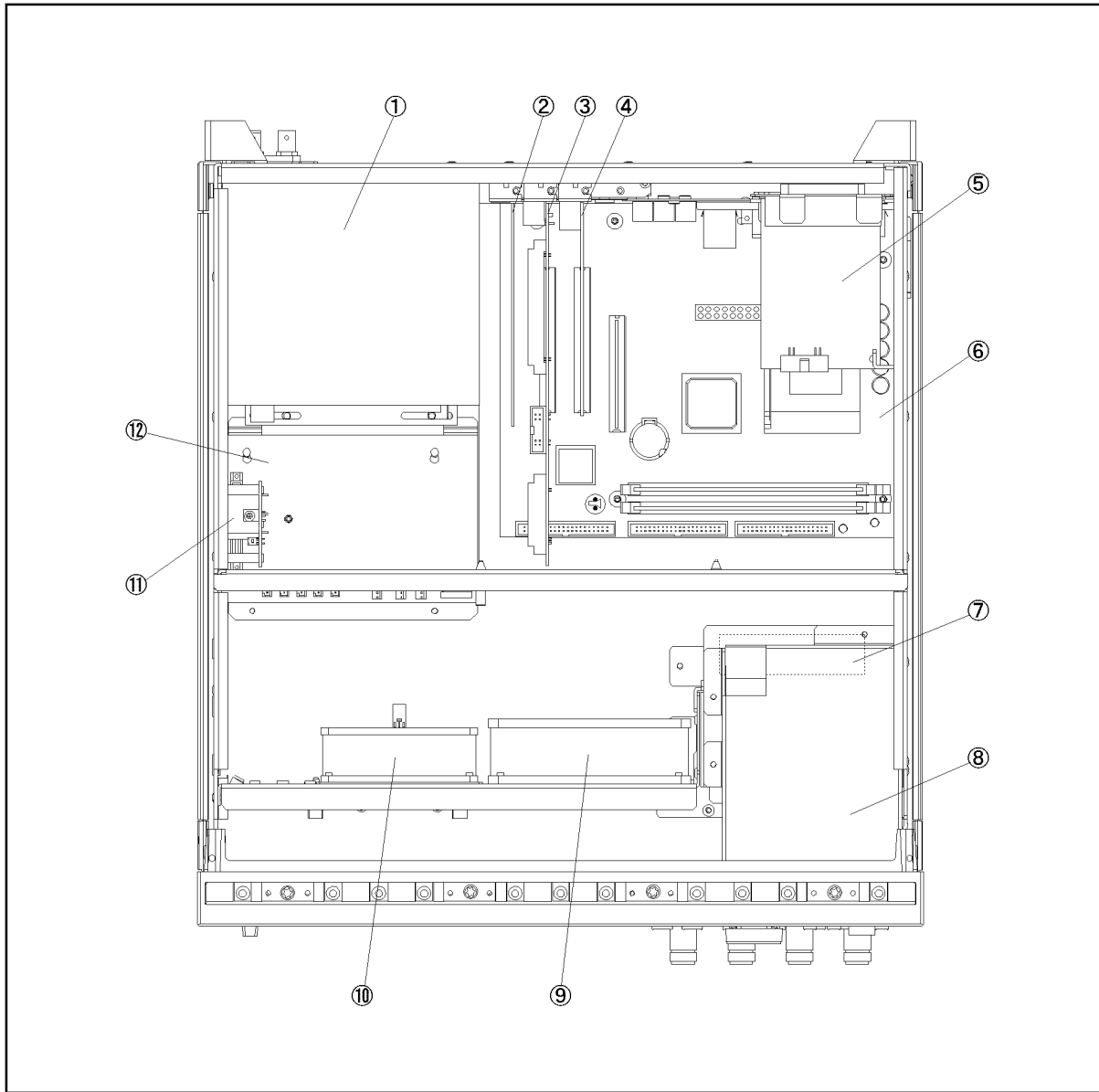
Replaceable Parts

Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above

Top View (Major Assemblies)

Figure 5-12

Top View (Major Assemblies)



e5070bse4001

**Table 5-12 Top View (Major Assemblies)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	0950-4773	3	1	A50 POWER SUPPLY
2	0960-2357	-	1	USB (USBTMC) INTERFACE CARD
3	E5070-66521	5	1	A21 ANALOG INTERFACE BOARD
4	E5070-61007	9	1	A24 GPIB CARD
5	E5070-61006	7	1	A23 HANDLER I/O BOARD
6	0960-2432	1	1	A20 DIGITAL MOTHERBOARD
7	04287-61001	8	1	FAN ASSY
8	See Table 5-37	-	1	A28 FDD ASSEMBLY
9	E5070-61004	9	1	FAN ASSY
10	E5070-61005	0	1	FAN ASSY
11	E4991-66505	7	1	A5 CRYSTAL OVEN (Opt. 1E5)
12	See Table 5-46	-	1	A6 RF SWITCH/TEMP. CONTROLLER ASSEMBLY

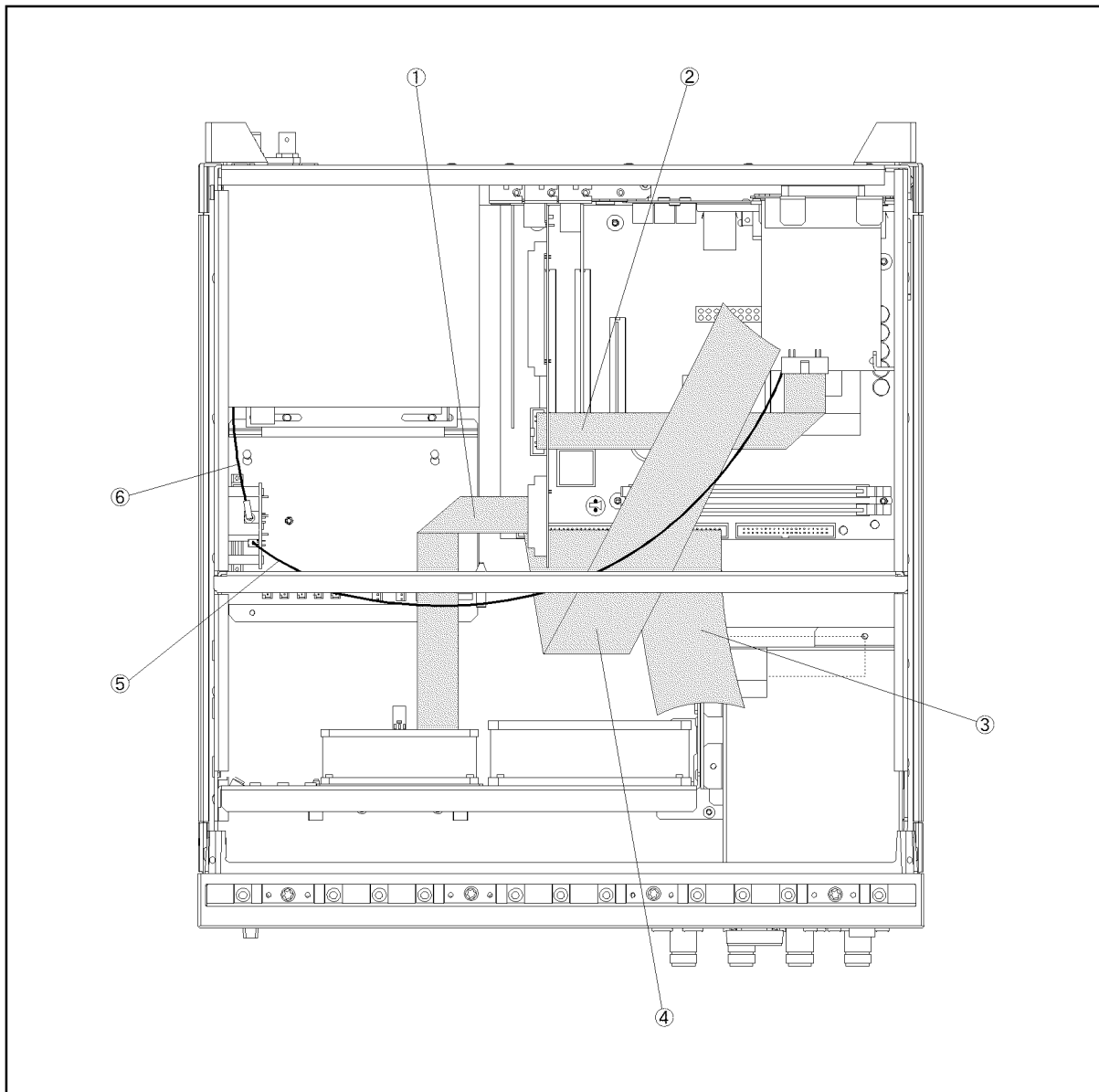
Replaceable Parts

Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above

Top View (Cables)

Figure 5-13

Top View (Cables)



e5070bse4003

**Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above**

**Table 5-13                      Top View (Cables)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61622	7	1	FLAT CABLE ASSY
2	E5070-61616	9	1	FLAT CABLE ASSY
3	E5070-61623	8	1	FLAT CABLE ASSY
4	E5070-61624	9	1	FLAT CABLE ASSY
5	E5070-61637	2	1	WIRE ASSY (Opt. 1E5)
6	E5070-61692	1	1	RF CABLE ASSY (Opt. 1E5)
	1400-1334	6	1	CLAMP CABLE

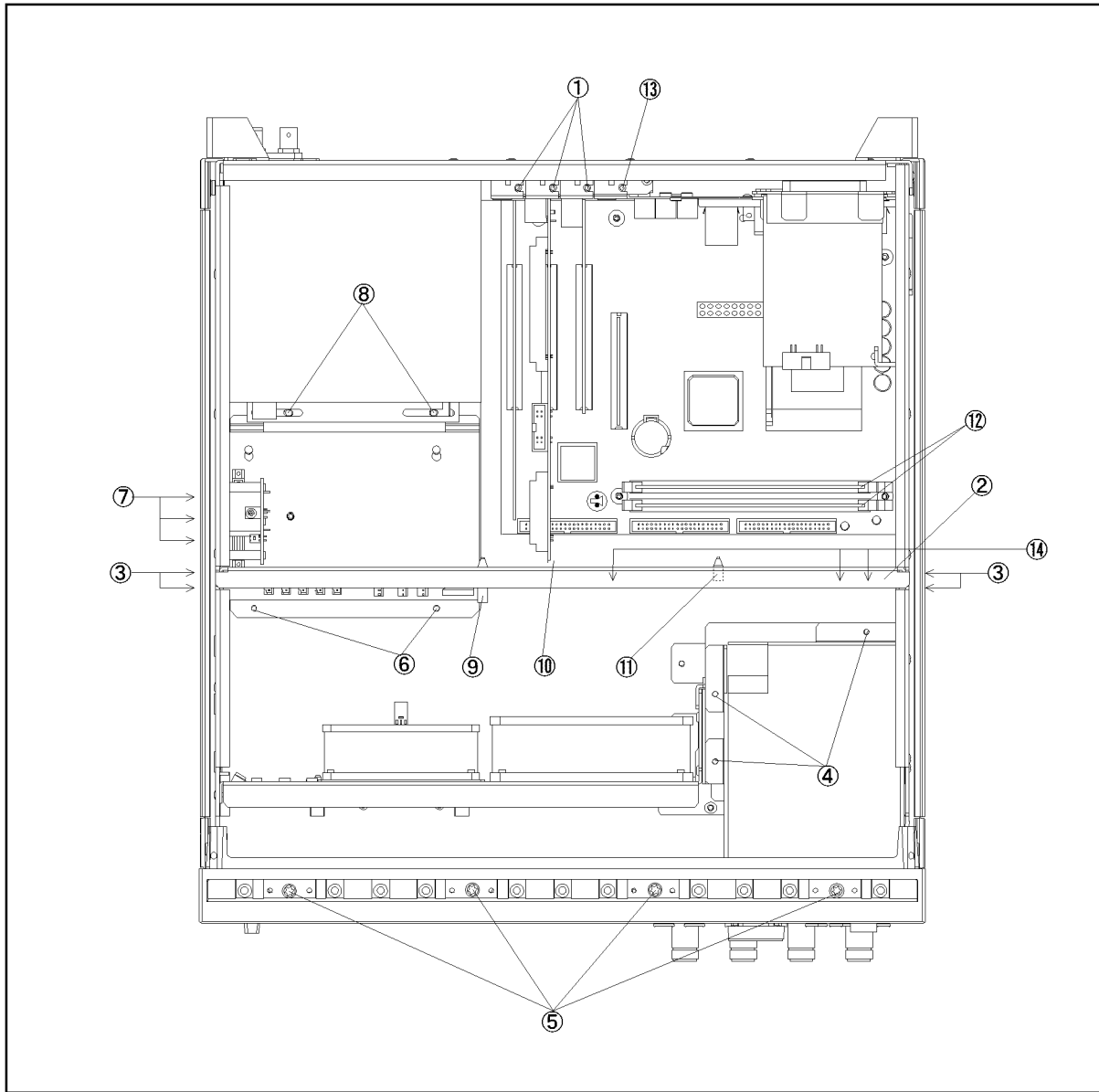
Replaceable Parts

Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above

Top View (Miscellaneous Parts)

Figure 5-14

Top View (Miscellaneous Parts)



e5070bse4004



**Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above**

**Table 5-14**                      **Top View (Miscellaneous Parts)**

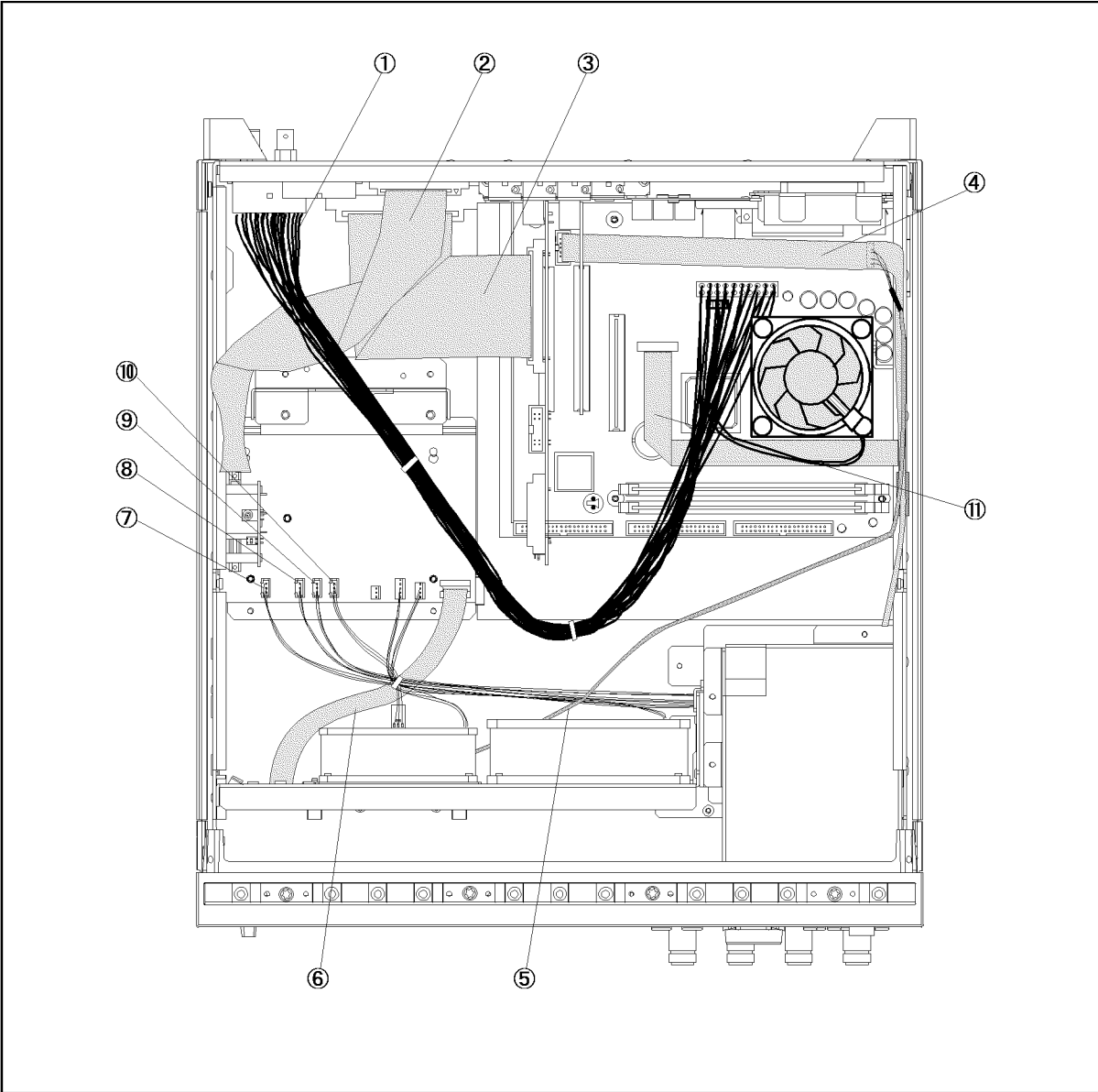
<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	0515-0430	3	3	SCREW-MACH M3.0 x 6 PN T10
2	E5070-01256	-	1	ANGLE
3	0515-1946	8	4	SCREW
4	0515-0430	3	3	SCREW-MACH M3.0 x 6 PN T10
5	0515-1382	6	4	SCREW-MACH M3.5 x 6 FL T15
6	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
7	0515-1946	8	3	SCREW-MACH M3.0 x 6 FL T10
8	0515-1402	1	2	SCREW-MACH M3.5 x 8 PN T15
9	1400-1051	4	1	SADDLE-WIRE
10	0403-1143	0	1	GUIDE-PC BD
11	1400-0866	7	1	CLAMP-CABLE
12	1400-3207	6	2	CABLE TIE
13	0515-0372	-	1	SCREW-MACH M3.0 x 8 PN T10
14	0515-0430	-	3	SCREW-MACH M3.0 x 6 PN T10

Replaceable Parts

Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above

Top View (Under Power Supply) for E5070B S/N from MY42401101 to  
MY42401986, E5071B S/N from MY42402455 to MY42404509

Figure 5-15 Top View (Under Power Supply)



e5070bse5001

**Table 5-15 Top View (Under Power Supply)**

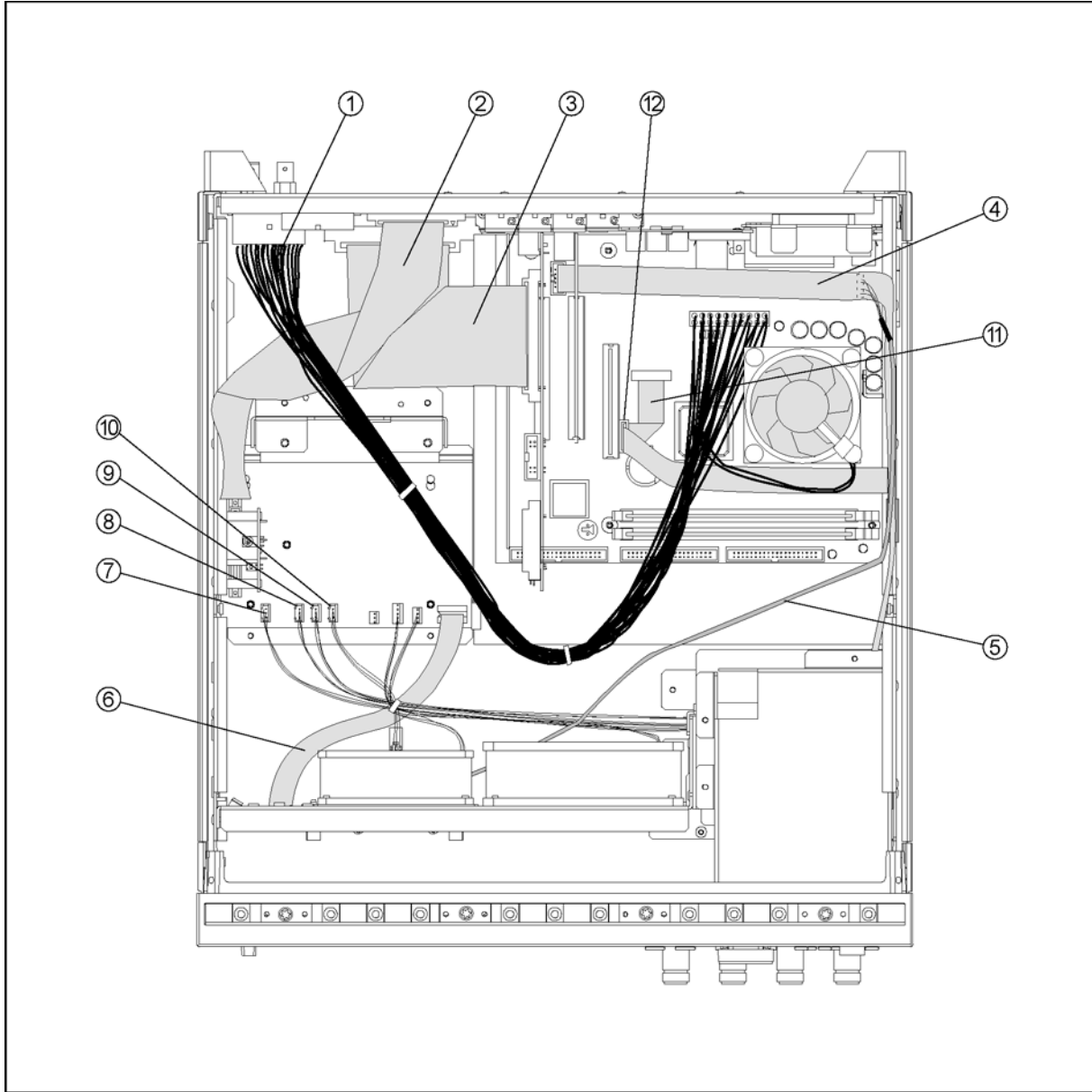
Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61661	4	1	WIRE ASSY
	1400-0493		2	CLAMP-CABLE
2	E5070-61663	6	1	FLAT CBL ASSY
3	E5070-61662	5	1	FLAT CBL ASSY
4	E5070-61664	7	1	FLAT CBL ASSY (Opt. 016)
5	E5070-61667		1	USB CABLE ASSY
6	E5070-61617	0	1	FLAT CABLE ASSY (Opt. 214)
	E5070-61618		1	FLAT CABLE ASSY (Opt. 314, 414)
7	E5070-61614	7	1	WIRE ASSY (YELLOW)
8	E5070-61613	6	1	WIRE ASSY (ORANGE) (Opt. 31x, 41x)
9	E5070-61612	5	1	WIRE ASSY (RED) (Opt. 31x, 41x)
10	E5070-61615	8	1	WIRE ASSY (BROWN) (Opt. 21x)
	E5070-61611		1	WIRE ASSY (BROWN) (Opt. 31x, 41x)
11	E5052-61626		1	FLAT FLEXIBLE CABLE DVI

Replaceable Parts

Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above

**Top View (Under Power Supply) for E5070B S/N MY42401987 and  
above, E5071B S/N MY42404510 and above**

**Figure 5-16** Top View (Under Power Supply)



e5070bse8001

**Table 5-16 Top View (Under Power Supply)**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61661	4	1	WIRE ASSY
	1400-0493		2	CLAMP-CABLE
2	E5070-61663	6	1	FLAT CBL ASSY
3	E5070-61662	5	1	FLAT CBL ASSY
4	E5070-61664	7	1	FLAT CBL ASSY (Opt. 016)
5	E5070-61667		1	USB CABLE ASSY
6	E5070-61617	0	1	FLAT CABLE ASSY (Opt. 214)
	E5070-61618		1	FLAT CABLE ASSY (Opt. 314, 414)
7	E5070-61614	7	1	WIRE ASSY (YELLOW)
8	E5070-61613	6	1	WIRE ASSY (ORANGE) (Opt. 31x, 41x)
9	E5070-61612	5	1	WIRE ASSY (RED) (Opt. 31x, 41x)
10	E5070-61615	8	1	WIRE ASSY (BROWN) (Opt. 21x)
	E5070-61611		1	WIRE ASSY (BROWN) (Opt. 31x, 41x)
11	E5052-61626		1	FLAT FLEXIBLE CABLE DVI
12	1400-3361		1	CLAMP-CABLE

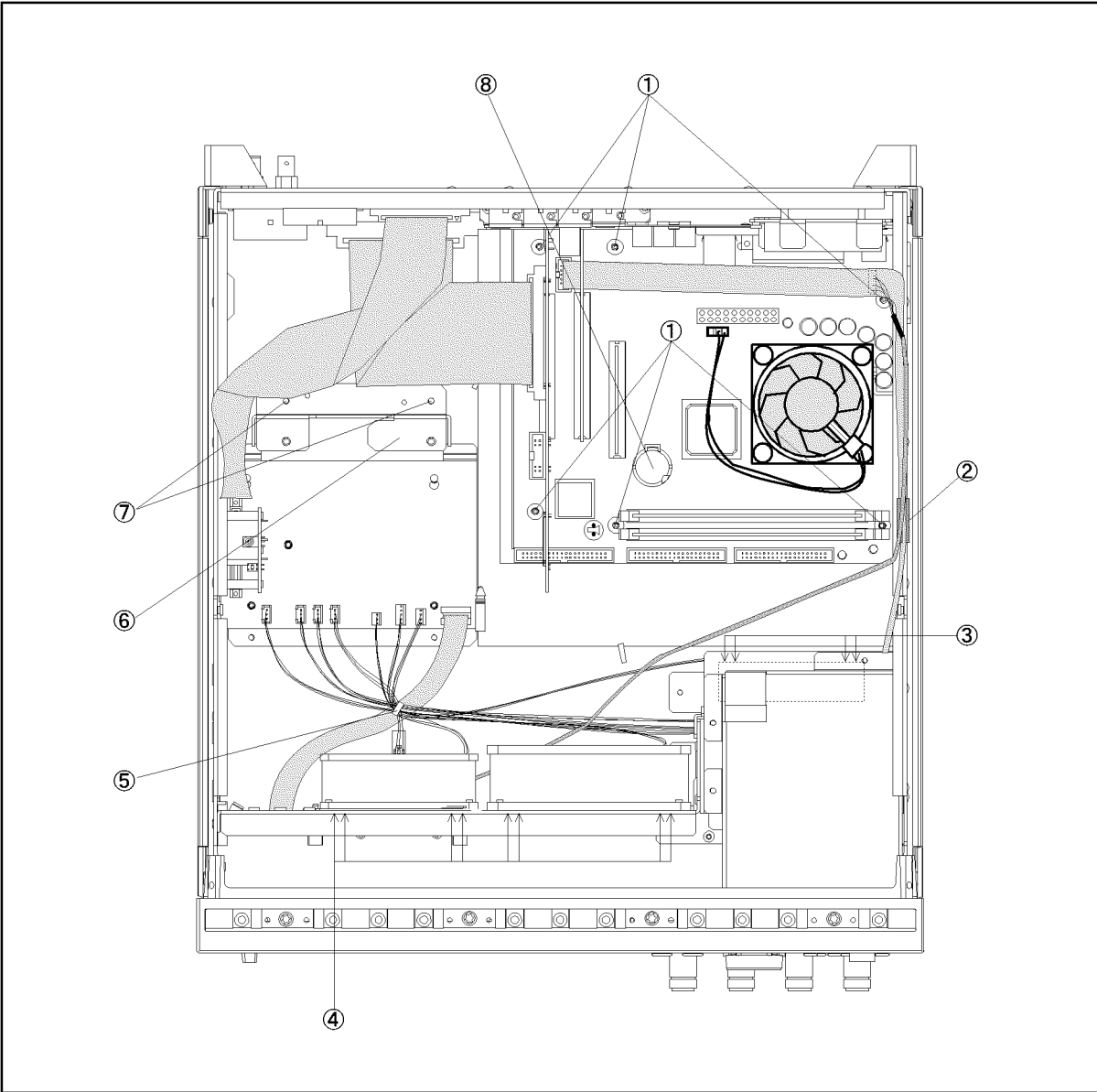
Replaceable Parts

Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above

Top View (Motherboard and Other Parts)

Figure 5-17

Top View (Motherboard and Other Parts)



e5070bse4006

**Replaceable Parts List (Top View) for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above**

**Table 5-17 Top View (Motherboard and Other Parts)**

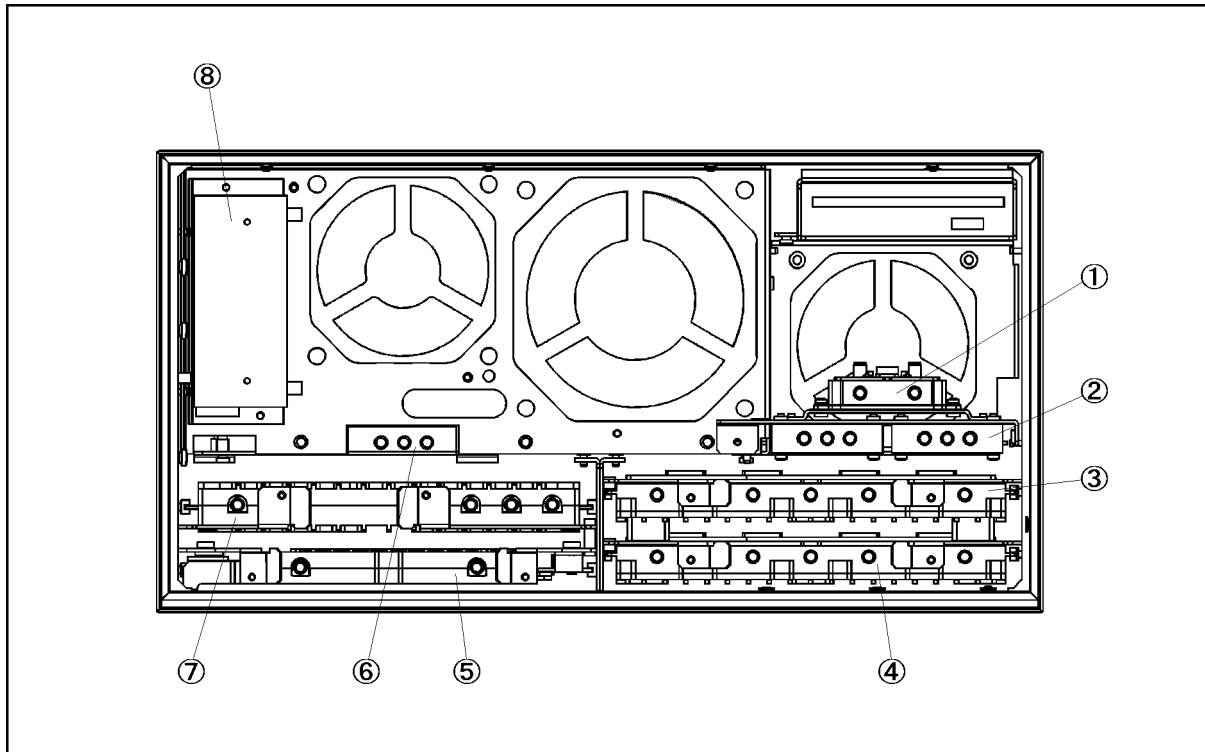
<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	0515-0430	2	6	SCREW-MACH M3.0 x 8 PN T10
2	1400-0611	0	1	CLAMP-CABLE
3	0515-2216	7	4	SCREW-MACH M4.0 x 40 PN T20
4	0361-1875	5	8	RIVET (PLASTIC)
5	1400-1391	6	1	CLAMP-CABLE
6	E5070-01267	7	1	BRACKET PS
7	0515-1402	2	2	SCREW-MACH M3.5 x 8 PN
8	1420-0356	-	1	BATTERY LITHIUM (CR2032), 3V, .22A-HR

**Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and MY421, E5071B serial prefix JP1KK, and MY421**

**Front View (Analog)**

Figure 5-18

Front View (Analog)



e5070bse071



**Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and  
MY421, E5071B serial prefix JP1KK, and MY421**

**Table 5-18 Front View (Analog)**

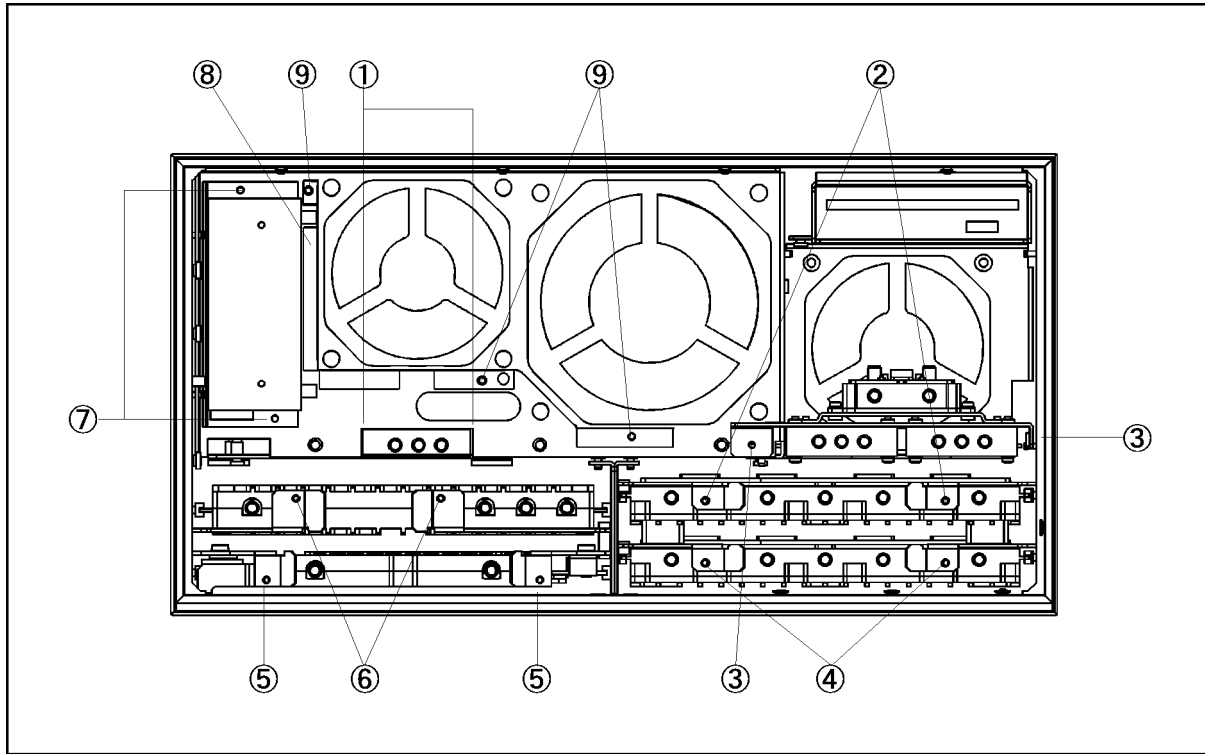
<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	See service note E5070B-06B / E5071B-06B		1	A4 POWER AMP MODULE (Opt. 31x, 41x)
			1	A4 POWER AMP MODULE (Opt. 213, 214)
2	See Table 5-41	-	1	A8 RF SWITCH ASSEMBLY
3	See Table 5-47	-	1	A2 RECEIVER BOARD
4	See Table 5-47	-	1	A2 RECEIVER BOARD (Opt. 31x, 41x)
5	E5071-61003	9	1	A3 LEVEL VERNIER
6	5087-7137	7	1	A8 RF SWITCH SPDT (Opt. 31x, 41x)
7	E5071-66571	2	1	A1 SOURCE BOARD
	E5071-69571	8	1	A1 SOURCE BOARD (Exchange)
8	See Table 5-43	-	1	STEP ATTENUATOR ASSEMBLY (Opt. 214, 314, 414)

Replaceable Parts

Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and MY421, E5071B serial prefix JP1KK, and MY421

Front View (Miscellaneous Parts)

Figure 5-19 Front View (Miscellaneous Parts)



e5070bse072

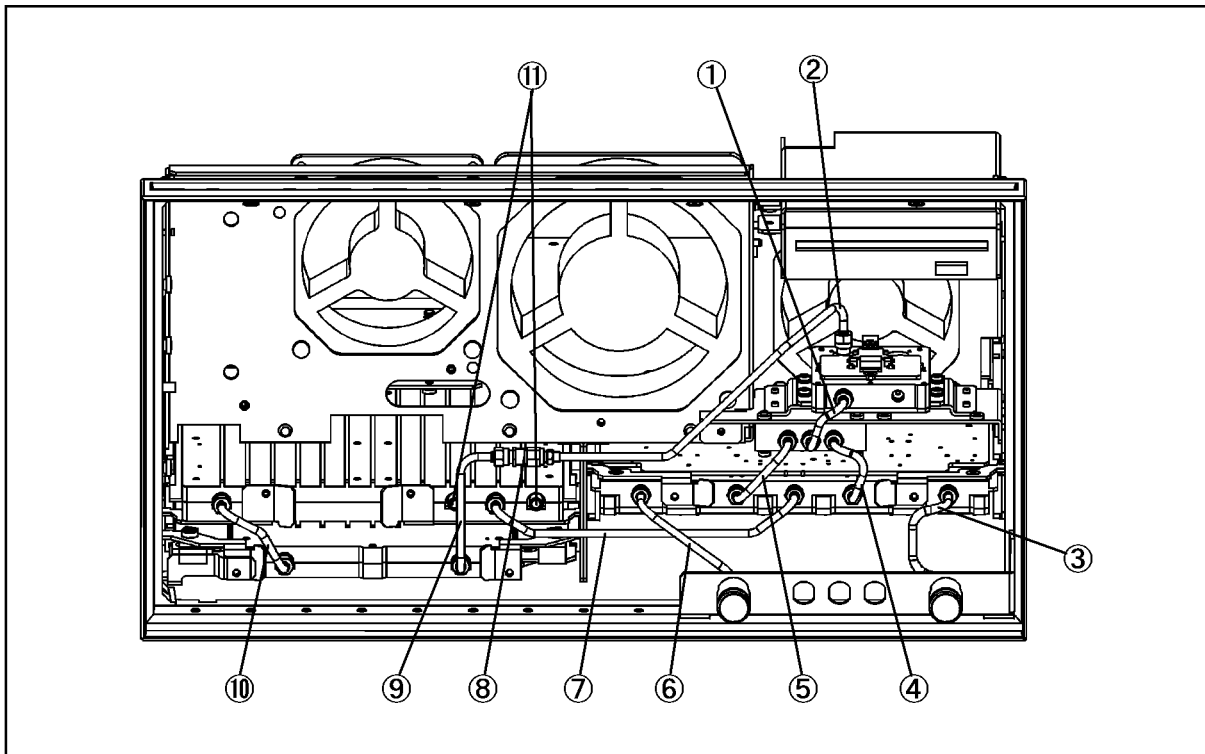
Table 5-19 Front View (Miscellaneous Parts)

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	0515-1410	1	2	SCREW-MACH M3.0 x 20 PN T10
2	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
3	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
4	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10 (Opt. 31x, 41x)
5	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
6	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
7	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10 (Opt. 214, 314, 414)
8	E5070-01222	5	1	PLATE
9	0515-0372	2	3	SCREW-MACH M3.0 x 8 PN T10

**Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and MY421, E5071B serial prefix JP1KK, and MY421**

**Front View (Semirigid Cables) (Opt. 213)**

**Figure 5-20 Front View (Semirigid Cables) (Opt. 213)**



e5070bse065

**Table 5-20 Front View (Semirigid Cables) (Opt. 213)**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61685	2	1	RF CABLE ASSY SRGD
2	E5070-61672	3	1	RF CABLE ASSY SRGD
3	E5070-61606	7	1	RF CABLE ASSY SRGD
4	E5070-61603	4	1	RF CABLE ASSY SRGD
5	E5070-61645	4	1	RF CABLE ASSY SRGD
6	E5070-61605	6	1	RF CABLE ASSY SRGD
7	E5070-61604	5	1	RF CABLE ASSY SRGD
8	0955-0208	5	1	U-WAVE ATTN 4DB
9	E5070-61671	6	1	RF CABLE ASSY SRGD
10	E5070-61687	2	1	RF CABLE ASSY SRGD
11	1810-0118	1	2	TERMINATION-COAX

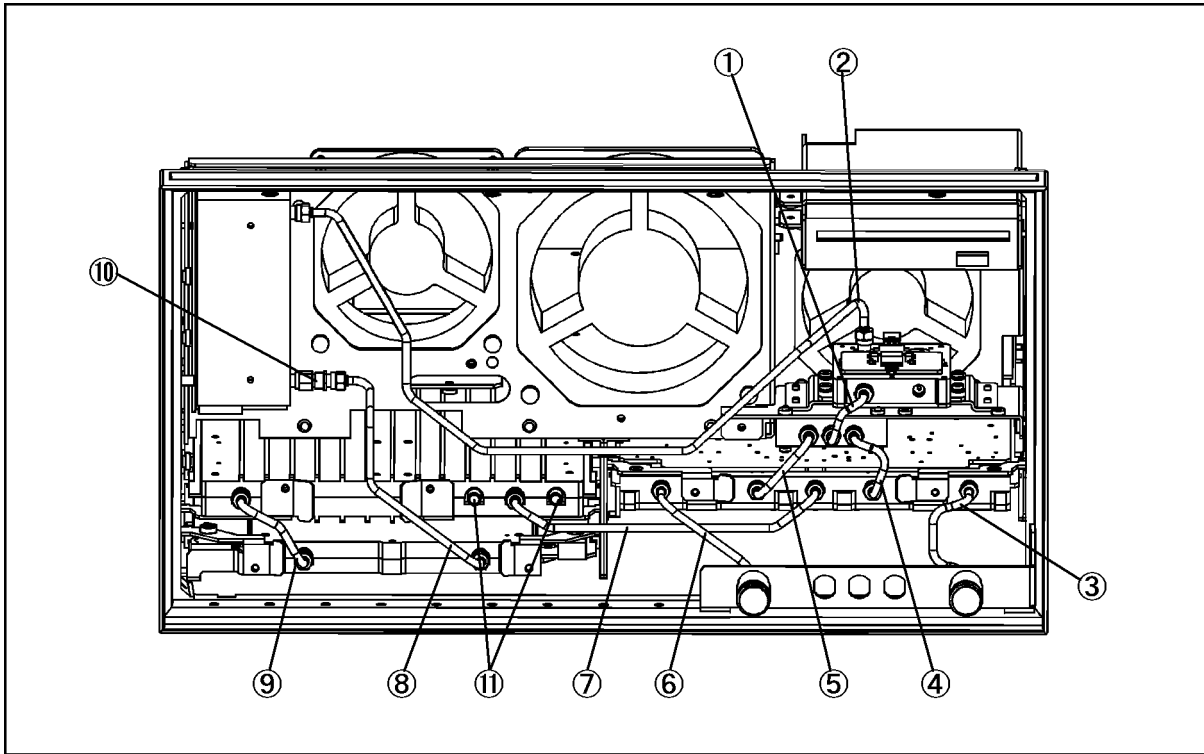
Replaceable Parts

Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and MY421, E5071B serial prefix JP1KK, and MY421

Front View (Semirigid Cables) (Opt. 214)

Figure 5-21

Front View (Semirigid Cables) (Opt. 214)



e5070bse066

**Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and  
MY421, E5071B serial prefix JP1KK, and MY421**

**Table 5-21 Front View (Semirigid Cables) (Opt. 214)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61685	2	1	RF CABLE ASSY SRGD
2	E5070-61674	9	1	RF CABLE ASSY SRGD
3	E5070-61606	7	1	RF CABLE ASSY SRGD
4	E5070-61603	4	1	RF CABLE ASSY SRGD
5	E5070-61645	4	1	RF CABLE ASSY SRGD
6	E5070-61605	6	1	RF CABLE ASSY SRGD
7	E5070-61604	5	1	RF CABLE ASSY SRGD
8	E5070-61673	8	1	RF CABLE ASSY SRGD
9	E5070-61687	2	1	RF CABLE ASSY SRGD
10	0955-0208	5	1	U-WAVE ATTN 4DB
11	1810-0118	1	2	TERMINATION-COAX

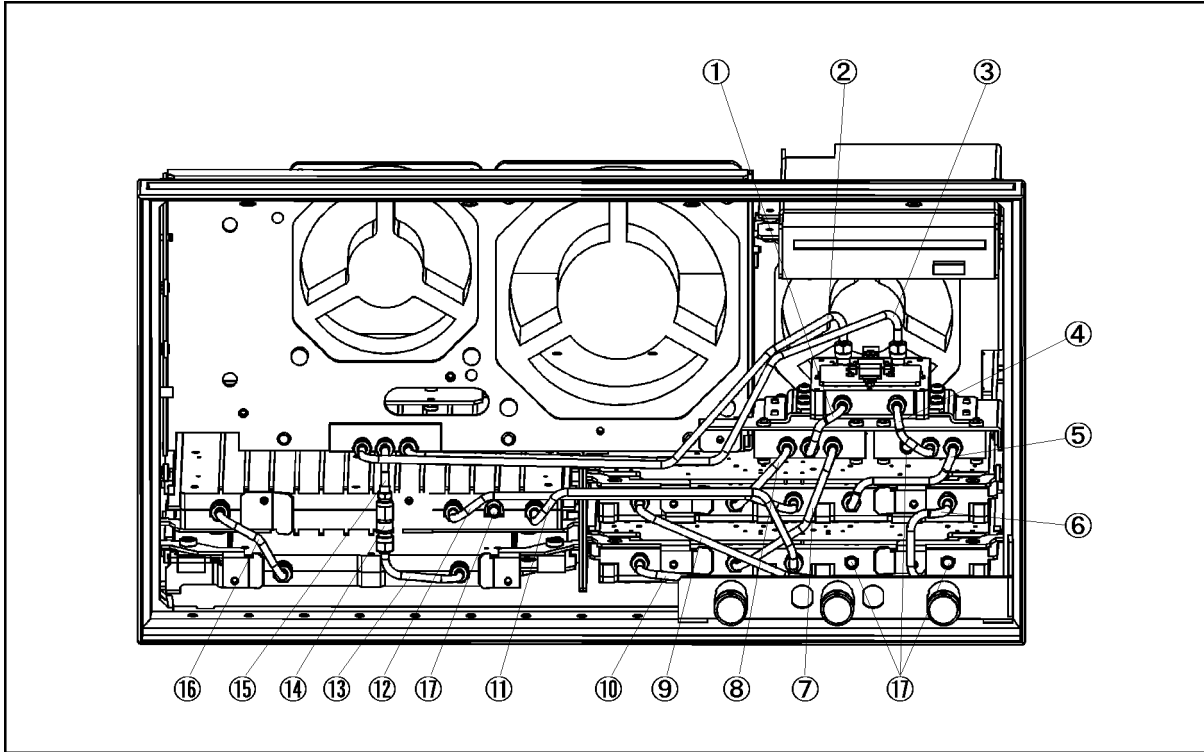
Replaceable Parts

Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and MY421, E5071B serial prefix JP1KK, and MY421

Front View (Semirigid Cables) (Opt. 313)

Figure 5-22

Front View (Semirigid Cables) (Opt. 313)



e5070bse067

**Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and  
MY421, E5071B serial prefix JP1KK, and MY421**

**Table 5-22 Front View (Semirigid Cables) (Opt. 313)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61685	2	1	RF CABLE ASSY SRGD
2	E5070-61677	2	1	RF CABLE ASSY SRGD
3	E5070-61678	3	1	RF CABLE ASSY SRGD
4	E5070-61685	2	1	RF CABLE ASSY SRGD
5	E5070-61648	7	1	RF CABLE ASSY SRGD
6	E5070-61632	9	1	RF CABLE ASSY SRGD
7	E5070-61646	5	1	RF CABLE ASSY SRGD
8	E5070-61645	4	1	RF CABLE ASSY SRGD
9	E5070-61688	8	1	RF CABLE ASSY SRGD
10	E5070-61651	2	1	RF CABLE ASSY SRGD
11	E5070-61679	1	1	RF CABLE ASSY SRGD
12	E5070-61649	8	1	RF CABLE ASSY SRGD
13	E5070-61675	0	1	RF CABLE ASSY SRGD
14	0955-0301	9	1	U-WAVE ATTN 2DB
15	E5070-61676	1	1	RF CABLE ASSY SRGD
16	E5070-61687	8	1	RF CABLE ASSY SRGD
17	1810-0118	1	4	TERMINATION-COAX

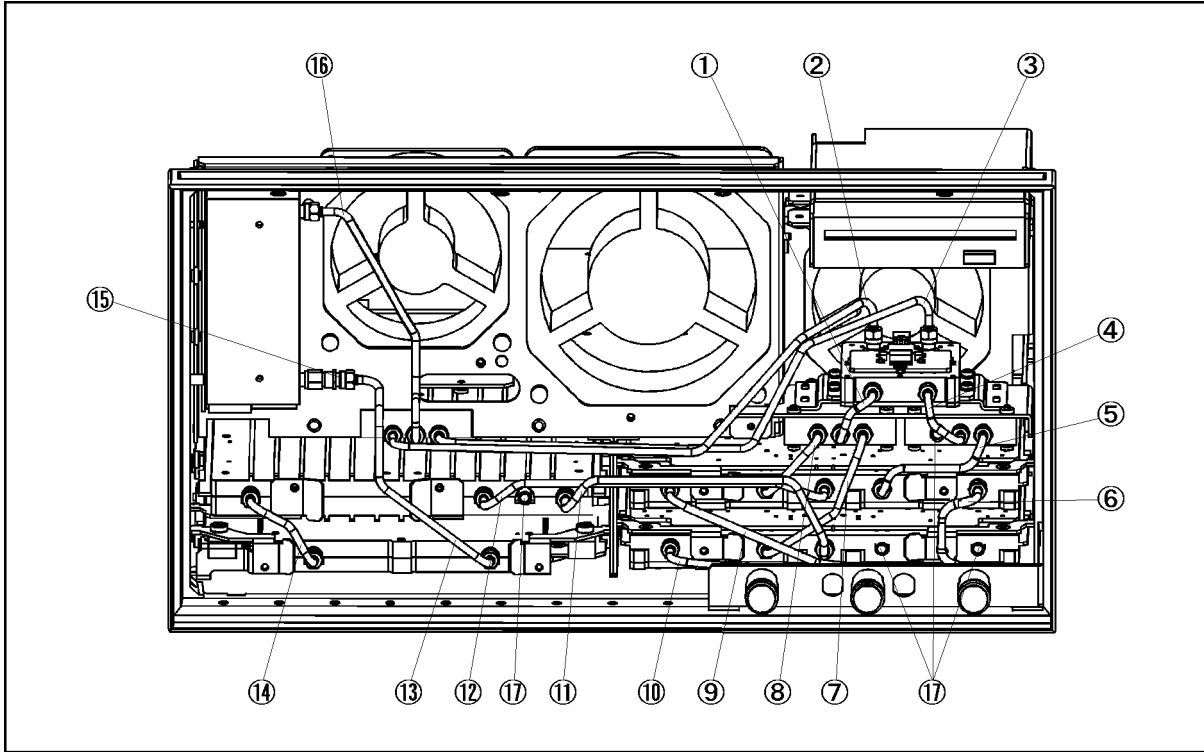
Replaceable Parts

Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and MY421, E5071B serial prefix JP1KK, and MY421

Front View (Semirigid Cables) (Opt. 314)

Figure 5-23

Front View (Semirigid Cables) (Opt. 314)



e5070bse068



**Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and  
MY421, E5071B serial prefix JP1KK, and MY421**

**Table 5-23 Front View (Semirigid Cables) (Opt. 314)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61685	2	1	RF CABLE ASSY SRGD
2	E5070-61677	2	1	RF CABLE ASSY SRGD
3	E5070-61678	3	1	RF CABLE ASSY SRGD
4	E5070-61685	2	1	RF CABLE ASSY SRGD
5	E5070-61648	7	1	RF CABLE ASSY SRGD
6	E5070-61632	9	1	RF CABLE ASSY SRGD
7	E5070-61646	5	1	RF CABLE ASSY SRGD
8	E5070-61645	4	1	RF CABLE ASSY SRGD
9	E5070-61688	8	1	RF CABLE ASSY SRGD
10	E5070-61651	2	1	RF CABLE ASSY SRGD
11	E5070-61679	1	1	RF CABLE ASSY SRGD
12	E5070-61649	8	1	RF CABLE ASSY SRGD
13	E5070-61673	9	1	RF CABLE ASSY SRGD
14	E5070-61687	9	1	RF CABLE ASSY SRGD
15	0955-0301	1	1	U-WAVE ATTN 2DB
16	E5070-61656	0	1	RF CABLE ASSY SRGD
17	1810-0118	1	4	TERMINATION-COAX

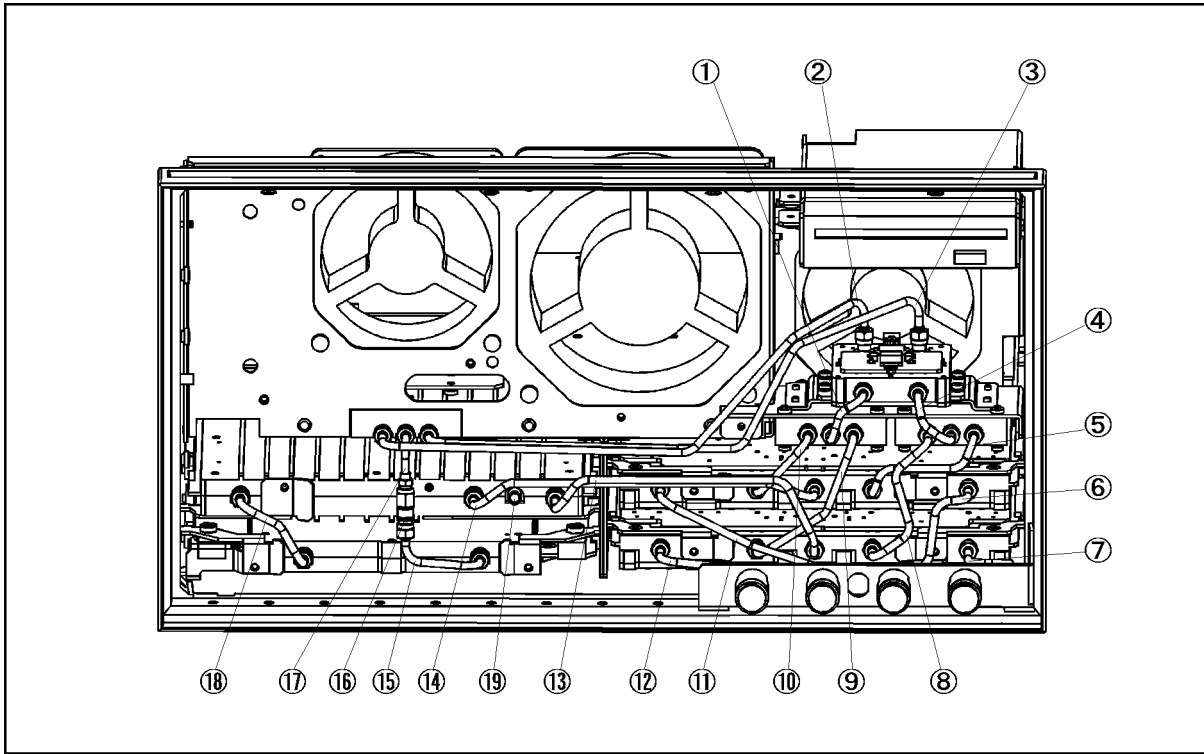
Replaceable Parts

Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and MY421, E5071B serial prefix JP1KK, and MY421

Front View (Semirigid Cables) (Opt. 413)

Figure 5-24

Front View (Semirigid Cables) (Opt. 413)



e5070bse069

**Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and  
MY421, E5071B serial prefix JP1KK, and MY421**

**Table 5-24 Front View (Semirigid Cables) (Opt. 413)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61685	2	1	RF CABLE ASSY SRGD
2	E5070-61677	2	1	RF CABLE ASSY SRGD
3	E5070-61678	3	1	RF CABLE ASSY SRGD
4	E5070-61685	2	1	RF CABLE ASSY SRGD
5	E5070-61648	7	1	RF CABLE ASSY SRGD
6	E5070-61653	9	1	RF CABLE ASSY SRGD
7	E5070-61654	5	1	RF CABLE ASSY SRGD
8	E5070-61647	8	1	RF CABLE ASSY SRGD
9	E5070-61646	5	1	RF CABLE ASSY SRGD
10	E5070-61645	4	1	RF CABLE ASSY SRGD
11	E5070-61652	8	1	RF CABLE ASSY SRGD
12	E5070-61651	2	1	RF CABLE ASSY SRGD
13	E5070-61679	1	1	RF CABLE ASSY SRGD
14	E5070-61649	8	1	RF CABLE ASSY SRGD
15	E5070-61675	0	1	RF CABLE ASSY SRGD
16	0955-0301	9	1	U-WAVE ATTN 2DB
17	E5070-61676	1	1	RF CABLE ASSY SRGD
18	E5070-61687	8	1	RF CABLE ASSY SRGD
19	1810-0118	1	1	TERMINATION-COAX

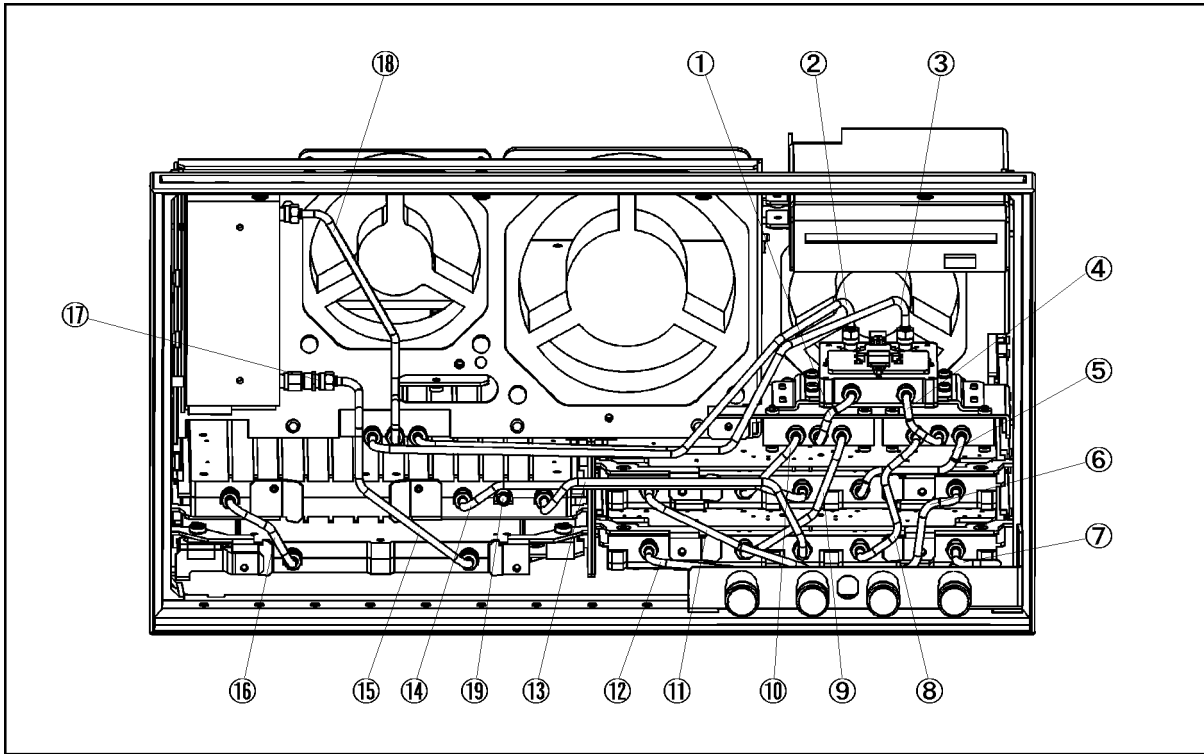
Replaceable Parts

Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and MY421, E5071B serial prefix JP1KK, and MY421

Front View (Semirigid Cables) (Opt. 414)

Figure 5-25

Front View (Semirigid Cables) (Opt. 414)



e5070bse070

**Replaceable Parts List (Front View) for E5070B serial prefix JP1KK, and  
MY421, E5071B serial prefix JP1KK, and MY421**

**Table 5-25 Front View (Semirigid Cables) (Opt. 414)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5070-61685	2	1	RF CABLE ASSY SRGD
2	E5070-61677	2	1	RF CABLE ASSY SRGD
3	E5070-61678	3	1	RF CABLE ASSY SRGD
4	E5070-61685	2	1	RF CABLE ASSY SRGD
5	E5070-61648	7	1	RF CABLE ASSY SRGD
6	E5070-61653	9	1	RF CABLE ASSY SRGD
7	E5070-61654	5	1	RF CABLE ASSY SRGD
8	E5070-61647	8	1	RF CABLE ASSY SRGD
9	E5070-61646	5	1	RF CABLE ASSY SRGD
10	E5070-61645	4	1	RF CABLE ASSY SRGD
11	E5070-61652	8	1	RF CABLE ASSY SRGD
12	E5070-61651	2	1	RF CABLE ASSY SRGD
13	E5070-61679	1	1	RF CABLE ASSY SRGD
14	E5070-61649	8	1	RF CABLE ASSY SRGD
15	E5070-61673	9	1	RF CABLE ASSY SRGD
16	E5070-61687	8	1	RF CABLE ASSY SRGD
17	0955-0301	9	1	U-WAVE ATTN 2DB
18	E5070-61656	0	1	RF CABLE ASSY SRGD
19	1810-0118	1	1	TERMINATION-COAX

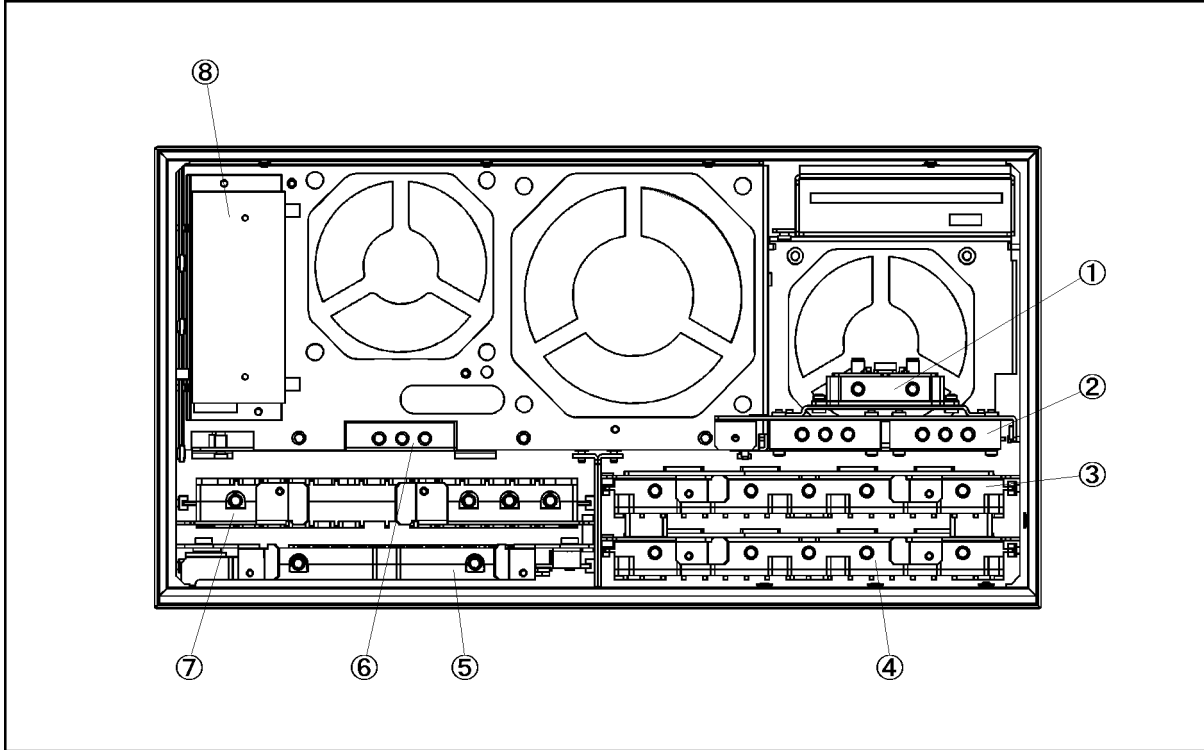
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## Replaceable Parts List (Front View) for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above

### Front View (Analog)

Figure 5-26

### Front View (Analog)



e5070bse071

**Replaceable Parts List (Front View) for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above**

**Table 5-26 Front View (Analog)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>C/D</b>	<b>Qty.</b>	<b>Description</b>
1	E5071-65008		1	A4 POWER AMP MODULE (Opt. 31x, 41x)
	E5071-65009		1	A4 POWER AMP MODULE (Opt. 213, 214)
2	See Table 5-42	-	1	A8 RF SWITCH ASSEMBLY
3	See Table 5-47	-	1	A2 RECEIVER BOARD
4	See Table 5-47, Table 5-48	-	1	A2 RECEIVER BOARD (Opt. 31x, 41x)
5	E5071-61003	9	1	A3 LEVEL VERNIER
6	5087-7137	7	1	A8 RF SWITCH SPDT (Opt. 31x, 41x)
7	E5071-66571	2	1	A1 SOURCE BOARD
	E5071-69571	8	1	A1 SOURCE BOARD (Exchange)
8	See Table 5-44, Table 5-45	-	1	STEP ATTENUATOR ASSEMBLY (Opt. 214, 314, 414)

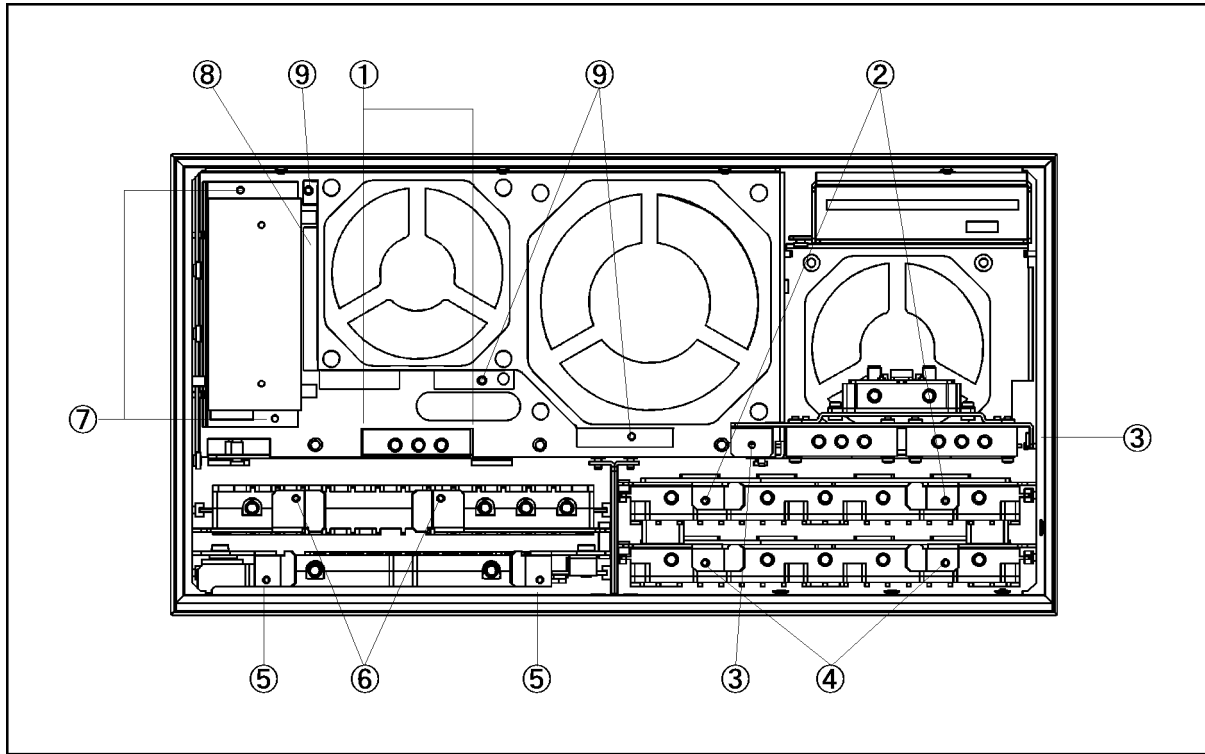
Replaceable Parts

Replaceable Parts List (Front View) for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above

Front View (Miscellaneous Parts)

Figure 5-27

Front View (Miscellaneous Parts)



e5070bse072

Table 5-27

Front View (Miscellaneous Parts)

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	0515-1410	1	2	SCREW-MACH M3.0 x 20 PN T10
2	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
3	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
4	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10 (Opt. 31x, 41x)
5	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
6	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
7	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10 (Opt. 214, 314, 414)
8	E5070-01222	5	1	PLATE (Opt. 214)
	E5070-01223		1	PLATE (Opt. 314, 414)
9	0515-0372	2	3	SCREW-MACH M3.0 x 8 PN T10

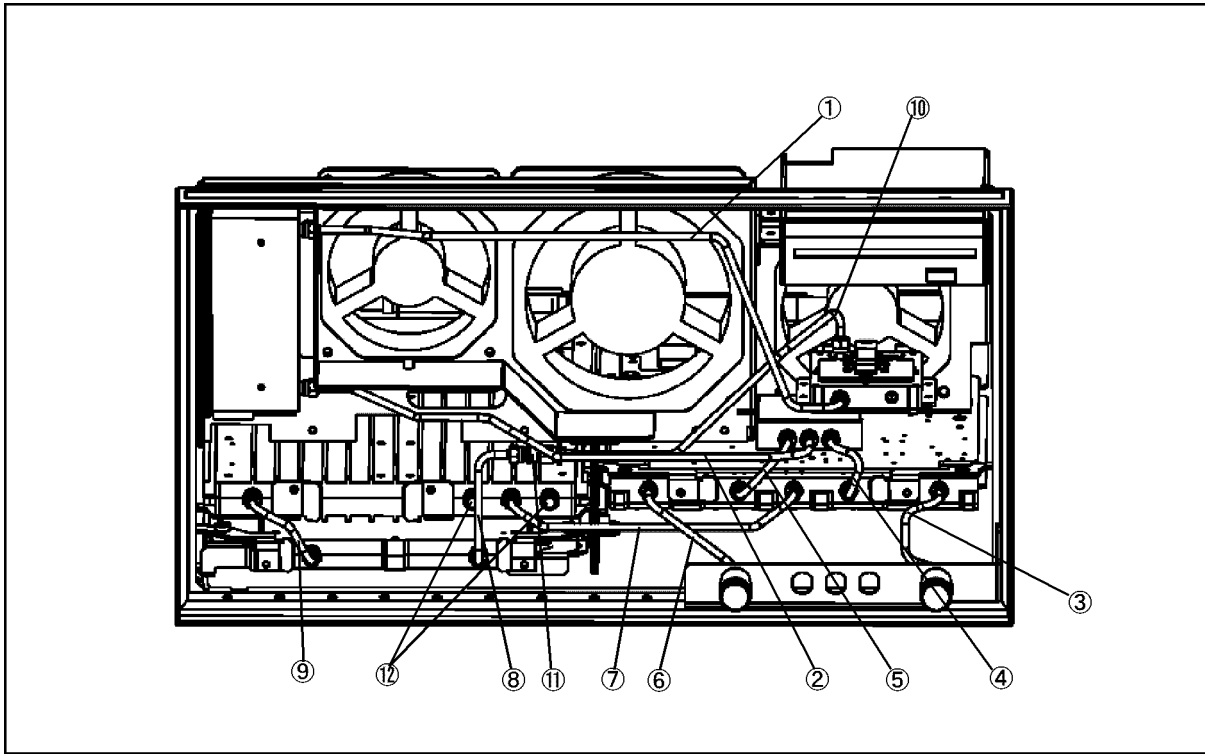


**Replaceable Parts List (Front View) for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above**

**Front View (Semirigid Cables) (Opt. 214)**

Figure 5-28

Front View (Semirigid Cables) (Opt. 214)



e5070bse3009

Table 5-28

Front View (Semirigid Cables) (Opt. 214)

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61633		1	RF CABLE ASSY SRGD
2	E5070-61634		1	RF CABLE ASSY SRGD
3	E5070-61606	7	1	RF CABLE ASSY SRGD
4	E5070-61603	4	1	RF CABLE ASSY SRGD
5	E5070-61645	4	1	RF CABLE ASSY SRGD
6	E5070-61605	6	1	RF CABLE ASSY SRGD
7	E5070-61604	5	1	RF CABLE ASSY SRGD
8	E5070-61671		1	RF CABLE ASSY SRGD
9	E5070-61687	2	1	RF CABLE ASSY SRGD
10	E5070-61672		1	RF CABLE ASSY SRGD
11	0955-0208	5	1	U-WAVE ATTN 4DB
12	1810-0118	1	2	TERMINATION-COAX

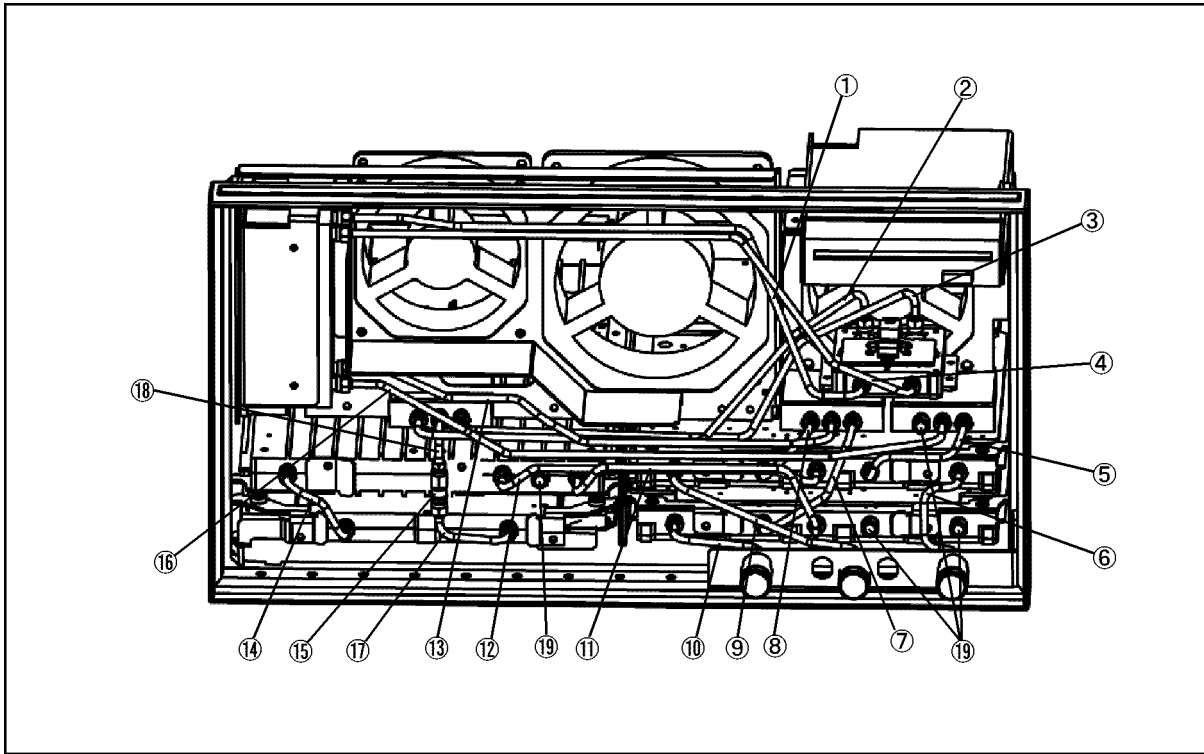
Replaceable Parts

Replaceable Parts List (Front View) for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above

Front View (Semirigid Cables) (Opt. 314)

Figure 5-29

Front View (Semirigid Cables) (Opt. 314)



e5070bse3010

**Replaceable Parts List (Front View) for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above**

**Table 5-29 Front View (Semirigid Cables) (Opt. 314)**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61633		1	RF CABLE ASSY SRGD
2	E5070-61677	2	1	RF CABLE ASSY SRGD
3	E5070-61678	3	1	RF CABLE ASSY SRGD
4	E5070-61635		1	RF CABLE ASSY SRGD
5	E5070-61648	7	1	RF CABLE ASSY SRGD
6	E5070-61632	9	1	RF CABLE ASSY SRGD
7	E5070-61646	5	1	RF CABLE ASSY SRGD
8	E5070-61645	4	1	RF CABLE ASSY SRGD
9	E5070-61688	8	1	RF CABLE ASSY SRGD
10	E5070-61651	2	1	RF CABLE ASSY SRGD
11	E5070-61679	1	1	RF CABLE ASSY SRGD
12	E5070-61649	8	1	RF CABLE ASSY SRGD
13	E5070-61634		1	RF CABLE ASSY SRGD
14	E5070-61687	9	1	RF CABLE ASSY SRGD
15	0955-0301	1	1	U-WAVE ATTN 2DB
16	E5070-61636		1	RF CABLE ASSY SRGD
17	E5070-61675		1	RF CABLE ASSY SRGD
18	E5070-61676		1	RF CABLE ASSY SRGD
19	1810-0118	1	4	TERMINATION-COAX

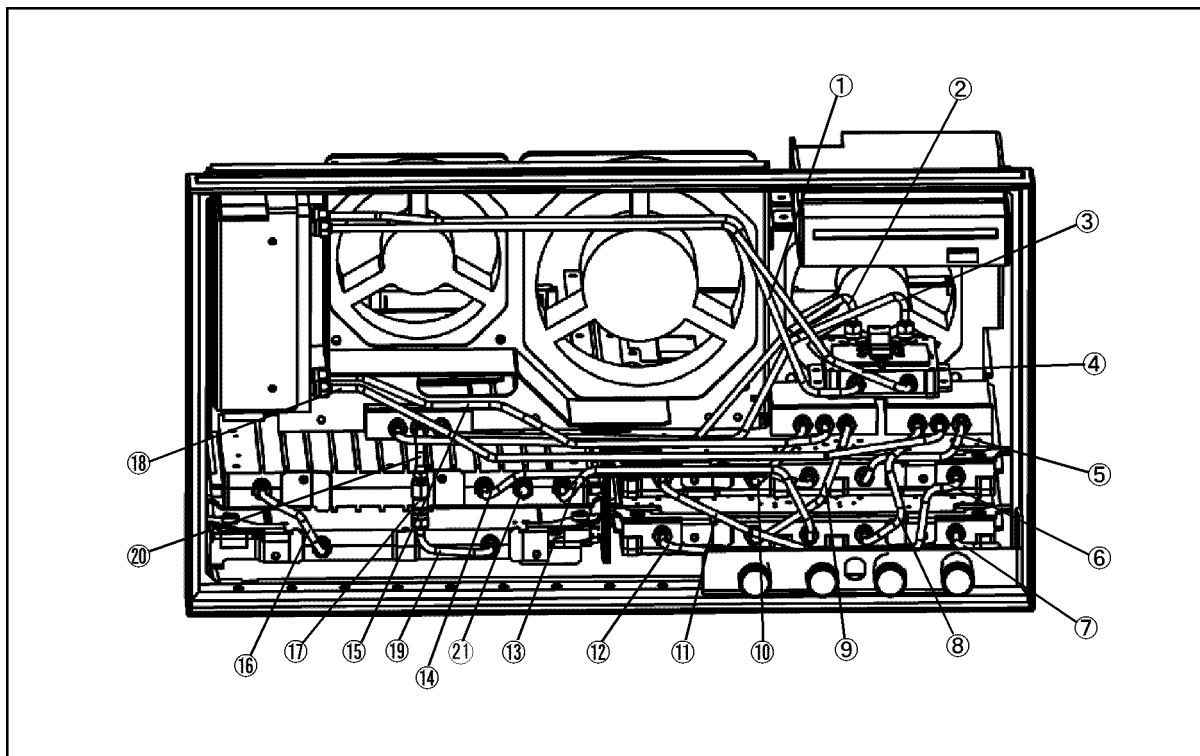
Replaceable Parts

Replaceable Parts List (Front View) for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above

Front View (Semirigid Cables) (Opt. 414)

Figure 5-30

Front View (Semirigid Cables) (Opt. 414)



e5070bse3011

**Replaceable Parts List (Front View) for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above**

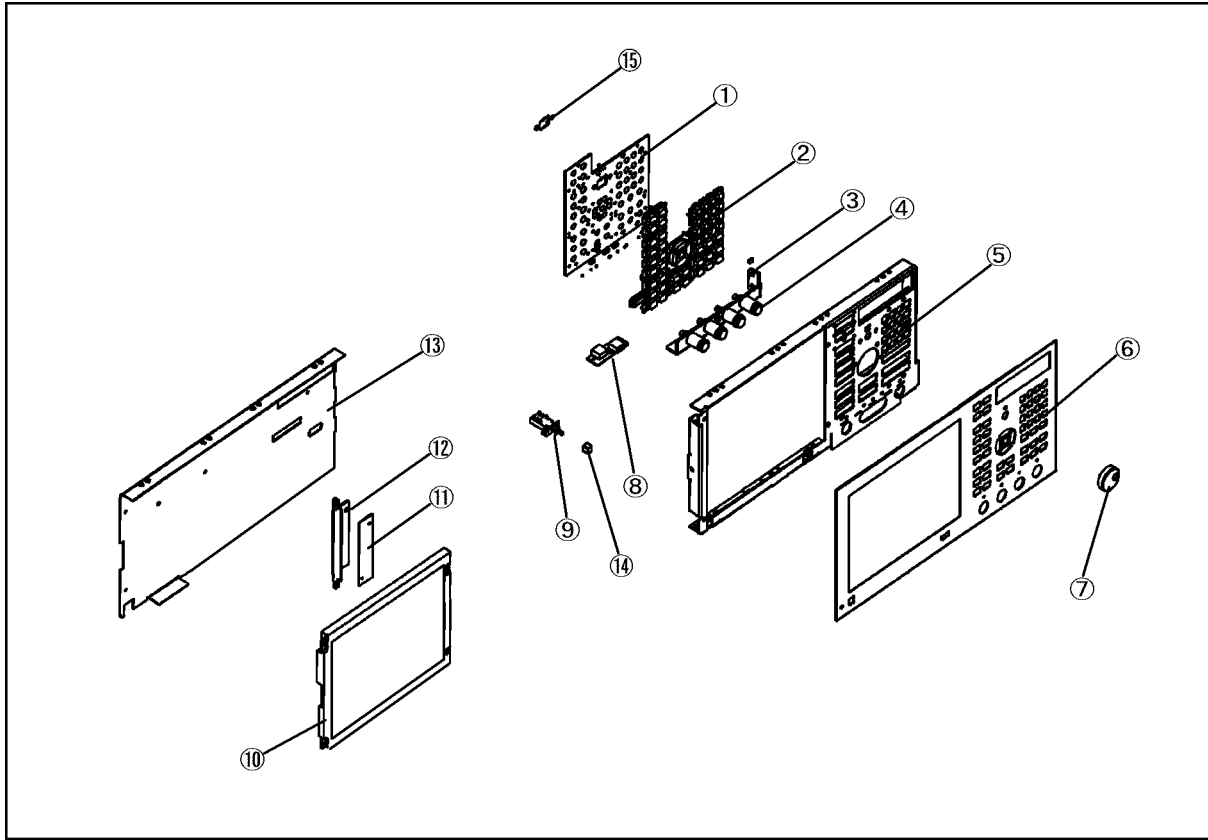
**Table 5-30 Front View (Semirigid Cables) (Opt. 414)**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61633		1	RF CABLE ASSY SRGD
2	E5070-61677	2	1	RF CABLE ASSY SRGD
3	E5070-61678	3	1	RF CABLE ASSY SRGD
4	E5070-61635		1	RF CABLE ASSY SRGD
5	E5070-61648	7	1	RF CABLE ASSY SRGD
6	E5070-61653	9	1	RF CABLE ASSY SRGD
7	E5070-61654	5	1	RF CABLE ASSY SRGD
8	E5070-61647	8	1	RF CABLE ASSY SRGD
9	E5070-61646	5	1	RF CABLE ASSY SRGD
10	E5070-61645	4	1	RF CABLE ASSY SRGD
11	E5070-61652	8	1	RF CABLE ASSY SRGD
12	E5070-61651	2	1	RF CABLE ASSY SRGD
13	E5070-61679	1	1	RF CABLE ASSY SRGD
14	E5070-61649	8	1	RF CABLE ASSY SRGD
15	E5070-61634		1	RF CABLE ASSY SRGD
16	E5070-61687	8	1	RF CABLE ASSY SRGD
17	0955-0301	9	1	U-WAVE ATTN 2DB
18	E5070-61636		1	RF CABLE ASSY SRGD
19	E5070-61675		1	RF CABLE ASSY SRGD
20	E5070-61676		1	RF CABLE ASSY SRGD
21	1810-0118	1	1	TERMINATION-COAX

## Replaceable Parts List (Others)

### Front Panel

Figure 5-31 Front Panel



e5070bse3007

**Table 5-31 Front Panel**

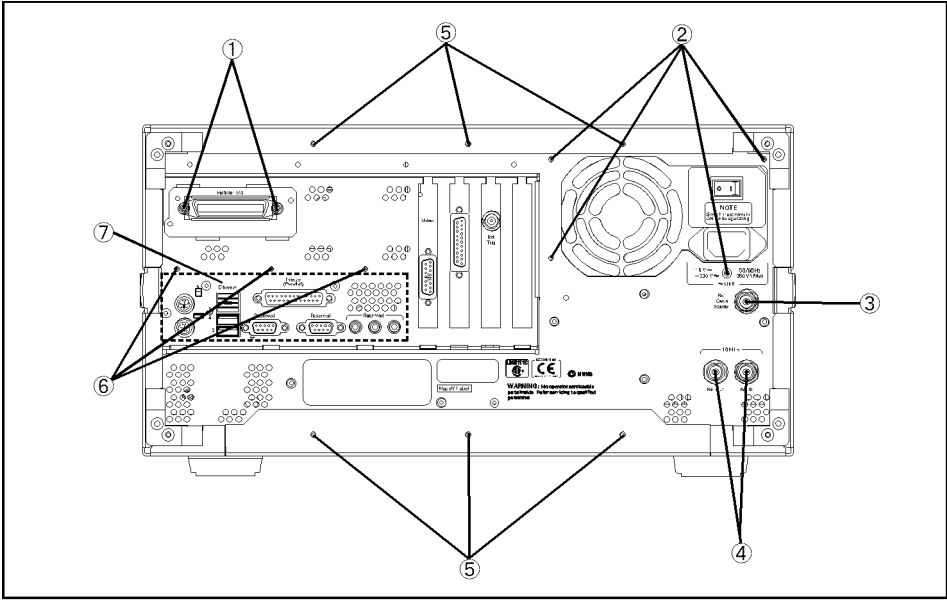
Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-66522	6	1	A22 FRONT PANEL KEYBOARD (with Video Card)
	E5070-66529		1	A22 FRONT PANEL KEYBOARD (without Video Card) (for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above)
2	E5070-25101	1	1	KEYPAD RUBBER
3	E5070-01231	8	1	ANGLE-N-CONN
4	86290-60005	7	1	CONN TP N ASSY
	2190-0104	0	1	WSHR-LK INTL T
	2950-0132	6	1	NUT-HEX-DUB-CHAM
5	E5070-00202	1	1	PANEL SUB
6	E5070-00211	2	1	PANEL FRONT (E5070B Opt. 21x)
	E5070-00213	4	1	PANEL FRONT (E5070B Opt. 31x)
	E5070-00214	5	1	PANEL FRONT (E5070B Opt. 41x)
	E5071-00211	3	1	PANEL FRONT (E5071B Opt. 21x)
	E5071-00213	5	1	PANEL FRONT (E5071B Opt. 31x)
7	E5071-00214	6	1	PANEL FRONT (E5071B Opt. 41x)
	5182-7594	2	1	KNOB
8	E5070-66533	8	1	A33 USB Adapter
	0515-0430	2	3	SCREW-MACH M3.0 x 6 PN T10
9	See Table 5-54	-	1	STANDBY SWITCH ASSEMBLY
10	E5070-60101	5	1	LCD-FILTER ASSY (Standard)
	E5070-60102	6	1	LCD-TPANEL ASSY (Opt. 016)
	2090-0888	5	1	BACKLIGHT (included in LCD ASSY)
11	0950-4091	2	1	A52 INVERTER LS700
	0515-1974	2	2	SCREW-MACH M2.5 x 4 PN T8
12	E5070-01211	4	1	BRACKET INVERTER
13	E5070-00621	8	1	COVER SHIELD
14	0371-3953	4	1	KEY CAP
15	3100-3711		1	SWITCH-ROTARY

Replaceable Parts  
Replaceable Parts List (Others)

Rear View

Figure 5-32

Rear View



e5070bse3006



**Table 5-32 Rear View**

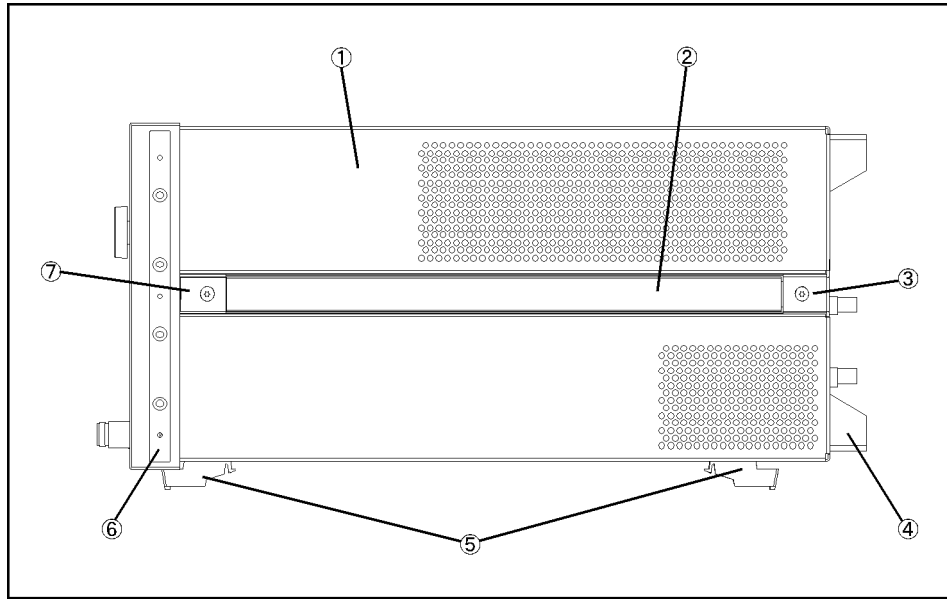
Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10
2	0515-0430	3	4	SCREW-MACH M3.0 x 6 PN T10
3	1250-0252	6	1	BNC CONNECTOR (Opt. 1E5)
	2950-0035	8	1	NUT-HEX-DBL-CHAM (Opt. 1E5)
	2190-0102	9	1	WSHR-LK INTL T (Opt. 1E5)
	6960-0041	1	1	PLUG HOLE (Opt. UNQ)
4	2950-0054	1	2	NUT-HEX-DBL-CHAM
	2190-0102	9	2	WSHR-LK INTL T
5	0515-1402	1	6	SCREW-MACH M3.5 x 8 PN T15
6	0515-0430	3	3	SCREW-MACH M3.0 x 6 PN T10
7	E5070-01228		1	BRACKET (for E5070B S/N JP1KKxxxxx or MY42300632 and below, for E5071B S/N JP1KKxxxxx or MY42301396 and below)
	E5070-01270		1	BRACKET (for E5070B S/N from MY42300633 to MY42399999, for E5071B S/N from MY42301397 to MY42399999)
	E5070-01271		1	BRACKET (for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above)

Replaceable Parts  
 Replaceable Parts List (Others)

Side View

Figure 5-33

Side View



e5070bse052

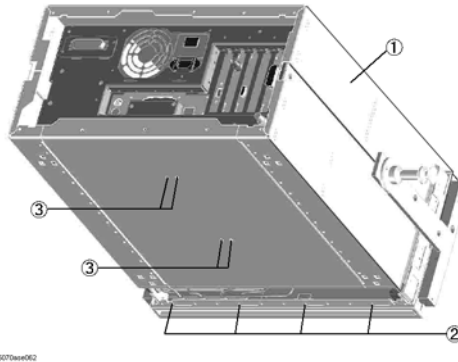
Table 5-33

Side View

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-60022	7	1	COVER ASSY (for E5070B Serial Prefix JP1KK, MY423 and below, for E5071B Serial Prefix JP1KK, MY423 and below)
	E5070-04023	-	1	COVER ASSY (for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above)
2	08720-00081	0	2	STRAP HANDLE
3	5041-9187	5	2	STRAP HANDLE REAR
	0515-2049	8	2	SCREW-MACH M5.0 x 16 FL T20
4	E5100-40002	0	4	STANDOFF
	0515-1402	5	4	SCREW-MACH M3.5 x 8 PN T15
5	5041-9167	1	4	FOOT FL
	1460-1345	5	2	WIREFORM
6	5041-9173	9	2	SIDE TRIM 221.5
7	5041-9186	4	2	STRAP HANDLE FRT
	0515-2049	8	2	SCREW-MACH M5.0 x 16 FL T20

**Cover Assembly for E5070B serial prefix JP1KK, MY423 and below, E5071B serial prefix JP1KK, MY423 and below**

**Figure 5-34** Cover Assembly



**Table 5-34** Cover Assembly

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-60022	9	1	COVER ASSY
2	0515-1382	6	4	SCREW-MACH M3.5 x 6 FL T15
3	0515-0430	3	4	SCREW-MACH M3.0 x 6 PN T10

Cover Assembly for E5070B S/N MY42401101 and above,  
 E5071B S/N MY42402455 and above

Figure 5-35 Cover Assembly (bottom view)

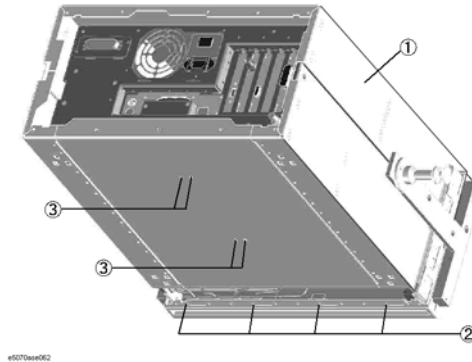


Table 5-35 Cover Assembly (bottom view)

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-04023	-	1	COVER ASSY
2	0515-1382	6	4	SCREW-MACH M3.5 x 6 FL T15
3	0515-0430	3	4	SCREW-MACH M3.0 x 6 PN T10

Figure 5-36 Cover Assembly (HDD cover on top view)

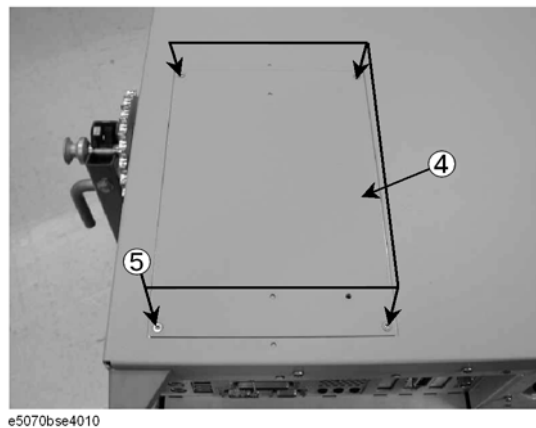
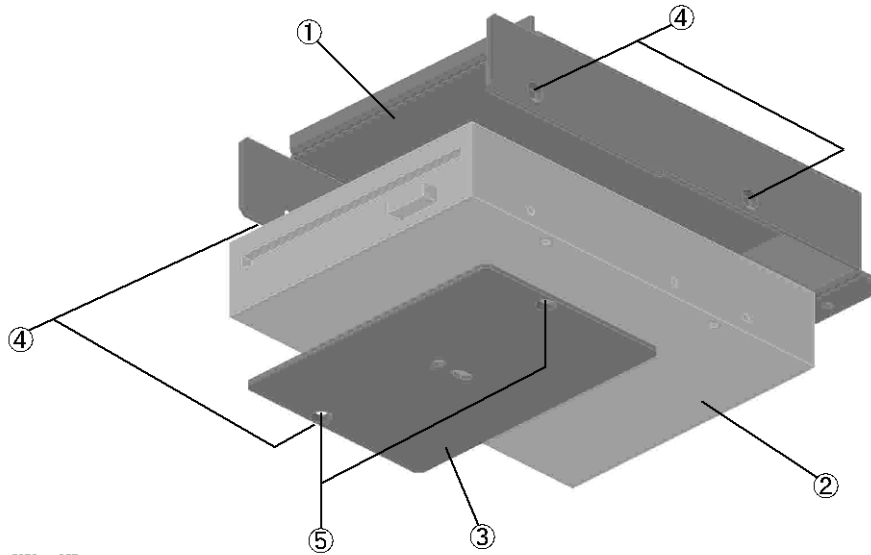


Table 5-36 Cover Assembly (HDD cover on top view)

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
4	E5070-01252	-	1	REMOVABLE HDD COVER
5	0515-2146	-	4	SCREW-MACH M3.0 x 4 FL T10

**A28 FDD Assembly**

**Figure 5-37** A28 FDD Assembly



e5070ase057

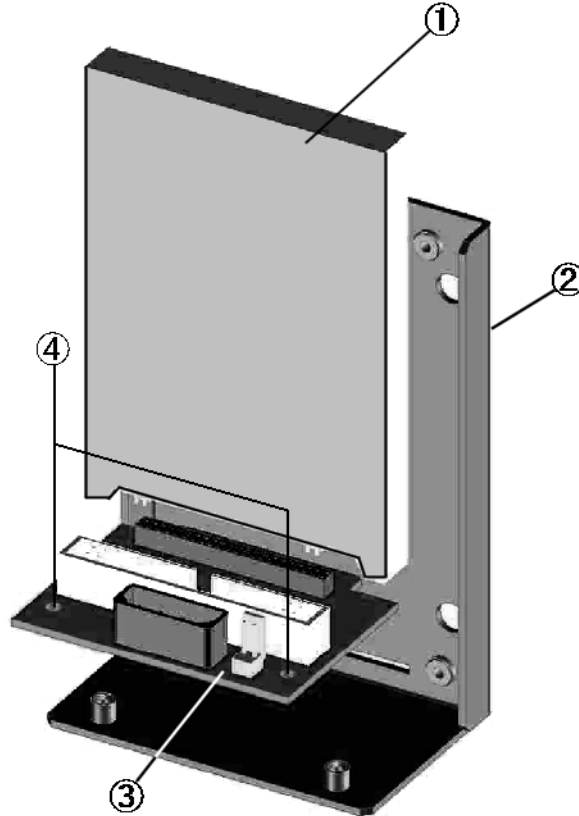
**Table 5-37** A28 FDD Assembly

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-01203	4	1	HOLDER FDD
2	0950-3334	4	1	A28 FDD 3.5
3	E5070-04005	0	1	COVER FDD
4	0515-2146	2	4	SCREW-MACH M3.0 x 4 FL T10
5	0515-2146	2	2	SCREW-MACH M3.0 x 4 FL T10

**A27 Mass Storage Disk Drive Assembly for E5070B serial prefix JP1KK, MY423 and below, E5071B serial prefix JP1KK, MY423 and below**

Figure 5-38

A27 Mass Storage Disk Drive Assembly for E5070B serial prefix JP1KK, MY423 and below, E5071B serial prefix JP1KK, MY423 and below

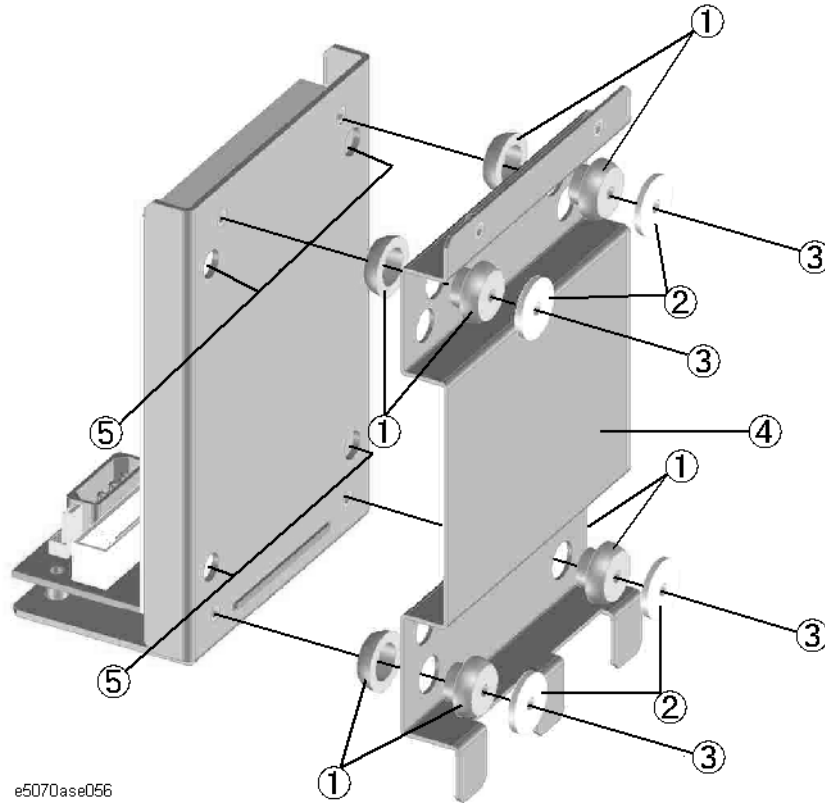


e5070ase055

**Table 5-38 A27 Mass Storage Disk Drive Assembly for E5070B serial prefix JP1KK, MY423 and below, E5071B serial prefix JP1KK, MY423 and below**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-82201		1	HDD INSTALLED
2	E5070-01205	6	1	HOLDER HDD
3	E5070-66530	6	1	DISK DR
4	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10

**Figure 5-39** A27 Mass Storage Disk Drive Mount Assembly for E5070B serial prefix JP1KK, MY423 and below, E5071B serial prefix JP1KK, MY423 and below



e5070ase056

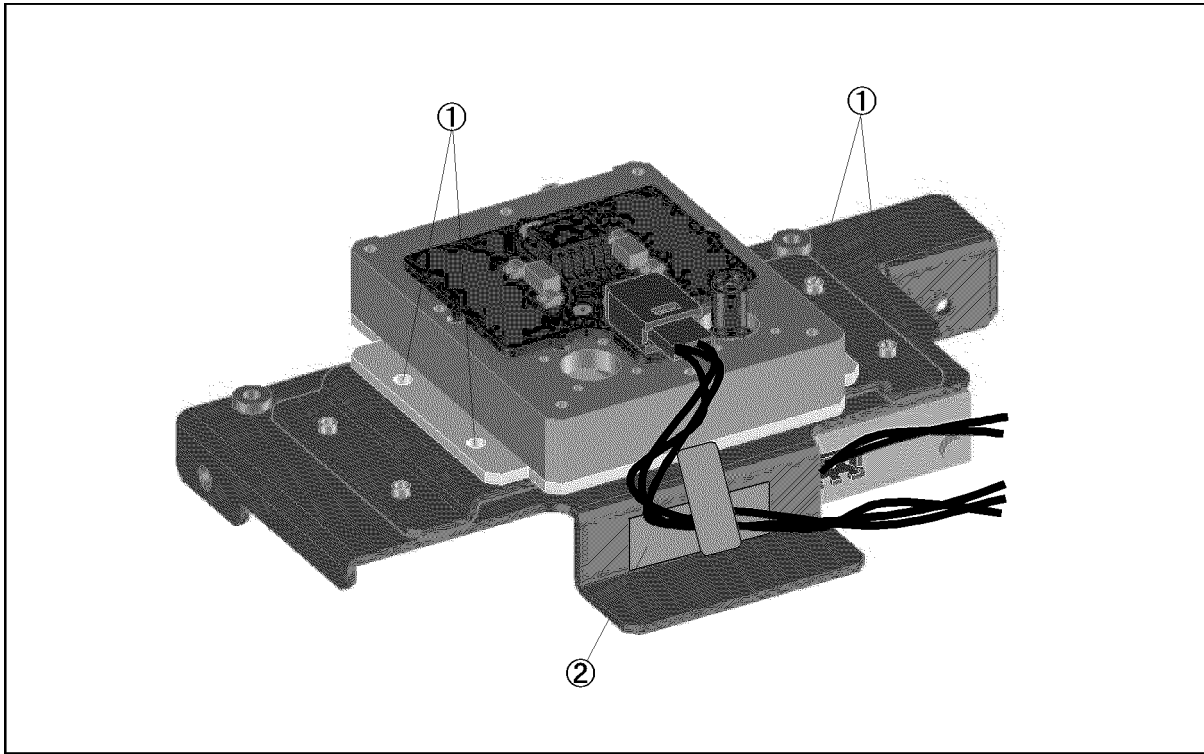
**Table 5-39** A27 Mass Storage Disk Drive Mount Assembly for E5070B serial prefix JP1KK, MY423 and below, E5071B serial prefix JP1KK, MY423 and below

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	1410-1580		4	BUSHING
2	E5070-24011	0	4	SPACER
3	0515-0665	6	4	SCREW-MACH M3.0 x 14 PN T10
4	E5070-01206	7	1	BRACKET HDD
5	0515-0374	4	4	SCREW-MACH M3.0 x 10 PN T10

Replaceable Parts  
 Replaceable Parts List (Others)

**A4 Power Amp. Module Assembly**

**Figure 5-40**      **A4 Power Amp. Module Assembly**



e5070bse077

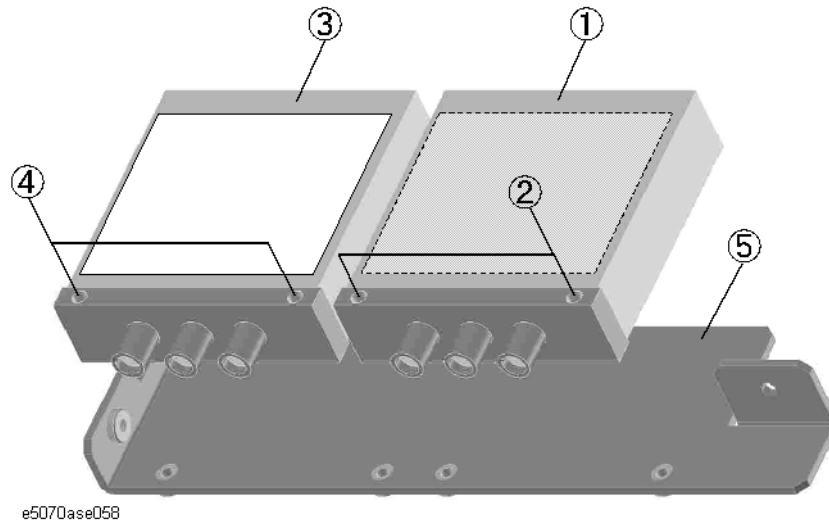
**Table 5-40**      **A4 Power Amp. Module Assembly**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	0515-0372	2	4	SCREW-MACH M3.0 x 8 PN T10
2	1400-1334	6	1	CABLE CLAMP



**A8 RF Switch Assembly for E5070B serial prefix JP1KK or MY421,  
 E5071B serial prefix JP1KK or MY421**

**Figure 5-41** A8 RF Switch Assembly for E5070B serial prefix JP1KK or MY421, E5071B serial prefix JP1KK or MY421

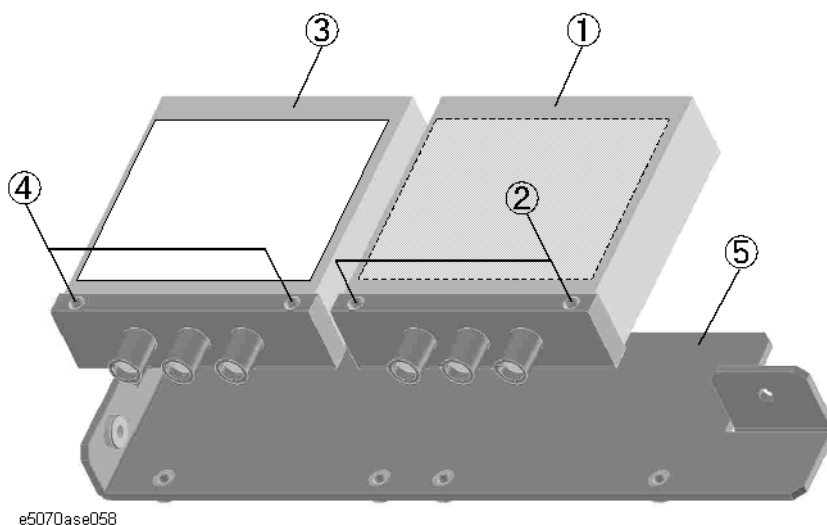


**Table 5-41** A8 RF Switch Assembly for E5070B serial prefix or MY421, E5071B serial prefix JP1KK or MY421

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	5087-7137		1	SWITCH RF SPDT (Opt. 21x, 31x, 41x)
2	0515-1410	1	2	SCREW-MACH M3.0 x 20 PN T10 (Opt. 21x, 31x, 41x)
3	5087-7137		1	SWITCH RF SPDT (Opt. 31x, 41x)
4	0515-1410	1	2	SCREW-MACH M3.0 x 20 PN T10 (Opt. 31x, 41x)
5	E5070-01265	0	1	PLATE SWITCH

**A8 RF Switch Assembly for E5070B serial prefix MY422 and above,  
 E5071B serial prefix MY422 and above**

**Figure 5-42** A8 RF Switch Assembly for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above



e5070ase058

**Table 5-42** A8 RF Switch Assembly for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	5087-7272		1	SWITCH RF SPDT (Opt. 21x, 31x, 41x)
2	0515-1410	1	2	SCREW-MACH M3.0 x 20 PN T10 (Opt. 21x, 31x, 41x)
3	5087-7272		1	SWITCH RF SPDT (Opt. 31x, 41x)
4	0515-1410	1	2	SCREW-MACH M3.0 x 20 PN T10 (Opt. 31x, 41x)
5	E5070-01265	0	1	PLATE SWITCH

**A7 Source Step Attenuator Assembly for E5070B serial prefix JP1KK or MY421, E5071B serial prefix JP1KK or MY421 (Opt. 214, 314, 414)**

Figure 5-43

A7 Source Step Attenuator Assembly for E5070B serial prefix JP1KK or MY421, E5071B serial prefix JP1KK or MY421 (Opt. 214, 314, 414)

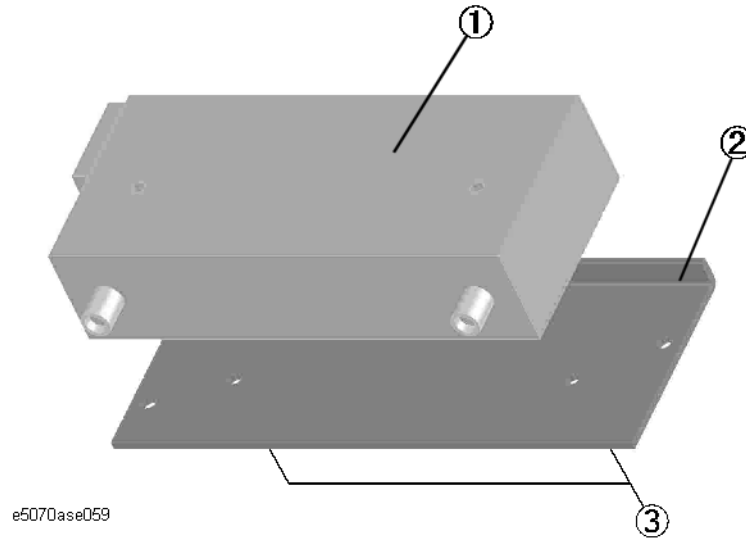


Table 5-43

A7 Source Step Attenuator Assembly for E5070B serial prefix or MY421, E5071B serial prefix JP1KK or MY421 (Opt. 214, 314, 414)

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	See service note E5071B-12C	8	1	A7 SOURCE STEP ATTENUATOR
2	E5070-01213	6	1	PLATE
3	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10

**A7 Source Step Attenuator Assembly for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above (Opt. 214)**

Figure 5-44

A7 Source Step Attenuator Assembly for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above (Opt. 214)

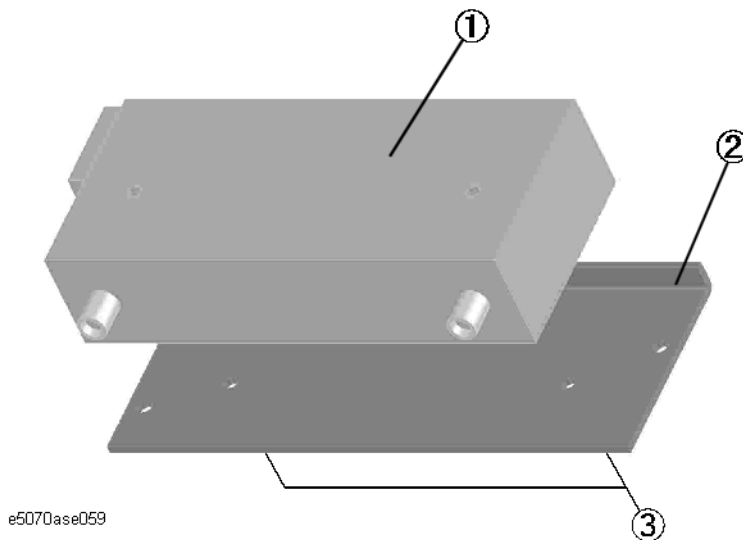


Table 5-44

**A7 Source Step Attenuator Assembly for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above (Opt. 214)**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	See service note E5071B-12C	8	1	A7 SOURCE STEP ATTENUATOR
2	E5070-01213	6	1	PLATE
3	0515-0372	2	2	SCREW-MACH M3.0 x 8 PN T10

**A7 Source Step Attenuator Assembly for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above (Opt. 314, 414)**

Figure 5-45

A7 Source Step Attenuator Assembly for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above (Opt. 314, 414)

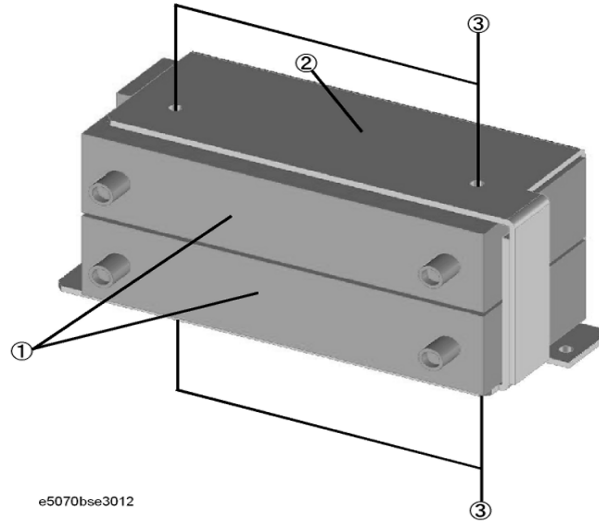


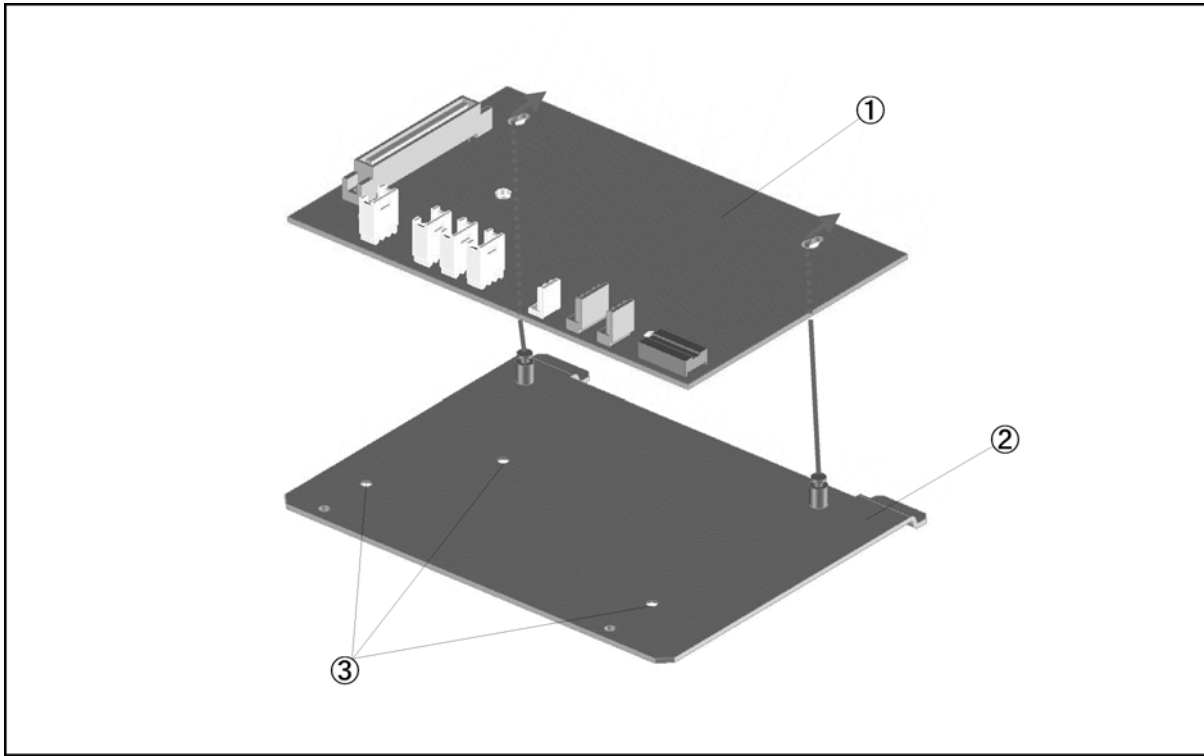
Table 5-45

A7 Source Step Attenuator Assembly for E5070B serial prefix MY422 and above, E5071B serial prefix MY422 and above (Opt. 314, 414)

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	See service note E5071B-12C	8	1	A7 SOURCE STEP ATTENUATOR
2	E5070-01214	6	1	PLATE
3	0515-0372	2	4	SCREW-MACH M3.0 x 8 PN T10

**A6 RF Switch/Temperature Controller Assembly**

**Figure 5-46** A6 RF Switch/Temperature Controller Assembly



e5070bse076

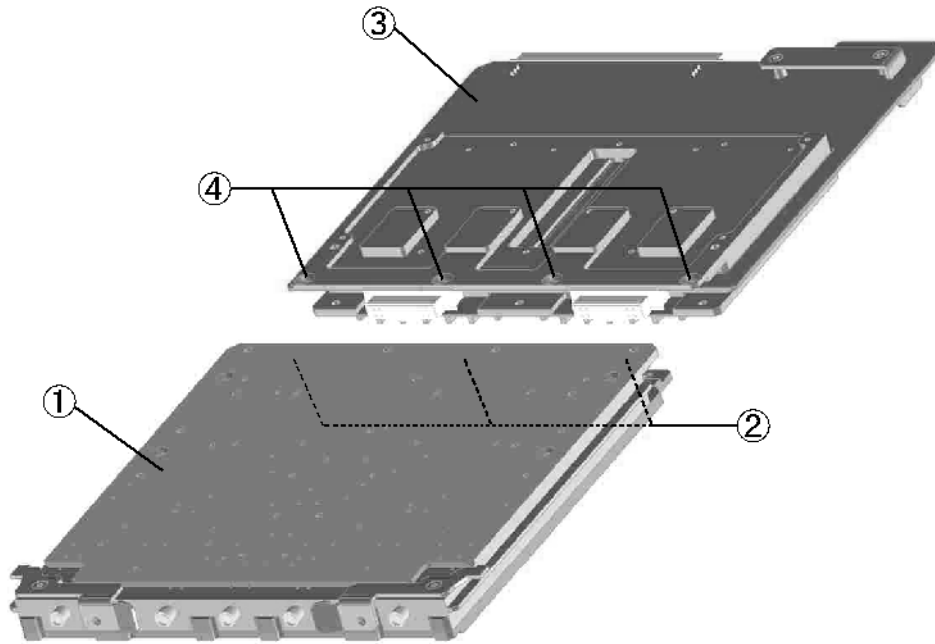
**Table 5-46** A6 RF Switch/Temperature Controller Assembly

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-66586	2	1	A6 RF SWITCH/TEMPERATURE CONTROLLER
2	E5070-01266	9	1	BRACKET
3	0515-1946	8	3	SCREW-MACH M3.0 x 6 FL T10

## A2 Receiver Board Assembly

Figure 5-47

A2 Receiver Board Assembly



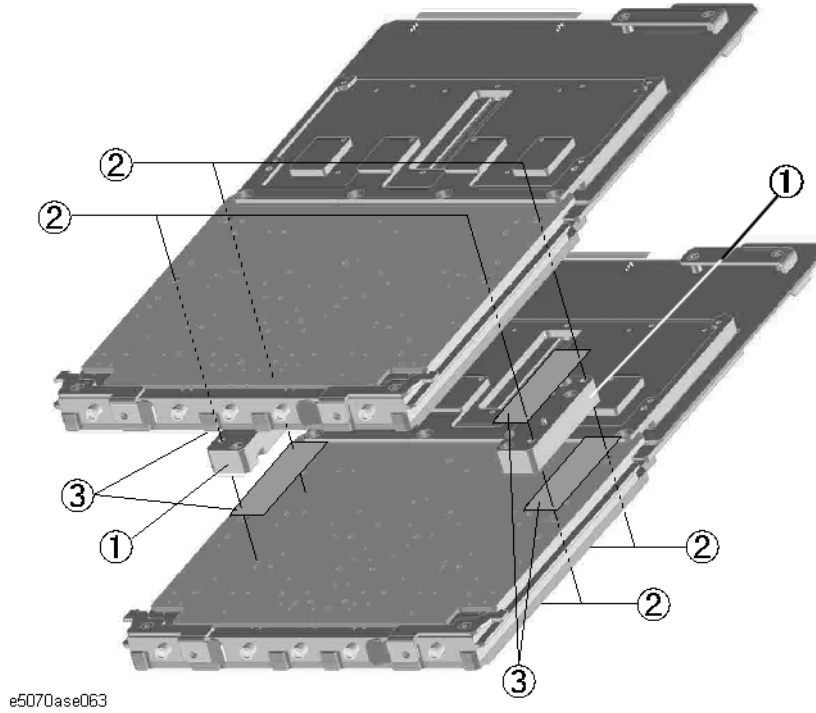
e5070ase060  
**Table 5-47 A2 Receiver Board Assembly**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5071-61015	2	1	A15 RECEIVER- RF BOARD (Opt. 21x)
	E5071-69015	8	1	A15 RECEIVER- RF BOARD (Exchange)
2	0515-1403	2	3	SCREW-MACH M4.0 x 6 FL T15 (Opt. 21x)
3	E5071-66517	0	1	A17 RECEIVER-IF BOARD (Opt. 21x)
4	0515-1403	2	4	SCREW-MACH M4.0 x 6 FL T15 (Opt. 21x)
1	E5071-61015	2	2	A15 RECEIVER-RF BOARD (Opt. 31x, 41x)
	E5071-69015	8	1	A15 RECEIVER-RF BOARD (Exchange)
2	0515-1403	2	6	SCREW-MACH M4.0 x 6 FL T15 (Opt. 31x, 41x)
3	E5071-66517	0	2	A17 RECEIVER-IF BOARD (Opt. 31x, 41x)
4	0515-1403	2	8	SCREW-MACH M4.0 x 6 FL T15 (Opt. 31x, 41x)

**Receiver Module Assembly (Opt. 31x, 41x)**

Figure 5-48

**Receiver Module Assembly (Opt. 31x, 41x)**



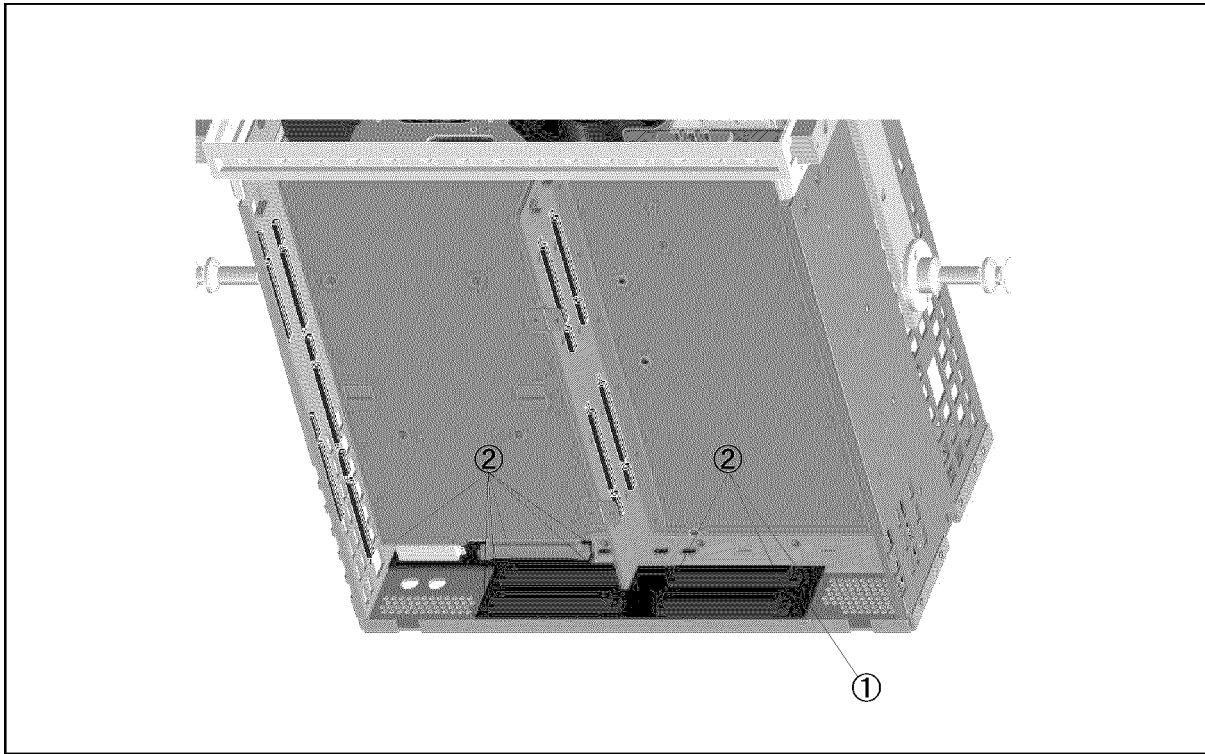
**Table 5-48 Receiver Module Assembly (Opt. 31x, 41x)**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-20031	6	2	BLOCK
2	0515-1864	9	8	SCREW-MACH M3.0 x 22 FL T10
3	E5070-25031	6	4	SHEET THERMAL



### Analog Motherboard Assembly

Figure 5-49 Analog Motherboard Assembly



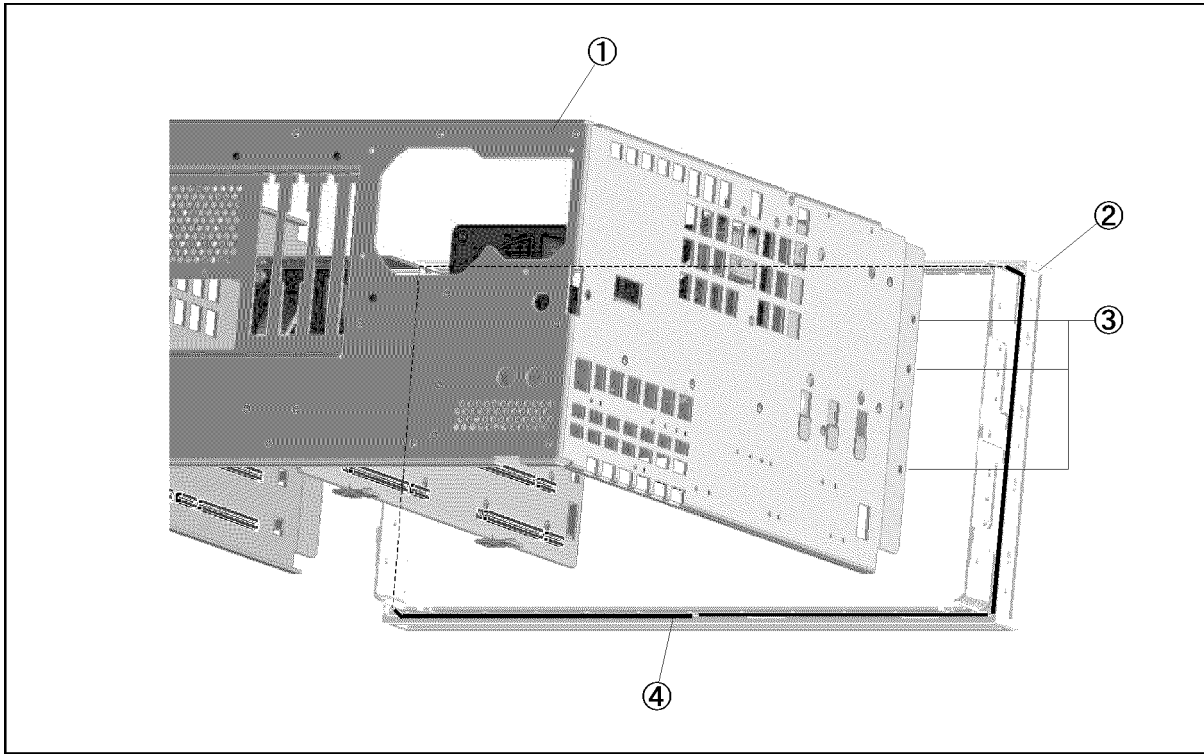
e5070bse075

Table 5-49 Analog Motherboard Assembly

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-66540	8	1	ANALOG MOTHER BOARD
2	0515-0372	2	9	SCREW-MACH M3.0 x 8 PN T10

**Chassis Assembly**

**Figure 5-50** Chassis Assembly



e5070bse074

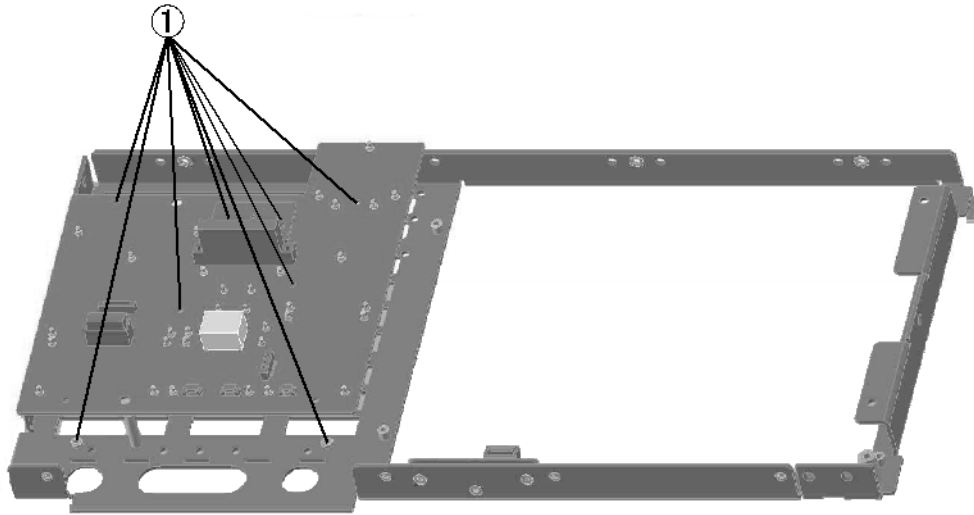
**Table 5-50** Chassis Assembly

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-60023	8	1	CHASSIS
2	5022-1190	4	1	FRONT FRAME
3	0515-2113	3	6	SCREW-MACH M4.0 x 8 PN T20
4	8160-0641	3	1	GASKET (125 cm)

**Keyboard Assembly**

**Figure 5-51**

**Keyboard Assembly**



e5070ase064

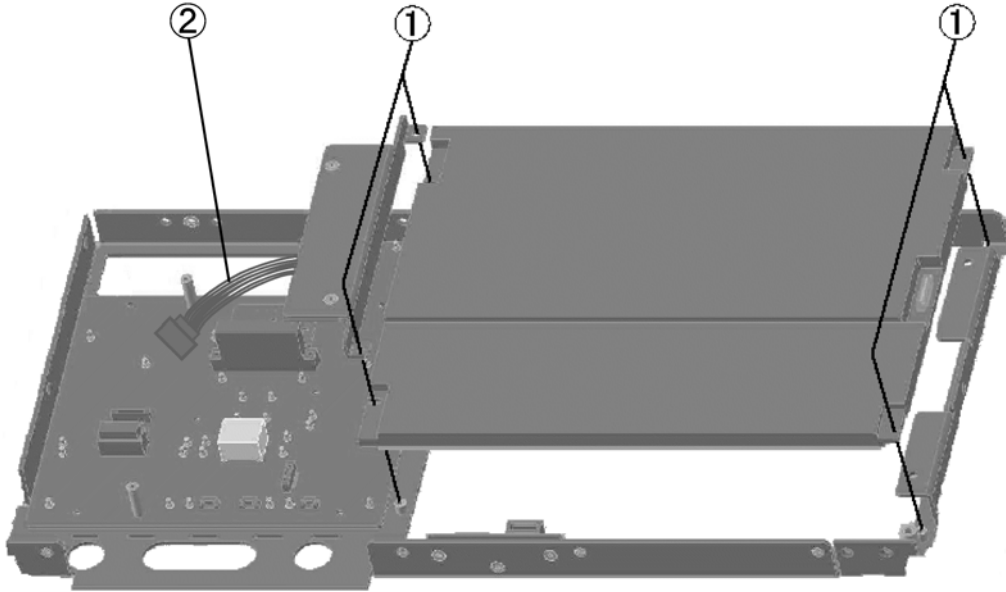
**Table 5-51**

**Keyboard Assembly**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	0515-0430	5	8	SCREW-MACH M3.0 x 6 PN T10

**LCD and Inverter Assembly for E5060B S/N MY42401986 and below,  
 for E5061B S/N MY42404509 and below**

**Figure 5-52** LCD and Inverter Assembly



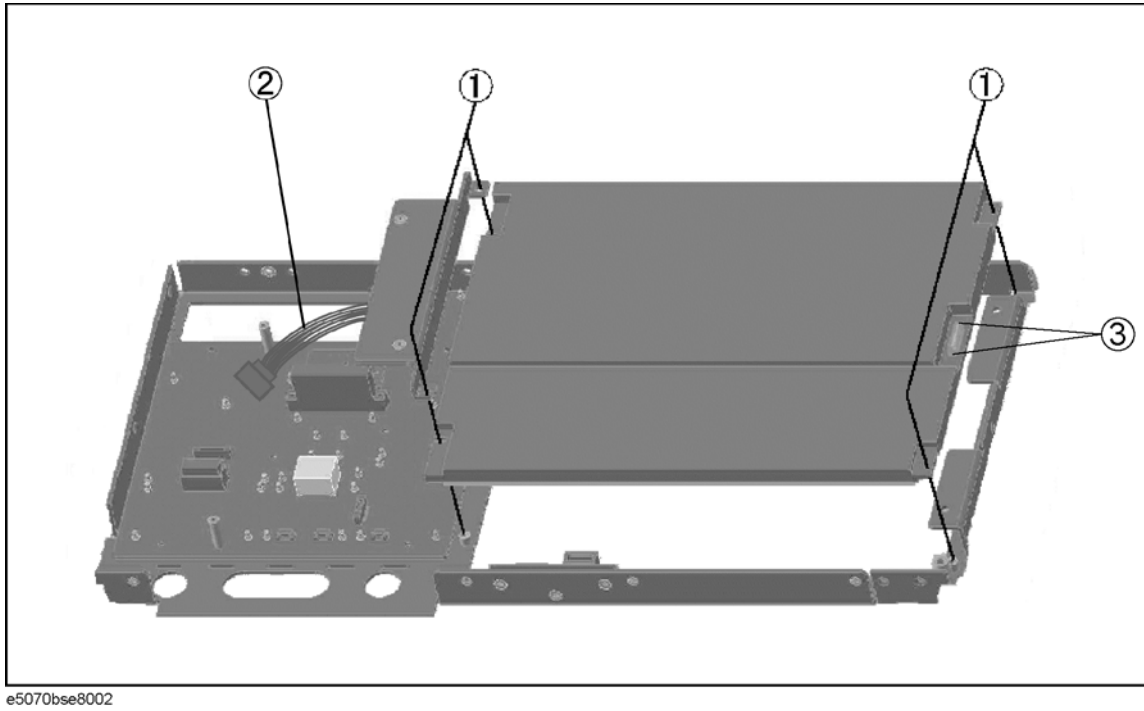
e5070ase295

**Table 5-52** LCD and Inverter Assembly

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	0515-1402	5	4	SCREW-MACH M3.0 x 8 PN T15
2	E5070-61627	2	1	WIRE ASSY

**LCD and Inverter Assembly for E5070B S/N MY42401987 and above,  
 for E5071B S/N MY42404510 and above**

**Figure 5-53** LCD and Inverter Assembly

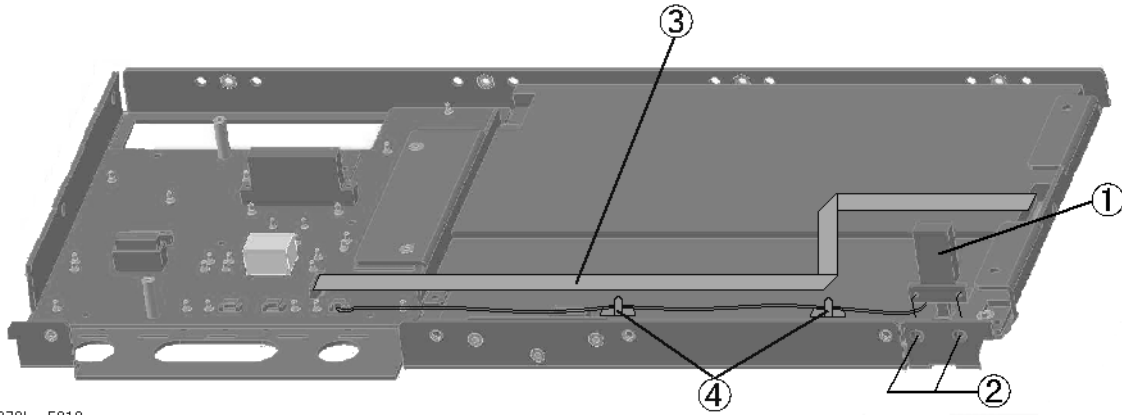


**Table 5-53** LCD and Inverter Assembly

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	0515-1402	5	4	SCREW-MACH M3.0 x 8 PN T15
2	E5070-61627	2	1	WIRE ASSY
3	5188-4418		2	SELF-TAPPING SCREW

**Standby Switch Assembly for E5070B S/N MY42401986 and below, for  
 E5071B S/N MY42404509 and below**

**Figure 5-54** Standby Switch Assembly



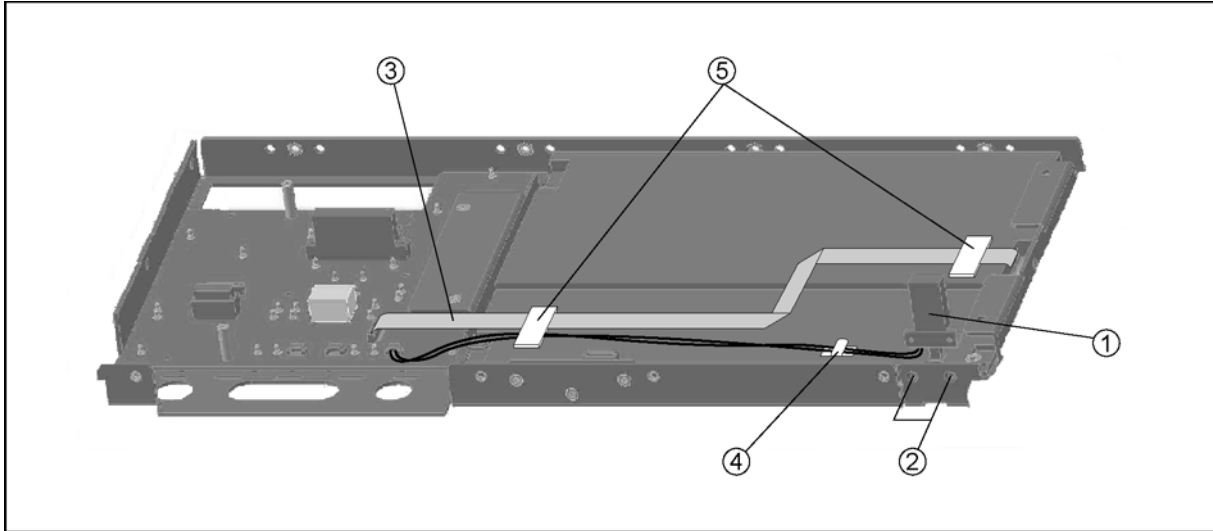
e5070bse5010

**Table 5-54** Standby Switch Assembly

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61901	5	1	WIRE ASSY W/STANDBY SWITCH
	0371-3953		1	KEY CAP
2	0515-2028	9	2	SCREW-MACH M2.5 x 6 FL T8
3	E5062-61612		1	FLAT FLEXIBLE CABLE-LCD (for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above)
4	1400-1334		2	CLAMP CABLE

**Standby Switch Assembly for E5070B S/N MY42401987 and above, for  
 E5071B S/N MY42404510 and above**

**Figure 5-55 Standby Switch Assembly**



e5070bse8003

**Table 5-55 Standby Switch Assembly**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61901	5	1	WIRE ASSY W/STANDBY SWITCH
	0371-3953		1	KEY CAP
2	0515-2028	9	2	SCREW-MACH M2.5 x 6 FL T8
3	E5062-61612		1	FLAT FLEXIBLE CABLE-LCD (for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above)
4	1400-1334		1	CLAMP CABLE
5	1400-3360		2	CLAMP CABLE

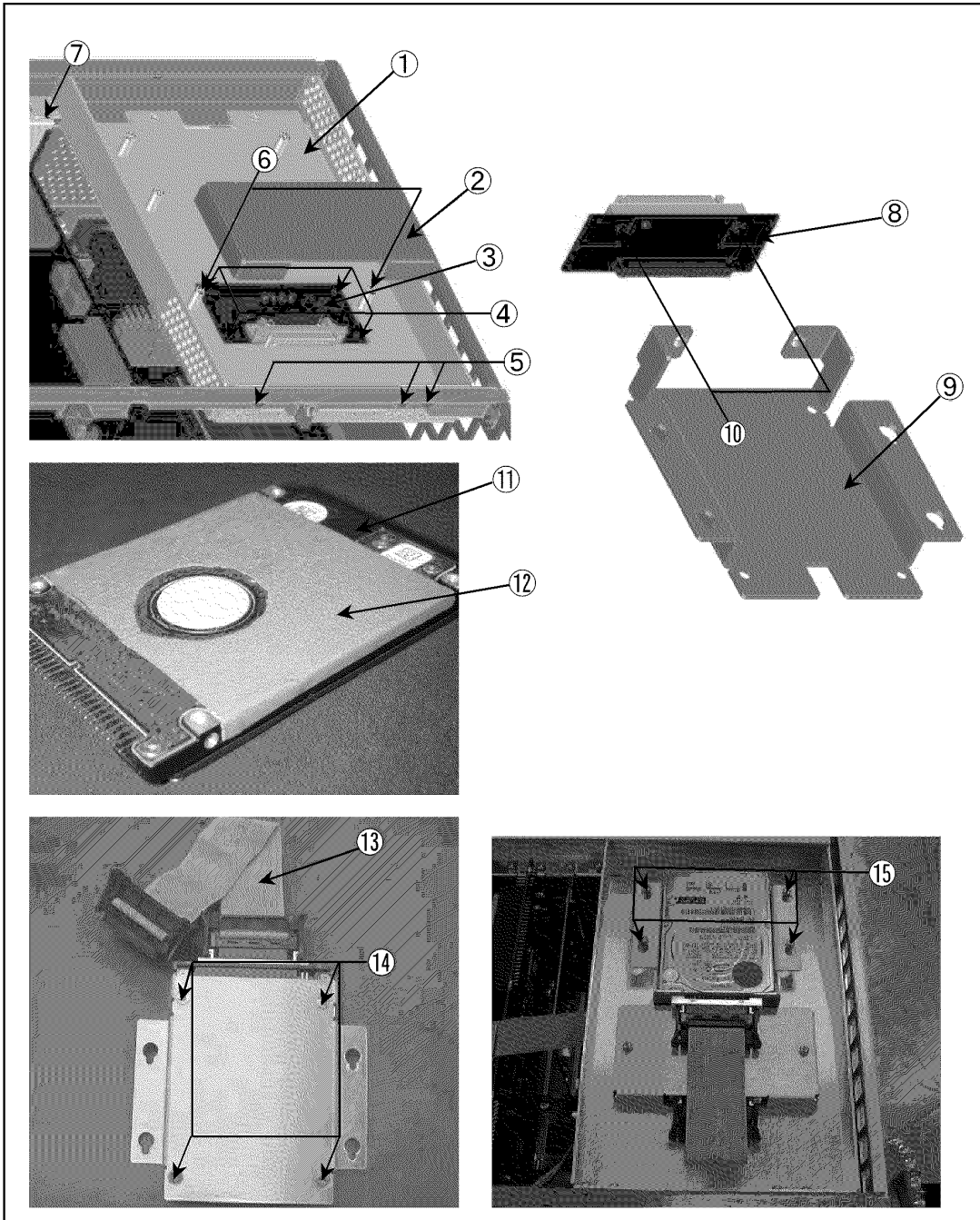


Replaceable Parts  
Replaceable Parts List (Others)

Removable Hard Disk Assemblies for E5070B S/N MY424 1101 and above,  
E5071B S/N MY42402455 and above

Figure 5-56

Removable Hard Disk Assemblies for E5070B S/N MY42401101 and above, E5071B  
S/N MY42402455 and above



e5070bse4009



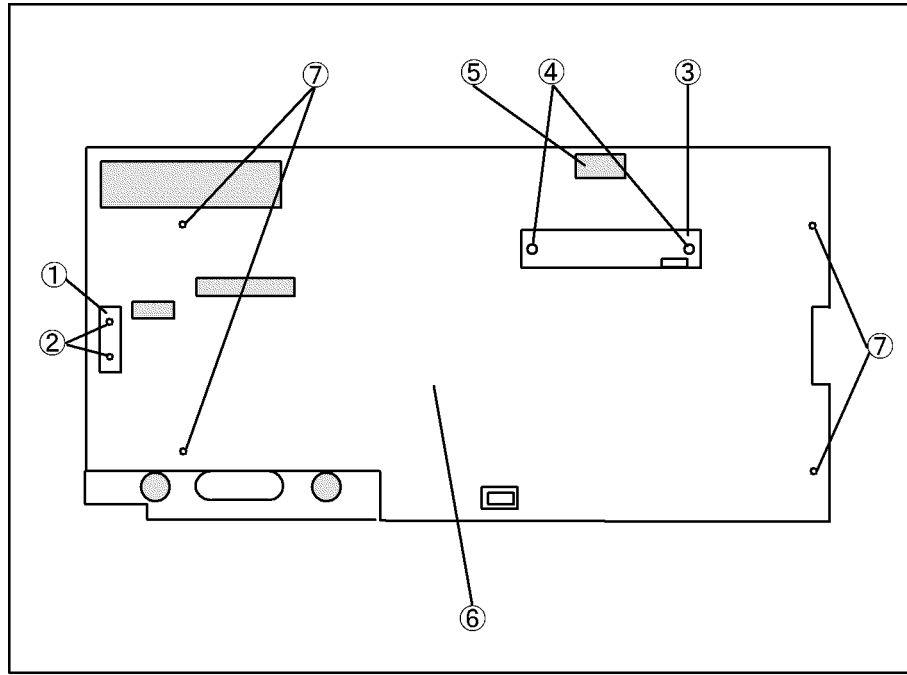
**Table 5-56 Removable Hard Disk Assemblies for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-01254	-	1	HDD BOX
2	E5070-01253	-	1	INNER COVER
3	E5070-66534	-	1	INTERFACE BD PCA
4	0515-0430	-	4	SCREW-MACH M3.0 x 6 PN T10
5	0515-0430	-	3	SCREW-MACH M3.0 x 6 PN T10
6	0515-0430	-	2	SCREW-MACH M3.0 x 6 PN T10
7	0515-0372	-	1	SCREW-MACH M3.0 x 8 PN T10
8	E5070-66535	-	1	CONNECTOR BD PCA
9	E5070-01255	-	1	HDD BRACKET
10	0515-2028	-	2	SCREW-MACH M2.5 x 6 FL T8
11	E5070-82201	-	1	HDD INSTALLED
12	E5070-25061	-	1	HEAT TRANSFER SHEET
13	E5070-61638	-	1	FLAT CABLE ASSY
14	0515-2146	-	4	SCREW-MACH M3.0 x 4 FL T10
15	0515-0374	-	4	SCREW-MACH M3.0 x 10 PN T10

**Cover Assembly (1)**

Figure 5-57

Cover Assembly



e5070bse5002

Table 5-57

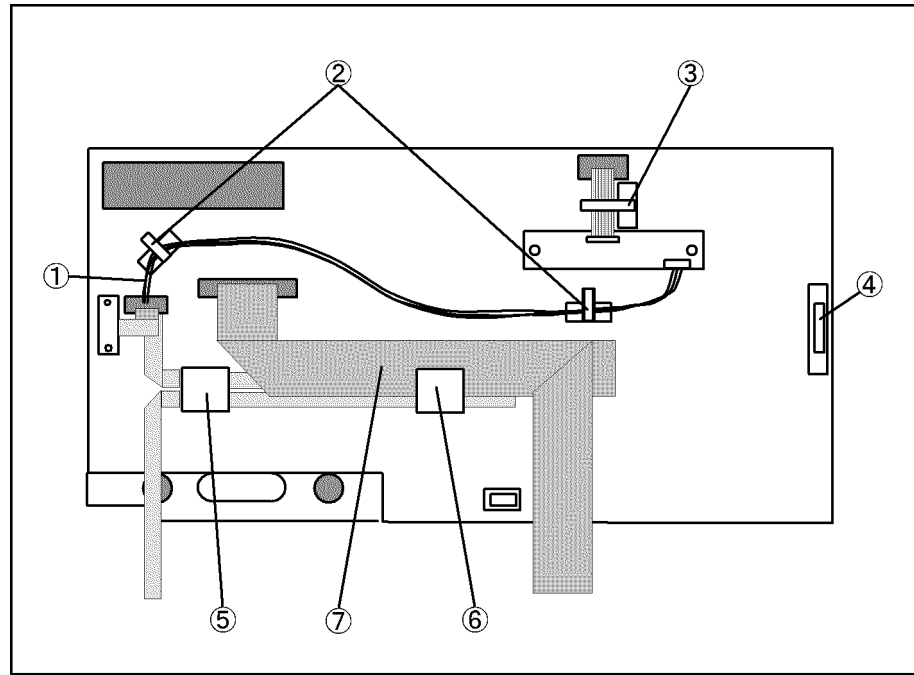
Cover Assembly

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61657	8	1	FLAT CBL ASSY (Opt. 016)
2	0515-0374	4	2	SCREW-MACH M3.0 x 10 PN T10 (Opt. 016)
3	5183-4184	2	1	CNTR TOUCH PANEL (Opt. 016)
4	0515-0430	2	2	SCREW-MACH M3.0 x 6 PN T10 (Opt. 016)
5	1400-3156	4	2	SADDLE EDGE (Opt. 016)
6	E5070-00621	8	1	COVER
7	0515-0430	2	4	SCREW-MACH M3.0 x 6 PN T10

**Cover Assembly (2)**

**Figure 5-58**

**Cover Assembly**



e5070bse5003

**Table 5-58**

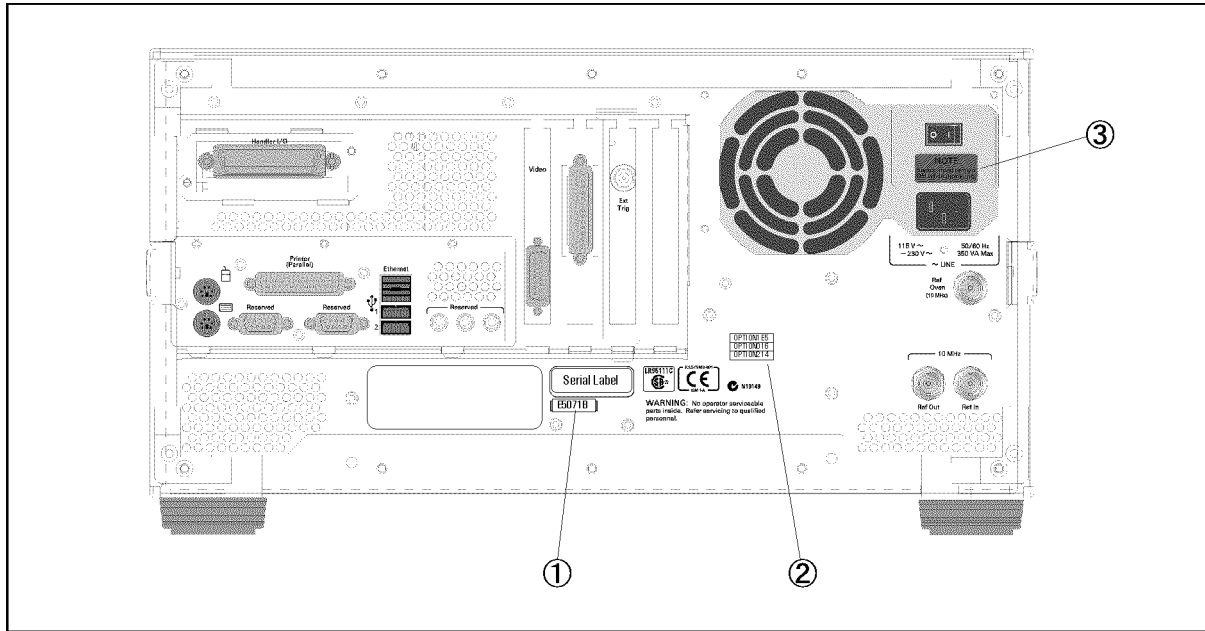
**Cover Assembly**

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-61628	3	1	WIRE ASSY
2	1400-1334	6	2	CLAMP-CABLE
3	1400-1391		1	CLAMP-CABLE
4	E5070-66531	7	1	LCD ADAPTER
5	1400-0611	0	1	CLAMP-CABLE (for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above)
6	1400-0611	0	1	CLAMP-CABLE
7	E5070-61622	7	1	FLAT CABLE ASSY

Replaceable Parts  
 Replaceable Parts List (Others)

Label on Rear Face

Figure 5-59 Label on Rear Face



e5070bse073

Table 5-59 Label on Rear Face

Ref. Desig.	Agilent Part Number	C/D	Qty.	Description
1	E5070-87107	7	1	LABEL (E5070B)
	E5071-87102	2	1	LABEL (E5071B)
2	5185-3713	5	1	LABEL (OPTION 213)
	5185-3714	6	1	LABEL (OPTION 214)
	5185-3715	7	1	LABEL (OPTION 313)
	5185-3716	8	1	LABEL (OPTION 314)
	5185-3717	9	1	LABEL (OPTION 413)
	5185-3718	0	1	LABEL (OPTION 414)
	5185-3720	4	1	LABEL (OPTION 016)
	5185-3722	6	1	LABEL (OPTION 1E5)
	5080-3939	5	1	LABEL (OPTION 010)
	5185-3719	-	1	LABEL (OPTION 015)
	5185-3795	-	1	LABEL (OPTION 008)
3	E5070-87103	3	1	LABEL (NOTE for Switch)

**Other Parts**

**Table 5-60 Other Parts**

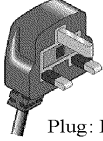
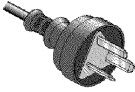
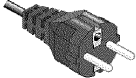
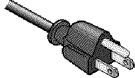


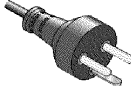

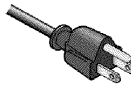

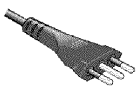
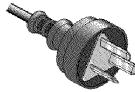
Agilent Part Number	C/D	Qty.	Description
E5070-900x0 <sup>*1</sup>	6	1	USER'S GUIDE
E5070-900x1 <sup>*1</sup>	7	1	INSTALLATION AND QUICK START GUIDE
E5070-900x2 <sup>*1</sup>	8	1	PROGRAMMER'S GUIDE
E5070-900x3 <sup>*1</sup>	9	1	VBA PROGRAMMER'S GUIDE
E5070-903x0 <sup>*1</sup>	7	1	SERVICE MANUAL <sup>*2</sup>
E5070-9050x <sup>*1</sup>	1	1	CD-ROM (DOCUMENTATION)
1150-7846	6	1	MOUSE
1150-7970	7	1	KEYBOARD

\*1. The number indicated by "x" in the part number of each manual, sample program disk, or CD-ROM, 0 for the first edition, is incremented by 1 each time a revision is made. The latest edition comes with the product.

\*2. Opt. 0BW only

## Power Cables and Plug Configurations

**Figure 5-60** Power Cables and Plug Configurations

<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

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## **6** Replacement Procedure

This chapter provides procedure for removing and replacing the major assemblies in the E5070B/E5071B ENA Series Network Analyzer.

## Replacing an Assembly

The following steps show the sequence for replacing an assembly in a E5070B/E5071B RF 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.

---

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**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 E5070B/E5071B.

**Table 6-1 Required Tools**

Assembly	TORX screwdriver				flat edge screwdriver	torque screwdriver TORX T10	cutting plier	file	hex key	open wrench		open torque wrench*1
	T8	T10	T15	T20					1.5 mm	9/16 in.	5/8 in.	5/16 in.
Outer Cover		√	√	√								
Front Panel		√	√	√	√							
Mass Storage		√	√	√								
Removable Hard Disk Drive	√	√	√	√								
Removable Hard Disk Assembly		√	√	√								
FDD		√	√	√								
Power Supply		√	√	√		√						
Handler I/O		√	√	√								
CPU		√	√	√								
DIMM		√	√	√			√					
Digital Mother Board		√	√	√			√					
Source Board		√	√	√	√					√		√
Receiver Board		√	√	√	√							√
Level Vernier		√	√	√	√							√
Fan & Switch Control Board		√	√	√								
Fan		√	√	√	√			√				
Attenuator		√	√	√	√							√
Switch		√	√	√	√							√
Power Amp.		√	√	√	√							√
Analog Motherboard		√	√	√	√					√		√
Analog Interface Board		√	√	√								
GPIB Board		√	√	√								
USB (USBTMC) Interface Card		√	√	√								
Display Board		√	√	√								
Front Keyboard		√	√	√	√			√				
Inverter	√	√	√	√	√							
LCD		√	√	√	√							
LCD Backlight		√	√	√	√							
Reference Oven		√	√	√								
N connector		√	√	√	√			√		√		√

\*1. It's recommended to use E5070-65100 if you want to wrench nuts easily.

## Outer Cover Removal

### Tools Required

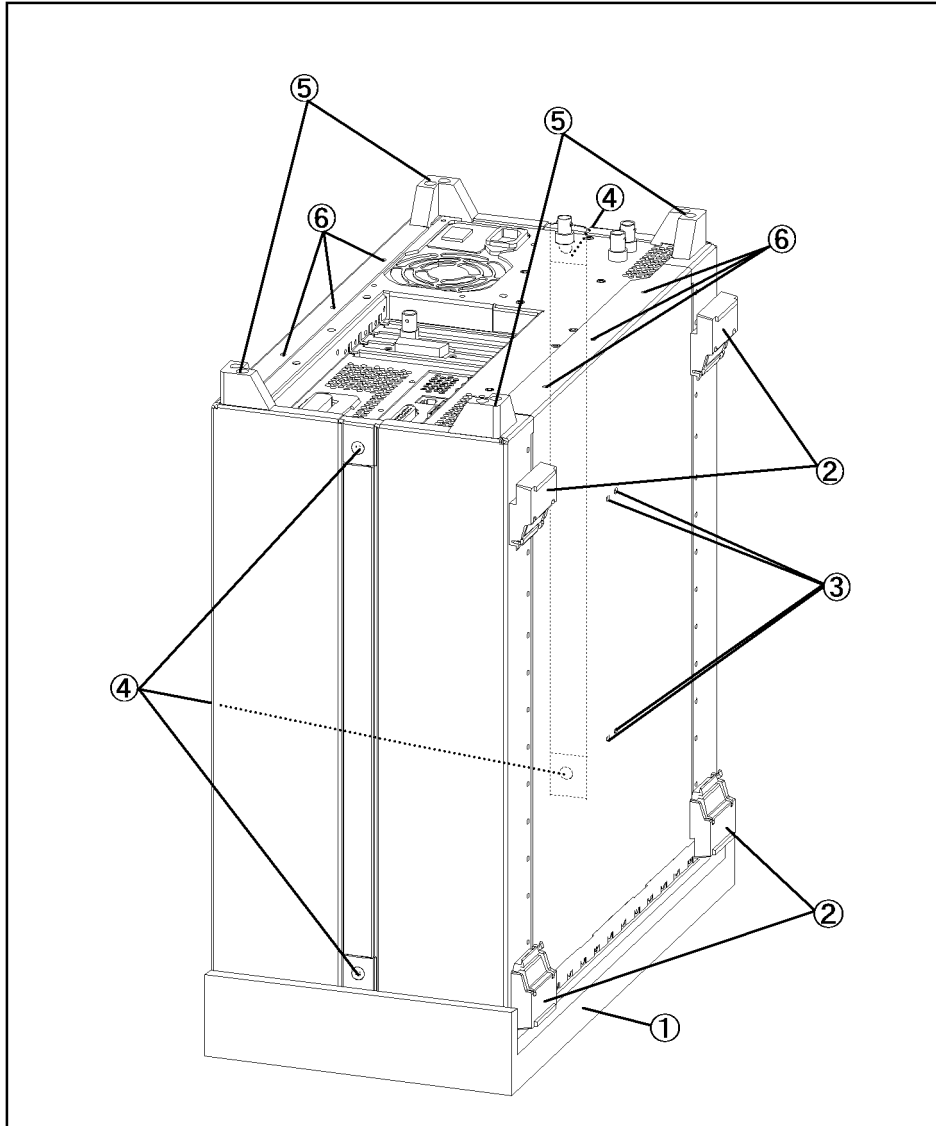
- TORX screwdriver, T10, T15, and T20

### Procedure

Refer to Figure 6-1 for this procedure.

- Step 1.** Disconnect the power cable from the E5070B/E5071B.
- Step 2.** Put a plastic cover (p/n 5959-8096, item 1) on the front panel of the analyzer and place the analyzer on flat table with its front panel down.
- Step 3.** Remove the four bottom feet (item 2).
- Step 4.** Remove the four TORX T10 screws (item 3) from the bottom.
- Step 5.** Remove the four TORX T20 screws (item 4) fastening the side strap handles.
- Step 6.** Remove the four TORX T15 screws (item 5) fastening the four rear foot
- Step 7.** Remove the six TORX T15 screws (item 6) fastening the cover.
- Step 8.** Slide up the outer cover and remove it carefully.

Figure 6-1 Outer Cover Removal



e5070bse079

## **Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**

### **Tools required**

- TORX screwdriver, T10, T15, and T20
- flat edge screwdriver

### **Procedure**

Refer to Figure 6-2 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Release the cable (item 8) from the cable clamp (item 1)
- Step 3.** Remove the top trim (item 2) using a flat edge driver.
- Step 4.** Remove the eight TORX T15 screws (item 3) fastening front panel.
- Step 5.** Gradually push the front panel assembly towards the outside.
- Step 6.** Release the mylar cable (item 4) from the cable clamp (item 5).
- Step 7.** Disconnect the three cables (item 6, 7 and 8) from the front panel.

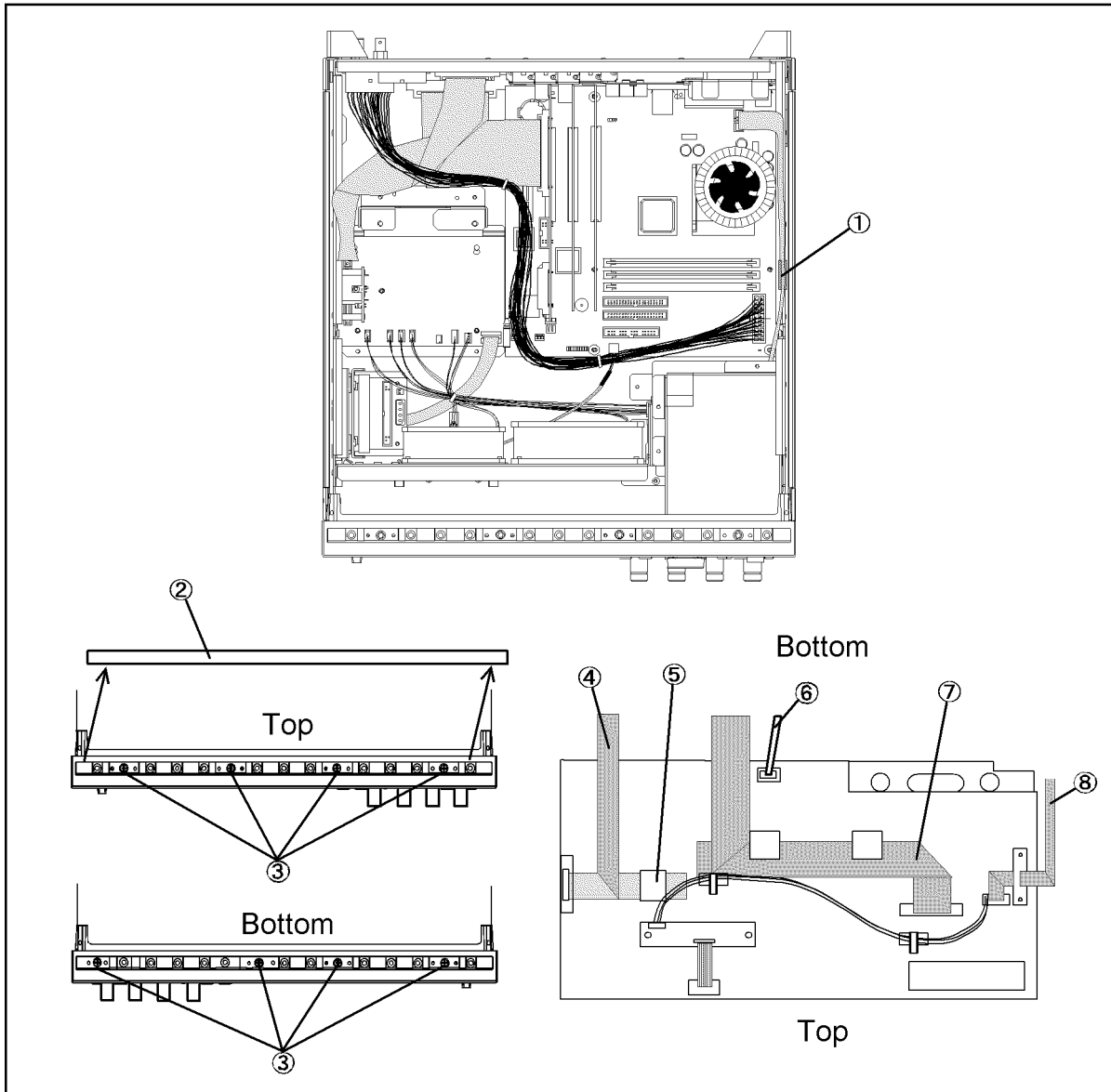
---

**NOTE**

Keep the mylar cable (item 4) connected.

Replacement Procedure  
Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below,  
E5071B : JP1KKxxxxx, MY42301396 and below

Figure 6-2 Front Panel Removal



e5070bse080

## Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454

### Tools required

- TORX screwdriver, T10, T15, and T20
- flat edge screwdriver

### Procedure

Refer to Figure 6-3 for this procedure.

**Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.

**Step 2.** Release the cable (item 8) from the cable clamp (item 1)

**Step 3.** Remove the top trim (item 2) using a flat edge driver.

**Step 4.** Remove the eight TORX T15 screws (item 3) fastening front panel.

**Step 5.** Gradually push the front panel assembly towards the outside.

**Step 6.** Release the mylar cable (item 4) from the cable clamp (item 5).

**Step 7.** Disconnect the three cables (item 6, 7 and 8) from the front panel.

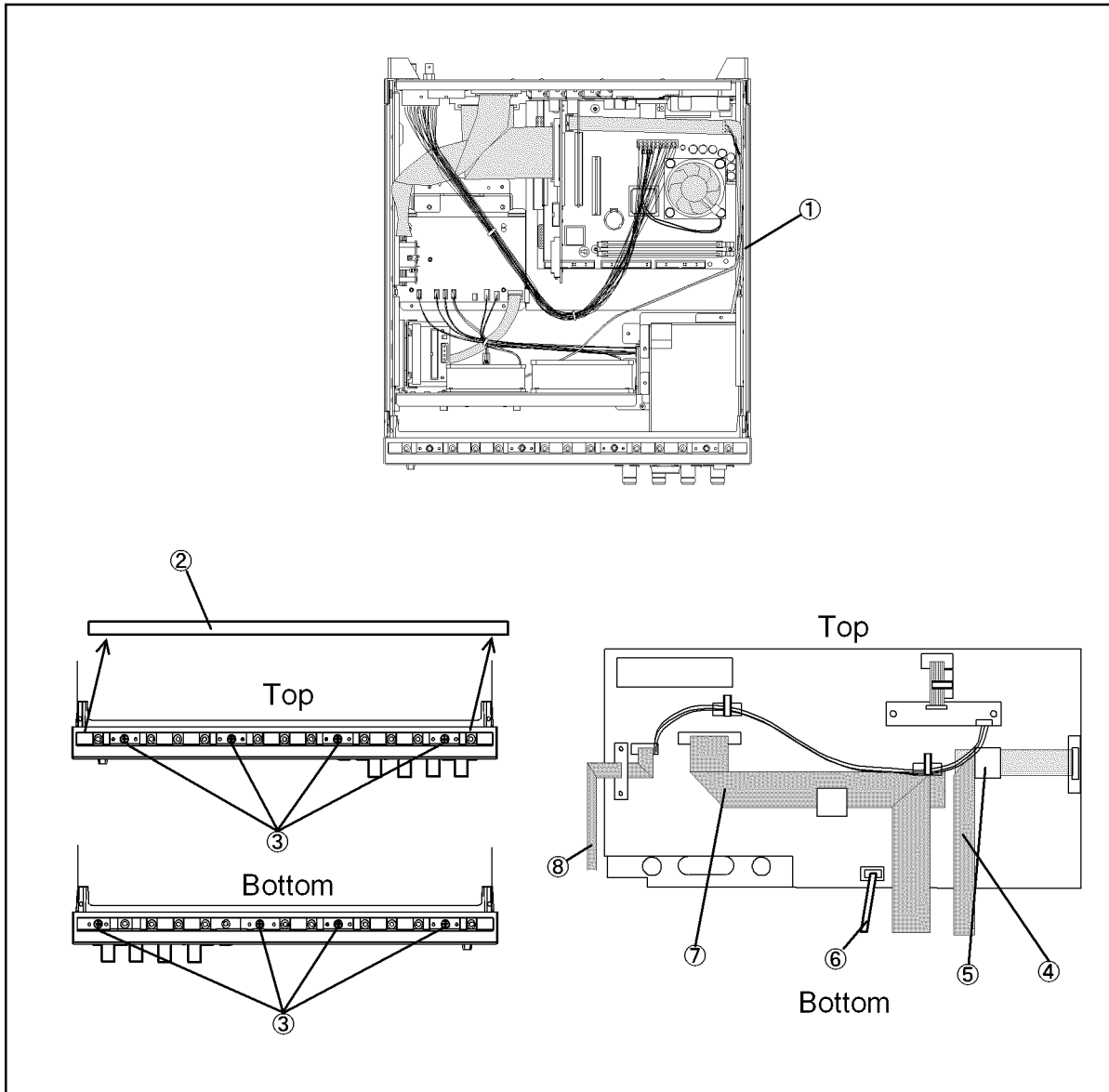
---

### NOTE

Keep the mylar cable (item 4) connected.

Replacement Procedure  
Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B :  
MY42301397 thru MY4232454

Figure 6-3 Front Panel Removal



e5070bse3020

## Front Panel Removal for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above

### Tools required

- TORX screwdriver, T10, T15, and T20
- flat edge screwdriver

### Procedure

Refer to Figure 6-4 for this procedure.

**Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.

**Step 2.** Release the cable (item 8) from the cable clamp (item 1)

**Step 3.** Remove the top trim (item 2) using a flat edge driver.

**Step 4.** Remove the eight TORX T15 screws (item 3) fastening front panel.

**Step 5.** Gradually push the front panel assembly towards the outside.

**Step 6.** Release the mylar cable (item 4) from the cable clamp (item 5).

**Step 7.** Disconnect the three cables (item 6, 7 and 8) from the front panel.

---

### NOTE

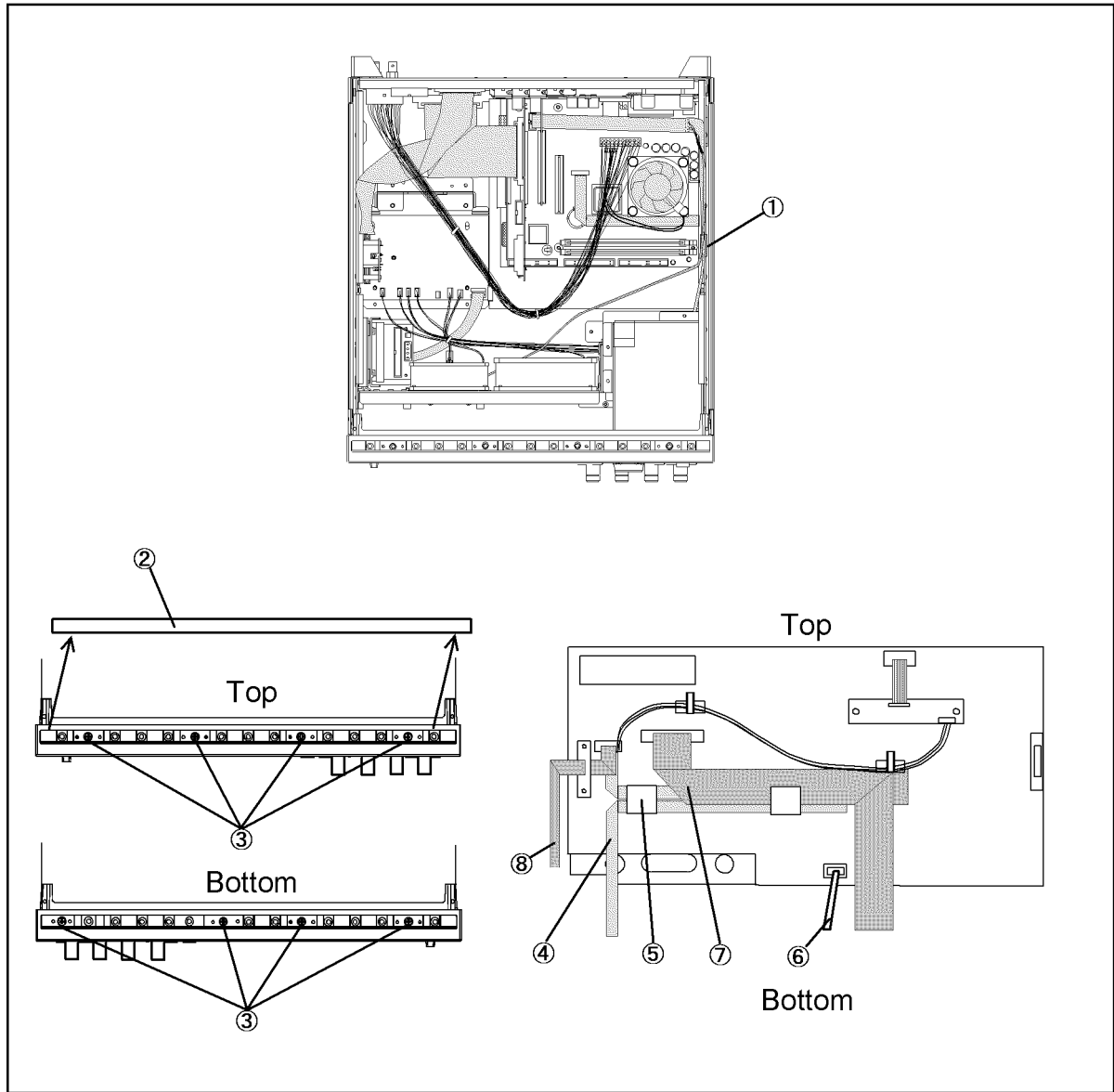
Keep the mylar cable (item 4) connected.

The mylar cable and its connector are very fragile. It's recommended that you should replace the mylar cable when the cable is disconnected and reconnected frequently.

---



Figure 6-4 Front Panel Removal



e5070bse5005

---

## **A27 Mass Storage Disk Drive Replacement**

### **Tools Required**

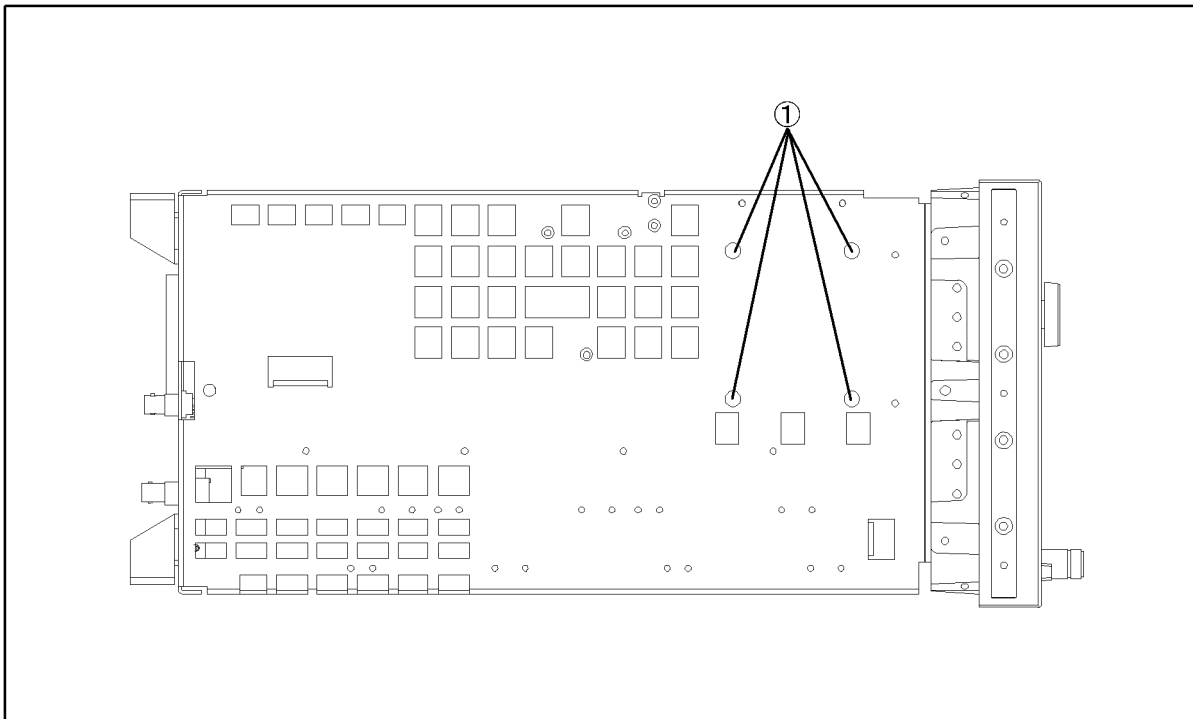
- TORX screwdriver, T10, T15, and T20

### **Removal Procedure**

Refer to Figure 6-5 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the four TORX T10 screws (item 1) fastening the A27 mass storage disk drive.
- Step 3.** Lift the mass storage disk drive.

**Figure 6-5**                    **A27 Mass Storage Disk Drive Removal**



e5070bse096

### **Replacement Procedure**

- Step 1.** Reverse the order of the removal procedure.
- Step 2.** Restore backup files onto the new mass storage disk drive as described in “Restore Backup Files onto the New Mass Storage Disk Drive” on page 391.
- Step 3.** Calibrate the touch screen as described in “Calibration of the Touch Screen” on page 391.

## Restore Backup Files onto the New Mass Storage Disk Drive

The Backup files is stored in the flash ROM on the analog interface board. The file must be restored in the new mass storage disk drive with the adjustment program. For detail of the adjustment program, refer to Chapter 3, “Adjustment,” on page 193.

- Step 1.** Run the adjustment program.
- Step 2.** Input the GPIB address of the E5070B/E5071B.
- Step 3.** Input the serial number of the E5070B/E5071B.
- Step 4.** Choose Spot Adjustment.
- Step 5.** Choose HDD.

## Calibration of the Touch Screen

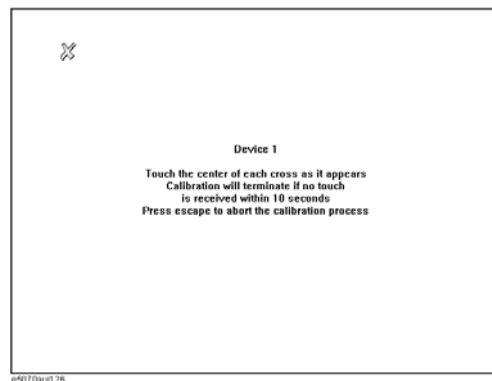
When you have replaced the HDD on a E5070B/E5071B equipped with an Option 016 touch screen, you have to calibrate the touch screen. Follow the procedure described below to calibrate the touch screen.

- Step 1.** Press **System**.
- Step 2.** Press **Service Menu**.
- Step 3.** Press **Test Menu**.
- Step 4.** Press **Adjust Touch Screen**.

The touch screen calibration screen (Figure 6-6) appears.

Figure 6-6

### Touch Panel Calibration Screen



- Step 5.** Touch the x mark on the upper left with your finger. The mark x appears also on the lower left, upper right, and lower right. Touch the x marks in that order with your finger.

Touching the four locations described above with your finger automatically concludes the touch screen calibration.

---

### NOTE

With no operation on the touch screen calibration screen for a preset time, it automatically closes and the previous measurement screen reappears.

## Removable Hard Disk Drive Replacement for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above

### Tools Required

- TORX screwdriver, T8, T10, T15, and T20

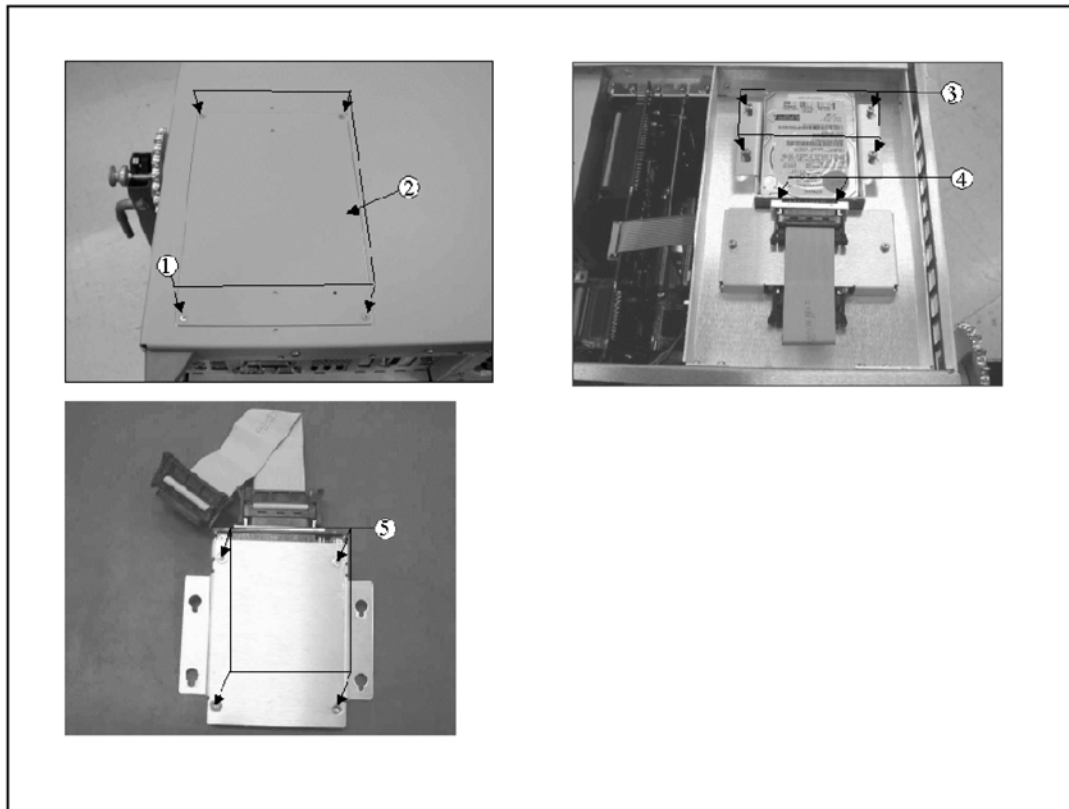
### Removal procedure

Refer to Figure 6-7 for this procedure.

- Step 1.** Remove the four TORX T10 screws (item 1), and remove the removable hard disk drive's lid (item 2).
- Step 2.** Remove the four TORX T10 screws (item 3) fastening the HDD bracket.
- Step 3.** Remove the two TORX T8 screws (item 4).
- Step 4.** Remove the four TORX T10 screws (item 5), and remove the HDD bracket.
- Step 5.** Remove the hard disk drive from the connector board.

Figure 6-7

### Removable Hard Disk Drive Removal



e5070bse4012

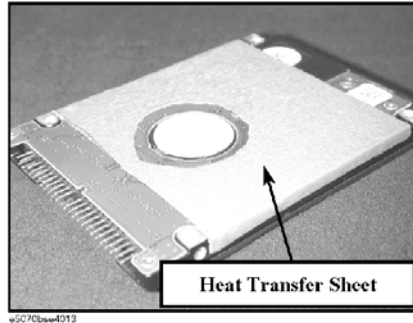
Replacement Procedure  
Removable Hard Disk Drive Replacement for E5070B S/N MY42401101 and  
above, for E5071B S/N MY42402455 and above

### Replacement Procedure

- Step 1.** Paste the heat transfer sheet to the hard disk drive rear side (Refer to Figure 6-8).

**Figure 6-8**

#### Heat Transfer Sheet



- Step 2.** Replace the removable hard disk drive by inverse procedure of removal.
- Step 3.** Restore backup files onto the new removable hard disk drive as described in “Restore Backup Files onto the New Removable Hard Disk Drive” on page 394.
- Step 4.** Calibrate the touch screen as described in “Calibration of the Touch Screen” on page 395.

## Replacement Procedure

### Removable Hard Disk Drive Replacement for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above

#### Restore Backup Files onto the New Removable Hard Disk Drive

The Backup files is stored in the flash ROM on the analog interface board. The file must be restored in the new removable hard disk drive with the adjustment program. For detail of the adjustment program, refer to Chapter 3, “Adjustment,” on page 193.

- Step 1.** Run the adjustment program.
- Step 2.** Input the GPIB address of the E5070B/E5071B.
- Step 3.** Input the serial number of the E5070B/E5071B.
- Step 4.** Choose Spot Adjustment.
- Step 5.** Choose HDD.

Replacement Procedure  
**Removable Hard Disk Drive Replacement for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above**

### Calibration of the Touch Screen

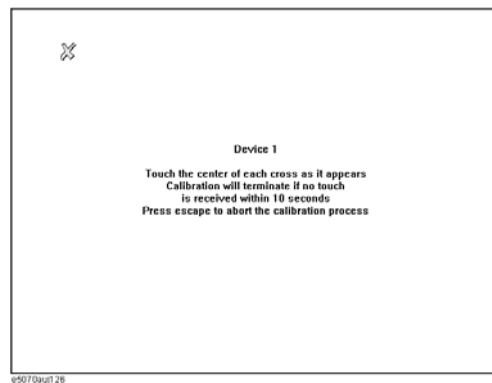
When you have replaced the HDD on a E5070B/E5071B equipped with an Option 016 touch screen, you have to calibrate the touch screen. Follow the procedure described below to calibrate the touch screen.

- Step 1.** Press **System**.
- Step 2.** Press **Service Menu**.
- Step 3.** Press **Test Menu**.
- Step 4.** Press **Adjust Touch Screen**.

The touch screen calibration screen (Figure 6-9) appears.

**Figure 6-9**

#### Touch Panel Calibration Screen



- Step 5.** Touch the x mark on the upper left with your finger. The mark x appears also on the lower left, upper right, and lower right. Touch the x marks in that order with your finger.

Touching the four locations described above with your finger automatically concludes the touch screen calibration.

---

**NOTE**

With no operation on the touch screen calibration screen for a preset time, it automatically closes and the previous measurement screen reappears.

## Removable Hard Disk Assembly Removal for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above

### Tools Required

- TORX screwdriver, T10, T15, and T20

### Removal procedure

Refer to Figure 6-10 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the TORX T10 screw (item 1).
- Step 3.** Remove the four TORX T10 screws (item 2) fastening the angle.
- Step 4.** Lift the angle with the removable hard disk assembly.

---

**CAUTION**

Lift the angle with the removable hard disk assembly slowly to prevent tension from cables.

---

- Step 5.** Remove three TORX T10 screws (item 3) and remove the removable hard disk assembly from the angle.
- Step 6.** Disconnect the cable (item 4) connected to the power supply.
- Step 7.** Disconnect the cable (item 5) connected to the crystal oven board.
- Step 8.** Disconnect the flat cable (item 6) connected to the mother board.

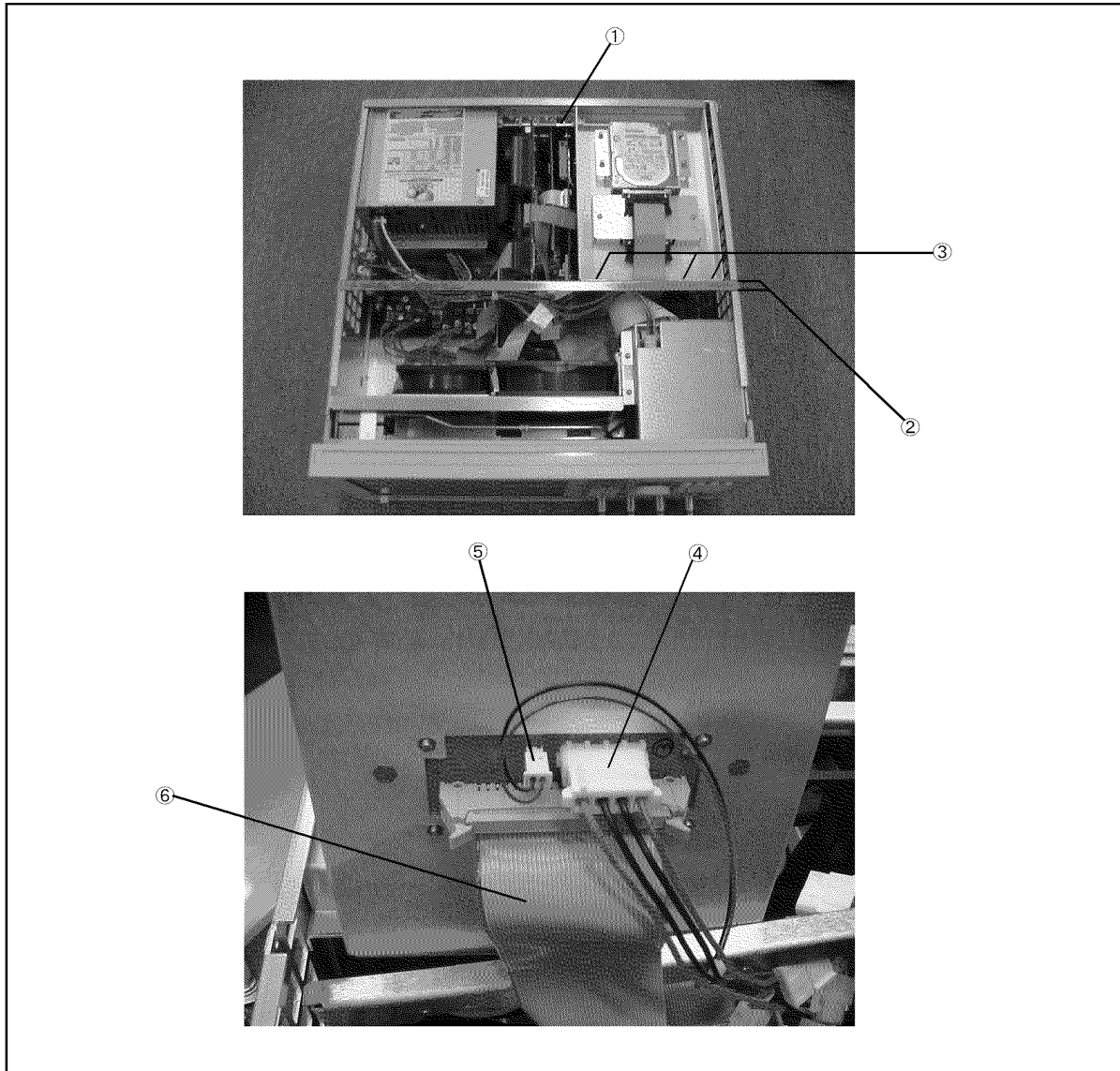
### Replacement Procedure

- Step 1.** Replace the removable hard disk assembly by inverse procedure of removal.



Replacement Procedure  
Removable Hard Disk Assembly Removal for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above

Figure 6-10 Removable Hard Disk Assembly Removal



e5070bse4007

## **A28 FDD (Floppy Disk Drive) Replacement**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20

### **Removal procedure**

Refer to Figure 6-11 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the clamp (item 1) from the angle.
- Step 3.** Disconnect the cable (item 2) connected from the power supply.
- Step 4.** Remove three TORX T10 screws (item 3).
- Step 5.** Slide the A28 FDD assembly backward.

---

**CAUTION**

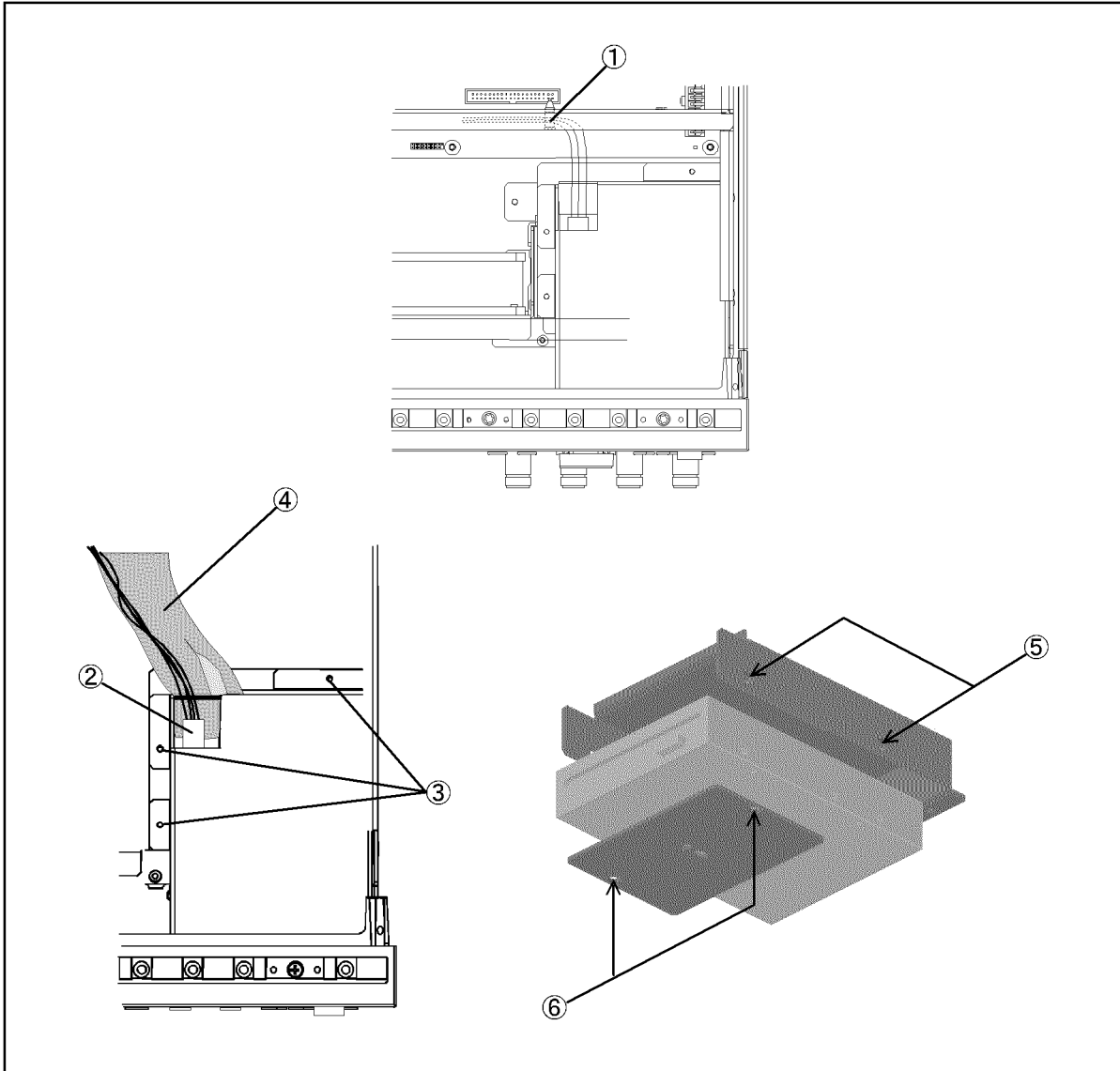
Slide the assembly slowly to prevent tension from cables

- Step 6.** Disconnect the flat cable (item 4) from the FDD.
- Step 7.** Remove the four TORX T10 screws (item 5) fastening the FDD to the mount.
- Step 8.** Remove the two TORX T10 screws (item 6) fastening the plate.

### **Replacement Procedure**

- Step 1.** Fasten the plate to the new FDD, and then fasten it to the mount as shown in Figure 6-11.
- Step 2.** Replace the FDD assembly by inverse procedure of removal.

Figure 6-11 A28 FDD Removal



e5070bse081

## A50 ATX Power Supply Assembly Replacement

### Tools Required

- TORX screwdriver, T10, T15, and T20
- torque screwdriver, TORX T10 (set to 7 in-lb)

### Removal Procedure

Refer to Figure 6-12 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the removable hard disk assembly as described in “Removable Hard Disk Assembly Removal for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above” on page 396.

---

**NOTE**

If it is a version where the E5070B/71B doesn't have the removable hard disk assembly, skip this step.

- Step 3.** Release the cables from the clamp (item 1) on the angle.
- Step 4.** Disconnect the power supply cables (item 2 and 3).
- Step 5.** Remove the two TORX T15 screws (item 4) fastening the power supply holder.
- Step 6.** Remove the four TORX T10 screws (item 5) from the rear panel.
- Step 7.** Lift the A50 ATX power supply assembly toward front side.
- Step 8.** Disconnect the power supply cables (item 6).

### Replacement Procedure

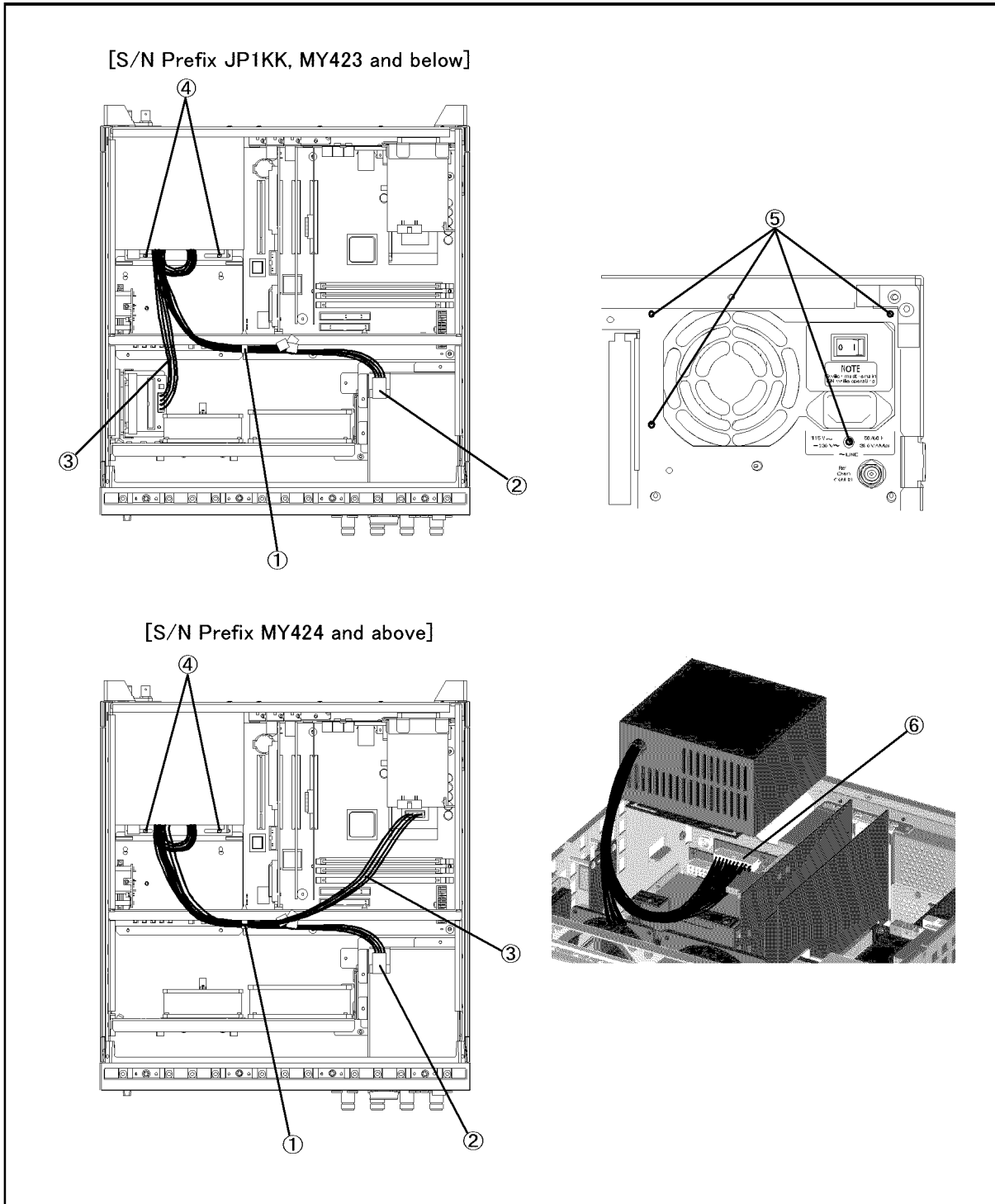
- Step 1.** Replace the A50 ATX power supply assembly by inverse procedure of removal.

---

**NOTE**

Fasten the TORX T10 screws (item 5) using a torque screwdriver.

Figure 6-12 A50 ATX Power Supply Assembly Removal



e5070bse4008

## A23 Handler I/O Board Replacement

### Tools Required

- TORX screwdriver, T10, T15, and T20

### Removal Procedure

Refer to Figure 6-13 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the removable hard disk assembly as described in “Removable Hard Disk Assembly Removal for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above” on page 396.

---

**NOTE**

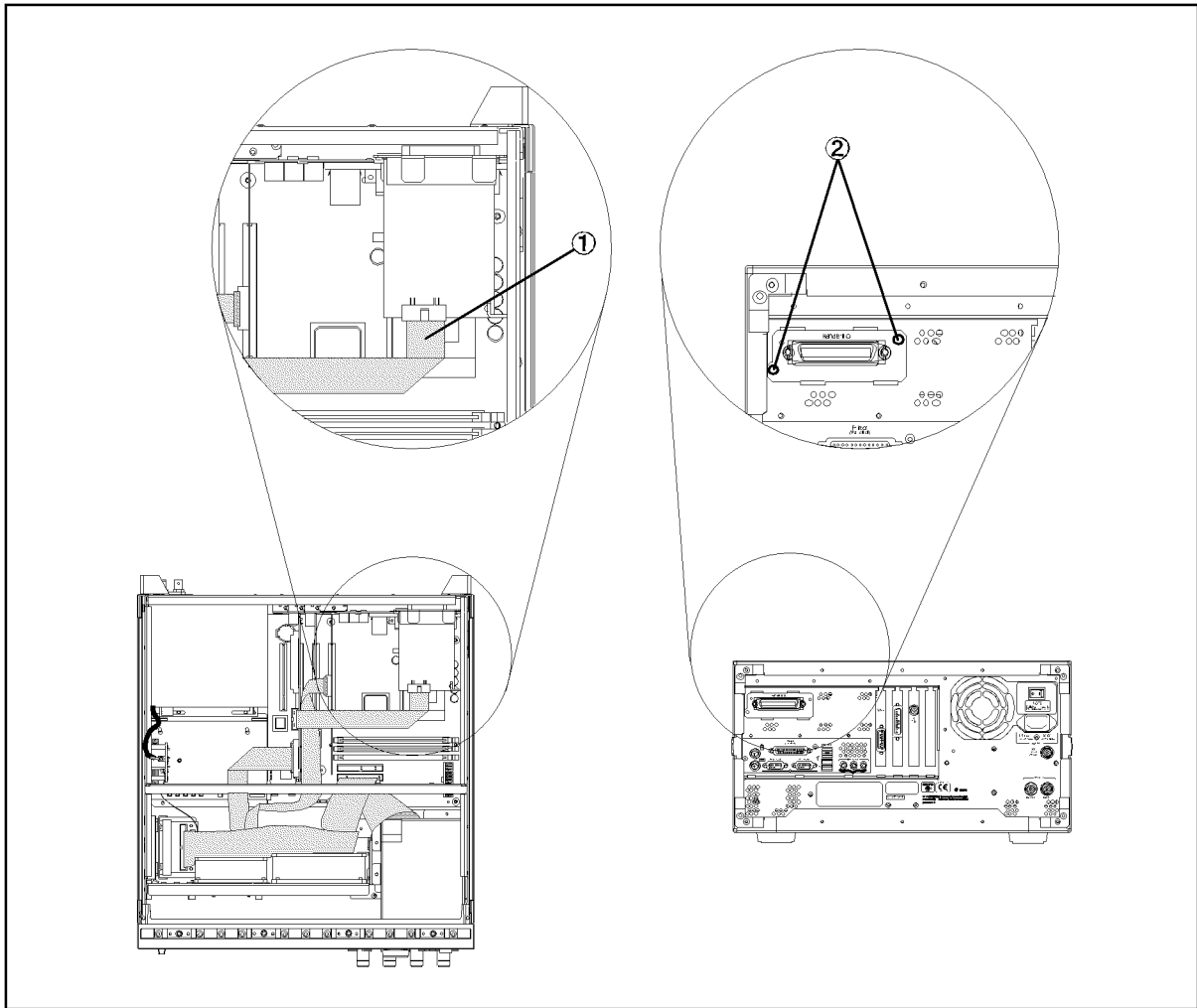
If it is a version where the E5070B/71B doesn't have the removable hard disk assembly, skip this step.

- Step 3.** Disconnect the flat cable (item 1) from the A23 handler I/O board.
- Step 4.** Remove the two TORX T10 screws (item 2) fastening the A23 handler I/O board.
- Step 5.** Slide the A23 handler I/O board toward backward.

### Replacement Procedure

- Step 1.** Replace the A23 handler I/O board by inverse procedure of removal.

Figure 6-13 A23 Handler I/O Board Removal



e5070bse082

## **DIMM Module Replacement for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**

There are two DIMM256MB memory module on the A20 digital motherboard.

---

### **NOTE**

It cannot replace only DIMMs, when an E5070B serial number is after MY42300633, or when an E5071B serial number is after MY42301397. It is necessary to replace an A20 digital motherboard.

---

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Cutting plier or scissors

### **Removal Procedure**

**Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.

**Step 2.** Remove the removable hard disk assembly as described in “Removable Hard Disk Assembly Removal for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above” on page 396.

---

### **NOTE**

If it is a version where the E5070B/71B doesn't have the removable hard disk assembly, skip this step.

---

**Step 3.** Remove the A26 LCD Interface as described in “A26 LCD Interface Card Replacement for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below” on page 444.

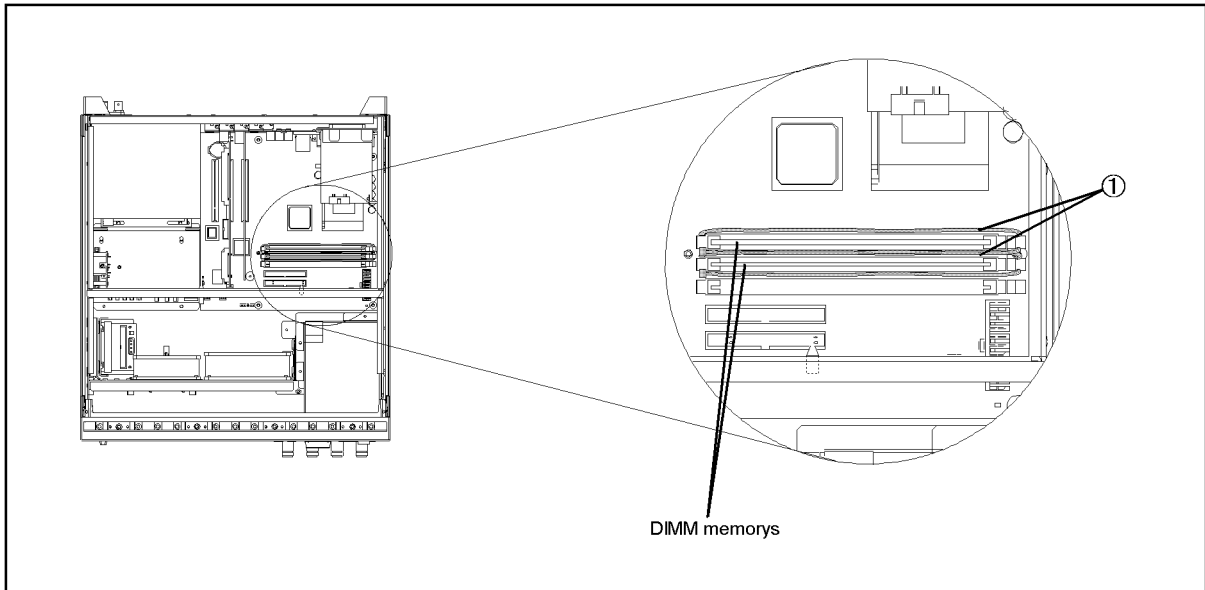
**Step 4.** Cut the cable tie (item 1).

**Step 5.** Unlatch the two clips and remove the DIMM memory.



Replacement Procedure  
DIMM Module Replacement for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below

Figure 6-14 DIMM Module Removal



e5070bse085

### Replacement Procedure

- Step 1.** Install the DIMM memory in the socket and latch the clips.
- Step 2.** Clamp the two clips using the new cable tie as shown in Figure 6-14.
- Step 3.** Replace the DIMM memory by inverse procedure of removal.

## **A20 Digital Motherboard Replacement for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Cutting plier or scissors

### **Removal Procedure**

Refer to Figure 6-15 for this procedure.

- Step 1.** Remove the mouse, the external keyboard and the parallel printer cable if they are connected to the rear panel.
- Step 2.** Remove the outer cover as described in “Outer Cover Removal” on page 382
- Step 3.** Remove the removable hard disk assembly as described in “Removable Hard Disk Assembly Removal for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above” on page 396.

---

#### **NOTE**

If it is a version where the E5070B/71B doesn't have the removable hard disk assembly, skip this step.

- Step 4.** Remove the following assemblies.
- A50 ATX Power Supply Assembly (refer to “A50 ATX Power Supply Assembly Replacement” on page 400.)
  - A23 Handler I/O board (refer to “A23 Handler I/O Board Replacement” on page 402.)
  - A21 Analog Interface board (refer to “A21 Analog Interface Board Replacement” on page 440.)
  - A24 GPIB board (refer to “A24 GPIB Card Replacement” on page 442.)
  - A26 LCD Interface Card (refer to “A26 LCD Interface Card Replacement for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below” on page 444.)
- Step 5.** Disconnect the following cables.
- Connected to the Front Panel (item 1).
  - Connected from the A10 Analog Mother Board (item 2).
  - Connected from the A28 FDD (item 3).
  - Connected from the mass storage disk assembly, or the removable hard disk assembly (item 4).
  - Connected to the A32 USB connector (item 5).
- Step 6.** Remove three TORX T10 screws (item 6) fastening the guide plate.
- Step 7.** Remove eight TORX T10 screws (item 7) fastening the digital motherboard.
- Step 8.** Lift the digital motherboard.

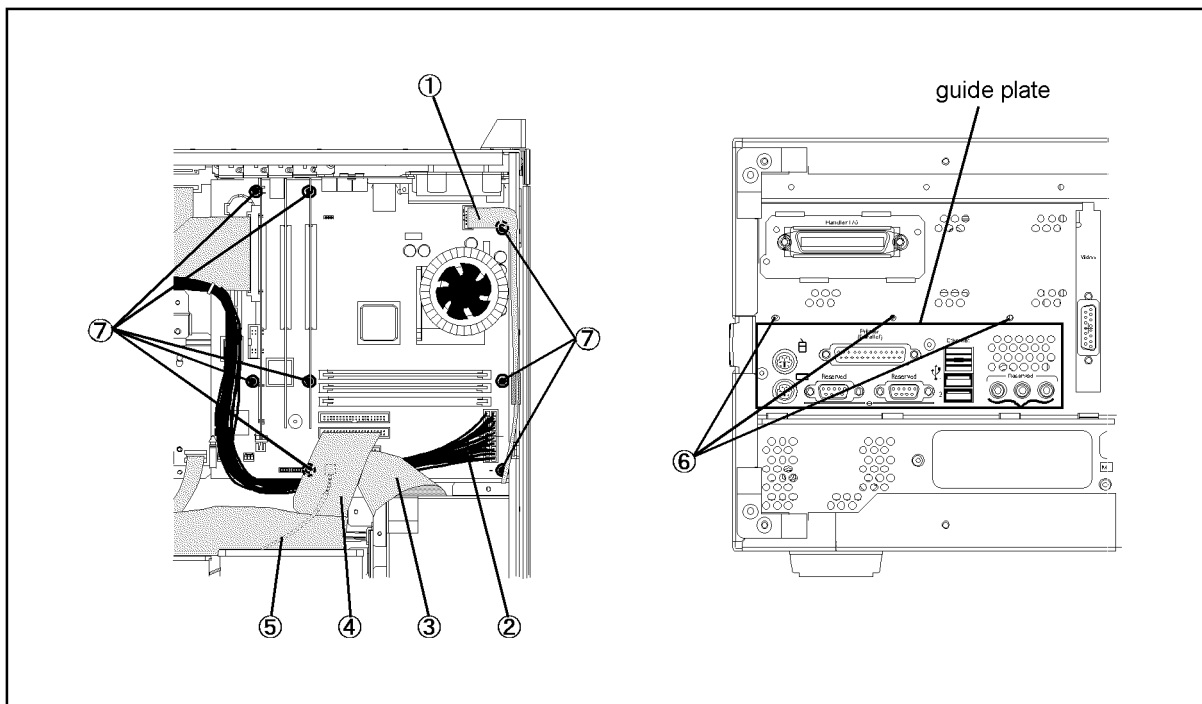
Replacement Procedure

**A20 Digital Motherboard Replacement for E5070B : JP1KKxxxxx,  
MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**

### Replacement Procedure

- Step 1.** Remove the replaceable parts on the old board.
- a. Remove the DIMM modules as described in “DIMM Module Replacement for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 404.
  - b. Disassemble the guide plate from rear side of the motherboard.
- Step 2.** Assemble the removed parts on the new board.
- Step 3.** Install the new board by the reverse procedure of removal.

**Figure 6-15**      **A20 Digital Motherboard Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**



e5070bse086

## **A20 Digital Motherboard Replacement for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Cutting plier or scissors

### **Removal Procedure**

Refer to Figure 6-16 for this procedure.

- Step 1.** Remove the mouse, the external keyboard and the parallel printer cable if they are connected to the rear panel.
- Step 2.** Remove the outer cover as described in “Outer Cover Removal” on page 382
- Step 3.** Remove the removable hard disk assembly as described in “Removable Hard Disk Assembly Removal for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above” on page 396.

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#### **NOTE**

If it is a version where the E5070B/71B doesn't have the removable hard disk assembly, skip this step.

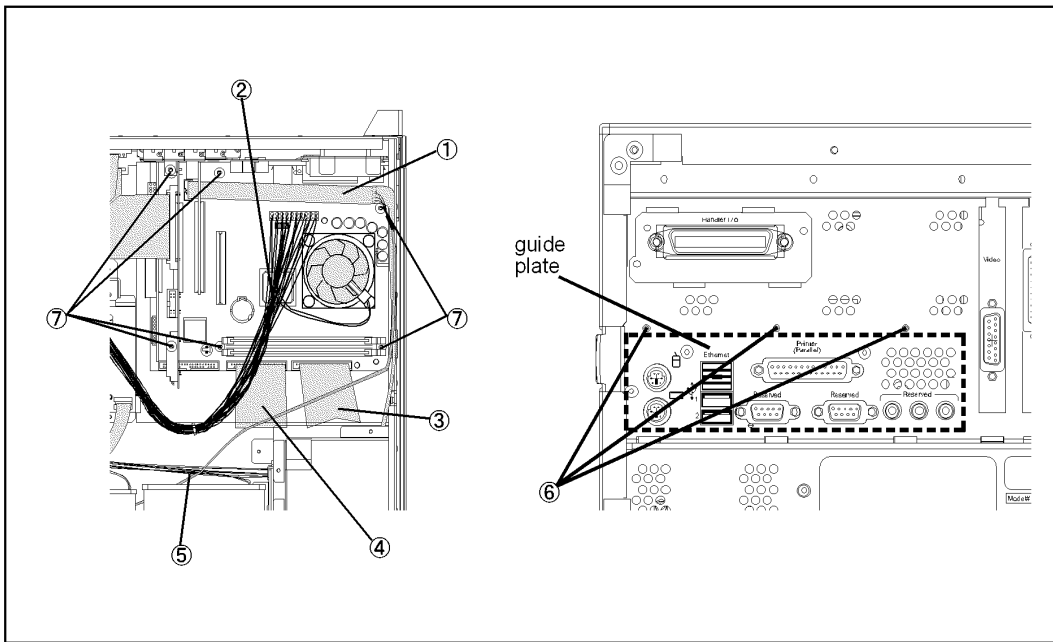
- Step 4.** Remove the following assemblies.
- A50 ATX Power Supply Assembly (refer to “A50 ATX Power Supply Assembly Replacement” on page 400.)
  - A23 Handler I/O board (refer to “A23 Handler I/O Board Replacement” on page 402.)
  - A21 Analog Interface board (refer to “A21 Analog Interface Board Replacement” on page 440.)
  - A24 GPIB board (refer to “A24 GPIB Card Replacement” on page 442.)
  - A26 LCD Interface Card (refer to “A26 LCD Interface Card Replacement for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below” on page 444.)
- Step 5.** Disconnect the following cables.
- Connected to the Front Panel (item 1).
  - Connected from the A10 Analog Mother Board (item 2).
  - Connected from the A28 FDD (item 3).
  - Connected from the mass storage disk assembly, or the removable hard disk assembly (item 4).
  - Connected to the A32 USB connector (item 5).
- Step 6.** Remove three TORX T10 screws (item 6) fastening the guide plate.
- Step 7.** Remove eight TORX T10 screws (item 7) fastening the digital motherboard.
- Step 8.** Lift the digital motherboard.

Replacement Procedure  
A20 Digital Motherboard Replacement for E5070B : MY42300633 thru  
MY4231100, E5071B : MY42301397 thru MY4232454

### Replacement Procedure

- Step 1.** Disassemble the guide plate from rear side of the mother board.
- Step 2.** Assemble the removed part on the new board.
- Step 3.** Clamp the two clips using the new cable tie for DIMM memories.
- Step 4.** Install the new board by the reverse procedure of removal.

**Figure 6-16** A20 Digital Motherboard Removal for E5070B : MY42300633 and above, E5071B : MY42301397 and above



e5070bse3016

## **A20 Digital Motherboard Replacement for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Cutting plier or scissors

### **Removal Procedure**

Refer to Figure 6-17 for this procedure.

- Step 1.** Remove the mouse, the external keyboard and the parallel printer cable if they are connected to the rear panel.
- Step 2.** Remove the outer cover as described in “Outer Cover Removal” on page 382
- Step 3.** Remove the removable hard disk assembly as described in “Removable Hard Disk Assembly Removal for E5070B S/N MY42401101 and above, for E5071B S/N MY42402455 and above” on page 396.

---

#### **NOTE**

If it is a version where the E5070B/71B doesn't have the removable hard disk assembly, skip this step.

- Step 4.** Remove the following assemblies.
- A50 ATX Power Supply Assembly (refer to “A50 ATX Power Supply Assembly Replacement” on page 400.)
  - A23 Handler I/O board (refer to “A23 Handler I/O Board Replacement” on page 402.)
  - A21 Analog Interface board (refer to “A21 Analog Interface Board Replacement” on page 440.)
  - A24 GPIB board (refer to “A24 GPIB Card Replacement” on page 442.)
  - A26 LCD Interface Card (refer to “A26 LCD Interface Card Replacement for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below” on page 444.)
- Step 5.** Disconnect the following cables.
- Connected to the Front Panel (item 1).
  - Connected from the A10 Analog Mother Board (item 2).
  - Connected from the A28 FDD (item 3).
  - Connected from the mass storage disk assembly, or the removable hard disk assembly (item 4).
  - Connected to the A32 USB connector (item 5).
  - Connected to the Front Panel (display)(item 6).

---

#### **NOTE**

The mylar cable (item 6) and its connector are very fragile. It's recommended to replace the mylar cable when the cable is disconnected and connected frequently.

Replacement Procedure

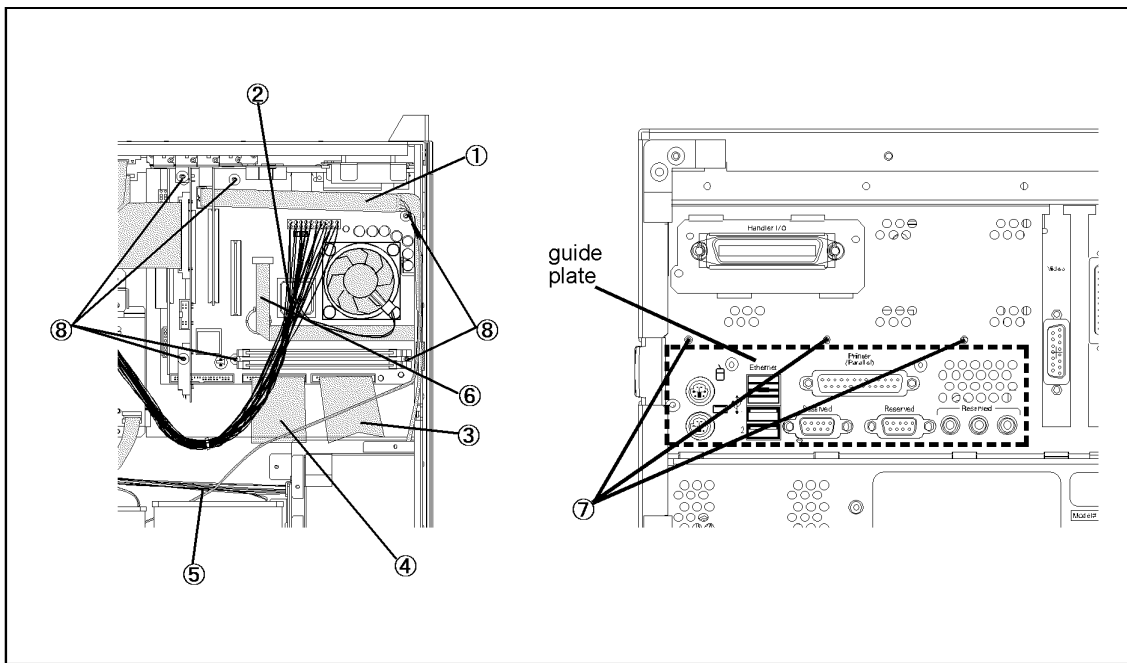
**A20 Digital Motherboard Replacement for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above**

- Step 6.** Remove three TORX T10 screws (item 7) fastening the guide plate.
- Step 7.** Remove eight TORX T10 screws (item 8) fastening the digital motherboard.
- Step 8.** Lift the digital motherboard.

### Replacement Procedure

- Step 1.** Disassemble the guide plate from rear side of the mother board.
- Step 2.** Assemble the removed part on the new board.
- Step 3.** Clamp the two clips using the new cable tie for DIMM memories.
- Step 4.** Install the new board by the reverse procedure of removal.

**Figure 6-17**                      **A20 Digital Motherboard Removal**



---

## A1 Source Board Replacement

### Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Box wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch (set to 10 in-lb) (for reconnecting SMA connector)

### Removal Procedure

Refer to Figure 6-18 for this procedure.

- Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 2.** Remove the two 5/8 inch nuts (item 1) fastening the BNC connector on the rear panel.
- Step 3.** Disconnect the all semi-rigid cables and the termination connected to the board referring to the figures as shown in Table 6-2.

---

**NOTE**

The label on the semi-rigid cable shows the last two digits of the part number.

**Table 6-2**

### Reference Figure

Option	Figure
213	Figure 5-20 on page 327
214	Figure 5-21 on page 328 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-28 on page 341 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
313	Figure 5-22 on page 330
314	Figure 5-23 on page 332 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-29 on page 342 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
413	Figure 5-24 on page 334
414	Figure 5-25 on page 336 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-30 on page 344 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above

- Step 4.** Remove the two TORX T10 screws fastening the extractor. (item 2)



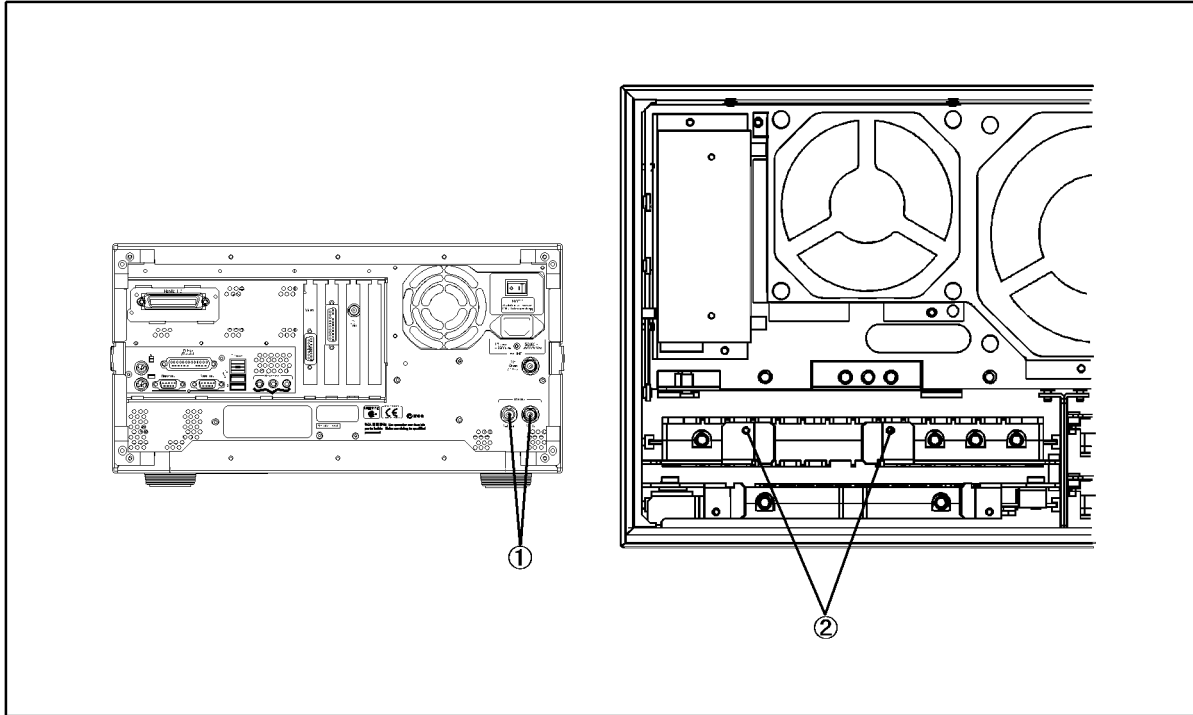
**Step 5.** Slide the A1 source board using the extractor.

### Replacement Procedure

**Step 1.** Replace the A1 source board by inverse procedure of removal.

**NOTE** Fasten the semi rigid cable using a torque wrench for replacement.

**Figure 6-18** A1 Source Board Removal



e5070bse102

## A2 Receiver Board Replacement

### Tools Required

- TORX screwdriver, T10
- Flat edge screwdriver
- Open-end torque wrench, 9/16 inch
- Open-end torque wrench, 5/16 inch (set to 10 in-lb) (for reconnecting SMA connector)

### Removal Procedure

Refer to Figure 6-19 for this procedure.

- Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 2.** Remove the N-connector holder as described in “N Connector Replacement” on page 462.
- Step 3.** Disconnect the semi-rigid cables and the termination from the receiver module as shown in Table 6-3.

#### NOTE

The label on the semi-rigid cable shows the last two digits of the part number.

**Table 6-3**

#### Reference Figure

Option	Figure
213	Figure 5-20 on page 327
214	Figure 5-21 on page 328 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-28 on page 341 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
313	Figure 5-22 on page 330
314	Figure 5-23 on page 332 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-29 on page 342 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
413	Figure 5-24 on page 334
414	Figure 5-25 on page 336 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-30 on page 344 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above

- Step 4.** Remove the all TORX T10 screws fastening the extractor . (item 1)

**Step 5.** Slide the receiver module using the extractor.

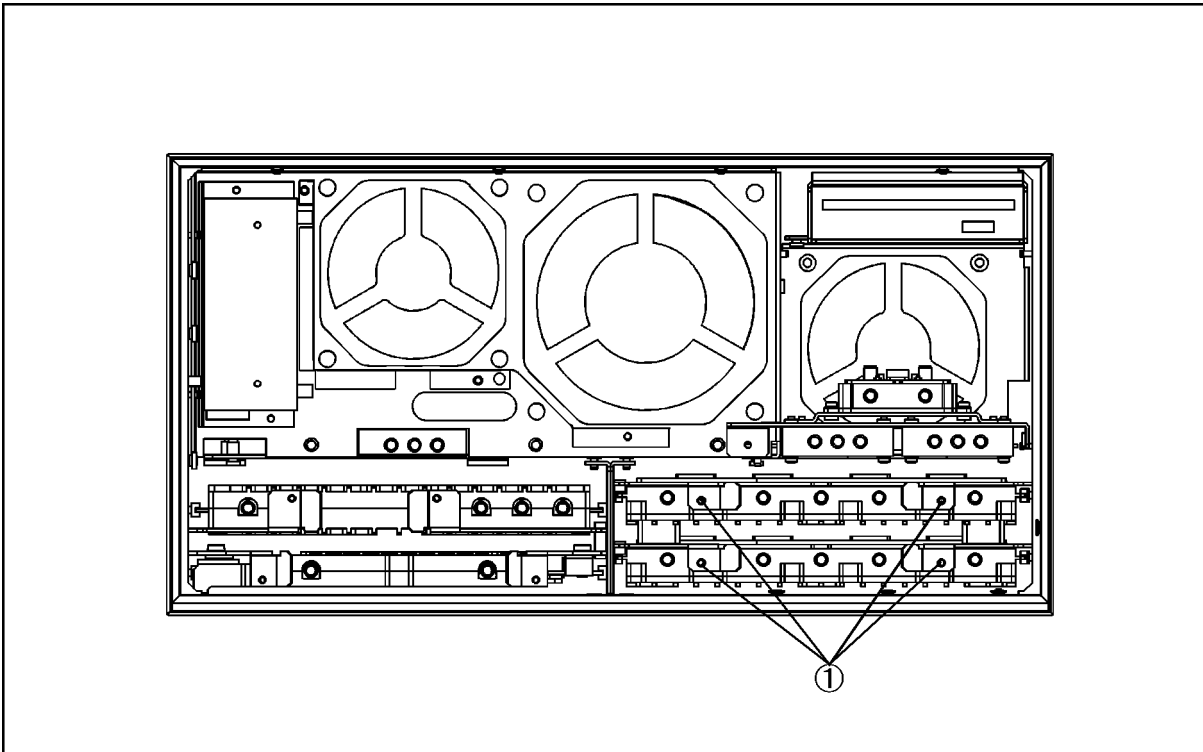
**NOTE** Slide the two board at once if two A2 receiver boards are slotted.

### Replacement Procedure

**Step 1.** Replace the A2 receiver boards by inverse procedure of removal.

**NOTE** Fasten the semi rigid cable using a torque wrench for replacement.

**Figure 6-19** A2 Receiver Removal



e5070bse103

Replacement Procedure  
**A2 Receiver Board Replacement**

**Module Disassemble Procedure**

Skip this procedure if the option 213 or 214 is installed.

Refer to Figure 6-20 for this procedure.

**Step 1.** Remove the eight TORX T10 screws (item 1) fastening the A2 receiver boards.

**Step 2.** Separate the two A2 receiver boards.

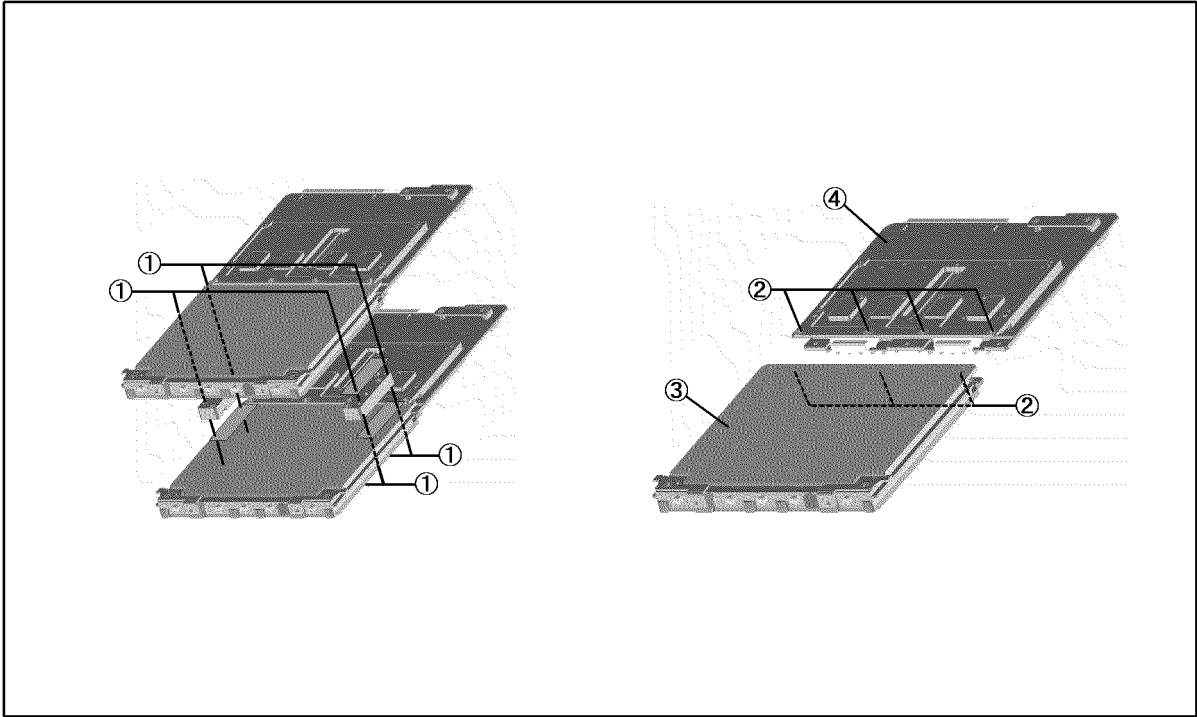
**Board Disassemble Procedure**

Refer to Figure 6-20 for this procedure.

**Step 1.** Remove the seven TORX T15 screws (item 2) fastening the A15 Receiver-RF board (item 3) and the A17 Receiver-IF board (item 4).

**Step 2.** Separate the two boards.

Figure 6-20 Receiver Disassemble



e5070bse104

---

## A3 Level Vernier Replacement

### Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch (set to 10 in-lb) (for reconnecting SMA connector)

### Removal Procedure

Refer to Figure 6-21 for this procedure.

- Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 2.** Disconnect the all semi-rigid cables and the termination connected to the boards referring to the figures as shown in Table 6-4.

---

#### NOTE

The label on the semi-rigid cable shows the last two digits of the part number.

**Table 6-4**

#### Reference Figure

Option	Figure
213	Figure 5-20 on page 327
214	Figure 5-21 on page 328 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-28 on page 341 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
313	Figure 5-22 on page 330
314	Figure 5-23 on page 332 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-29 on page 342 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
413	Figure 5-24 on page 334
414	Figure 5-25 on page 336 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-30 on page 344 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above

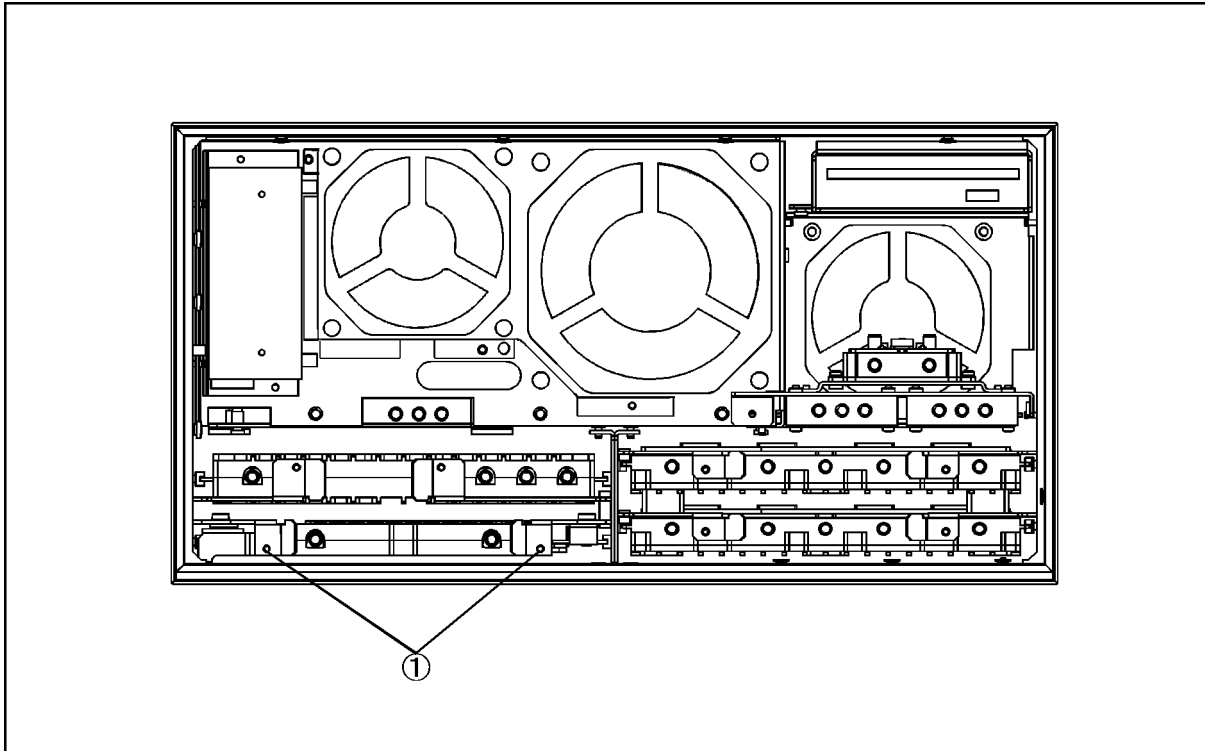
- Step 3.** Remove the two TORX T10 screws fastening the extractor. (item 2)
- Step 4.** Slide the A3 level vernier using the extractor.

## Replacement Procedure

**Step 1.** Replace the A3 level vernier by inverse procedure of removal.

**NOTE** Fasten the semi rigid cable using a torque wrench for replacement.

**Figure 6-21** A3 Level Vernier Removal



e5070bse105

## **B1 Fan & A6 Switch Control Board Replacement**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20

### **Removal Procedure**

Refer to Figure 6-22 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the power supply as described in “A50 ATX Power Supply Assembly Replacement” on page 400.
- Step 3.** Disconnect the all cables from the board.
- Step 4.** Remove two TORX T10 screws (item 1) fastening the board.
- Step 5.** Remove the board.

### **Replacement Procedure**

- Step 1.** Replace the B1 fan & switch control board by inverse procedure of removal.

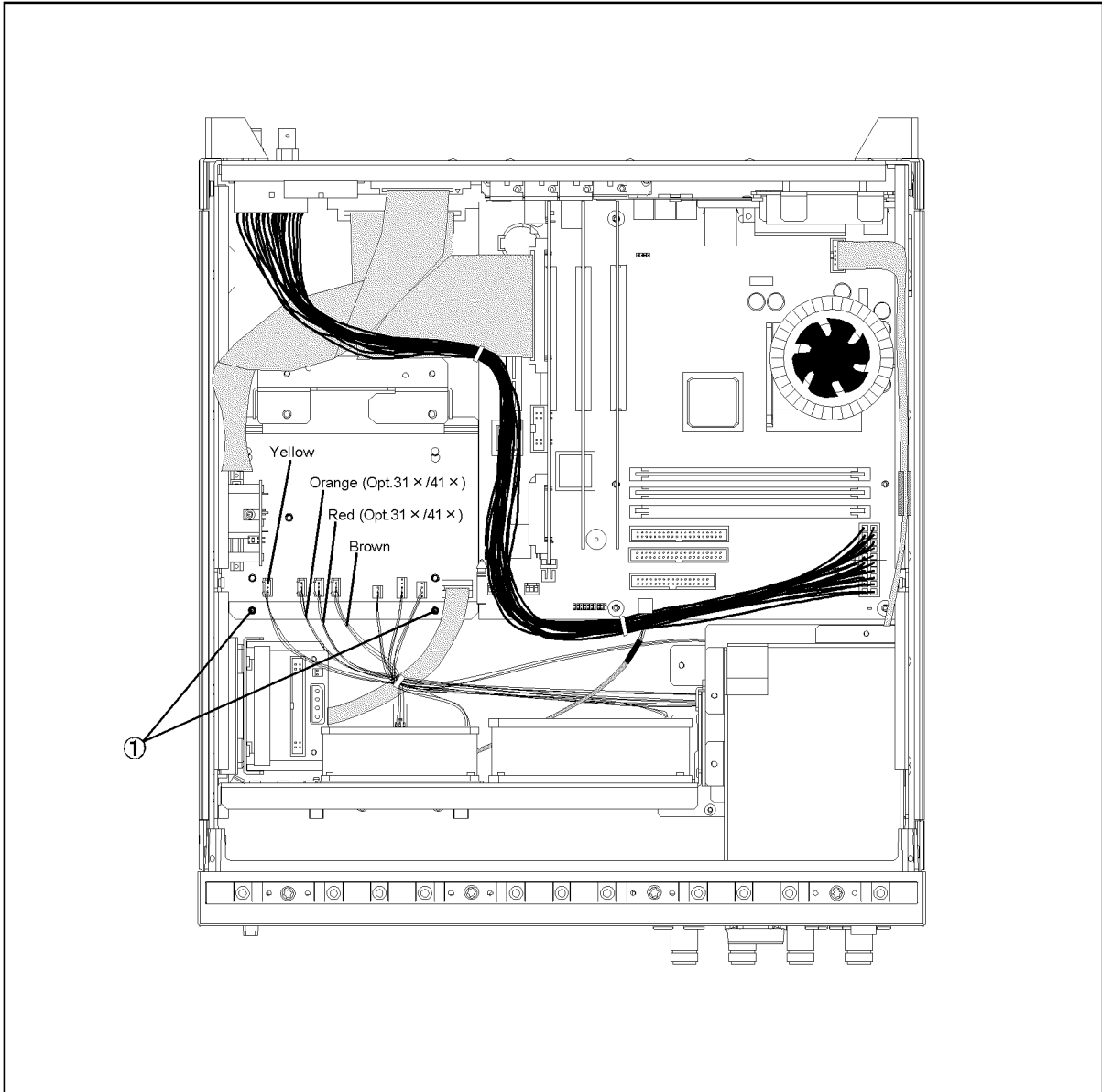
---

**NOTE**

Connect the cables as Figure 6-22.



Figure 6-22 B1 Fan & A6 Switch Control Board Removal

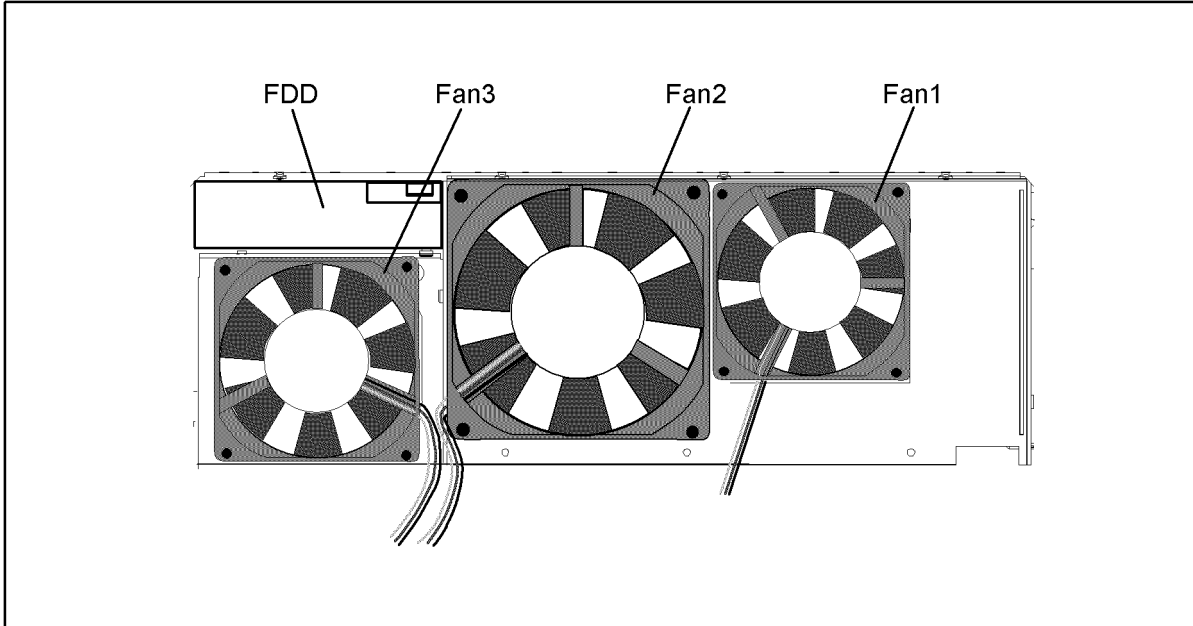


e5070bse090

## B1 Fan Replacement

There are three fans as shown in Figure 6-23.

**Figure 6-23** The location and direction of the fan 1, fan 2, and fan 3



e5070bse091

## Fan 1 and 2

### Tools Required

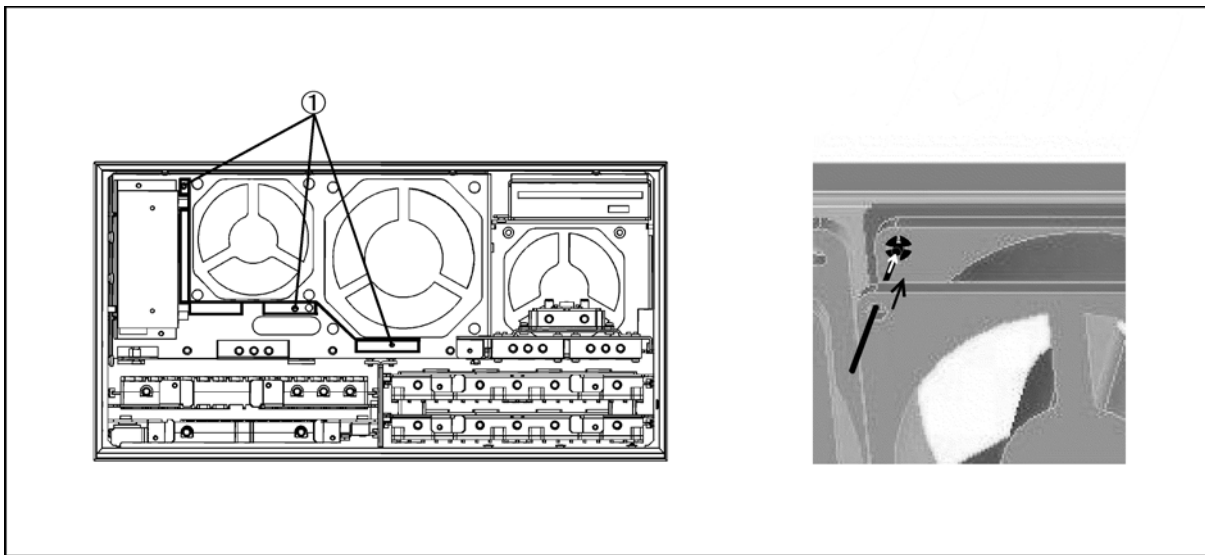
- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- A fine stick such as Hex key, 1.5 mm

### Removal Procedure

Refer to Figure 6-24 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 3.** Remove the three TORX T10 screws (item 1) fastening the fan plate.
- Step 4.** Disconnect the fan cable from the fan & switch control board.
- Step 5.** Remove parts and cables which may block operation.
- Step 6.** Remove the eight rivet (plastic) fastening the fan as shown in Figure 6-24.

**Figure 6-24** Fan 1 and 2 Removal



e5070bse092

### Replacement Procedure

- Step 1.** Replace the fan by inverse procedure of removal.

#### NOTE

Fasten the fan in the direction as shown in Figure 6-23.

Replacement Procedure  
**B1 Fan Replacement**

**Fan 3**

**Tools Required**

- TORX screwdriver, T10, T15, and T20

**Removal Procedure**

Refer to Figure 6-25 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Disconnect the fan cable from the fan & switch control board.
- Step 3.** Remove parts and cables which may block operation.
- Step 4.** Remove the three TORX T10 screws (item 1) fastening the fan assembly.
- Step 5.** Slide the fan assembly as shown in Figure 6-25
- Step 6.** Remove the four TORX T20 screws (item 2) fastening the fan.

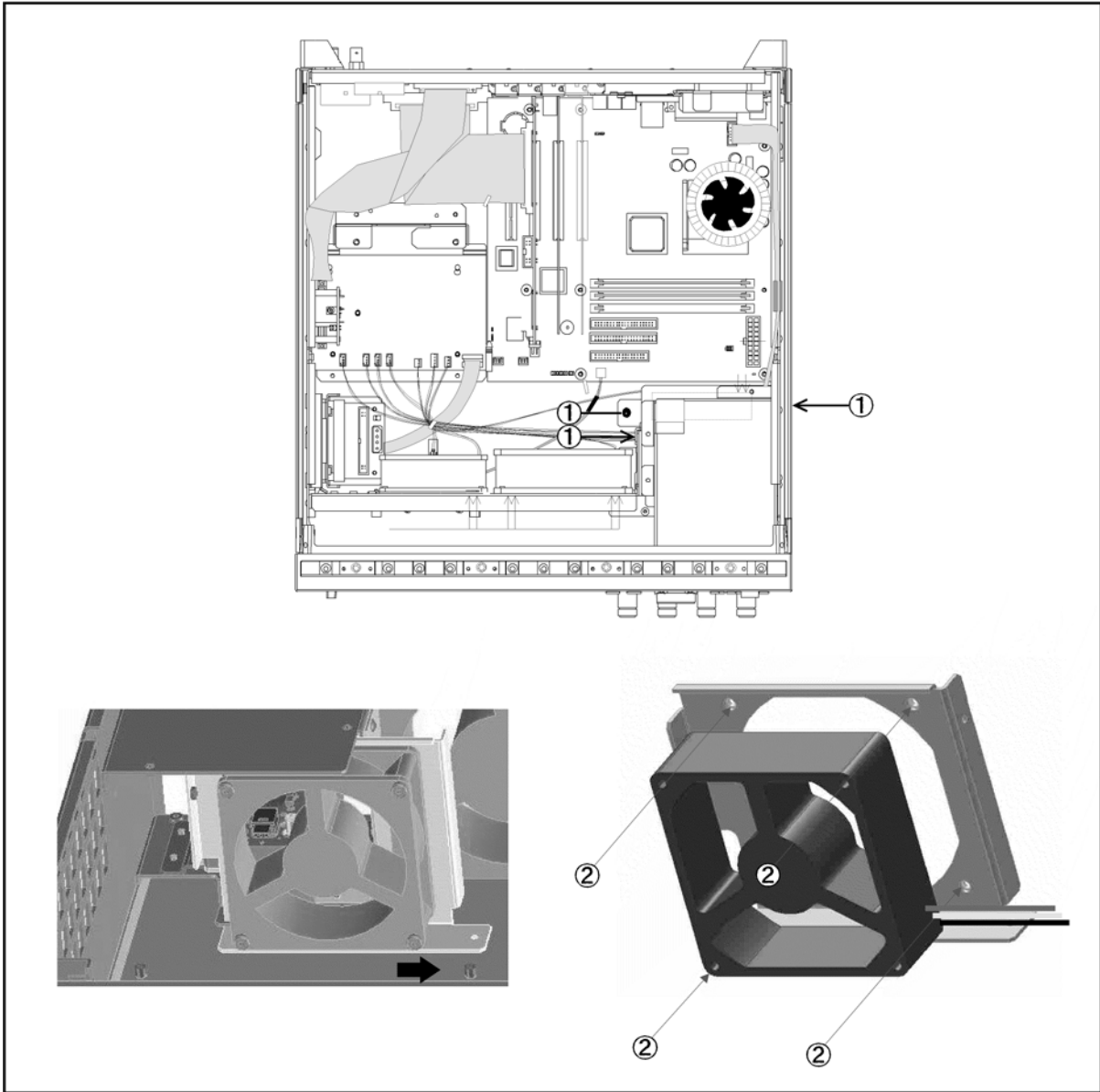
**Replacement Procedure**

- Step 1.** Fasten the new fan to the fan assembly.
- Step 2.** Replace the fan assembly by inverse procedure of removal.

---

**NOTE** Fasten the fan in the direction as shown in Figure 6-23.

Figure 6-25 Fan 3 Removal



e5070bse093

## **A7 Source Step Attenuator Replacement for E5070B S/N prefix JP1KK or MY421, E5071B S/N prefix JP1KK or MY421 (Option 214, 314 and 414)**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end torque wrench, 5/16 inch (set to 10 in-lb) (for reconnecting SMA connector)

### **Removal Procedure**

Refer to Figure 6-26 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 3.** Remove the three TORX T10 screws (item 1) fastening the fan plate.
- Step 4.** Disconnect the semi-rigid cables (item 2 and 3) from the A7 source step attenuator.

---

**NOTE**

The label on the semi-rigid cable shows the last two digits of the part number.

- Step 5.** Disconnect the flat cable (item 4) from the attenuator.
- Step 6.** Remove the two TORX T10 screws (item 5) fastening the A7 source step attenuator holder from the front side.
- Step 7.** Remove the two TORX T10 screws (item 6) fastening the A7 source step attenuator to the holder.

### **Replacement Procedure**

- Step 1.** Fasten the new source step attenuator to the holder as shown in Figure 6-26.
- Step 2.** Replace the A7 source step attenuator holder by inverse procedure of removal.

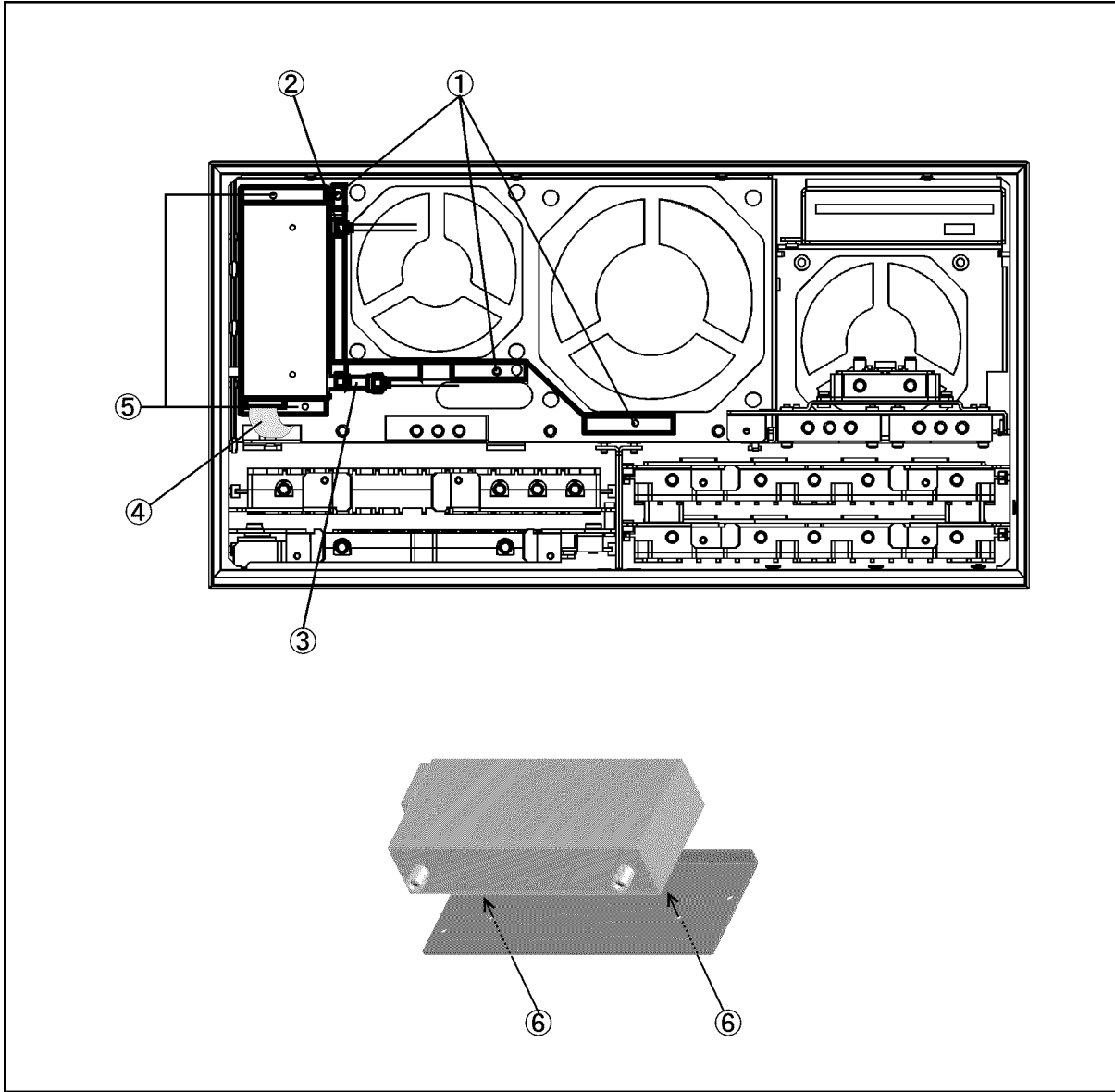
---

**NOTE**

Fasten the semi rigid cable using a torque wrench for replacement.

Replacement Procedure  
A7 Source Step Attenuator Replacement for E5070B S/N prefix JP1KK or MY421, E5071B S/N prefix JP1KK or MY421 (Option 214, 314 and 414)

Figure 6-26 A7 Source Step Attenuator Removal



e5070bse3019

## **A7 Source Step Attenuator Replacement for E5070B S/N prefix MY422 and above, E5071B S/N prefix MY422 and above (Option 214, 314 and 414)**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end torque wrench, 5/16 inch (set to 10 in-lb) (for reconnecting SMA connector)

### **Removal Procedure**

Refer to Figure 6-27 for Opt.214, and Figure 6-28 for Opt.314, or 414 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 3.** Remove the three TORX T10 screws (item 1) fastening the fan plate.
- Step 4.** Disconnect the semi-rigid cables (item 2 and 3) from the A7 source step attenuator.

---

**NOTE** The label on the semi-rigid cable shows the last two digits of the part number.

- Step 5.** Disconnect the flat cable (item 4) from the attenuator.
- Step 6.** Remove the two TORX T10 screws (item 5) fastening the A7 source step attenuator holder from the front side.
- Step 7.** Remove the two TORX T10 screws (item 6) fastening the A7 source step attenuator to the holder.

### **Replacement Procedure**

- Step 1.** Fasten the new source step attenuator to the holder as shown in Figure 6-27 or Figure 6-28.
- Step 2.** Replace the A7 source step attenuator holder by inverse procedure of removal.

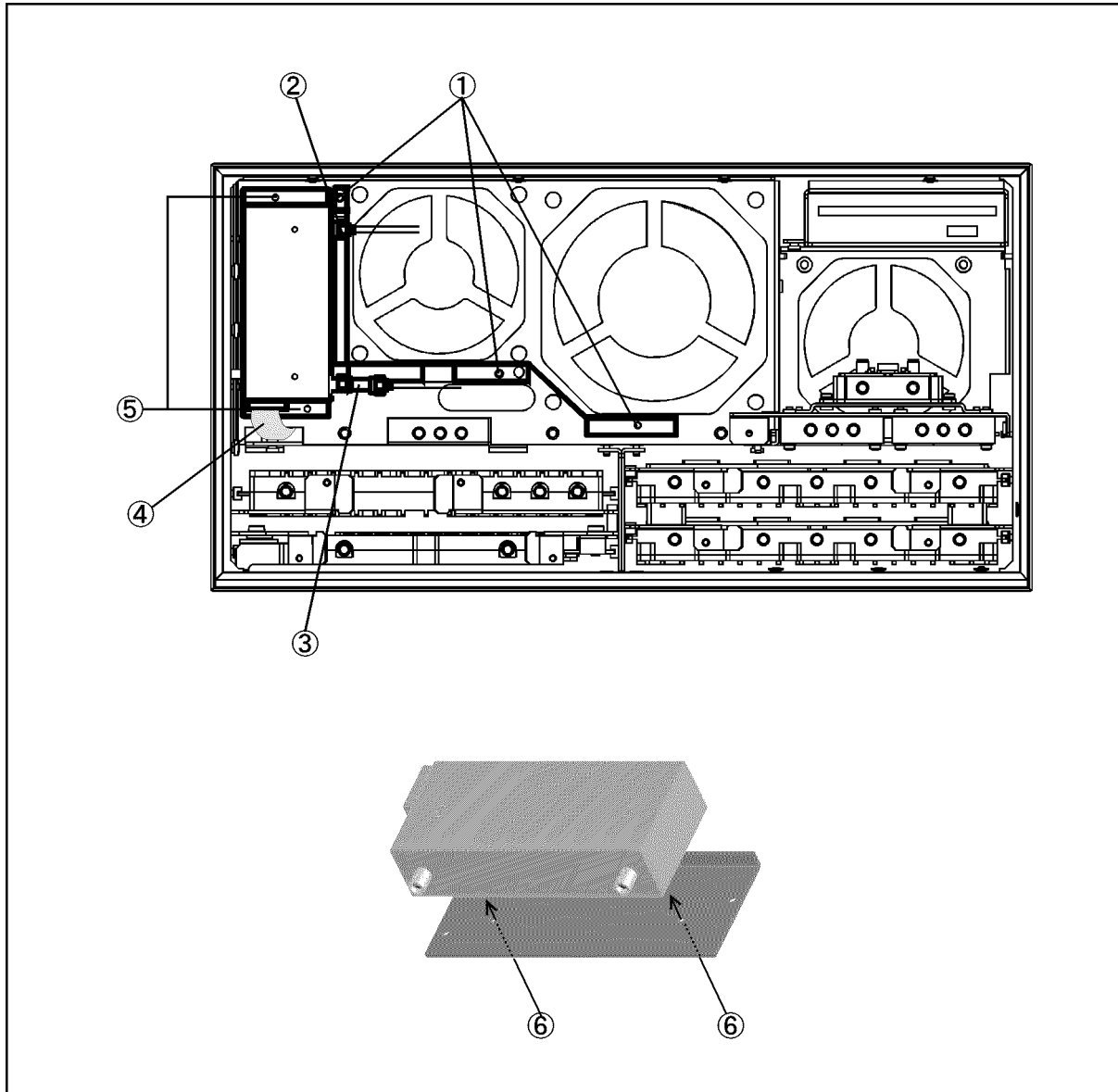
---

**NOTE** Fasten the semi rigid cable using a torque wrench for replacement.



Replacement Procedure  
A7 Source Step Attenuator Replacement for E5070B S/N prefix MY422 and above, E5071B S/N prefix MY422 and above (Option 214, 314 and 414)

Figure 6-27 A7 Source Step Attenuator Removal for Opt.214



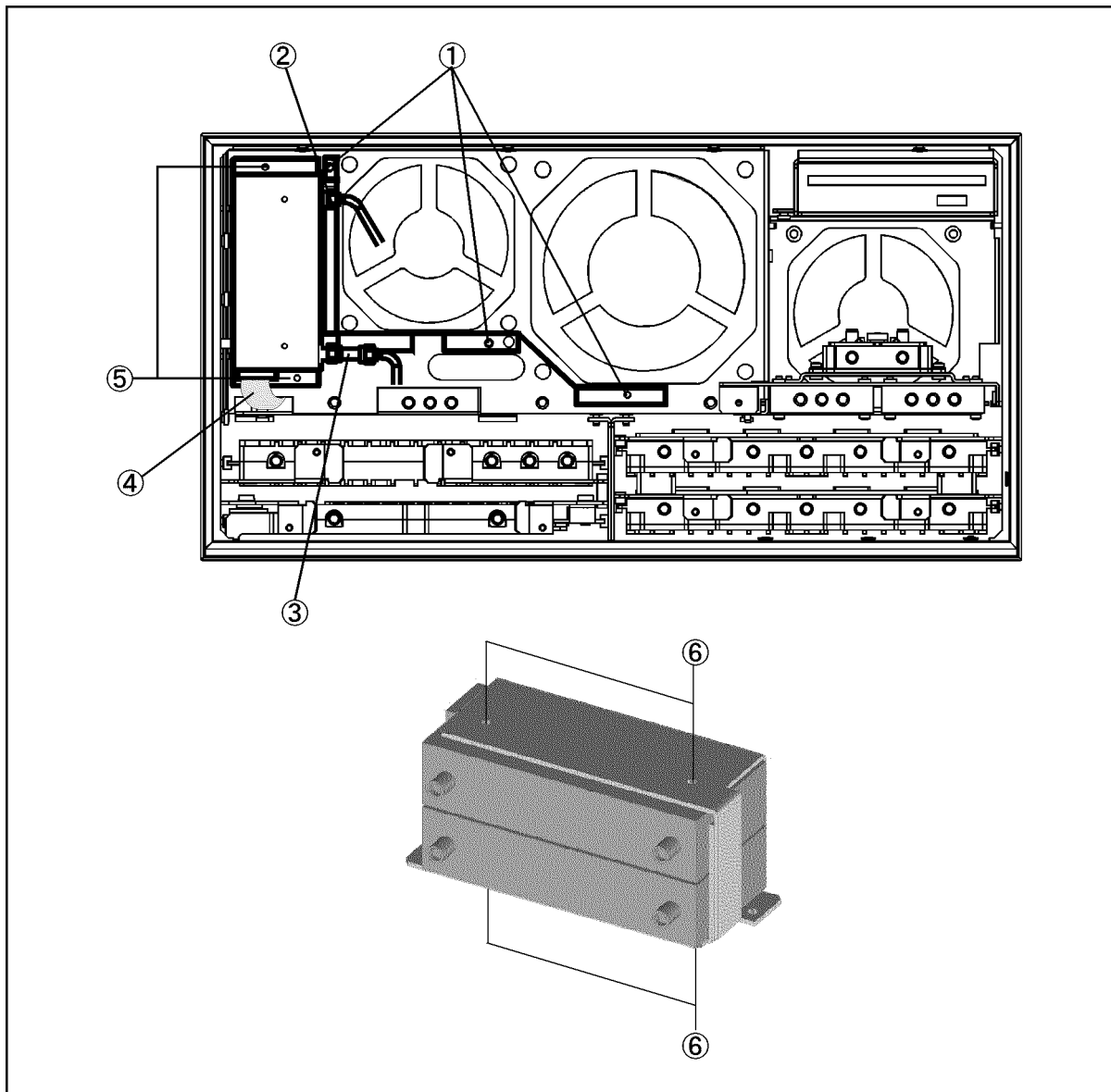
e5070bse3019

Replacement Procedure

**A7 Source Step Attenuator Replacement for E5070B S/N prefix MY422 and above, E5071B S/N prefix MY422 and above (Option 214, 314 and 414)**

Figure 6-28

**A7 Source Step Attenuator Removal for Opt.314, or 414**



e5070bse3018

---

## A8 RF Switch Replacement

### Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end torque wrench, 5/16 inch (set to 10 in-lb) (for reconnecting SMA connector)

### A8 RF Switch (source board side)

#### Removal Procedure

Refer to Figure 6-29 for this procedure.

- Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 2.** Remove the three TORX T10 screws (item 1) fastening the fan plate.
- Step 3.** Disconnect the all semi-rigid cables from the switch on the left side. (refer to the figure as shown in Table 6-5)

---

#### NOTE

The label on the semi-rigid cable shows the last two digits of the part number.

**Table 6-5**

**Reference Figure**

<b>Option</b>	<b>Figure</b>
213	Figure 5-20 on page 327
214	Figure 5-21 on page 328 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-28 on page 341 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
313	Figure 5-22 on page 330
314	Figure 5-23 on page 332 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-29 on page 342 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
413	Figure 5-24 on page 334
414	Figure 5-25 on page 336 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-30 on page 344 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above

**Step 4.** Disconnect the semi-rigid cables (item 1 and 2 in Figure 6-27) from the A7 source step attenuator if the option 214, 314 or 414 is installed.

**Step 5.** Disconnect the switch cable from the switch.

**Step 6.** Remove the two TORX T10 screws fastening the switch. (item 2)

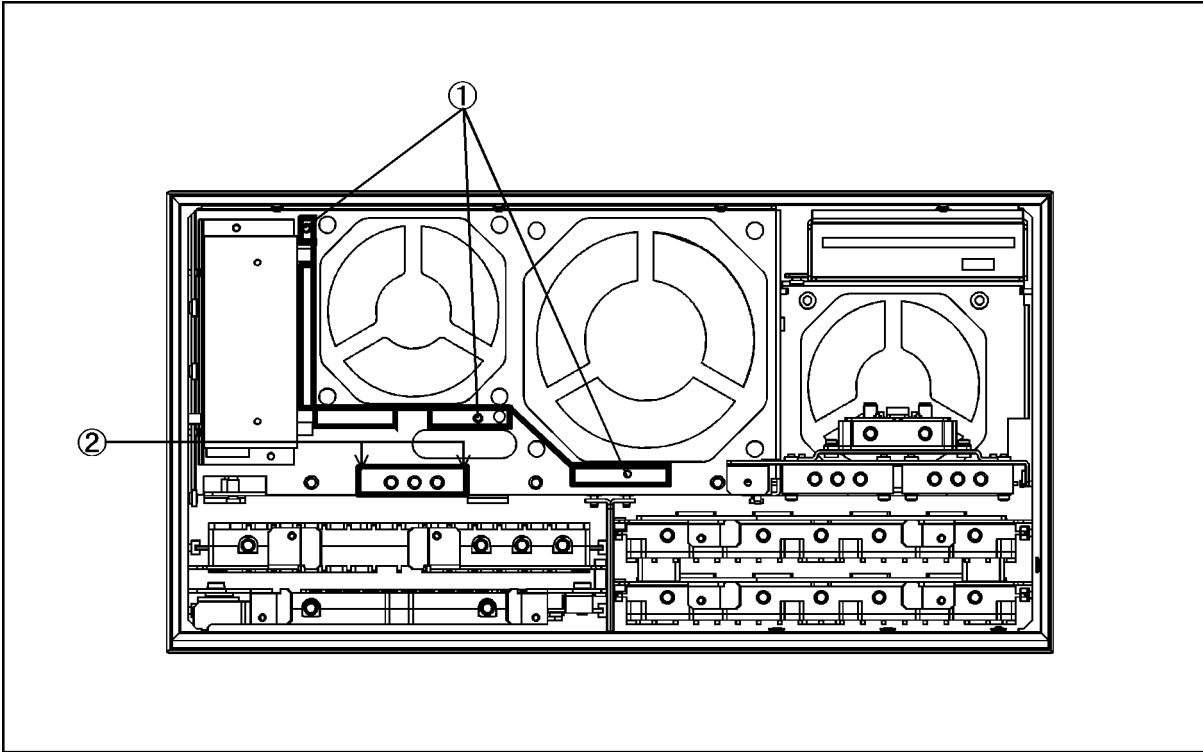
**Replacement Procedure**

**Step 1.** Replace the switch by inverse procedure of removal.

**NOTE**

Fasten the semi-rigid cable using a torque wrench for replacement.

Figure 6-29 A8 RF Switch (source board side) Replacement



e5070bse094

## A8 RF Switch (receiver board side)

### Removal Procedure

Refer to Figure 6-30 for this procedure.

- Step 1.** Remove the A4 power amp. module assembly.
- a. Remove the outer cover as described in “Outer Cover Removal” on page 382.
  - b. Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384.
  - c. Remove the floppy disk drive as described in “A28 FDD (Floppy Disk Drive) Replacement” on page 398.
  - d. Remove the three TORX T10 screws (item 1 in Figure 6-29) fastening the fan plate.
  - e. Release the cables from the cable clamp (item 1).
  - f. Disconnect the all semi-rigid cables from the switches on the left side and the A4 power amp. module. (refer to the figure as shown in Table 6-5 on page 432)

---

**NOTE**

The label on the semi-rigid cable shows the last two digits of the part number.

- g. Remove the two TORX T10 screws (item 2) fastening the A4 power amp. module assembly.
- h. Release the cables from the cable clamp (item 3).
- i. Disconnect the cables from the switches and the A4 power amp. module.

- Step 2.** Remove the TORX T10 screws (item 4) fastening the switches.

### Replacement Procedure

- Step 1.** Fasten the new switches to the A4 power amp. module assembly as shown in Figure 6-30.

- Step 2.** Replace the assembly by inverse procedure of removal.

---

**NOTE**

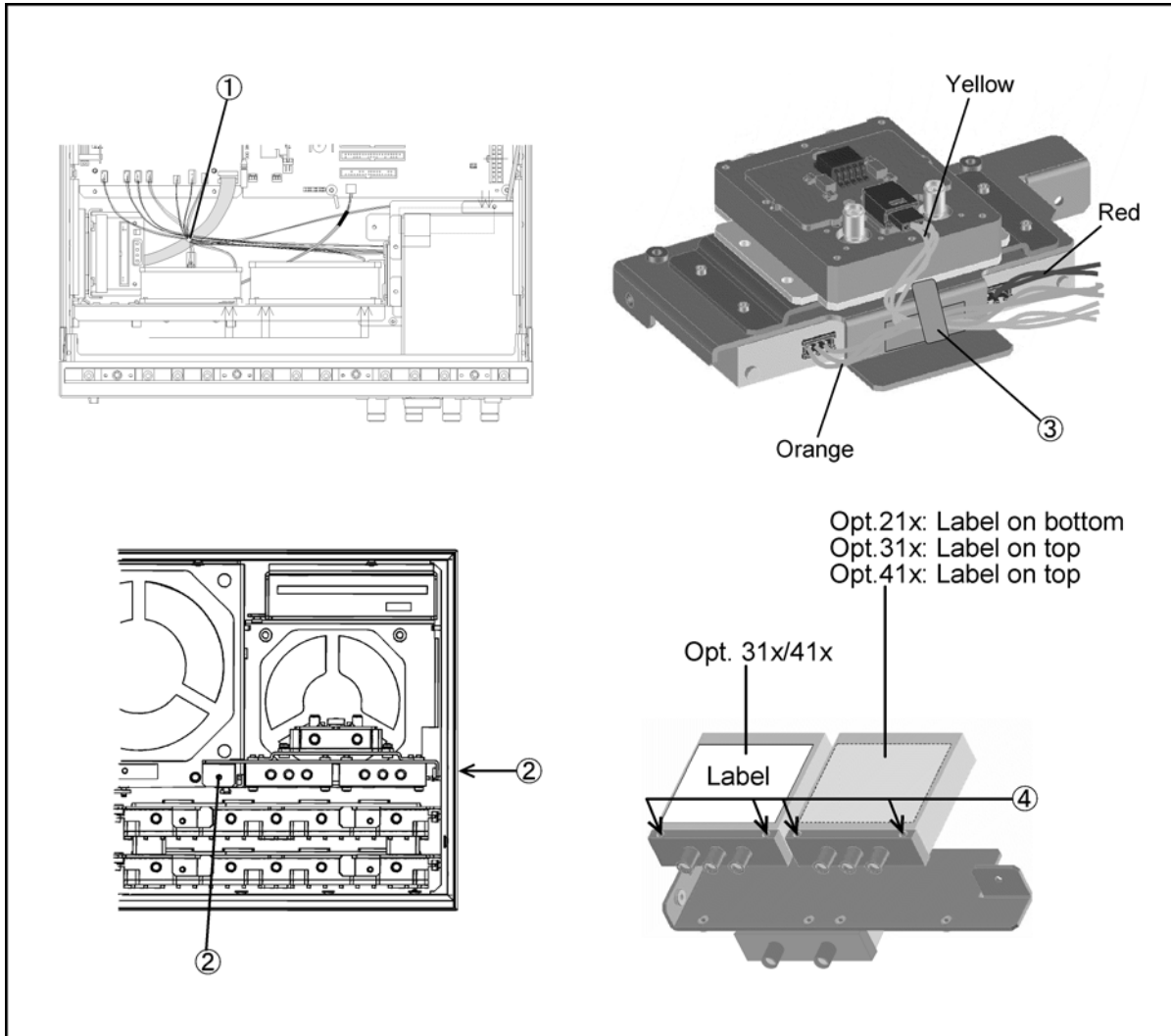
Confirm that the cables are connected as shown in Figure 6-30 on page 435

Fasten the semi rigid cable using a torque wrench for replacement.

---

## Replacement Procedure A8 RF Switch Replacement

**Figure 6-30** A8 RF Switch (receiver board side) Replacement



e5070bse095

## **A4 Power Amp. Module Replacement**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end torque wrench, 5/16 inch (set to 10 in-lb) (for reconnecting SMA connector)

### **Removal Procedure**

Refer to Figure 6-31 for this procedure.

- Step 1.** Remove the A4 power amp. module assembly as described in Step 1 in “A8 RF Switch (receiver board side)” on page 434.
- Step 2.** Remove the four TORX T10 screws (item 1) fastening the A4 power amp. module.

### **Replacement Procedure**

- Step 1.** Fasten the new amp. module as shown in Figure 6-31.
- Step 2.** Replace the A4 power amp. module assembly by inverse procedure of removal.

---

#### **NOTE**

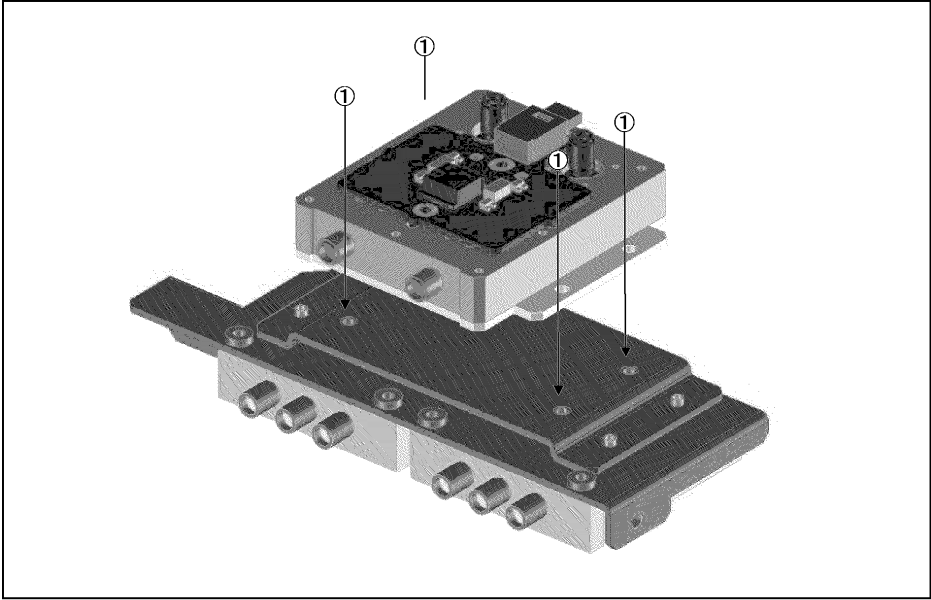
Confirm that the cables are connected as shown in Figure 6-30 on page 435.  
Fasten the semi rigid cable using a torque wrench for replacement.

---



Figure 6-31

A4 Power Amp. Module (Opt. 31x/41x) Replacement



e5070bse097

## **A10 Analog Motherboard Replacement**

### **Tools Required**

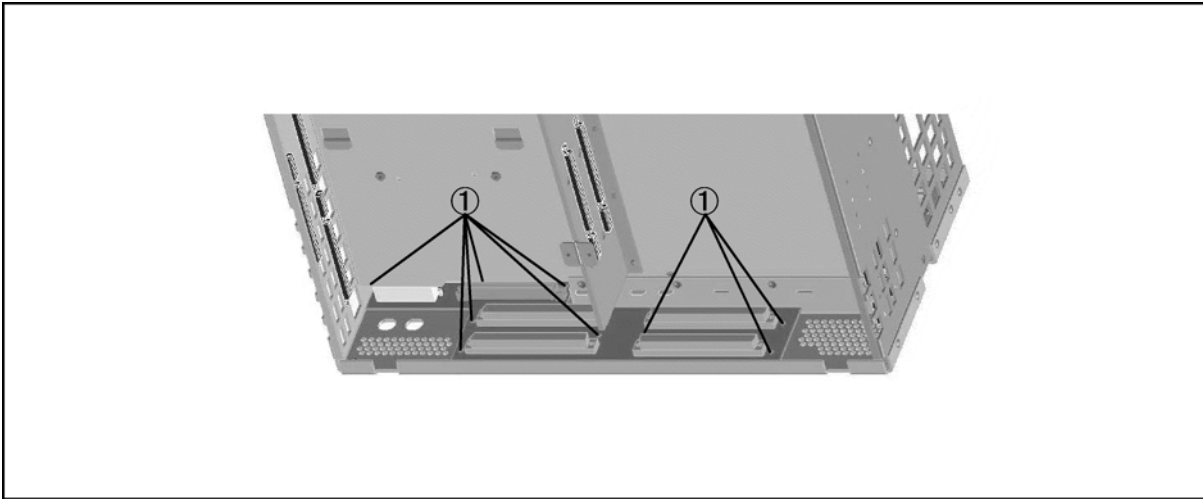
- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/16 inch and 5/8 inch
- Open-end torque wrench, 5/16 inch (set to 10 in-lb) (for reconnecting SMA connector)

### **Removal Procedure**

Refer to Figure 6-32 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the front frame as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 3.** Remove the source board as described in “A1 Source Board Replacement” on page 412.
- Step 4.** Remove the receiver board as described in “A2 Receiver Board Replacement” on page 414.
- Step 5.** Remove the level vernier as described in “A3 Level Vernier Replacement” on page 418.
- Step 6.** Remove the power supply as described in “A50 ATX Power Supply Assembly Replacement” on page 400
- Step 7.** Disconnect the cables connected to the A10 analog motherboard.
- Step 8.** Remove the nine TORX T10 screws (item 1) fastening the A10 analog mother board.

**Figure 6-32**      **A10 Analog Motherboard Removal**



e5070bse106

### **Replacement Procedure**

**Step 1.** Replace the A10 analog mother board by inverse procedure of removal.

## **A21 Analog Interface Board Replacement**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20

### **Removal Procedure**

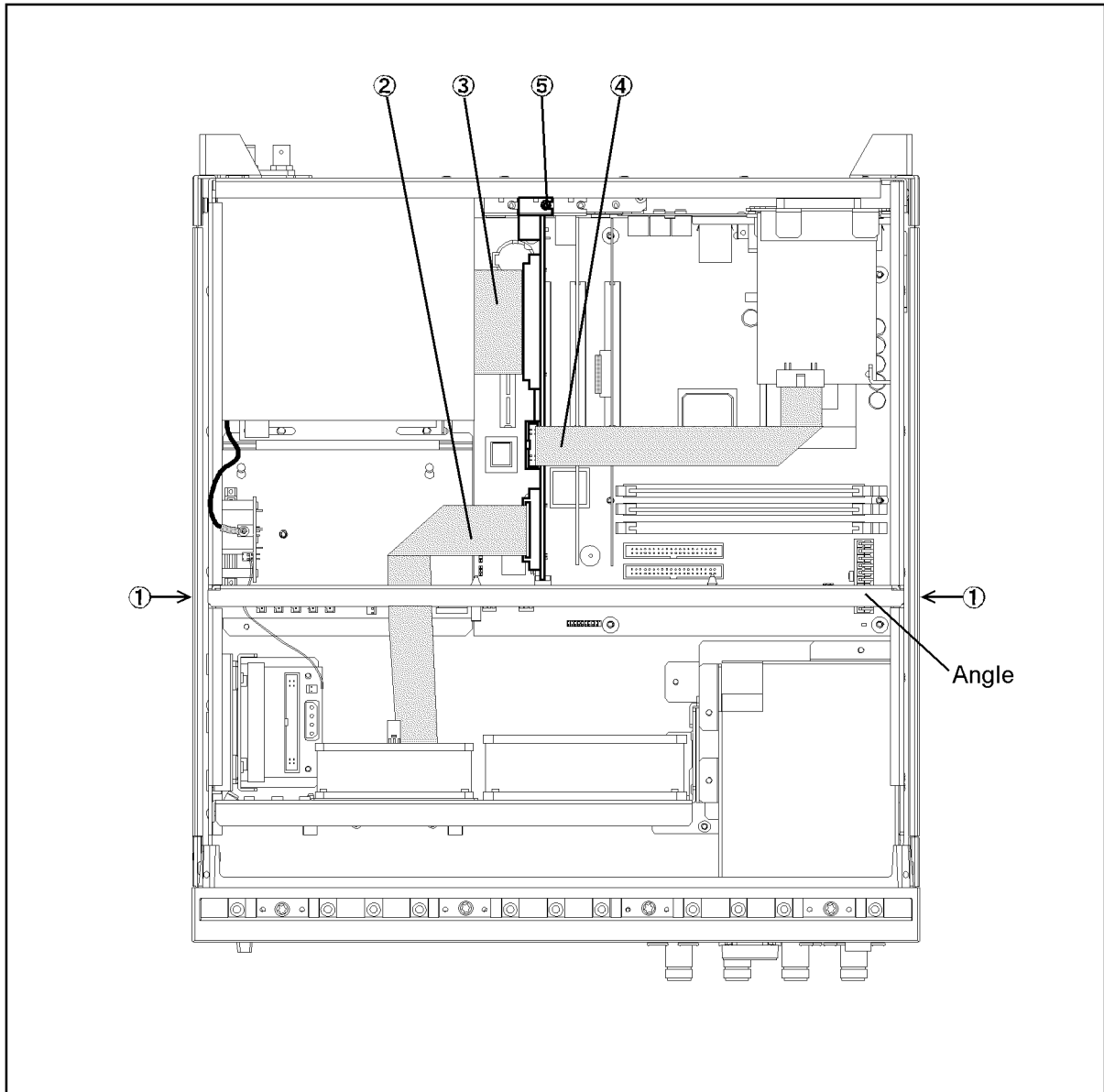
Refer to Figure 6-33 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove four TORX T10 screw (item 1) fastening the angle to the side panels.
- Step 3.** Disconnect the cables (item 2, 3 and 4) from the A21 Analog Interface board.
- Step 4.** Remove a TORX T10 screw (item 5) fastening the board to the rear panel.
- Step 5.** Lift the A21 analog interface board.

### **Replacement Procedure**

- Step 1.** Replace the A21 analog interface board by inverse procedure of removal.

Figure 6-33 A21 Analog Interface Board Removal



e5070bse087

**NOTE** Refer to Chapter 5, “Replaceable Parts,” on page 287 for the latest cabling too.

## **A24 GPIB Card Replacement**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20

### **Removal Procedure**

Refer to Figure 6-34 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the TORX T10 screw (item 1) fastening the card to the rear panel.
- Step 3.** Lift the A24 GPIB card.

---

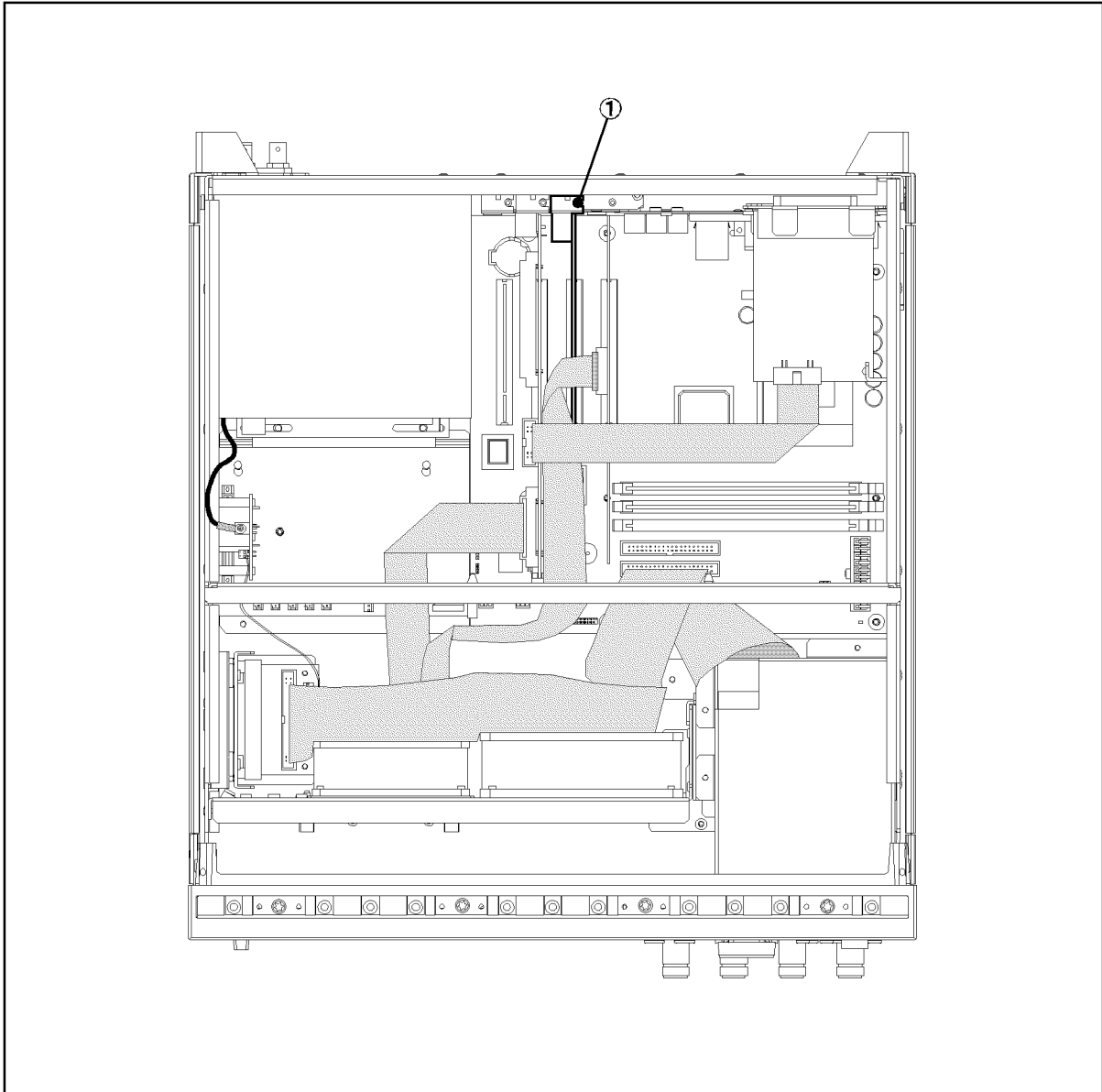
**CAUTION**

Be careful not to injure the cable connecting the display board to the front assembly.

### **Replacement Procedure**

- Step 1.** Replace the A24 GPIB card by inverse procedure of removal.

Figure 6-34 A24 GPIB Card Removal



e5070bse089

**NOTE** Refer to Chapter 5, “Replaceable Parts,” on page 287 for the latest cabling too.

## **A26 LCD Interface Card Replacement for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20

### **Removal Procedure**

Refer to Figure 6-36 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Disconnect the mylar cables (item 1) from the display board.

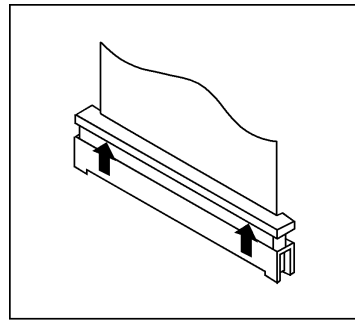
---

#### **NOTE**

Use the following procedure when you handle the mylar ribbon cable. The mylar cable and their connector are very fragile. It’s recommended to replace the mylar cable when you are instructed to disconnect and connect the mylar cable frequently.

- a.** Pry up the retainer slightly at either end of the connector as shown in Figure 6-35, using a small flat edge screwdriver.

**Figure 6-35** pry up the retainer



- b.** Pull the mylar ribbon cable out of the connector.

- Step 3.** Remove the TORX T10 screw (item 2) fastening the card to the rear panel.
- Step 4.** Lift the A26 LCD interface card.

### **Replacement Procedure**

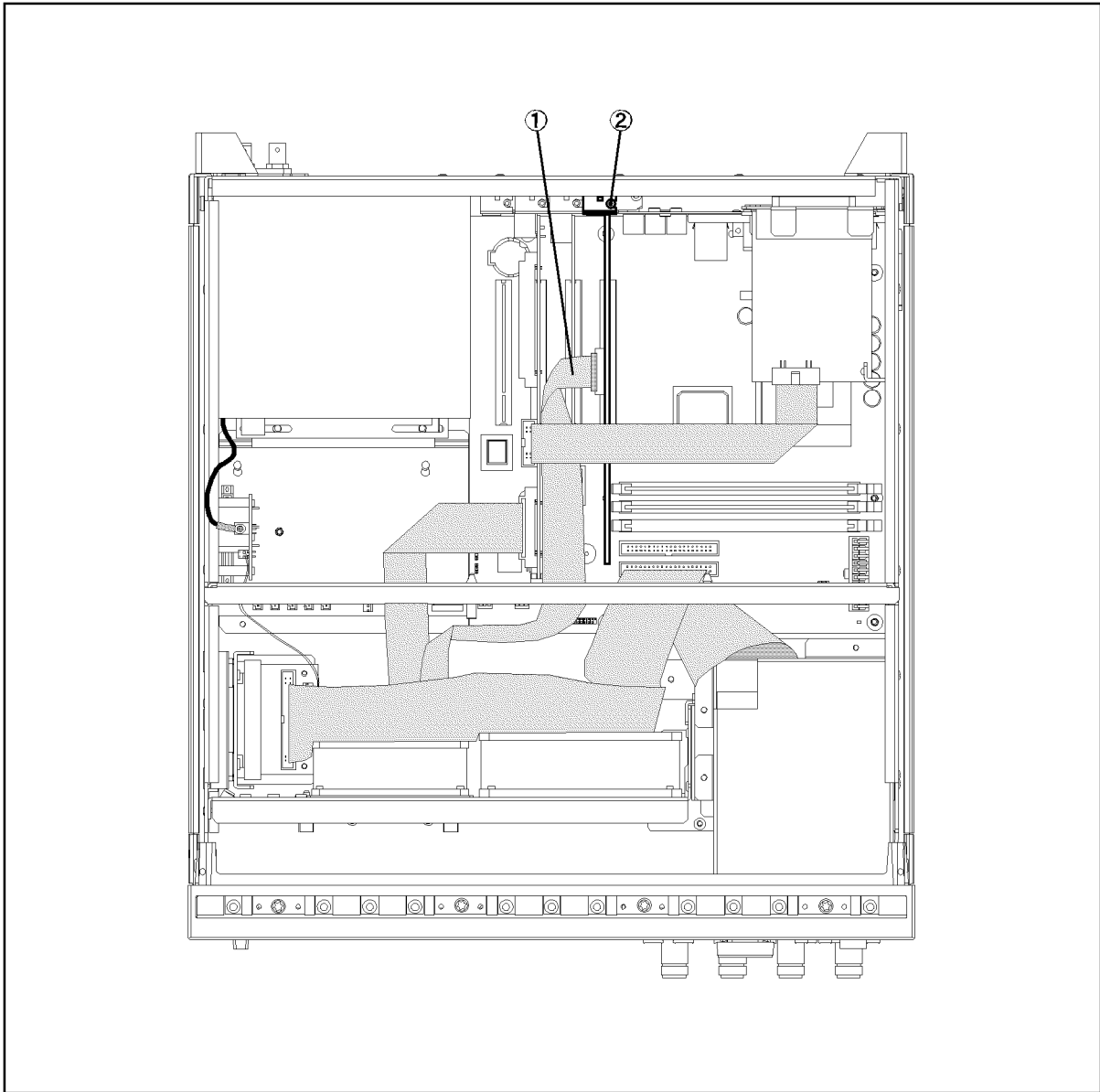
- Step 1.** Replace the A26 LCD interface card by inverse procedure of removal.



Replacement Procedure  
A26 LCD Interface Card Replacement for E5070B S/N prefix JP1KK,  
MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below

Figure 6-36

A26 LCD Interface Card Removal for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below



e5070bse088

**NOTE**

Refer to Chapter 5, “Replaceable Parts,” on page 287 for the latest cabling too.

## **USB (USBTMC) Interface Card Replacement for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20

### **Removal Procedure**

Refer to Figure 6-37 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the TORX T10 screw fastening the card (item 1) to the rear panel.
- Step 3.** Remove the flat cable (item 2) from the A21 analog interface board.
- Step 4.** Lift the USB (USBTMC) interface card.

---

**CAUTION**

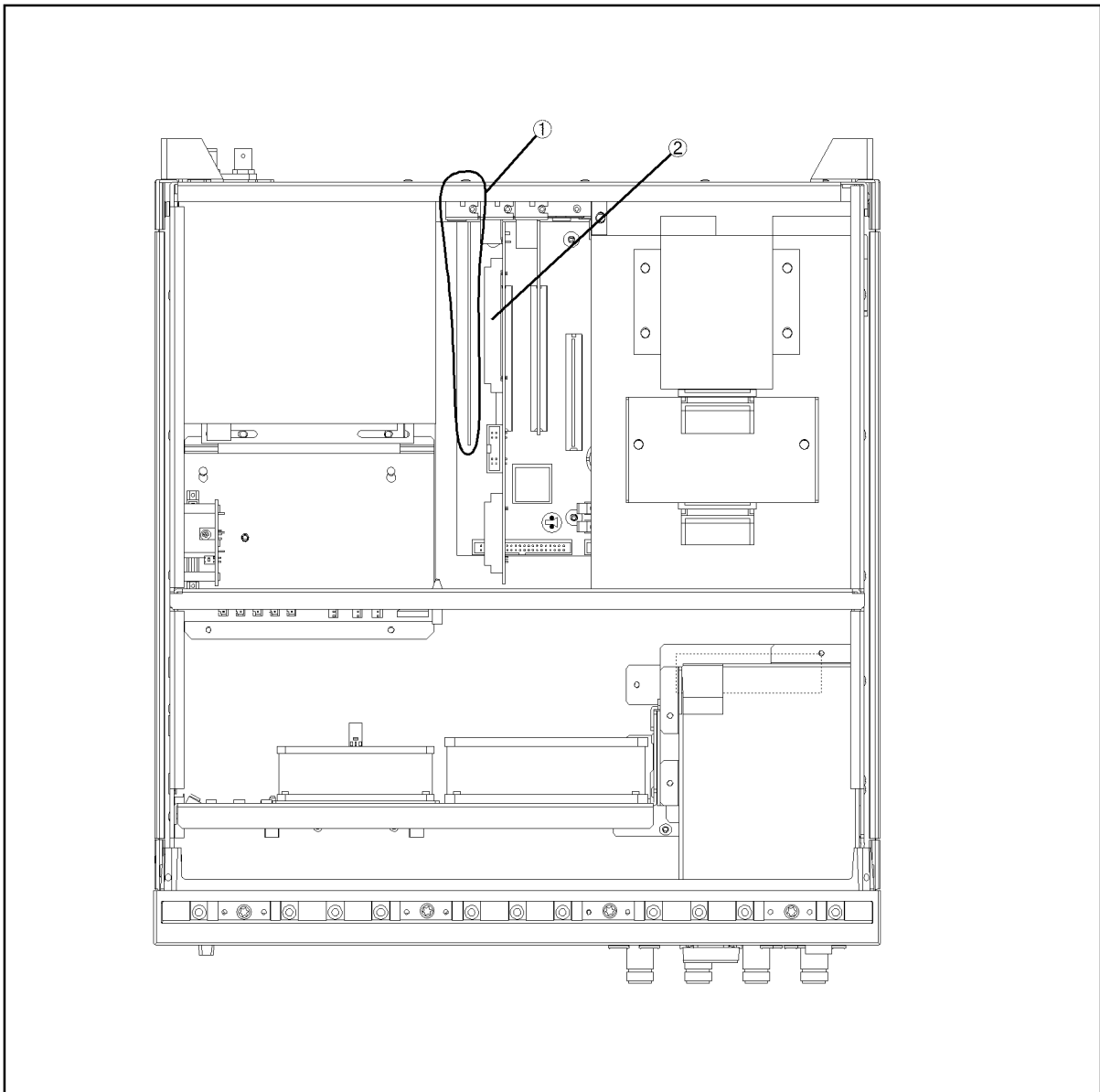
Be careful not to injure the cable connecting the display board to the front assembly.

### **Replacement Procedure**

- Step 1.** Replace the USB (USBTMC) interface card by inverse procedure of removal.

Replacement Procedure  
**USB (USBTMC) Interface Card Replacement for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above**

**Figure 6-37** USB (USBTMC) Interface Card Removal for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above



e5070bse4011

**NOTE**

Refer to Chapter 5, "Replaceable Parts," on page 287 for the latest cabling too.

## **A22 Front Panel Keyboard Replacement for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Hex key, 1.5 mm

### **Removal Procedure**

Refer to Figure 6-38 for this procedure.

**Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.

**Step 2.** Release the clamped cables from the clamps (item 1) on the cover.

---

**NOTE** Keep the mylar cable connected.

**Step 3.** Disconnect the cables (item 2 and 3) from the touch screen controller if the option 016 is installed.

**Step 4.** Remove the four TORX T10 screws (item 4) fastening the cover to the front panel.

**Step 5.** Disconnect the cable (item 5 and 6) connected through the cover.

---

**NOTE** The item 6 is not connected in the E5070B/E5071B without the option 016.

**Step 6.** Disconnect the two cables (item 7 and 8) from the front keyboard.

**Step 7.** Remove the knob from the front panel with a 1.5 mm hex key.

**Step 8.** Remove the two TORX T15 screws (item 9) fastening the inverter assembly.

**Step 9.** Remove the eight TORX T10 screws (item 10) fastening the A22 front panel keyboard.

**Step 10.** Separate the keyboard into the board and the rubber key.

### **Replacement Procedure**

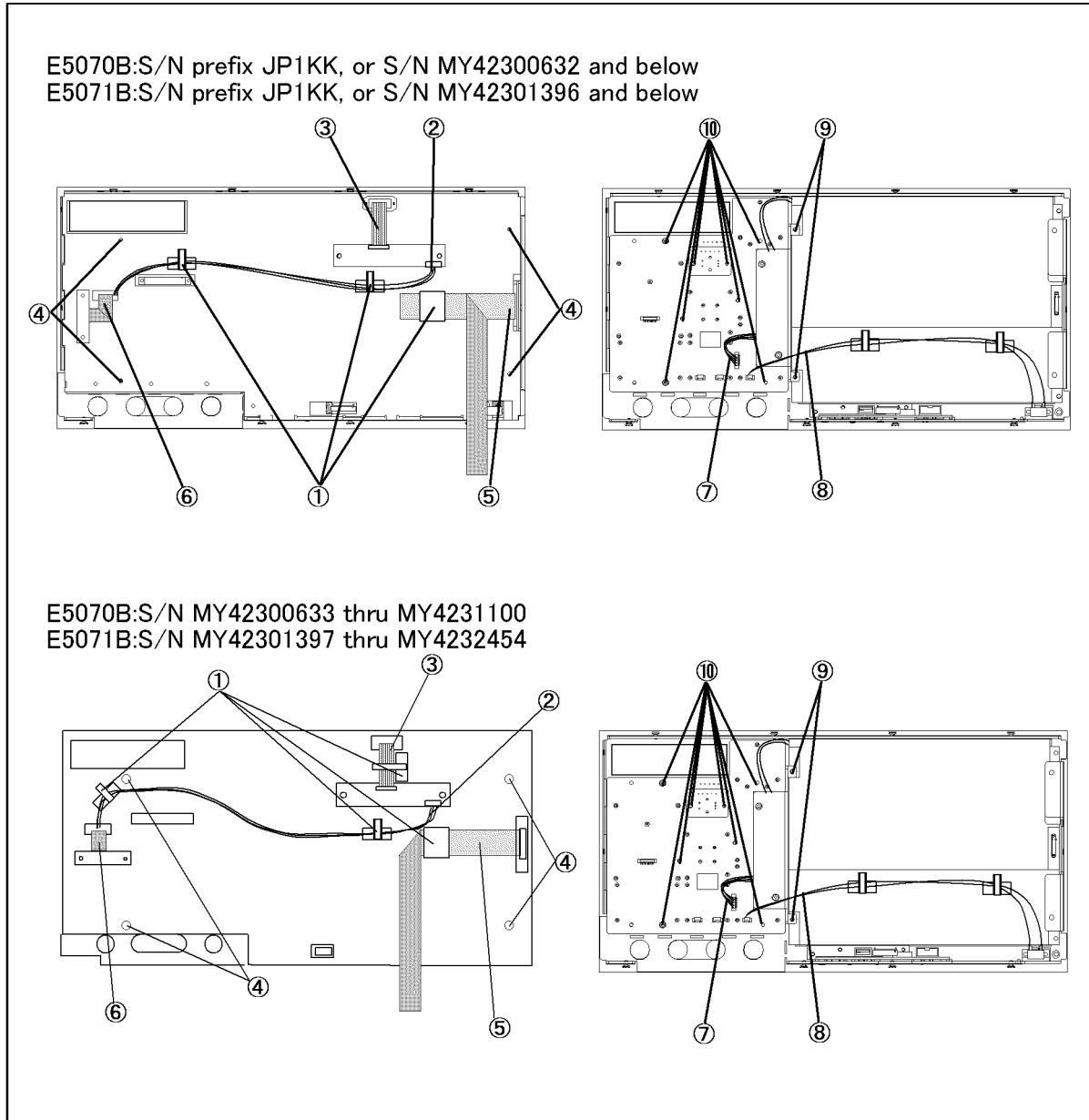
**Step 1.** Insert the whole jut of the rubber key into the hole on the new A22 front panel keyboard.

**Step 2.** Replace the A22 front panel keyboard by inverse procedure of removal.

Replacement Procedure

**A22 Front Panel Keyboard Replacement for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below**

**Figure 6-38 A22 Front Panel Keyboard Removal**



e5070bse3013

## **A22 Front Panel Keyboard Replacement for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Hex key, 1.5 mm

### **Removal Procedure**

Refer to Figure 6-39 for this procedure.

- Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above” on page 388.
- Step 2.** Release the clamped cables from the clamps (item 1) on the cover.

---

**NOTE** Keep the mylar cable connected.

- Step 3.** Disconnect the cables (item 2 and 3) from the touch screen controller if the option 016 is installed.
- Step 4.** Remove the four TORX T10 screws (item 4) fastening the cover to the front panel.
- Step 5.** Disconnect the cable (item 5) connected through the cover.

---

**NOTE** The item 5 is not connected in the E5070B/E5071B without the option 016.

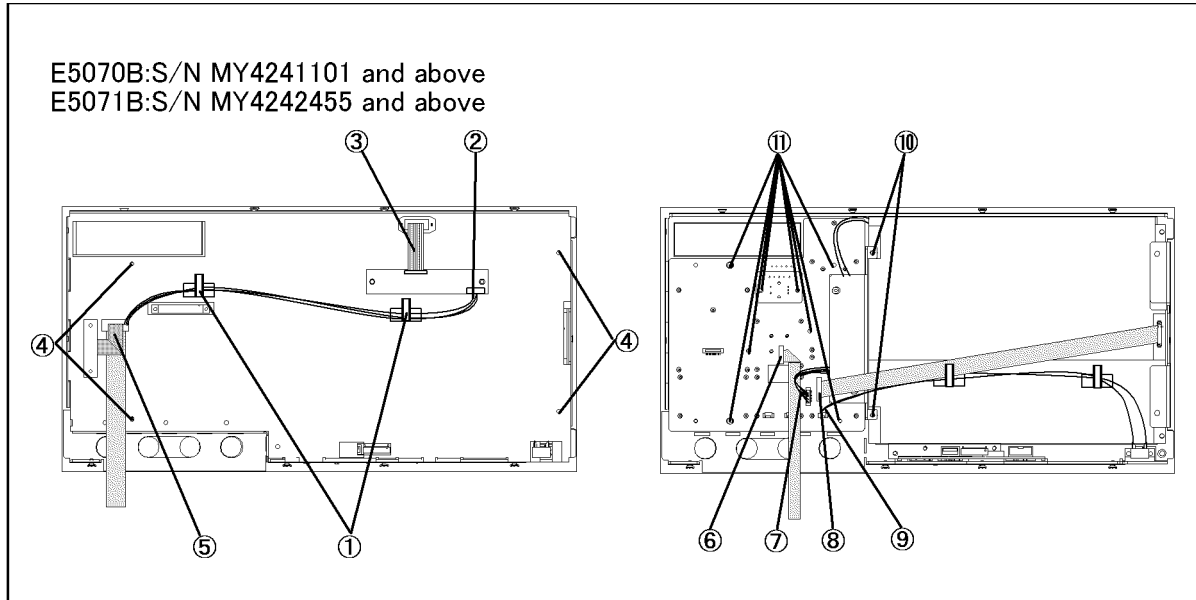
- Step 6.** Disconnect the four cables (item 6,7,8 and 9) from the front keyboard.
- Step 7.** Remove the knob from the front panel with a 1.5 mm hex key.
- Step 8.** Remove the two TORX T15 screws (item 10) fastening the inverter assembly.
- Step 9.** Remove the eight TORX T10 screws (item 11) fastening the A22 front panel keyboard.
- Step 10.** Separate the keyboard into the board and the rubber key.

### **Replacement Procedure**

- Step 1.** Insert the whole jut of the rubber key into the hole on the new A22 front panel keyboard.
- Step 2.** Replace the A22 front panel keyboard by inverse procedure of removal.

Replacement Procedure  
A22 Front Panel Keyboard Replacement for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above

Figure 6-39 A22 Front Panel Keyboard Removal



e5070bse5007

## **A52 Inverter Board Replacement for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below**

### **Tools Required**

- TORX screwdriver, T8, T10, T15, and T20
- Flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-40 for this procedure.

- Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 2.** Release the clamped cables from the clamps (item 1) on the cover.

---

**NOTE** Keep the mylar cable connected.

- Step 3.** Disconnect the cables (item 2 and 3) from the touch screen controller if the option 016 is installed.
- Step 4.** Remove the four TORX T10 screws (item 4) fastening the cover to the front panel.
- Step 5.** Disconnect the cable (item 5 and 6) connected through the cover.

---

**NOTE** The item 6 is not connected in the E5070B/E5071B without the option 016.

- Step 6.** Disconnect the two cables (item 7 and 8) from the inverter.
- Step 7.** Remove the two TORX T15 screws (item 9) fastening the inverter assembly.
- Step 8.** Remove the two TORX T8 screws (item 10) fastening the inverter to the holder.

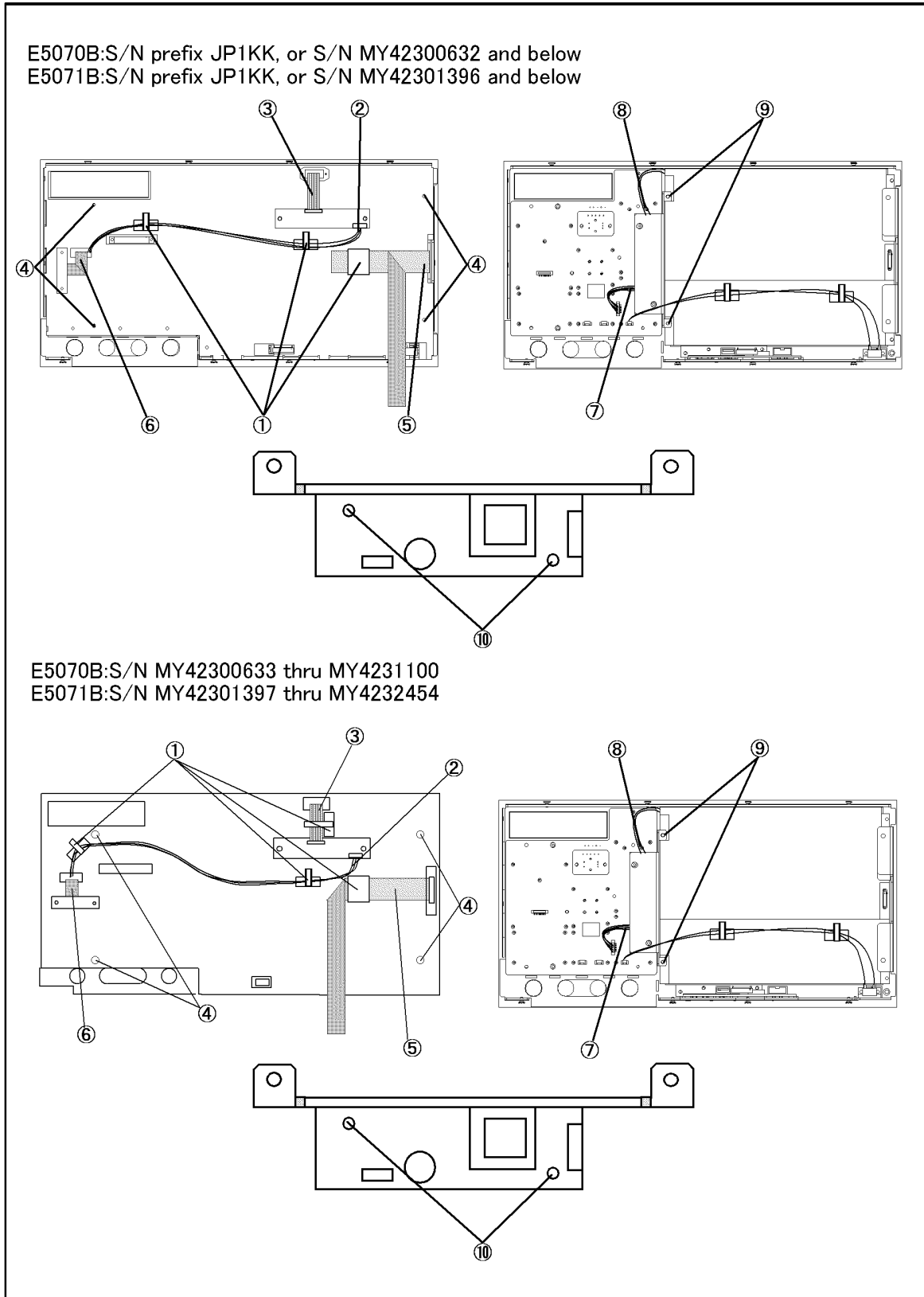
### **Replacement Procedure**

- Step 1.** Fasten the new A52 inverter board to the holder.
- Step 2.** Replace the inverter assembly by inverse procedure of removal.



**A52 Inverter Board Replacement for E5070B S/N prefix JP1KK, MY4231100 and below, E5071B S/N prefix JP1KK, MY4232454 and below**

**Figure 6-40 A52 Inverter Board Removal**



e5070bse3015

## **A52 Inverter Board Replacement for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above**

### **Tools Required**

- TORX screwdriver, T8, T10, T15, and T20
- Flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-41 for this procedure.

**Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above” on page 388.

**Step 2.** Release the clamped cables from the clamps (item 1) on the cover.

---

**NOTE** Keep the mylar cable connected.

**Step 3.** Disconnect the cables (item 2 and 3) from the touch screen controller if the option 016 is installed.

**Step 4.** Remove the four TORX T10 screws (item 4) fastening the cover to the front panel.

**Step 5.** Disconnect the cable (item 5) connected through the cover.

---

**NOTE** The item 5 is not connected in the E5070B/E5071B without the option 016.

**Step 6.** Disconnect the two cables (item 6 and 7) from the inverter.

**Step 7.** Remove the two TORX T15 screws (item 8) fastening the inverter assembly.

**Step 8.** Remove the two TORX T8 screws (item 9) fastening the inverter to the holder.

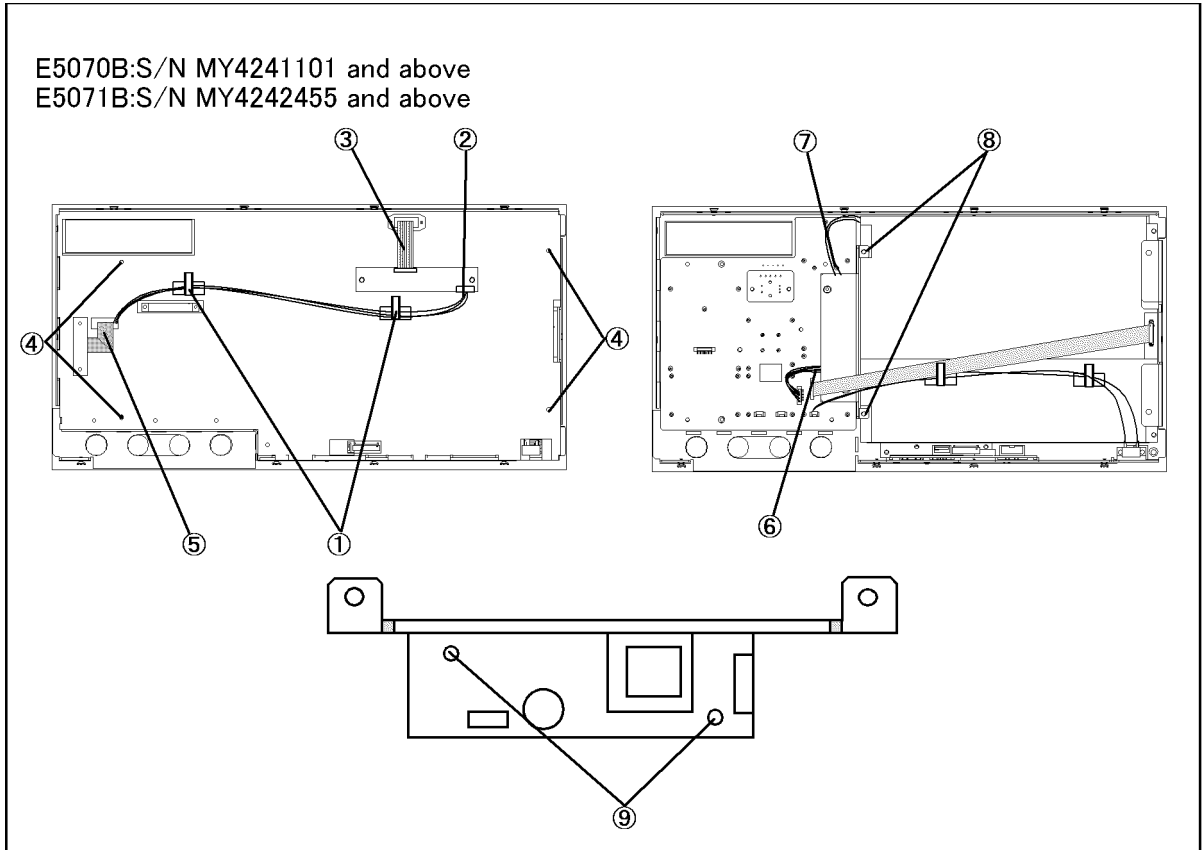
### **Replacement Procedure**

**Step 1.** Fasten the new A52 inverter board to the holder.

**Step 2.** Replace the inverter assembly by inverse procedure of removal.

Replacement Procedure  
**A52 Inverter Board Replacement for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above**

**Figure 6-41** A52 Inverter Board Removal



e5070bse5008

## **A51 LCD Display Replacement for E5070B S/N prefix JP1KK, MY42300632 thru MY4231100, E5071B S/N prefix JP1KK, MY42301397 thru MY4232454**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-42 for this procedure.

- Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 2.** Release the clamped cables from the clamps (item 1) on the cover.
- Step 3.** Disconnect the cables (item 2 and 3) from the touch screen controller if the option 016 is installed.
- Step 4.** Remove the four TORX T10 screws (item 4) fastening the cover to the front panel.
- Step 5.** Disconnect the two cables (item 5 and 6) connected through the cover.

---

**NOTE**

The item 6 is not connected in the E5070B/E5071B without the option 016.

- Step 6.** Release the cable from the clamps (item 7) on the LCD.
- Step 7.** Disconnect the cable (item 8) connected to the inverter.
- Step 8.** Remove the four TORX T15 screws (item 9) fastening the A51 LCD display to the front panel.

### **Replacement Procedure**

- Step 1.** Replace the A51 LCD display by inverse procedure of removal.

---

**NOTE**

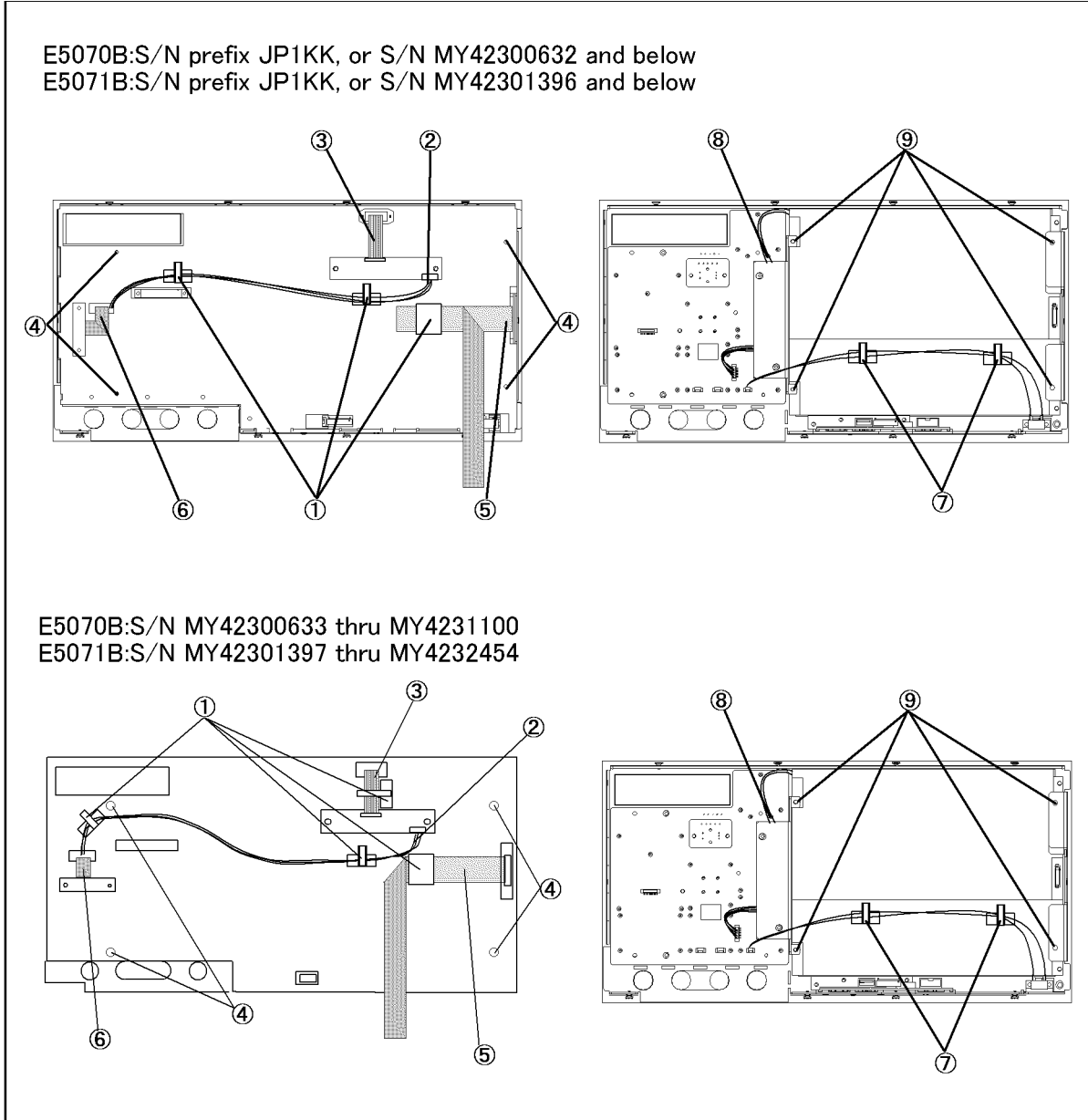
Fasten the TORX T15 screws (item 9) using a torque screwdriver ( set to 1.02 N-m / 9.0 lb-in).

- Step 2.** When you have replaced the LCD on a E5070B/E5071B equipped with an Option 016 touch screen, you have to calibrate the touch screen. Follow the procedure described on “Calibration of the Touch Screen” on page 391.

Replacement Procedure

**A51 LCD Display Replacement for E5070B S/N prefix JP1KK, MY42300632  
thru MY4231100, E5071B S/N prefix JP1KK, MY42301397 thru MY4232454**

**Figure 6-42 A51 LCD Removal**



e5070bse3014

## **A51 LCD Display Replacement for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above**

### **Tools Required**

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver

### **Removal Procedure**

Refer to Figure 6-43 for this procedure.

- Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B S/N MY42401101 and above, E5071B S/N MY42402455 and above” on page 388.
- Step 2.** Release the clamped cables from the clamps (item 1) on the cover.
- Step 3.** Disconnect the cables (item 2 and 3) from the touch screen controller if the option 016 is installed.
- Step 4.** Remove the four TORX T10 screws (item 4) fastening the cover to the front panel.
- Step 5.** Disconnect the cables (item 5) connected through the cover.

---

**NOTE**

The item 5 is not connected in the E5070B/E5071B without the option 016.

- Step 6.** Release the cable from the clamps (item 6) on the LCD.
- Step 7.** Disconnect the cable (item 7) connected to the front panel keyboard.
- Step 8.** Disconnect the cable (item 8) connected to the inverter.
- Step 9.** Remove the four TORX T15 screws (item 9) fastening the A51 LCD display to the front panel.

### **Replacement Procedure**

- Step 1.** Replace the A51 LCD display by inverse procedure of removal.

---

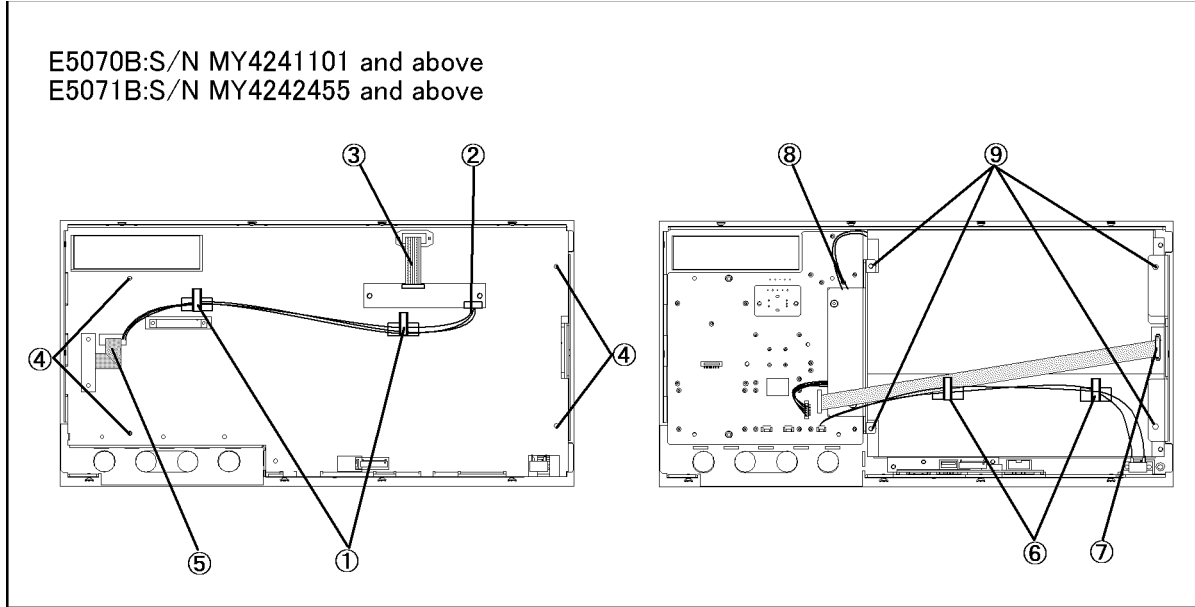
**NOTE**

Fasten the TORX T15 screws (item 9) using a torque screwdriver ( set to 1.02 N-m / 9.0 lb-in).

- Step 2.** When you have replaced the LCD on a E5070B/E5071B equipped with an Option 016 touch screen, you have to calibrate the touch screen. Follow the procedure described on “Calibration of the Touch Screen” on page 391.

Replacement Procedure  
A51 LCD Display Replacement for E5070B S/N MY42401101 and above,  
E5071B S/N MY42402455 and above

Figure 6-43 A51 LCD Removal



e5070bse5009

## LCD Backlight Replacement

### Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver

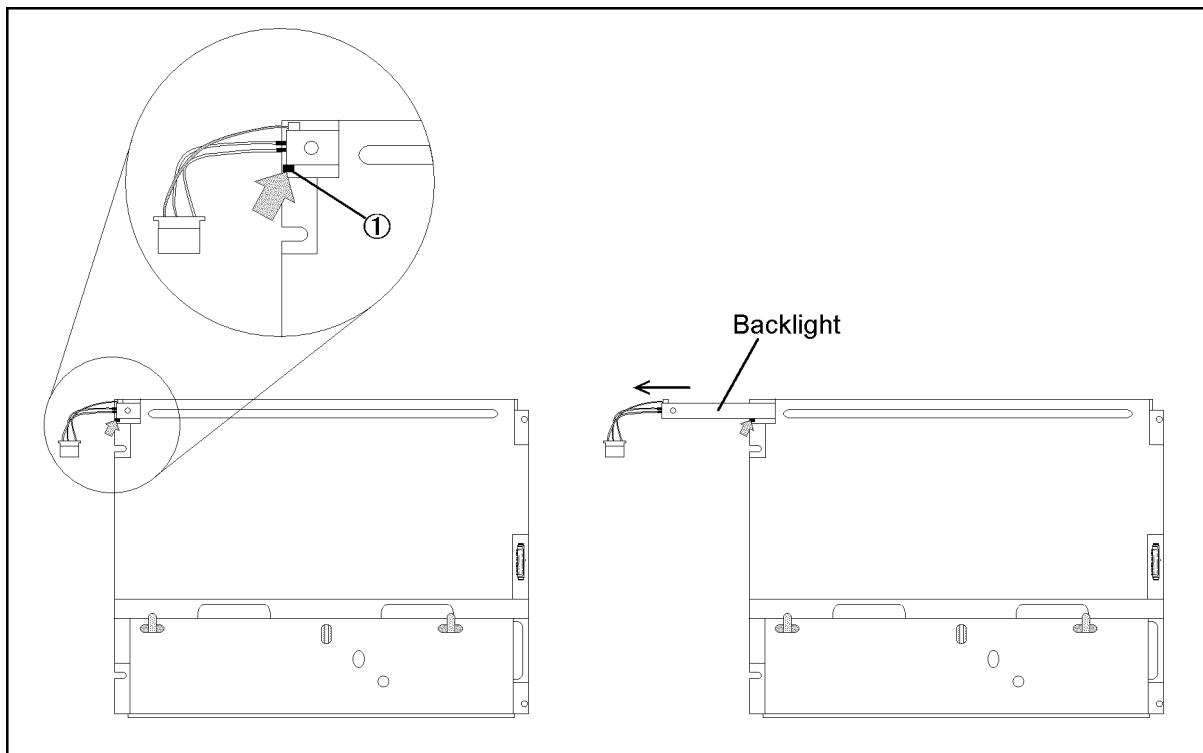
### Removal Procedure

Refer to Figure 6-44 for this procedure.

**Step 1.** Remove the A51 LCD display as described in “A51 LCD Display Replacement for E5070B S/N prefix JP1KK, MY42300632 thru MY4231100, E5071B S/N prefix JP1KK, MY42301397 thru MY4232454” on page 456.

**Step 2.** Push the stopper (item 1) and slide the backlight as shown in Figure 6-44.

Figure 6-44 LCD Backlight Removal



e5070bse100

### Replacement Procedure

**Step 1.** Replace the backlight by inverse procedure of removal.



## A5 Crystal Oven Board (Opt.1E5) Replacement

### Tools Required

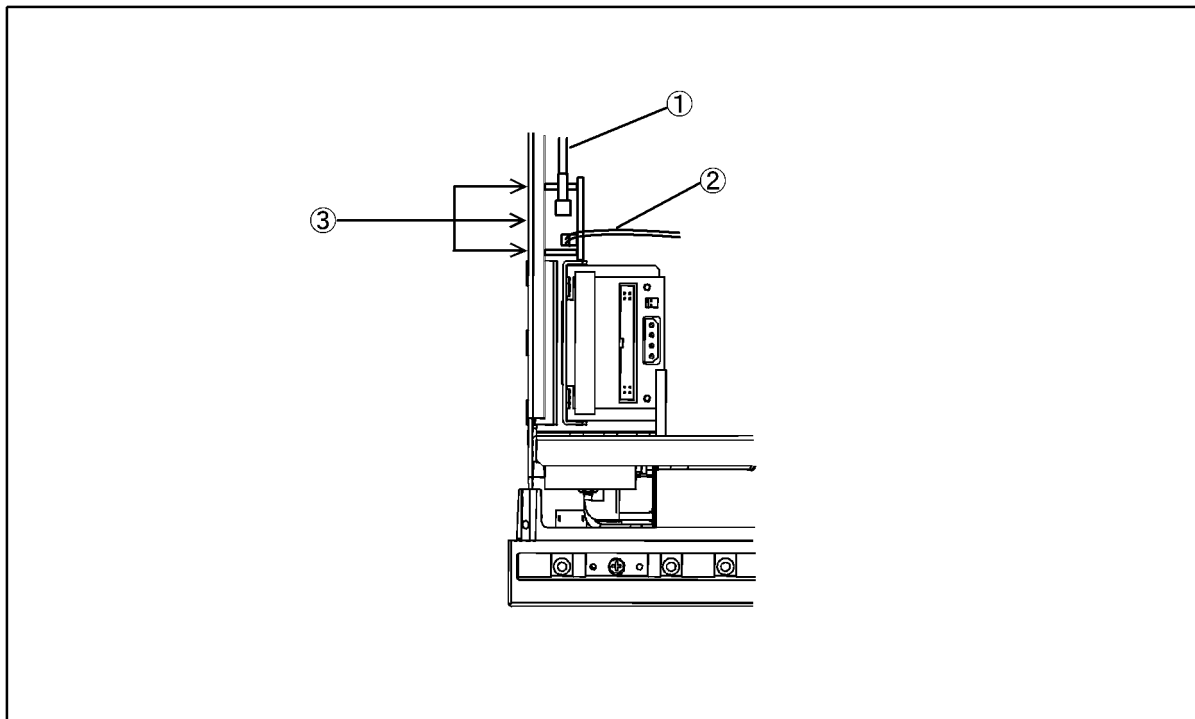
- TORX screwdriver, T10, T15 and T20

### Removal Procedure

Refer to Figure 6-45 for this procedure.

- Step 1.** Remove the outer cover as described in “Outer Cover Removal” on page 382.
- Step 2.** Remove the two cables (item 1 and 2) connected to the crystal oven board.
- Step 3.** Remove three TORX T10 screws (item 3) fastening the crystal oven board from the outside.

Figure 6-45 A5 Crystal Oven Board Removal



e5070ase225

### Replacement Procedure

- Step 1.** Replace the crystal oven board by inverse procedure of removal.

---

## N Connector Replacement

### Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 9/16
- Open-end torque wrench, 5/16 inch (set to 10 in-lb) (for reconnecting SMA connector)
- File

### Removal Procedure

Refer to Figure 6-46 for this procedure.

- Step 1.** Remove the front panel as described in “Front Panel Removal for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 384, or “Front Panel Removal for E5070B : MY42300633 thru MY4231100, E5071B : MY42301397 thru MY4232454” on page 386.
- Step 2.** Remove the trim from the right side of the front panel.
- Step 3.** Remove the TORX T15 screw (item 1) fastening the N-connector holder from the right side.
- Step 4.** Remove the two TORX T15 screws (item 2) from the bottom.
- Step 5.** Disconnect the semi-rigid cables from the N connector. (refer to the figure as shown in Table 6-6)

---

#### NOTE

The label on the semi-rigid cable shows the last two digits of the part number.

**Table 6-6**

#### Reference Figure

Option	Figure
213	Figure 5-20 on page 327
214	Figure 5-21 on page 328 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-28 on page 341 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
313	Figure 5-22 on page 330
314	Figure 5-23 on page 332 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421 Figure 5-29 on page 342 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above
413	Figure 5-24 on page 334

**Table 6-6**

**Reference Figure**

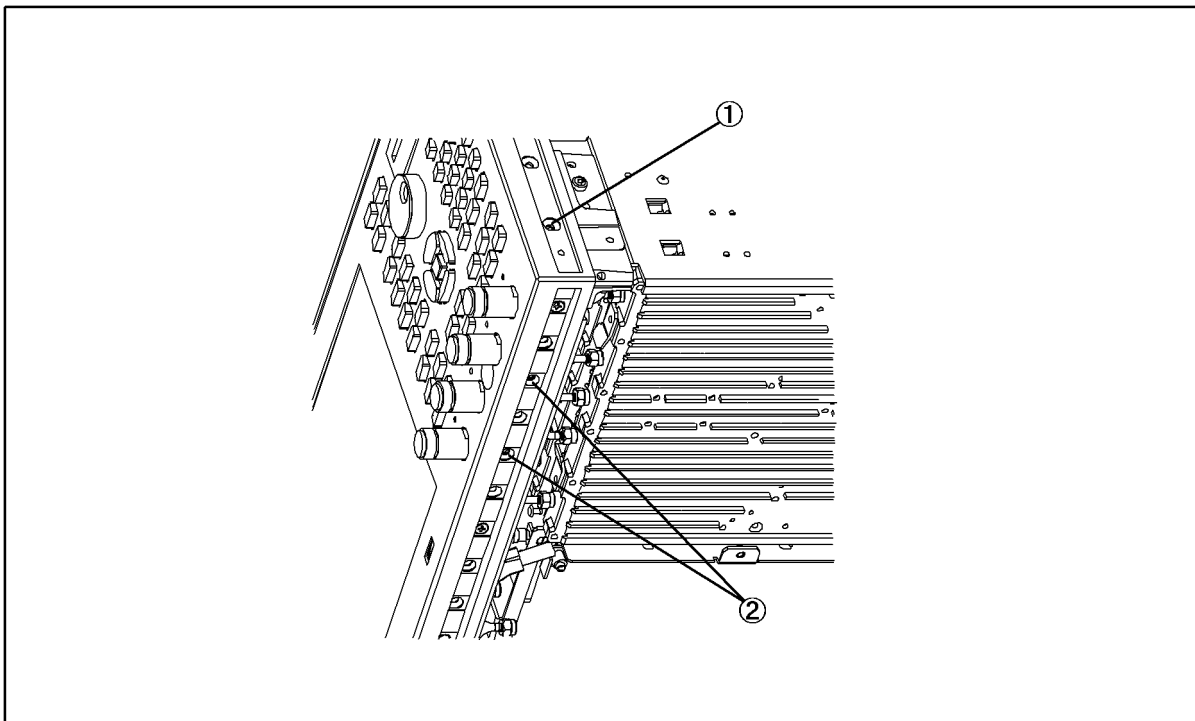
Option	Figure
414	Figure 5-25 on page 336 for E5070B with S/N prefix JP1KK or MY421 , for E5071B with S/N prefix JP1KK or MY421  Figure 5-30 on page 344 for E5070B with S/N prefix MY422 and above, for E5071B with S/N prefix MY422 and above

**Step 6.** Remove the washers and nuts from the N connectors.

**Step 7.** Remove the N connector from the holder.

**Figure 6-46**

**N Connector Removal**



e5070bse099

Replacement Procedure  
**N Connector Replacement**

**Replacement Procedure**

**Step 1.** Fasten the new N connector to the holder.

---

**NOTE**

Match the dents on the holder and the juts on the connector.

File the hole of the holder smooth if the new N connector cannot be inserted into the hole easily.

---

**Step 2.** Replace the N-connector holder by inverse procedure of removal.

---

**NOTE**

Fasten the semi rigid cable using a torque wrench for replacement.

---

## **7** Post-Repair Procedures

This chapter lists the procedures required to verify the E5070B/E5071B 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, CPU or DIMM(Memory). 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 Board	Perform the following required adjustments using “Source Board” in Spot Adjustment of the program.  Frequency Reference Adjustment Source Power Adjustment Test Port Characteristics Adjustment	“To Execute the Internal Test” on page 219 “To Execute the External Test” on page 240  Frequency Accuracy Test RF Output Level Accuracy and Flatness Test RF Output Level Linearity Test Trace Noise CW Test Crosstalk Test System Dynamic Range Test Dynamic Accuracy Test Uncorrected System Performance Test
A3 Level Vernier Board	Perform the following required adjustments using “Level Vernier” in Spot Adjustment of the program.  Source Power Adjustment Test Port Characteristics Adjustment	“To Execute the Internal Test” on page 219 “To Execute the External Test” on page 240  RF Output Level Accuracy and Flatness Test RF Output Level Linearity Test Trace Noise CW Test Crosstalk Test System Dynamic Range Test Dynamic Accuracy Test Uncorrected System Performance Test
A4 Power Amp Module	Perform the following required adjustments using “Power Amp Module” in Spot Adjustment of the program.  Source Power Adjustment Test Port Characteristics Adjustment	“To Execute the Internal Test” on page 219 “To Execute the External Test” on page 240  RF Output Level Accuracy and Flatness Test RF Output Level Linearity Test Trace Noise CW Test Crosstalk Test System Dynamic Range Test Dynamic Accuracy Test Uncorrected System Performance Test

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

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
A15 Receiver-RF Board	Perform the following required adjustments using “Receiver (RF) Board” in Spot Adjustment of the program.  Source Power Adjustment Test Port Characteristics Adjustment	“To Execute the Internal Test” on page 219 “To Execute the External Test” on page 240  RF Output Level Accuracy and Flatness Test RF Output Level Linearity Test Trace Noise CW Test Crosstalk Test System Dynamic Range Test Dynamic Accuracy test Uncorrected System Performance Test
A17 Receiver-IF Board	Perform the following required adjustments using “Receiver (IF) Board” in Spot Adjustment of the program.  IF Range Gain/Phase Adjustment Source Power Adjustment Test Port Characteristics Adjustment	“To Execute the Internal Test” on page 219 “To Execute the External Test” on page 240  Trace Noise CW Test Crosstalk Test System dynamic range Test Dynamic accuracy test Uncorrected system performance
A5 Crystal Oven (for 1E5)	Perform the following required adjustment using “Crystal Oven (for 1E5)” in Spot Adjustment of the program.  Oven Reference Adjustment (Opt. 1E5)	Frequency Accuracy Test(with Option 1E5)
A8 Source Swich	Perform the following required adjustments using “RF SW” in Spot Adjustment of the program.  Source Power Adjustment Test Ports Characteristics Adjustment	“To Execute the Internal Test” on page 219 “To Execute the External Test” on page 240  Trace Noise CW Test Crosstalk Test System dynamic range Test Dynamic accuracy test Uncorrected system performance
A6 RF Switch / Temperature Controller Board	No adjustment needed	“To Execute the Internal Test” on page 219
A7 Source Step Attenuator (Opt. 214/314/414)	Perform the following required adjustments using “Att (for 214/314/414)” in Spot Adjustment of the program.  Source Power Adjustment Test Port Characteristics Adjustment	“To Execute the Internal Test” on page 219 “To Execute the External Test” on page 240  RF Output Level Accuracy and Flatness Test RF Output Level Linearity Test Trace Noise CW Test Crosstalk Test System Dynamic Range Test Dynamic Accuracy Test Uncorrected System Performance Test

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>
A10 Analog Motherboard	No adjustment needed	Inspect the Booting Process  When the symptom of failure is out of specification, perform the performance test.
A20 Digital Motherboard	Set jumpers and BIOS parameters on the A20. For details, see “To configure the A20 Digital Motherboard and BIOS for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 262.	Inspect the Booting Process
A21 Analog Interface Board	Perform the following required adjustments using “Analog Interface” in Spot Adjustment of the program.  Writing ID	Inspect the Booting Process  “To Check the Front Panel” on page 230 “To Check the External Trigger Input” on page 233
A22 Front Panel Keyboard	No adjustment needed	“To Execute the External Test” on page 240 “To Check the Front Panel” on page 230
A23 Handler I/O Board	No adjustment needed	“To Execute the External Test” on page 240
A24 GPIB Board	No adjustment needed	“To Check the GPIB” on page 238
USB (USBTMC) Interface Card	No adjustment needed	“To Check the USB (USBTMC) Interface Card” on page 238
A26 Display Board	No adjustment needed	Inspect the Booting Process  “To Execute the External Test” on page 240 “To Check the Video output” on page 233
A27 Mass Storage Disk Drive	Perform “HDD” (Hard Disk Drive) in Spot Adjustment of the program.  Calibration of the Touch Screen (for opt. 016)	Inspect the Booting Process
Removable Hard Disk Drive	Perform “HDD” (Hard Disk Drive) in Spot Adjustment of the program.  Calibration of the Touch Screen (for opt. 016)	Inspect the Booting Process
A28 FDD	No adjustment needed	“To Check the FDD” on page 232
A50 Power Supply Assembly	No adjustment needed	Inspect the Booting Process



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

<b>Replaced Assembly or Part</b>	<b>Required Adjustments Correction Constants (CC)</b>	<b>Verification</b>
A51 LCD	Not adjustment needed	Inspect the Booting Process “To Execute the External Test” on page 240 “To Check the LCD” on page 231
Touch panel (for Opt. 016)	Calibration of the Touch Screen	Inspect the Booting Process “To Execute the External Test” on page 240 “To Check the LCD” on page 231
A52 Inverter Board	No adjustment needed	Inspect the Booting Process “To Execute the External Test” on page 240
DIMM	No adjustment needed	Inspect the Booting Process

7. Post-Repair Procedures

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

---

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

This appendix contains the information required to adapt this manual to versions or configurations of the E5070B/E5071B manufactured earlier than the current printing date of this manual. The information in this manual applies directly to E5070B/E5071B units with the serial number that is printed on the title page of this manual.

---

## Manual Changes

To adapt this manual to your E5070B/E5071B, 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

The ten-character serial number is stamped on the serial number plate (Figure A-1) on the rear panel.

**Figure A-1** Serial Number Plate



e5070buj7013

---

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

This appendix describes how to recover the operating system (Windows 2000) when the operating system has been damaged.

## System Recovery

By executing system recovery, you can return the system of the E5070B/E5071B (the Windows operating system and the firmware) to the factory state (at the time of purchase<sup>\*1</sup>).

### Types of system recoveries

The following 2 types of system recoveries are available.

Factory recovery

Returns the contents of the C drive to the factory state.

User recovery<sup>\*2</sup>

Returns the contents of the C drive to a user-specified state. To use this function, you must prepare for recovery in advance. For information on the preparation, see “Procedure to create the user backup image” on page 481 or on page 484 for information on the execution, see “Procedure to execute the user recovery function” on page 487 or on page 490.

### Notes on executing the factory recovery function

Executing the factory recovery function causes the following:

- In addition to the Windows operating system and the firmware, the following settings of the E5070B/E5071B are returned to the factory state or a user specified state.
  - Network setting
  - GPIB setting
  - Printer setting
- The driver for the supported printer installed after purchase is deleted.
- You need to execute initial registration again.

Files you created using the save function (files in the D drive) are not affected, but we recommend backing them up before executing system recovery for precautionary purposes. For more information on backup, refer to “Making Backup Files” as described in E5070B/E5071B User’s Guide.

---

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

\*2. This function is available when the volume label on the hard disk is CP600 or higher.

**Procedure to execute the factory recovery for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**

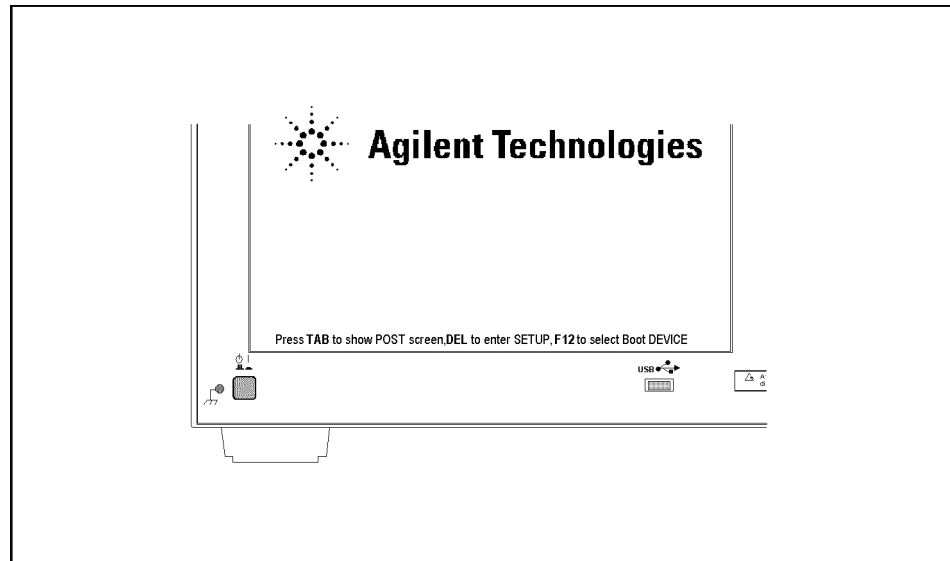
This section describes how to return the contents of the C drive to the factory state.

---

**NOTE** You need the keyboard for this operation.

---

- Step 1.** Shut down the E5070B/E5071B.
- Step 2.** Connect the keyboard to the E5070B/E5071B.
- Step 3.** Insert the disk for the system recovery which is furnished with the E5070B/E5071B into the floppy disk drive of the E5070B/E5071B.
- Step 4.** Press the standby switch of the E5070B/E5071B to turn it on.
- Step 5.** When the screen as shown in the figure below appears, press and hold **F12** of the keyboard until this screen disappears.



e5070bu034

---

**NOTE** After several seconds, the next screen appears automatically even if you do not press any key, so do not miss it.

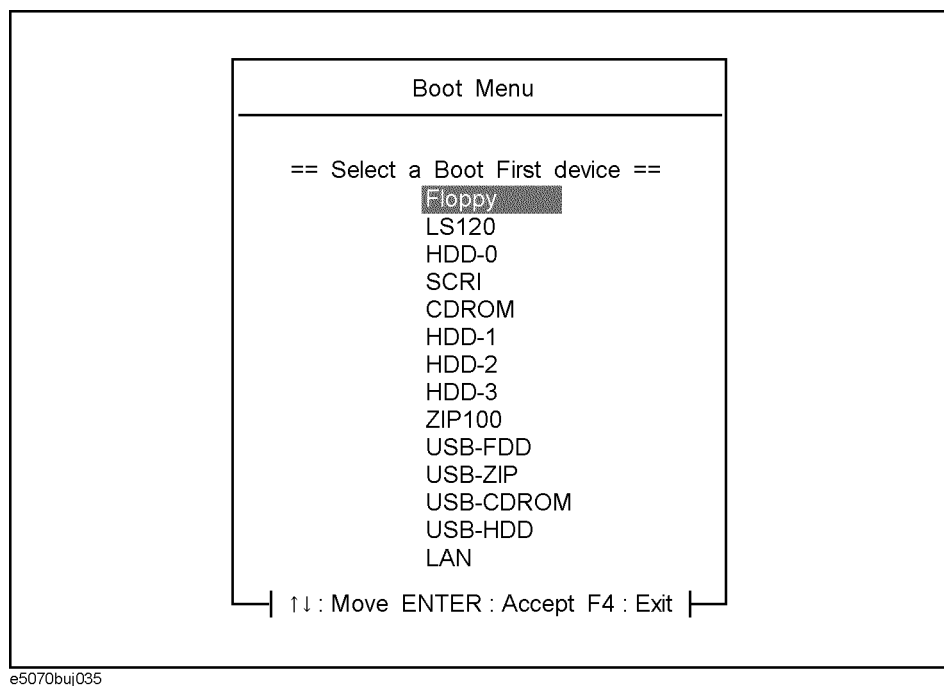
If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---

## System Recovery

### System Recovery

**Step 6.** The following screen appears. Check that Floppy is selected (highlighted) (if Floppy is not selected, select it with  of the keyboard), and press  of the keyboard.



**Step 7.** The message as shown below appears. Press  of the keyboard. If you want to cancel the factory recovery, press  here.

```
Agilent Technologies System Utilities
Recovery & Backup Options (for the E5070/71B)
```

Choose One of the following:

- 
1. Recover Factory Backup Image
  2. Create User Backup Image
  3. Recover User Backup Image
  4. Exit
- 

Enter a Choice: \_

---

#### NOTE

If the above message does not appear, the instrument or the disk for the system recovery is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---



- Step 8.** The message as shown below appears. Press **C** of the keyboard. If you want to cancel the factory recovery, press **E** here.

You chose to Restore your system by installing the original factory installed OS and system software.

WARNING: Press C to Continue only if you are sure that you want to proceed. The C: Drive will be completely overwritten with no chance of recovering any data. Use Option 1 to recover the system from a serious malfunction caused by corrupted or inadvertently deleted files on the system's primary C: partition.

Press C to Continue or E to Exit: \_

- Step 9.** The message as shown below appears. Press **C** of the keyboard to start the factory recovery. If you want to cancel the factory recovery, press **E** here.

CAUTION! Interrupting this process may leave the system in an unstable state. Allow the software to complete the backup and recovery process. This may take up to 20 minutes depending on the system configuration.

Press C to Continue or E to Exit: \_

---

**CAUTION**

**Never turn off the power during the system recovery because doing so may cause serious damage to the E5070B/E5071B.**

- Step 10.** The factory recovery will be complete in about 5 minutes. When the factory recovery is complete, the message as shown below appears. Press **Ctrl**, **Alt**, and **Delete** of the keyboard at the same time to restart.

Remove the disk and Press CLT+ALT+DEL to restart your system.

---

**NOTE**

If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

- Step 11.** After restart, the screen for initial registration appears. Execute initial registration. For information on the execution procedure, refer to “Initial Registration of E5070B/E5071B” on page 493.
- Step 12.** For the E5070B/E5071B equipped with the Option 016 touch screen, execute the calibration of the touch screen. For information on the execution procedure, refer to “Calibration of the Touch Screen” on page 496.


System Recovery  
System Recovery

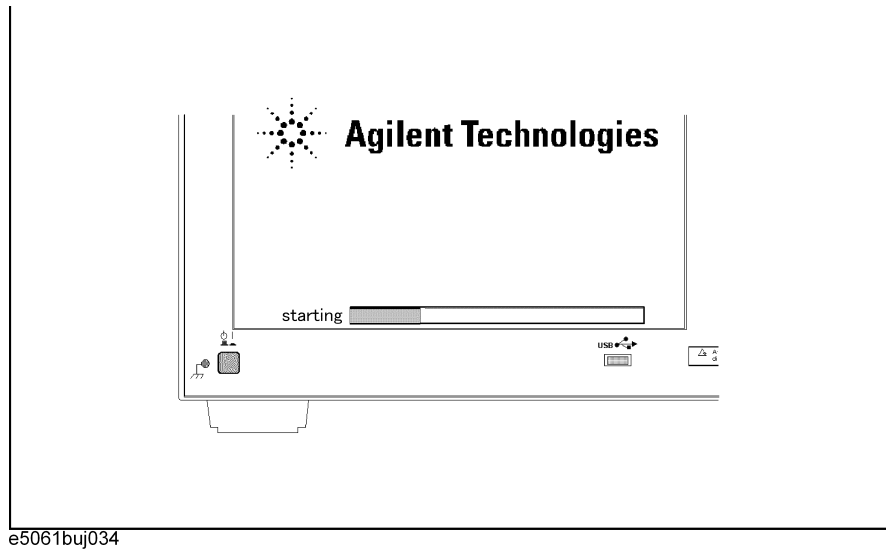
**Procedure to execute the factory recovery for E5070B : MY42300633,  
and above, E5071B : MY42301397 and above**

---

**NOTE** You need the keyboard for this operation.

---

- Step 1.** Shut down the E5070B/E5071B.
- Step 2.** Connect the keyboard to the E5070B/E5071B.
- Step 3.** Insert the disk for the system recovery which is furnished with the E5070B/E5071B into the floppy disk drive of the E5070B/E5071B.
- Step 4.** Press the standby switch of the E5070B/E5071B to turn it on.
- Step 5.** When the screen as shown in the figure below appears, press and hold  of the keyboard until this screen disappears.






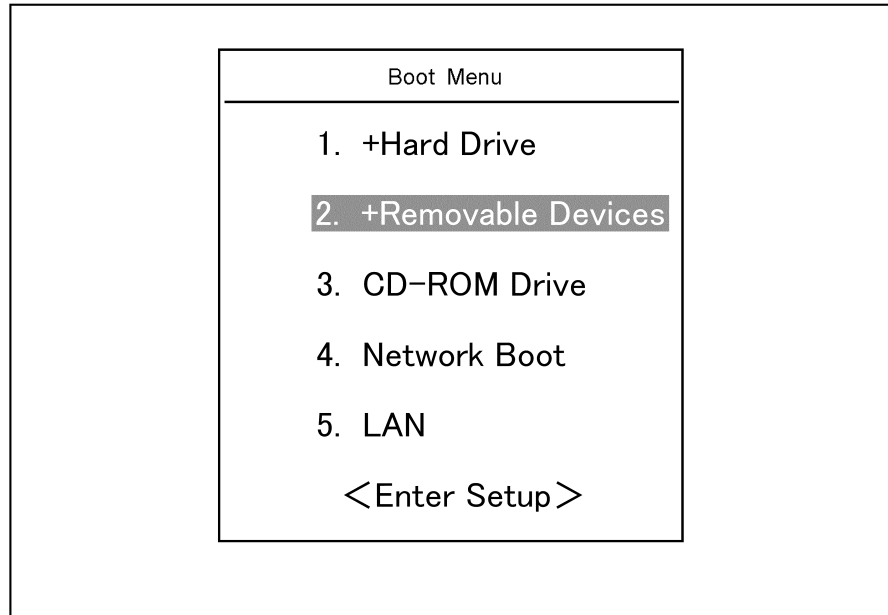
---



**NOTE** After several seconds, the next screen appears automatically even if you do not press any key, so do not miss it.

If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---

**Step 6.** The following screen appears. Select “+Removable Devices” with   of the keyboard, and press  of the keyboard.



**Step 7.** The message as shown below appears. Press  of the keyboard. If you want to cancel the factory recovery, press  here.

```

Agilent Technologies System Utilities
Recovery & Backup Options (for the E5070B/E5071B)

```

Choose One of the following:

- 
1. Recover Factory Backup Image
  2. Create User Backup Image
  3. Recover User Backup Image
  4. Exit
- 

Enter a Choice: \_

**NOTE**

If the above message does not appear, the instrument or the disk for the system recovery is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

## System Recovery

### System Recovery

- Step 8.** The message as shown below appears. Press **C** of the keyboard. If you want to cancel the factory recovery, press **E** here.

You chose to Restore your system by installing the original factory installed OS and system software.

WARNING: Press C to Continue only if you are sure that you want to proceed. The C: Drive will be completely overwritten with no chance of recovering any data. Use Option 1 to recover the system from a serious malfunction caused by corrupted or inadvertently deleted files on the system's primary C: partition.

Press C to Continue or E to Exit: \_

- Step 9.** The message as shown below appears. Press **C** of the keyboard to start the factory recovery. If you want to cancel the factory recovery, press **E** here.

CAUTION! Interrupting this process may leave the system in an unstable state. Allow the software to complete the backup and recovery process. This may take up to 20 minutes depending on the system configuration.

Press C to Continue or E to Exit: \_

---

#### CAUTION

**Never turn off the power during the system recovery because doing so may cause serious damage to the E5070B/E5071B.**

- Step 10.** The factory recovery will be complete in about 5 minutes. When the factory recovery is complete, the message as shown below appears. Press **Ctrl**, **Alt**, and **Delete** of the keyboard at the same time to restart.

Remove the disk and Press CLT+ALT+DEL to restart your system.

---

#### NOTE

If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

- Step 11.** After restart, the screen for initial registration appears. Execute initial registration. For information on the execution procedure, refer to “Initial Registration of E5070B/E5071B” on page 493.
- Step 12.** For the E5070B/E5071B equipped with the Option 016 touch screen, execute the calibration of the touch screen. For information on the execution procedure, refer to “Calibration of the Touch Screen” on page 496.

**Procedure to create the user backup image for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below**

This section describes how to create the user backup image. The C drive contents saved in this creation are recalled when the user recovery function is executed.

---

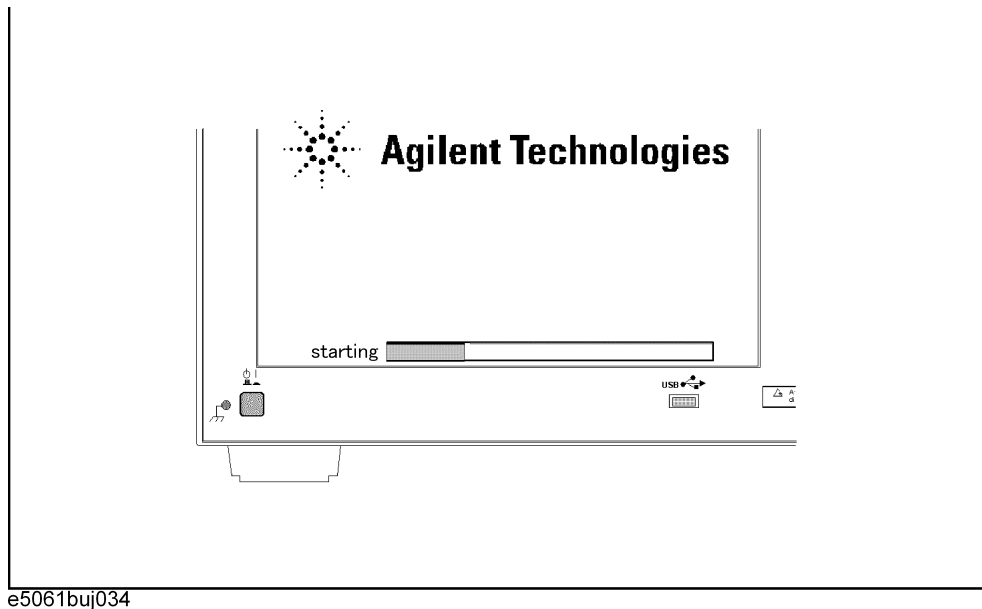
**NOTE** This function is available when the volume label on the hard disk is CP600 or higher.

---

**NOTE** You need the keyboard for this operation.

---

- Step 1.** Shut down the E5070B/E5071B.
- Step 2.** Connect the keyboard to the E5070B/E5071B.
- Step 3.** Insert the disk for the system recovery into the floppy disk drive of the E5070B/E5071B.
- Step 4.** Press the standby switch of the E5070B/E5071B to turn it on.
- Step 5.** When the screen as shown in the figure below appears, press and hold **F12** of the keyboard until this screen disappears.



---

**NOTE** After several seconds, the next screen appears automatically even if you do not press any key, so do not miss it.

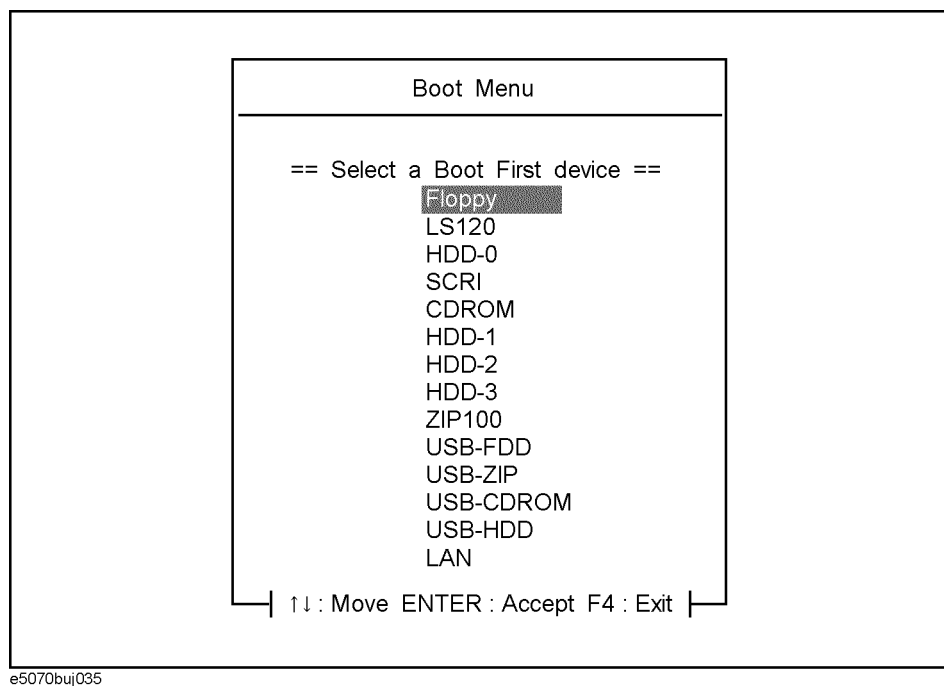
If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---

## System Recovery

### System Recovery

**Step 6.** The following screen appears. Check that Floppy is selected (highlighted) (if Floppy is not selected, select it with  of the keyboard), and press  of the keyboard.



**Step 7.** The message as shown below appears. Press  of the keyboard. If you want to cancel the create user backup image, press  here.

```
Agilent Technologies System Utilities
Recovery & Backup Options (for the E5070/71B)
```

Choose One of the following:

- 
1. Recover Factory Backup Image
  2. Create User Backup Image
  3. Recover User Backup Image
  4. Exit
- 

Enter a Choice: \_

---

#### NOTE

If the above message does not appear, the instrument or the disk for the system recovery is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---

- Step 8.** The message as shown below appears. Press **C** of the keyboard. If you want to cancel the create user backup image, press **E** here.

You chose to create a backup image file of your system.

The system will perform a quick integrity check of the file structure on the C: Drive. It will then copy the C: partition to an image file and store it on the System Recovery partition.

Press C to Continue or E to Exit: \_

- Step 9.** The message as shown below appears. Press **C** of the keyboard to start the create user backup image. If you want to cancel the create user backup image, press **E** here.

CAUTION! Interrupting this process may leave the system in an unstable state. Allow the software to complete the backup and recovery process. This may take up to 20 minutes depending on the system configuration.

Press C to Continue or E to Exit: \_

---

**CAUTION**

**Never turn off the power during the create user backup image because doing so may cause serious damage to the E5070B/E5071B.**

- Step 10.** The create user backup image will be complete in about 5 minutes. When the create user backup image is complete, the message as shown below appears. Press **Ctrl**, **Alt**, and **Delete** of the keyboard at the same time to restart.

Remove the disk and Press CLT+ALT+DEL to restart your system.

---

**NOTE**

If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

**Procedure to create the user backup image for E5070B : MY42300633,  
and above, E5071B : MY42301397 and above**

This section describes how to create the user backup image. The C drive contents saved in this creation are recalled when the user recovery function is executed.


---

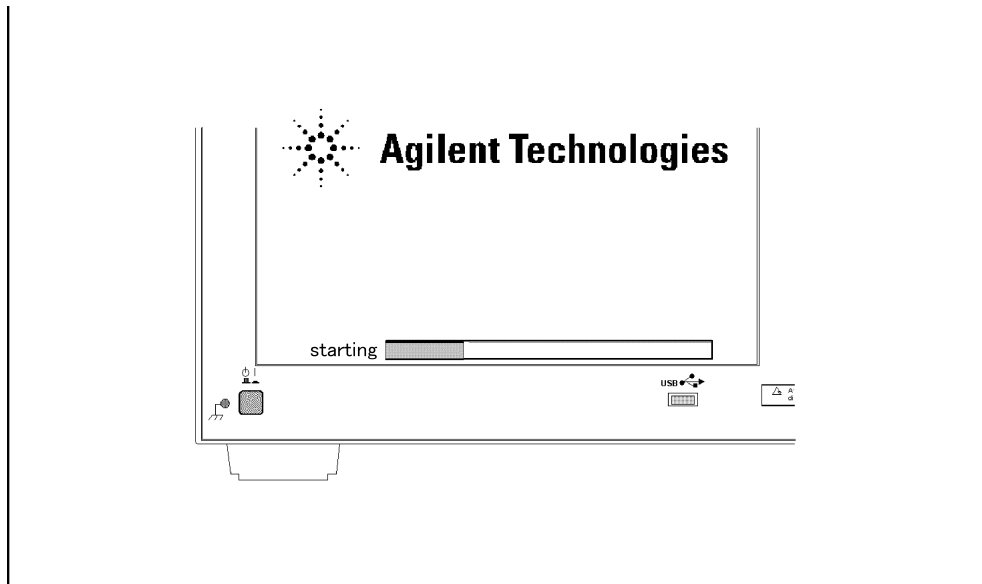
**NOTE** This function is available when the volume label on the hard disk is CP600 or higher.

---

**NOTE** You need the keyboard for this operation.

---

- Step 1.** Shut down the E5070B/E5071B.
- Step 2.** Connect the keyboard to the E5070B/E5071B.
- Step 3.** Insert the disk for the system recovery into the floppy disk drive of the E5070B/E5071B.
- Step 4.** Press the standby switch of the E5070B/E5071B to turn it on.
- Step 5.** When the screen as shown in the figure below appears, press and hold  of the keyboard until this screen disappears.



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---

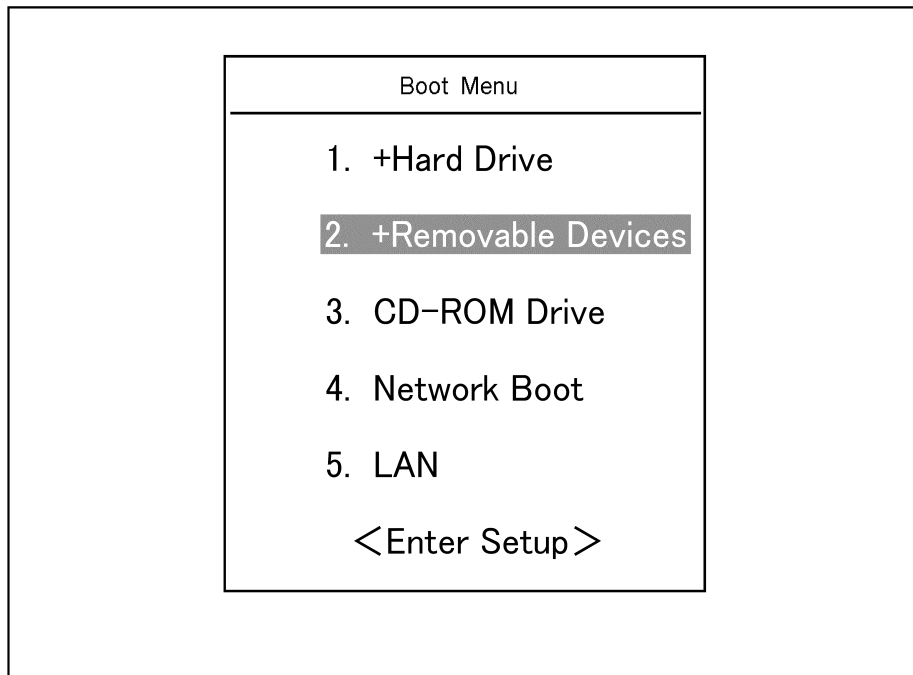
**NOTE** After several seconds, the next screen appears automatically even if you do not press any key, so do not miss it.

If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---



**Step 6.** The following screen appears. Select “+Removable Devices” with   of the keyboard, and press  of the keyboard.



**Step 7.** The message as shown below appears. Press  of the keyboard. If you want to cancel the create user backup image, press  here.

```

Agilent Technologies System Utilities
Recovery & Backup Options (for the E5070/71B)

```

Choose One of the following:

- 
- 1. Recover Factory Backup Image
  - 2. Create User Backup Image
  - 3. Recover User Backup Image
  - 4. Exit
- 

Enter a Choice: \_

**NOTE**

If the above message does not appear, the instrument or the disk for the system recovery is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

## System Recovery

### System Recovery

**Step 8.** The message as shown below appears. Press **C** of the keyboard. If you want to cancel the create user backup image, press **E** here.

You chose to create a backup image file of your system.

The system will perform a quick integrity check of the file structure on the C: Drive. It will then copy the C: partition to an image file and store it on the System Recovery partition.

Press C to Continue or E to Exit: \_

**Step 9.** The message as shown below appears. Press **C** of the keyboard to start the create user backup image. If you want to cancel the create user backup image, press **E** here.

CAUTION! Interrupting this process may leave the system in an unstable state. Allow the software to complete the backup and recovery process. This may take up to 20 minutes depending on the system configuration.

Press C to Continue or E to Exit: \_

---

#### CAUTION

**Never turn off the power during the create user backup image because doing so may cause serious damage to the E5070B/E5071B.**

---

**Step 10.** The create user backup image will be complete in about 5 minutes. When the create user backup image is complete, the message as shown below appears. Press **Ctrl**, **Alt**, and **Delete** of the keyboard at the same time to restart.

Remove the disk and Press CLT+ALT+DEL to restart your system.

---

#### NOTE

If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---

**Procedure to execute the user recovery function for E5070B :  
JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx,  
MY42301396 and below**

Returns the contents of the C drive to a user-specified state. To use this function, you must create the user backup image in advance. For more information, see the description “Procedure to create the user backup image for E5070B : JP1KKxxxxx, MY42300632 and below, E5071B : JP1KKxxxxx, MY42301396 and below” on page 481.

---

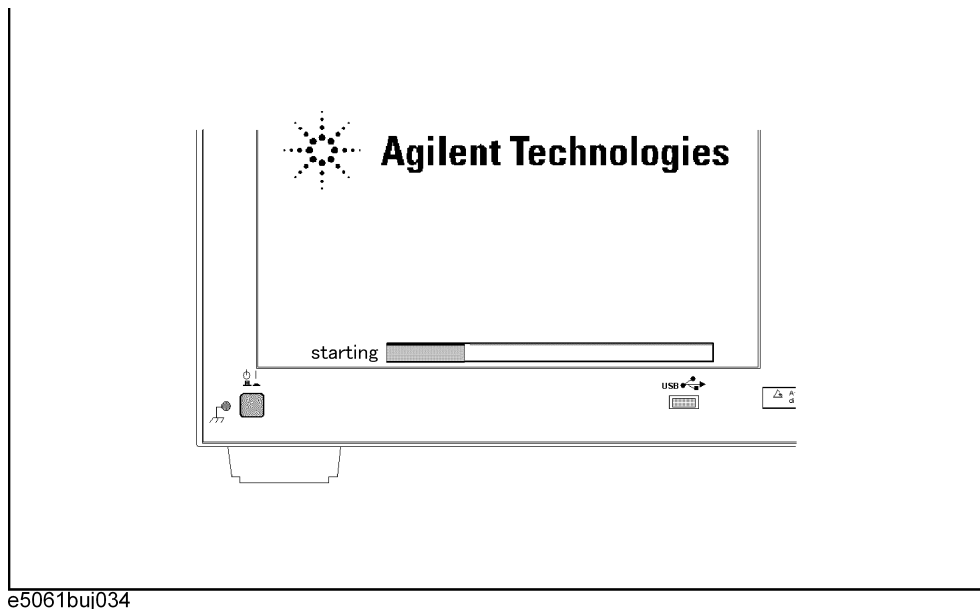
**NOTE** This function is available when the volume label on the hard disk is CP600 or higher.

---

**NOTE** You need the keyboard for this operation.

---

- Step 1.** Shut down the E5070B/E5071B.
- Step 2.** Connect the keyboard to the E5070B/E5071B.
- Step 3.** Insert the disk for the system recovery into the floppy disk drive of the E5070B/E5071B.
- Step 4.** Press the standby switch of the E5070B/E5071B to turn it on.
- Step 5.** When the screen as shown in the figure below appears, press and hold **F12** of the keyboard until this screen disappears.



---

**NOTE** After several seconds, the next screen appears automatically even if you do not press any key, so do not miss it.

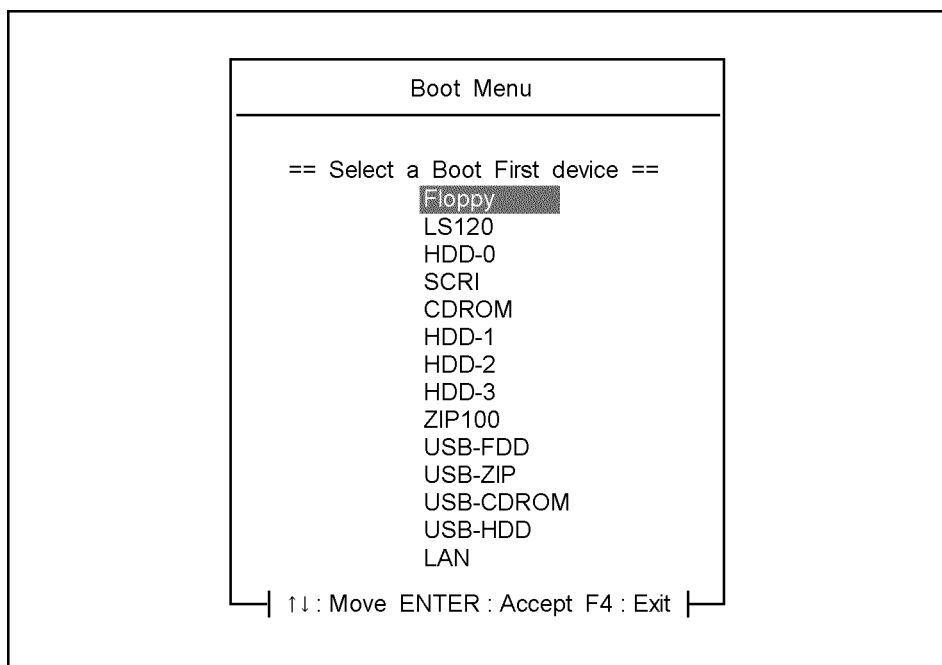
If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---

## System Recovery

### System Recovery

**Step 6.** The following screen appears. Check that Floppy is selected (highlighted) (if Floppy is not selected, select it with  of the keyboard), and press  of the keyboard.



**Step 7.** The message as shown below appears. Press  of the keyboard. If you want to cancel the user recovery, press  here.

```
Agilent Technologies System Utilities
Recovery & Backup Options (for the E5070/71B)
```

Choose One of the following:

- 
1. Recover Factory Backup Image
  2. Create User Backup Image
  3. Recover User Backup Image
  4. Exit
- 

Enter a Choice: \_

---

#### NOTE

If the above message does not appear, the instrument or the disk for the system recovery is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---

- Step 8.** The message as shown below appears. Press **C** of the keyboard. If you want to cancel the user recovery, press **E** here.

You chose to recover your own system backup image file.

WARNING: Press C to Continue only if you are sure that you want to proceed. The C: partition will be completely overwritten with no chance of recovering any data. Use Option 3 to recover the system from a serious malfunction caused by corrupted or inadvertently deleted files on the system's primary C: partition.

Press C to Continue or E to Exit: \_

- Step 9.** The message as shown below appears. Press **C** of the keyboard to start the user recovery. If you want to cancel the user recovery, press **E** here.

CAUTION! Interrupting this process may leave the system in an unstable state. Allow the software to complete the backup and recovery process. This may take up to 20 minutes depending on the system configuration.

Press C to Continue or E to Exit: \_

---

**CAUTION**

**Never turn off the power during the system recovery because doing so may cause serious damage to the E5070B/E5071B.**

---

- Step 10.** The user recovery will be complete in about 5 minutes. When the user recovery is complete, the message as shown below appears. Press **Ctrl**, **Alt**, and **Delete** of the keyboard at the same time to restart.

Remove the disk and Press CLT+ALT+DEL to restart your system.

---

**NOTE**

If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---

**Procedure to execute the user recovery function for E5070B :  
MY42300633, and above, E5071B : MY42301397 and above**

Returns the contents of the C drive to a user-specified state. To use this function, you must create the user backup image in advance. For more information, see the description “Procedure to create the user backup image for E5070B : MY42300633, and above, E5071B : MY42301397 and above” on page 484.


---

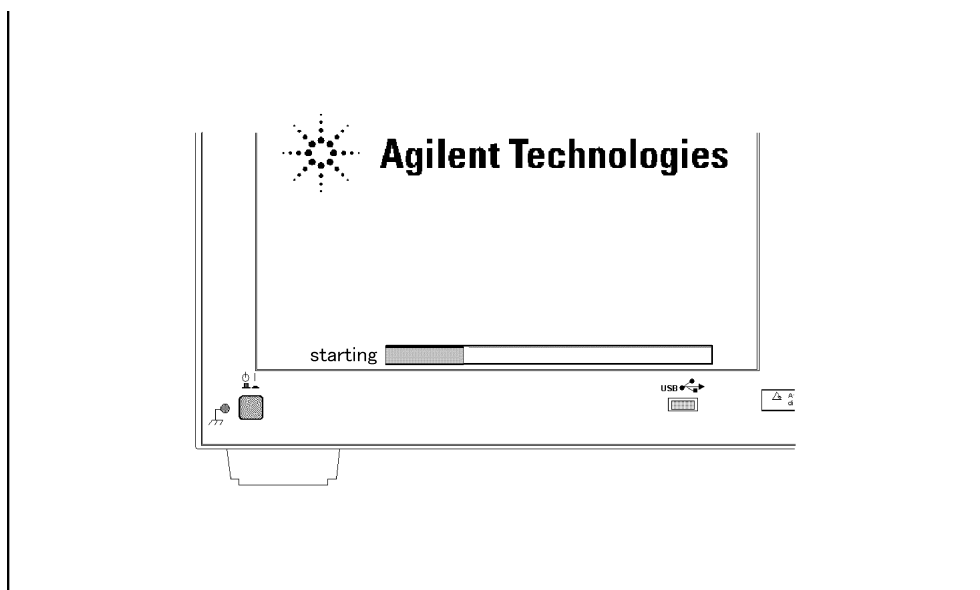
**NOTE** This function is available when the volume label on the hard disk is CP600 or higher.

---

**NOTE** You need the keyboard for this operation.

---

- Step 1.** Shut down the E5070B/E5071B.
- Step 2.** Connect the keyboard to the E5070B/E5071B.
- Step 3.** Insert the disk for the system recovery into the floppy disk drive of the E5070B/E5071B.
- Step 4.** Press the standby switch of the E5070B/E5071B to turn it on.
- Step 5.** When the screen as shown in the figure below appears, press and hold  of the keyboard until this screen disappears.






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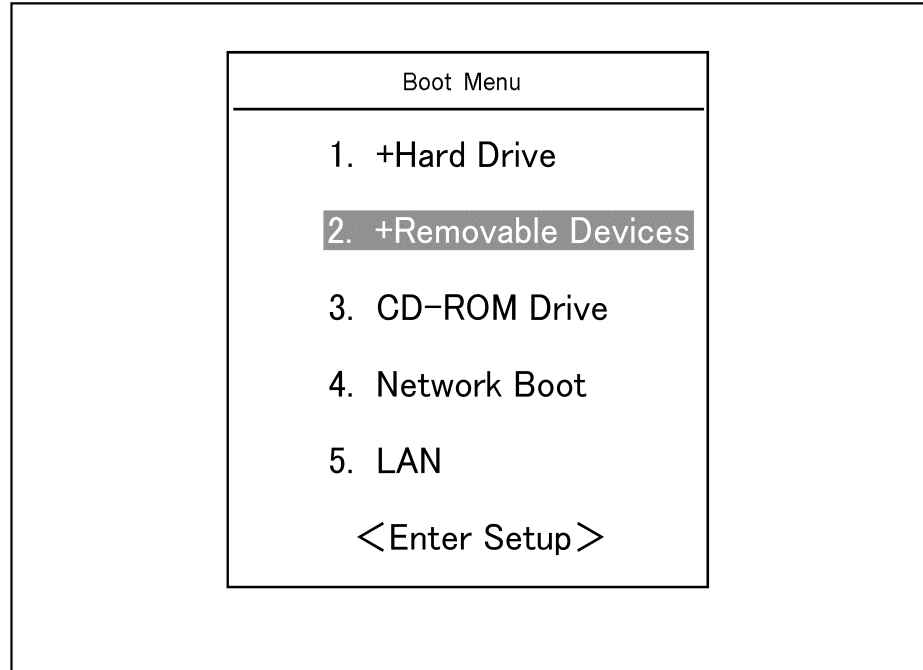
---



**NOTE** After several seconds, the next screen appears automatically even if you do not press any key, so do not miss it.

If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---

**Step 6.** The following screen appears. Select “+Removable Devices” with   of the keyboard, and press  of the keyboard.



**Step 7.** The message as shown below appears. Press  of the keyboard. If you want to cancel the user recovery, press  here.

```

Agilent Technologies System Utilities
Recovery & Backup Options (for the E5070/71B)

```

Choose One of the following:

- 
1. Recover Factory Backup Image
  2. Create User Backup Image
  3. Recover User Backup Image
  4. Exit
- 

Enter a Choice: \_

**NOTE**

If the above message does not appear, the instrument or the disk for the system recovery is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

## System Recovery

### System Recovery

**Step 8.** The message as shown below appears. Press **C** of the keyboard. If you want to cancel the user recovery, press **E** here.

You chose to recover your own system backup image file.

WARNING: Press C to Continue only if you are sure that you want to proceed. The C: partition will be completely overwritten with no chance of recovering any data. Use Option 3 to recover the system from a serious malfunction caused by corrupted or inadvertently deleted files on the system's primary C: partition.

Press C to Continue or E to Exit: \_

**Step 9.** The message as shown below appears. Press **C** of the keyboard to start the user recovery. If you want to cancel the user recovery, press **E** here.

CAUTION! Interrupting this process may leave the system in an unstable state. Allow the software to complete the backup and recovery process. This may take up to 20 minutes depending on the system configuration.

Press C to Continue or E to Exit: \_

---

#### CAUTION

**Never turn off the power during the system recovery because doing so may cause serious damage to the E5070B/E5071B.**

---

**Step 10.** The user recovery will be complete in about 5 minutes. When the user recovery is complete, the message as shown below appears. Press **Ctrl**, **Alt**, and **Delete** of the keyboard at the same time to restart.

Remove the disk and Press CLT+ALT+DEL to restart your system.

---

#### NOTE

If the above message does not appear, the instrument is at fault; contact your local Agilent customer center listed at the end of this manual or distributor.

---



---

## Initial Registration of E5070B/E5071B

When you start up the E5070B/E5071B for the first time or after executing system recovery, you need to perform the initial registration of the Windows 2000 operating system of the E5070B/E5071B.

---

**NOTE** You cannot use the front panel keys during the initial registration of the E5070B/E5071B therefore connect the mouse and the keyboard before turning on the power.

---

**NOTE** If you perform the following procedure incorrectly, a message asking you whether to return to the previous registration screen and perform the registration appears. In this case, follow the instruction to return to the previous registration screen.

---

- Step 1.** Turns on the E5070B/E5071B.
- Step 2.** The Windows 2000 Professional Setup wizard appears. Click the **Next >** button (Figure B-1).

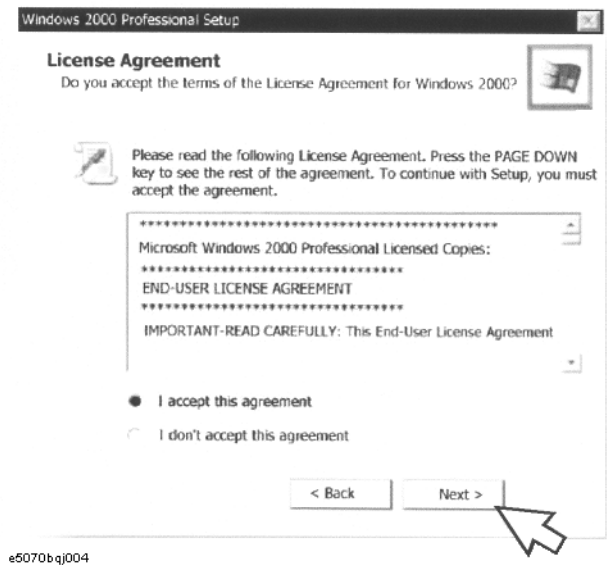
**Figure B-1** Windows 2000 Professional Setup wizard



System Recovery  
Initial Registration of E5070B/E5071B

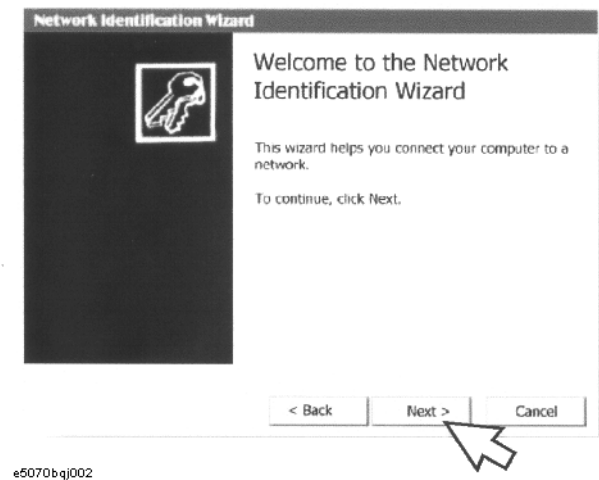
**Step 3.** In the Windows 2000 Professional Setup dialog box, select the **I accept this agreement** box and click the **Next >** button (Figure B-2). Then, the Windows 2000 operating system is restarted automatically.

**Figure B-2** Windows 2000 Professional Setup dialog box



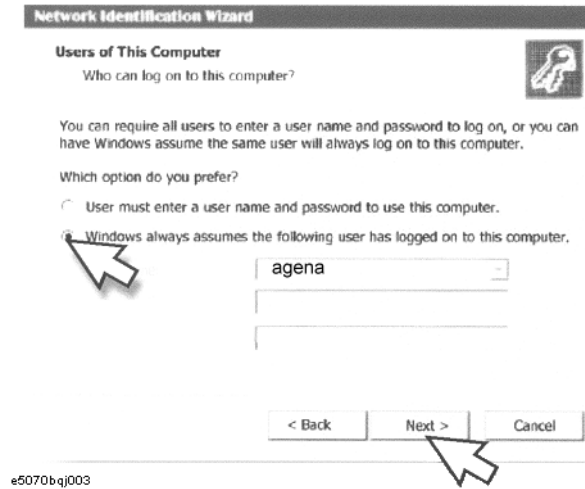
**Step 4.** The Network Identification wizard appears. Click the **Next >** button (Figure B-3).

**Figure B-3** Network Identification wizard



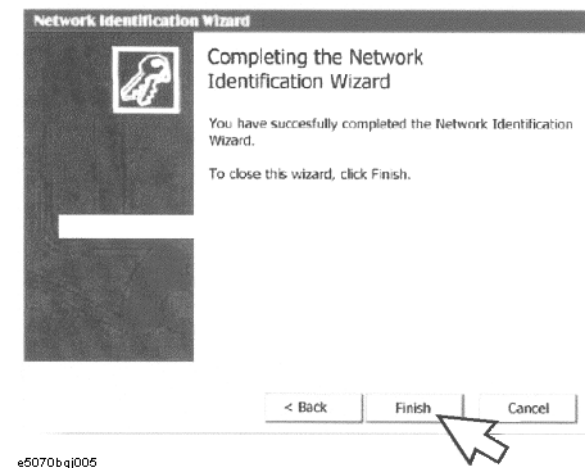
- Step 5.** In the Network Identification Wizard dialog box (1/2), select the **Windows always assumes the following user has logged on to this computer** box and check that **agena** is in the **User Name** box. If not, type in **agena**. Finally, click the **Next>** button (Figure B-4).

**Figure B-4** Network Identification Wizard dialog box (1/2)



- Step 6.** In the Network Identification Wizard dialog box (2/2), click the **Finish** button to finish the initial registration of the E5070B/E5071B (Figure B-4). Then, the measurement display of the E5070B/E5071B appears.

**Figure B-5** Network Identification Wizard dialog box (2/2)



## Calibration of the Touch Screen

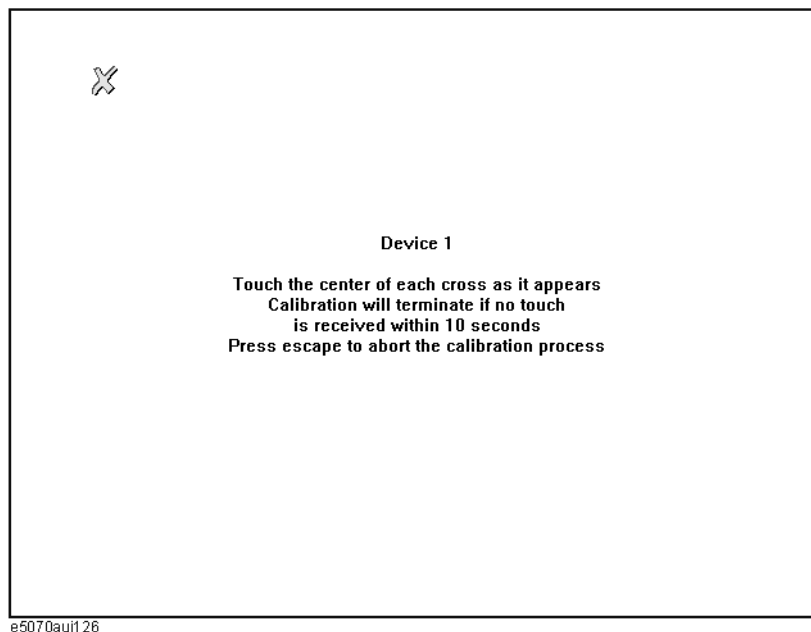
When you have executed system recovery on the E5070B/E5071B equipped with an Option 016 touch screen, you have to calibrate the touch screen. Follow the procedure described below to calibrate the touch screen.

- Step 1.** Press **System**.
- Step 2.** Press **Service Menu**.
- Step 3.** Press **Test Menu**.
- Step 4.** Press **Adjust Touch Screen**.

The touch screen calibration screen (Figure 7-1) appears.

Figure 7-1

### Touch Panel Calibration Screen



- Step 5.** Touch the x mark on the upper left with your finger. The mark x appears also on the lower left, upper right, and lower right. Touch the x marks in that order with your finger.

Touching the four locations described above with your finger automatically concludes the touch screen calibration.

---

#### NOTE

With no operation on the touch screen calibration screen for a preset time, it automatically closes and the previous measurement screen reappears.

---

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

This appendix describes how to update the E5070B/E5071B firmware. When you want to update the E5070B/E5071B firmware, refer to this appendix.

---

## Firmware Update for revision A.06.51 or lower

### Required Equipment

- E5070B or E5071B (with keyboard and mouse).
- Several blank floppy disks (DOS format).

### How to make E5070B/E5071B Firmware Installation Disk

The following is the procedure to make the E5070B/E5071B Firmware Installation Disk.

- Step 1.** Copy the following files from Agilent Technologies web site to the several floppy disks using your computer's FDD.

---

#### NOTE

You need the same number of floppy disks as that of cab files. Where, "n" indicates the maximum number of floppy disks.

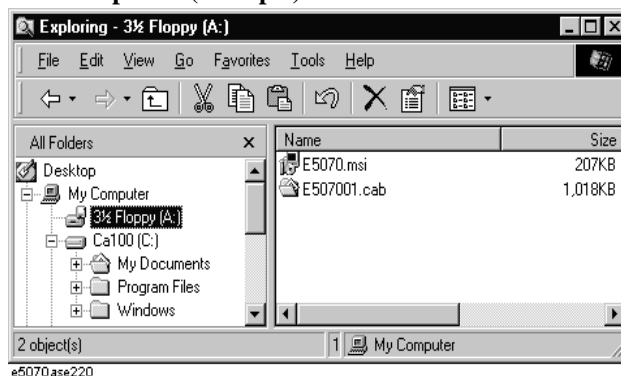
- disk1(1 of n)-- e5070.msi, e507001.cab
- disk2(2 of n)-- e507002.cab
- disk3(3 of n)-- e507003.cab
- :
- diskn(n of n)-- e5070xx.cab

- Step 2.** Assign the Label name as follows using the properties of your computer's Windows Explorer as shown in Figure C-1.

- DISK\_1 (for disk1)
- DISK\_2 (for disk2)
- DISK\_3 (for disk3)
- :
- DISK\_n (for diskn)

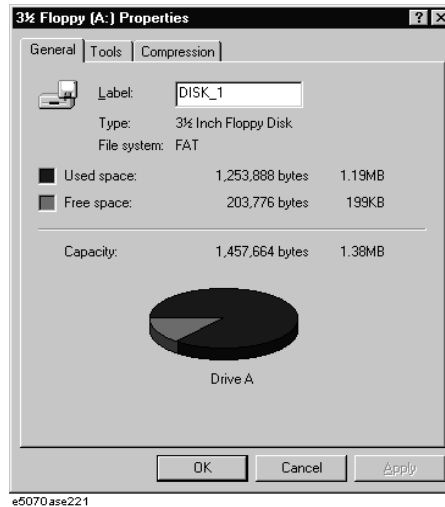
Figure C-1

#### Windows Explorer (example)



1. Insert the disk1 into the FDD of your computer.
2. On the Windows Explorer, click **3 1/2 Floppy [A:]** and confirm the files.
3. Right click on **3 1/2 Floppy [A:]**, then click **Properties**. The Properties dialog box appears.
4. Enter the Label name in the Label box of properties dialog box (General) for the disk1 as shown in Figure C-2, and press the **OK** button.

**Figure C-2** Properties Dialog Box (example)



5. Perform 1 through  $n$  for each disk.

**NOTE**

If the label name is not assigned, the firmware update for the E5070B/E5071B will not be done correctly.

**How to update the E5070B/E5071B firmware**

It is possible to update the E5070B/E5071B firmware, but not the following software by this procedure.

- OS (Operating System)
- VBA (Visual Basic for Application)
- Calibration Constant Data

The following is the procedure to update the E5070B/E5071B firmware.

- Step 1.** Prepare the E5070B/E5071B firmware installation disks.
- Step 2.** Connect the mouse and the keyboard to the E5070B/E5071B rear panel. Then turn the E5070B/E5071B on.
- Step 3.** Insert the E5070B/E5071B firmware installation disk1 into the FDD of the E5070B/E5071B.
- Step 4.** Update the E5070B/E5071B firmware.

## Firmware Update

### Firmware Update for revision A.06.51 or lower

1. Press **System** key.
2. Press **Service Menu - Update Firmware** on the menu bar, and the Password dialog box will appear.

---

**NOTE**

If you do not see “Update Firmware” soft key, execute log-off, and re-login as “agena”.

3. Enter the password **e507xa** into the Password box, then click **OK**.
4. Open dialog box appears. Confirm that **E5070.msi** is displayed at the File name column. Press the **Open** button, and the Windows installer will appear.
5. After the disk 1 installation is finished, insert the firmware installation disk 2 (2 of  $n$ ) into the FDD of the E5070B/E5071B, then click **OK**.
6. Repeat 5 for the number of floppy disks.

**Step 5.** After the disk  $n$  installation is finished, the instrument will be restarted and the measurement view will appear.

**Step 6.** Press **System** -**Firmware Revision**. Confirm the firmware revision you have just installed.



---

## Firmware Update for revision A.08.01 and A.08.11

### Required Equipment

- E5070B or E5071B (with keyboard and mouse).
- Several blank floppy disks (DOS format).

### How to make E5070B/E5071B Firmware Installation Disk

The following is the procedure to make the E5070B/E5071B Firmware Installation Disk.

- Step 1.** Copy the following files from Agilent Technologies web site to the several floppy disks using your computer's FDD.

---

**NOTE**

You need the same number of floppy disks as that of cab files. Where, “*n*” indicates the maximum number of floppy disks.

---

**NOTE**

Copy the msi file to each of the floppy disks.

- disk1(1 of *n*)-- e5070.msi, e507001.cab
- disk2(2 of *n*)-- e5070.msi, e507002.cab
- :
- disk*n*(*n* of *n*)-- e5070.msi, e5070xx.cab

### How to update the E5070B/E5071B firmware

It is possible to update the E5070B/E5071B firmware, but not the following software by this procedure.

- OS (Operating System)
- VBA (Visual Basic for Application)
- Calibration Constant Data

The following is the procedure to update the E5070B/E5071B firmware.

- Step 1.** Prepare the E5070B/E5071B firmware installation disks.
- Step 2.** Connect the mouse and the keyboard to the E5070B/E5071B rear panel. Then turn the E5070B/E5071B on.
- Step 3.** Insert the E5070B/E5071B firmware installation disk1 into the FDD of the E5070B/E5071B.
- Step 4.** Update the E5070B/E5071B firmware.
1. Press **System** key.
  2. Press **Service Menu - Update Firmware** on the menu bar, and the Password dialog box

Firmware Update  
Firmware Update for revision A.08.01 and A.08.11

will appear.

---

**NOTE**

If you do not see “Update Firmware” soft key, execute log-off, and re-login as “agena”.

3. Enter the password **e507xa** into the Password box, then click **OK**.
4. Open dialog box apperas. Confirm that **E5070.msi** is displayed at the File name column. Press the **Open** button, and the Windows instoller will appear.
5. After the disk 1 installation is finished, insert the firmware installation disk 2 (2 of *n*) into the FDD of the E5070B/E5071B, then click **OK**.
6. Repeat 5 for the number of floppy disks.

**Step 5.** After the disk *n* installation is fininshed, the instrument will be restarted and the measurement view will appear.

**Step 6.** Press System -**Firmware Revision**. Confirm the firmware revision you have just installed.

---

## Firmware Update for revision A.09.10 or later

### Required Equipment

- E5070B or E5071B (with keyboard and mouse).
- USB mass storage device.

### Location of the latest E5070B/71B Firmware

**Step 1.** The latest firmware can be downloaded from the following site.

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

### How to update the E5070B/E5071B firmware

It is possible to update the E5070B/E5071B firmware, but not the following software by this procedure.

- OS (Operating System)
- VBA (Visual Basic for Application)
- Calibration Constant Data

The following is the procedure to update the E5070B/E5071B firmware.

---

**NOTE** User should log in as “agena”, and user should have administrator authority when performing firmware update.

---

**Step 1.** Download the latest firmware from the donload site. It is prepared as execusion file (E507071B\_xx.yy.exe).

**Step 2.** Run the “E507071B\_xx.yy.exe” to extract the E5070.msi. Then, save the E5070.msi to USB mass storage device using PC.

---

**NOTE** For E5070B/71B firmware revision 9.10 or later, there is only 1 .msi file and no .cab files.

---

**Step 3.** Connect the mouse and the keyboard to the E5070B/E5071B rear panel. Then turn the E5070B/E5071B on.

**Step 4.** Connect the USB mass storage device into the front USB port of the E5070B/71B.

**Step 5.** Copy e5070.msi from the USB mass storage device to the directory under D:\ drive.

---

**NOTE** Do not use “space“ for directory name.

---

**Step 6.** Update the E5070B/E5071B firmware.

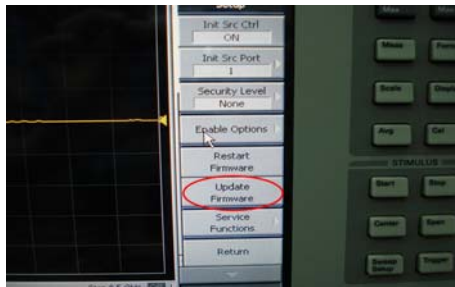
1. Press **System** key.
2. Press **Service Menu - Update Firmware** on the menu bar, and the Password dialog box will appear.

Firmware Update  
Firmware Update for revision A.09.10 or later

Figure C-3 Service Menu soft key



Figure C-4 Update Firmware soft key

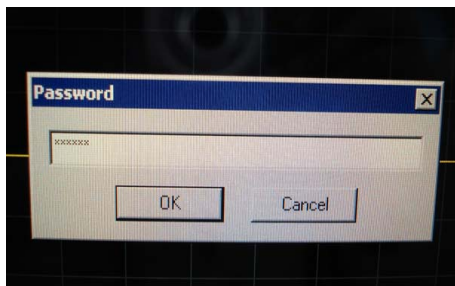


---

**NOTE** If you do not see “Update Firmware” soft key, execute log-off, and re-login as “agena”.

3. When prompted for a password, enter the password **e507xa** into the Password box, then click **OK**.

Figure C-5 Password Box



4. Press **Cancel** if you are asked to insert a disk into drive A and select the D:\ drive from **Look in**.
  5. Confirm that E5070.msi is displayed at the File name column. Select it, then press the **Open** button and the Windows installer will appear.
- Step 7.** After installation is finished, the instrument will be restarted and the measurement view will appear.
- Step 8.** Press **[System]** -**Firmware Revision**. Confirm the firmware revision you have just installed.

Figure C-6 Firmware Revision soft key



- Step 9.** To unplug USB mass storage device, press Ctrl & ESC on the keyboard. The Windows toolbar should appear. There should be the “Unplug/Eject Hardware“ (a green arrow) icon in the system tray.

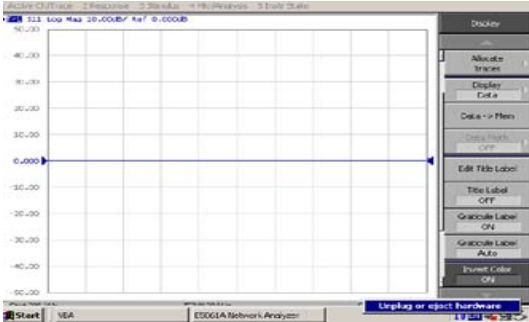
Figure C-7 Windows toolbar



- Step 10.** Left click on the icon to stop USB mass storage device, or right click on the icon then “Unplug or eject “ to show “Unplug or Eject Hardware“ screen.

Firmware Update  
Firmware Update for revision A.09.10 or later

Figure C-8 Unplug or eject hardware



---

## **D** **Computer Virus Check**

This appendix describes an example of how to check the system of E5070B/E5071B for computer viruses using computer viruses check software.

## Computer Virus Check

The E5070B/E5071B should be protected against computer viruses. If you need to check the system of E5070B/E5071B for computer viruses, it's recommended that an external PC installed anti-virus software is used to access E5070B/E5071B's built-in drive (C and D) via LAN and perform virus scan.

The E5070B/E5071B has no virus function nor anti-virus software installed. The Windows operating system installed in this instrument is customized for more effective operation. Installing Windows-based software (including anti-virus software) for ordinary PCs into this instrument may affect the behavior of the instrument during measurement.

### Required equipment

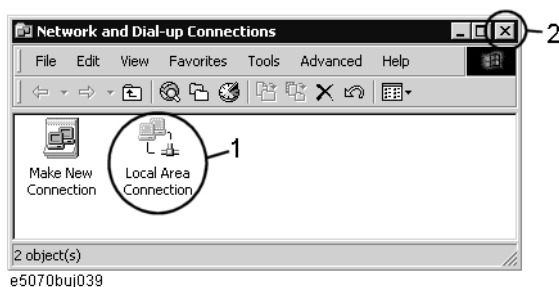
- E5070B or E5071B (with keyboard and mouse).
- An external PC installed anti-virus software such as "Norton AntiVirus®".
- A crossed LAN cable (It enables the peer-to-peer communication between the E5070B/E5071B and the PC.)

### How to check the drive C and D of E5070B/E5071B

The following is an example procedure to check the drive C and D of E5070B/E5071B using the external PC.

- Step 1.** Set up the E5070B/E5071B for file sharing.
1. Connect the E5070B/E5071B to the PC using the crossed LAN cable.
  2. Press **[System]** key.
  3. Press **Misc Setup - Network Setup - Network Configuration**. The Network and Dial-up Connections window will appear.

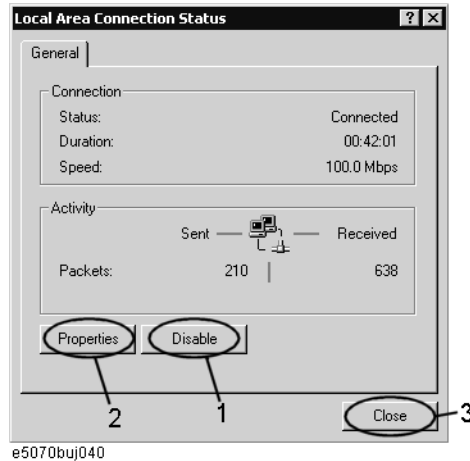
**Figure D-1** Network and Dial-up Connections window



4. Double-click the Local Area Connection icon (1 in Figure D-1) in the Network and dial-up connections window to enable the network connection function. The Local Area Connection Status dialog box appears. Click the **Properties** button.

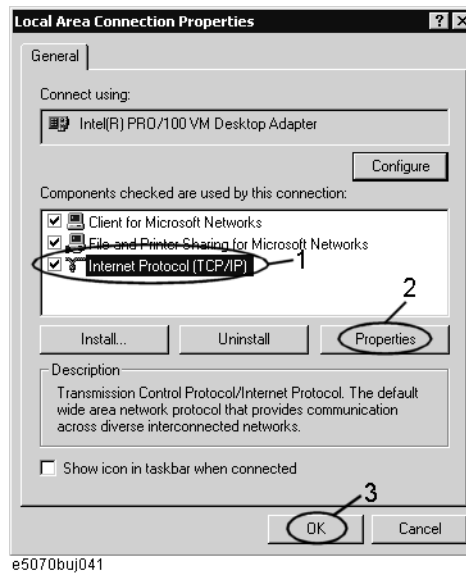


**Figure D-2** Local Area Connection Status dialog box



5. The Local Area Connection Properties dialog box (Figure D-3) appears. Select (highlight) **Internet protocol (TCP/IP)** (1 in Figure D-3) and then click the **Properties** button (2 in Figure D-3).

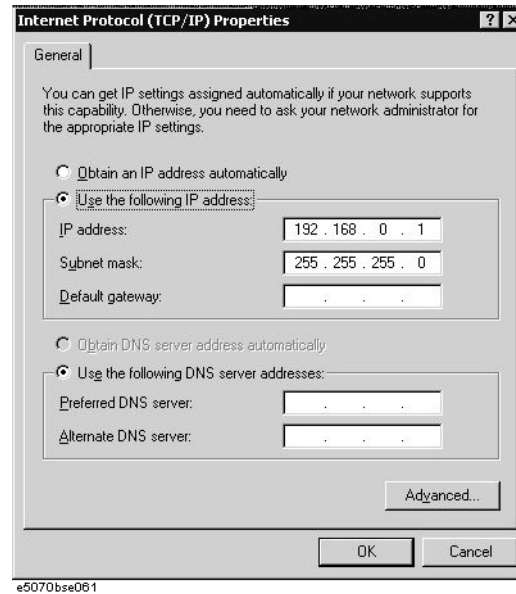
**Figure D-3** Local Area Connection Properties dialog box



6. The Internet Protocol (TCP/IP) Properties dialog box (Figure D-4 ) appears. If **Obtain an IP address automatically** has been selected, you select **Use the following IP address** (1 in Figure D-4) and then enter the IP address 192.168.0.1 (2 in Figure D-4) and subnet mask 255.255.255.0 (3 in Figure D-4).

If a specific IP address and subnet mask have been assigned, press the **OK** button.

**Figure D-4** Internet Protocol (TCP/IP) Properties dialog box

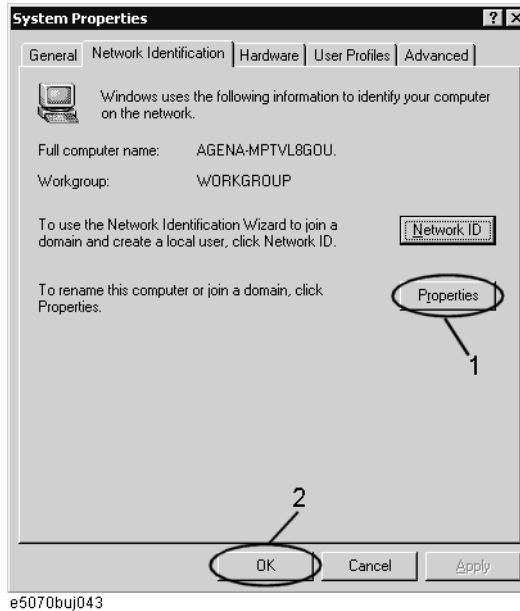


7. In the Internet Protocol (TCP/IP) Properties dialog vbox, click the **OK** button (6 in Figure D-4 ).
8. In the Local Area Connection Properties dialog box, click the **OK** button (3 in Figure D-3).
9. In the Local Area Connection Status dialog box, click the **Close** button (3 in Figure D-2).
10. Click the **x** button (2 in Figure D-1) in the upper right of the Network and Dial-up Connection window.

**Step 2.** Confirm the computer name of the E5070B/E5071B.

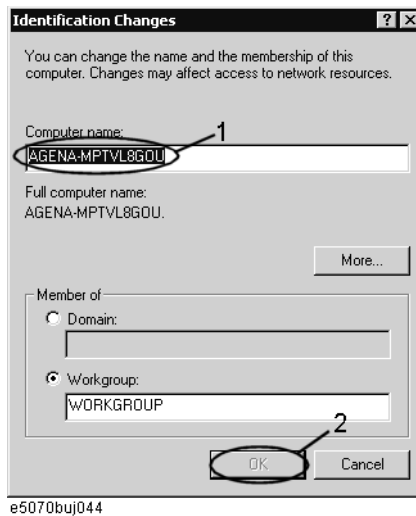
1. Press **System** key.
2. Press **Misc Setup - Network Setup - Network Identification**.
3. The System Properties dialog box as shown in Figure D-5 will appear. Click the **Properties** button (1 in Figure D-5).

**Figure D-5** System Properties dialog box



4. The Identification Change dialog box (Figure D-6) appears. Confirm the computer name in the **Computer Name** box (1 in Figure D-6).

**Figure D-6** Identification Change dialog box

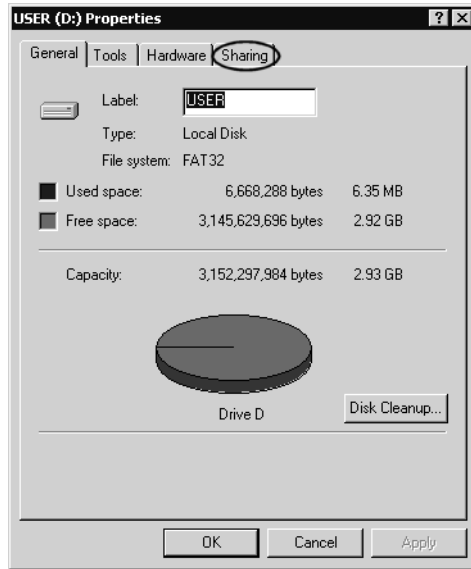


5. Turn the E5070B/E5071B power off and then turn it on.

**Step 3.** Set for sharing the hard disk (C or D drive) in the E5070B/E5071B.

1. Press **Save/Recall**., and then press **Explore ....**
2. The Windows Explorer opens. Right click on **(C:)** or **USER (D:)** and then click **Properties** in the File menu.
3. The (C:) or USERS(D:) Properties dialog box (Figure D-7) appears. Select the **Sharing** tab.

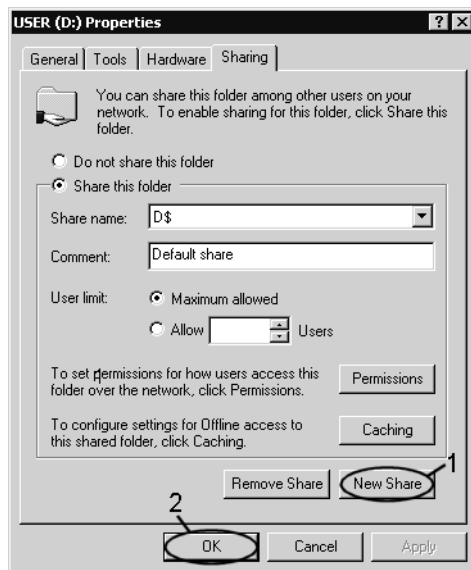
Figure D-7 USERS(D:) Properties dialog box (General tab)



e5070buj047

4. Select the **Share this folder** if (C:) is selected. Click the **New Share** button (1 in Figure D-8).

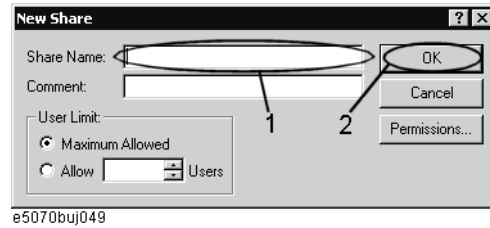
Figure D-8 USERS(D:) Properties dialog box (Sharing tab)



e5070buj048

5. The New Share dialog box (Figure D-9) appears. Enter the share name (name used when accessed from the external PC) in the **Share Name** box (1 in Figure D-9) and click the **OK** button (2 in Figure D-9).

**Figure D-9** New Share dialog box

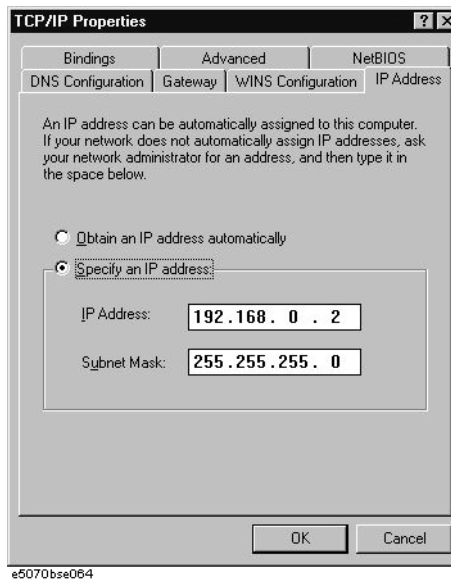


6. In the (C:) or USERS(D:) Properties dialog box, click the **OK** button (2 in Figure D-8).

**Step 4.** Set up the external PC's IP address and subnet mask.

1. Double-click "**My Computer**" icon on Windows desktop of the external PC. And double-click **Control Panel**. The Control Panel window will appear.
2. In the Control Panel window, double-click **Network**. The Network dialog box shown in fig will appear. In the **Configuration** tab, select **TCP/IP** (display it in revers video) and press the **Properties** button.
3. The dialog box appears. If **Specify an IP address** has been selected, record the IP address and sbnet mask.
4. If the **Obtain an IP address automatically** has been selected, select the **Speccify an IP address**. Enter the IP address xxx.xxx.xxx.y and subnet mask xxx.xxx.xxx.xxx as shown in Figure D-10. The letters x represent the IP address and subnet mask of the E5070B/E5071B. The letter y is different from the IP address of the E5070B/E5071B. Press the **OK** button.

**Figure D-10** Network Dialog Box ("IP Address" Tab)



**Step 5.** Connect the drive of E5070B/E5071B to the PC, and check the drive using anti-virus software.

1. Click **Programs -Window Explorer** on the Start Menu to start up the PC's Explorer.

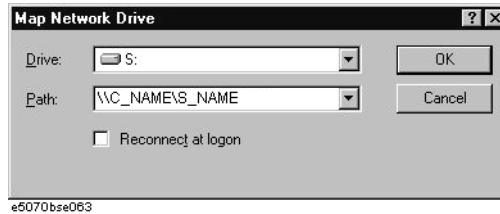
## Computer Virus Check

### Computer Virus Check

Click **Tools - Map Network Drive** on the menu of the Explorer.

2. Select a suitable drive name, enter the network path as shown in Figure D-11, and then press the **OK** button. For example, the network path is \\C\_NAME\S\_NAME.

**Figure D-11** Map Network Drive Dialog Box



**C\_NAME** in the network path is the computer name of the E5070B/E5071B you confirmed on 4 of Step 2.

**S\_NAME** in the share name of the C or D drive of the E5070B/E5071B you entered on 5 of Step 3.

3. The dialog box to enter the user name and the password appears. Enter the user name **agena** and then click the **OK** button.
4. The network path will appear on the PC's Explorer. Confirm that the network path you enter is connected to the PC.
5. Execute the anti-virus software on the PC, and the menu for the anti-virus software will appear. Check the drive you entered on 2 of Step 5. For the operation of anti-virus software, refer to its manual.
6. Check if the drives C and D are infected.

**Step 6.** Disconnect the drives of E5070B/E5071B from the PC.

1. Click **Programs - Window Explorer** on the Start Menu to start up the PC's Explorer. Click **Tools - Disconnect Network Drive** on the menu of the Explorer. Disconnect Network dialog box will appear.
2. Select Network Drive you checked, and press the **OK** button. The drive will disappear from the Explorer.

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#### NOTE

If no drive has been infected, proceed the next step.

If the drive C or D has been infected, replace the A27 mass storage of the E5070B/E5071B.

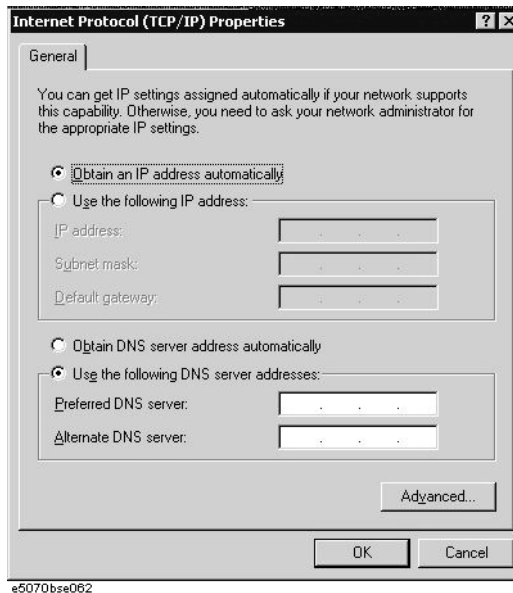
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**Step 7.** Change the IP address and subnet mask of the E5070B/E5071B if you select **Use the following IP address** and entered the IP address and subnet mask on the 6 of Step 1.

1. Press **[System]** key.
2. Press **Misc Setup - Network Setup - Network Configuration**.
3. Double-click the Local Area Connection icon (1 in Figure D-1) in the Network and Dial-up Connections window. The Local Area Connection Status dialog box (Figure D-2) appears. Click the **Properties** button (2 in Figure D-2).
4. The dialog box (Figure D-12) appears. Select **Obtain an IP address automatically** and

press the **OK** button.

**Figure D-12** Internet Protocol (TCP/IP) Properties dialog box



5. In the Internet Protocol (TCP/IP) Properties dialog vbox, click the **OK** button (6 in Figure D-4 ).
6. In the Local Area Connection Properties dialog box, click the **OK** button (3 in Figure D-3).
7. The Local Network dialog box will appear, press the **Yes** button to restart the instrument.

**Step 8.** Change the IP address and subnet mask of the external PC.

1. Double-click “**My Computer**” icon on Windows desktop of the external PC. And double-click **Control Panel**. The Control Panel window will appear.
2. In the Control Panel window, double-click **Network**. The Network dialog box appears. In the **Configuration** tab, select **TCP/IP** (display it in revers video) and press the **Properties** button.
3. The dialog box appears. If **Specify an IP address** has been selected on Step 4, enter the IP address and sbnet mask you recorded on 3 of Step 4.
4. If the **Obtain an IP address automatically** has been selected on Step 4, select the **Obtain an IP address automatically**.
5. Press the **OK** button.

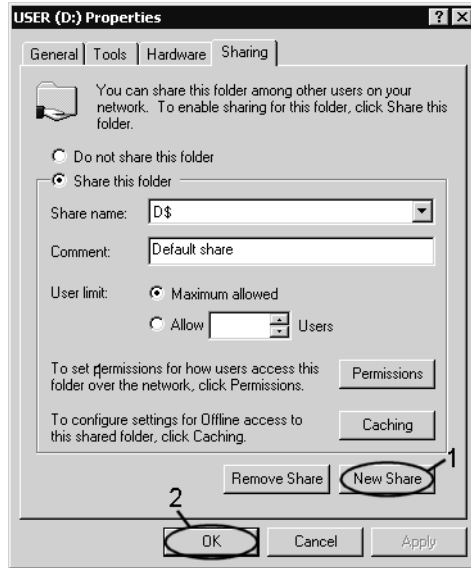
**Step 9.** Disable the C drive of the E5070B/E5071B when you checked the C drive.

1. Press **Save/Recall**., and then press **Explore ...**.
2. The Windows Explorer opens. Select (highlight) **(C:)** and then click **Properties** in the File menu.
3. The (C:) Properties dialog box (Figure D-7) appears. Select the **Sharing** tab.

## Computer Virus Check Computer Virus Check

4. Select the **Do not share this folder**, and then **OK** button.

**Figure D-13** (C:) Properties dialog box (Sharing tab)



5. Turn the E5070B/E5071B power off.



---

**E**      **Power Requirement**

## Preparation for Power Supply

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

### Power Requirements

The E5070B/E5071B 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	350 VA

\*1. Switched automatically by the E5070B/E5071B 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 E-1 for the part numbers of the power cables available.

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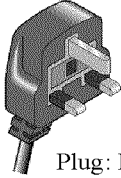
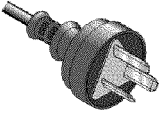
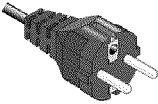
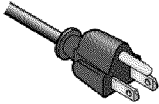

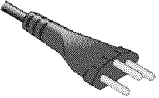
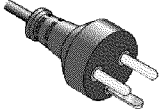
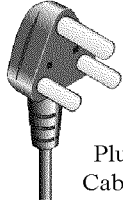
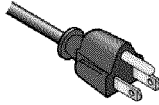
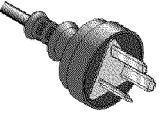
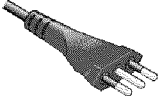
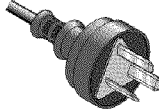
#### WARNING

**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 E-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>

NOTE: Each option number includes a 'family' of cords and connectors of various materials and plug body configurations (straight, 90° etc.).





power\_e

E: Power Requirement




## 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 E5070B/E5071B 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 E5070B/E5071B.
- 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 E5070B/E5071B 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 E5070B/E5071B 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 E5070B/E5071B.

---

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## **F** Messages

The E5070B/5071B can display error messages as well as messages that indicate the internal operating status of the equipment. This appendix explains what these messages mean by listing them in alphabetical order.

Messages showing the status of the E5070B/5071B are displayed in the lower-left area of the E5070B/5071B LCD screen. These messages include error messages that occur during

## Messages

the 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

### A

20

#### **Additional standard needed**

The GPIB command that turns ON the calibration function has been sent before all of the data measurements needed to calculate the calibration factor have been completed. In 1-port calibration, for example, when measurements completed for OPEN and SHORT standards but not yet for LOAD standard,

You have tried to turn on the calibration function by calculating 1-port calibration coefficient using SENS:CORR:COLL:SAVE or SENS:CORR:OFFS:COLL:SAVE. Be sure to measure all necessary calibration data before sending commands. This error is not generated by front key operations.

### B

-168

#### **Block data not allowed**

An block-data element has been received at a position where this instrument does not accept one.

### C

240

#### **Calibration data lost**

This error occurs when a file containing the system calibration data is not found or in a damaged state at time of the startup of this instrument, indicating a failure of this instrument. Contact an Agilent Technology sales office or the company from which you bought the instrument.

22

#### **Calibration method not selected**

This error occurs when the command for validating the calibration data, SENS:CORR:COLL:SAVE or SENS:CORR:OFFS:COLL:SAVE is executed before the command for selecting a calibration type, SENS:CORR:COLL:METH:xxxx or SENS:CORR:OFFS:COLL:METH:xxxx, is executed. This error is not generated by front key operations.

-148

#### **Character data not allowed**

A character data element (not violating the standard) has been received at a position where this instrument does not accept one. Double quotes (") are omitted where it is necessary to place a parameter in double quotes ("), for example.

- 100           **Command error**
- A comprehensive syntax error has occurred showing that this instrument cannot detect a more detailed error. This code simply shows that a command error defined in 11.5.1.1.4, IEEE488.2 has occurred.
- 60             **Continuous switching may damage source attenuator**
- This error occurs when different source attenuator (power range) settings are present during measurement on two or more channels. Performing such measurement for a long time is not recommended because of the possibility of the source attenuator being damaged. The measurement value is normal. This error occurs only on models with the extended power output (Option 214, 314, and 414). In firmware 3.60 and later, Auto Power Range set function may cause this error according to a channel setting. Refer to “Setting power level with Auto Power Range set function” as described in E5070B/5071B User’s Guide.
- D**
- 222           **Data out of range**
- A data element (not violating the standard) outside the range defined by this instrument has been received. This error occurs when an integer-based command for which the parameter can be rounded exceeds the range of -65536 to +65536 or when a real-number-based command for which the parameter can be rounded exceeds the range of -9.9e37 to +9.9e37, for example.
- This error occurs also when a numeric value other than a specified one is entered into a command in which the “port number” and “CalKit number” are specified as parameters and hence the parameters are not rounded. Such commands are, for example, CALC:FSIM:BAL:TOP:BBAL:PPOR, SENS:CORR:COLL:ACQ:OPEN, SENS:CORR:COLL:ECAL:SOLT3, SENS:CORR:COLL:CKIT:ORD:LOAD, etc.
- 104           **Data type error**
- The parser has recognized a data element that must not exist. Block data has been sent instead of numeric value data or character string data that had been expected, for example.
- E**
- 32             **ECal module not in appropriate RF path**
- This error occurs when an ECal command, SENS:CORR:COLL:ECAL:SOLTn or SENS:CORR:OFFS:COLL:ECAL:xxxx, is executed with the port on the ECal module not connected correctly to the instrument.
- 200           **Execution error**
- An error associated with execution has been generated for which this instrument cannot specify the error message. This code shows that an error associated with execution defined in 11.5.1.1.5, IEEE488.2 has occurred. This error occurs also when a calibration measurement is aborted.
- 123           **Exponent too large**
- The absolute value of the exponent exceeds 32,000 (see 7.7.2.4.1, IEEE488.2).



- 178      **Expression data not allowed**  
An expression-data element has been received at a position where this instrument does not accept one.
- 170      **Expression error**  
When the expression data is put to syntactic analysis, an error not corresponding to one of Error Numbers -171 through -179 occurs.
- F**
- 31      **Failed to configure ECal module**  
This error occurs when the control of the ECal module fails at time of executing an ECal command, SENS:CORR:COLL:ECAL:SOLTn or SENS:CORR:OFFS:COLL:ECAL:xxxx. The failure results from the failure to connect the ECal module to the USB port, failure of the ECal module, etc.
- 76      **Failed to control signal generator**  
This error occurs when the external signal source fails to respond during measurement, though it is enabled (SENS:OFFS:LOC:STAT ON and SENS:OFFS:LOC:CONT ON).  
Ensure the connection of the external signal source.
- 102      **Failed to copy file**  
This error occurs when copying a file (MMEM:COPY command) fails.
- 104      **Failed to create directory**  
This error occurs when creating a directory (MMEM:MDIR command) fails.
- 103      **Failed to delete file**  
This error occurs when deleting a file (MMEM:DEL command) fails.
- 100      **Failed to read file**  
This error occurs when a 2-port touchstone file (CALC:FSIM:SEND:PMC:PORT:USER:FIL command), the formatted data array (MMEM:LOAD:FDAT command) and limit table (MMEM:STOR:LIM command) for the active trace on the active channel, segment sweep table (MMEM:LOAD:SEGM command) for the active channel, a VBA project file (MMEM:LOAD:PROG command), etc. cannot be read normally.
- 101      **Failed to write file**  
This error occurs when the formatted data array (MMEM:STOR:FDAT command) and limit table (MMEM:STOR:LIM command) for the active trace on the active channel, segment sweep table (MMEM:STOR:SEGM command) for the active channel, display image (MMEM:STOR:IMAG command) for the LCD screen, a VBA project file (MMEM:STOR:PROG command), etc. cannot be written normally.
- 257      **File name error**  
A file name error. This message appears when an error exists in the file name and hence a command is not executed correctly. This error occurs when you try to copy to an unsuitable file name, for example.

- 256      **File name not found**  
The file name specified is not found and hence the command is not executed correctly. This error occurs when you try to read a file that does not exist in a disk or a disk is not correctly inserted into the drive to read or write a file, for example.
- 107      **File transfer failed**  
This error occurs when writing data into or reading data from a file (MMEM:TRAN command) fails.
- 56      **Fixture Simulator not allowed**  
This error occurs when the fixture simulator is executed (CALC:FSIM:STAT ON) under the condition of the frequency offset is enabled (SENS:OFFS ON).  
The fixture simulator is allowed to use when the frequency offset is not enabled.
- 24      **Frequency offset enabled**  
This error occurs when the normal calibration (SENS:CORR:COLL:OPEN etc.) is performed under the condition of the frequency offset is enabled (SENS:OFFS ON).
- 25      **Frequency offset not enabled**  
This error occurs when the scalar-mixer calibration (SENS:CORR:OFFS:COLL:OPEN etc.) is performed under the condition of the frequency offset is not enabled (SENS:OFFS OFF).
- 62      **Frequency out of range**  
This error occurs when the setting of frequency exceeds output frequency range under the condition of the frequency offset is enabled (SENS:OFFS ON).
- G**
- 105      **GET not allowed**  
A group execution trigger (GET) has been received in the program message (see 7.7, IEEE488.2).
- H**
- 114      **Header suffix out of range**  
The unit of the header is outside the range. The header is invalid in the unit for numeric parameters following a SCPI command.
- I**
- 224      **Illegal parameter value**  
The parameter value is not suitable. This error occurs when the CALC:PAR:DEF command is used to specify an S-parameter that does not exist in the model (S44 in the case of a 2-port model), for example.
- 282      **Illegal program name**  
This error occurs when a nonexistent VBA program name is specified by the PROG:SEL:NAME command.

- 213      **Init ignored**  
Because another measurement is in progress, the request for initiating a measurement (“INIT” command) is ignored.
- 35      **Insufficient ECal module memory**  
This error occurs when the embedded memory is insufficient to save the user property in ECal module during the user definition ECal processing.
- 161      **Invalid block data**  
Block data has been expected, but the block data that appears is invalid for some reason (see 7.7.6.2, IEEE488.2). The END message is received before the length of block data has been filled, for example.
- 28      **Invalid calibration method**  
If the type of calibration is not specified or not correct when partial overwrite is executed with the GPIB command, this error occurs. This error does not occur for operation with front keys.
- 101      **Invalid character**  
An invalid character exists in the program message character string.
- 141      **Invalid character data**  
An invalid character is found in the character data element, or the parameter received is not valid.
- 121      **Invalid character in number**  
A character that is invalid for the data type subject to syntactic analysis has been received. For example, a letter is found in a decimal numeric value or a numeric character “9” in octal data.
- 500      **Invalid equation expression**  
This error occurs when the invalid equation is specified in the equation of the equation editor.
- 501      **Invalid equation label**  
This error occurs when the invalid equation label is specified in the equation of the equation editor.  
A space is not available for the equation label.
- 171      **Invalid expression**  
The expression-data element is invalid (see 7.7.7.2, IEEE488.2). Parentheses are not paired, or illegal characters are used, for example.
- 103      **Invalid separator**  
The parser (a syntactic analysis program) had been expecting a delimiter, but a character that is not a delimiter has been sent.
- 151      **Invalid string data**  
Character string data has been expected, but the character string data that appears is invalid for some reason (see 7.7.5.2, IEEE488.2). The END message is received before the ending quotation mark character appears, for example.

- 131           **Invalid suffix**
- The suffix does not comply with the syntax defined in 7.7.3.2, IEEE488.2. Or it does not suit E5070B/5071B.
- L**
- 53           **Log sweep requires 2 octave minimum span**
- The span of sweep range is not satisfied the requirement for logarithmic sweep. The sweep type is automatically changed to linear sweep when this error occurs.
- For example, this error occurs when, with the start and stop frequency are set 1 MHz and 2 MHz respectively, the sweep type is changed to logarithmic sweep.
- Set the stop frequency to more than four times as many as the start frequency. And then select logarithmic sweep.
- M**
- 109           **Missing parameter**
- The number of parameters is less than that required for the command, or the parameter has not been entered. For example, the command SENS{1-6}:SWE:POIN requires one more parameter.
- Therefore, when a message “SENS1:SWE:POIN” is sent to a correct program message “SENS1:SWE:POIN 201” this instrument receives the former message as an invalid one because all parameters have not been entered. Enter command parameters correctly.
- N**
- 70           **No GPIB system controller**
- The GPIB system controller is not set properly.
- This error occurs when USB/GPIB interface is not connected or the interface setting is improper, during the measurement for power calibration data or for that in scalar-mixer calibration.
- It also occurs when USB/GPIB interface is not connected or the interface setting is improper, though the control of the external signal source is enabled.
- Ensure the connection of USB/GPIB interface and its setting.
- 52           **No valid memory trace**
- This error occurs when you have executed either DISP:WIND:TRAC:MEM ON command to display memory trace, or any other command to enable data calculation using memory trace (CALC:MATH:FUNC command with other than NORM is specified), though no valid data exists in memory trace. This error is not generated by front key operations.
- 120           **Numeric data error**
- An error resulting from the numeric value data (including numeric value data having no decimal point representation) has occurred. A numeric value error other than Errors -121 through -129 has occurred.
- 128           **Numeric data not allowed**

An numeric-value-data element (not violating the standard) has been received at a position where this instrument does not accept one.

## O

200

### Option not installed

The command received has been ignored because of the mismatch between the contents of an option for this instrument and the command.

For example, this error occurs when the source attenuator (power range) is set at a value other than zero (SOUR:POW:ATT command) in a model not having the extended power output option.

It also occurs when you try to enable the time domain function in a model not having the time domain option. This holds true for the frequency offset option.

This error is not generated by front key operations.

-225

### Out of memory

Insufficient memory is available in this instrument to perform the required operation.

## P

-220

### Parameter error

When a parameter-related error other than Errors -221 through -229 occurs, that error is displayed.

-108

### Parameter not allowed

The number of parameters exceeds that required for the command.

For instance, when a program message “:SENS1:SWE:TYPE LIN, SEGM” is sent instead of a correct program message with a command “:SENS1:SWE:TYPE LIN” which requires a parameter, the instrument receives the message as the number of parameters is invalid. See the command reference to confirm the required number of parameters.

41

### Peak not found

This error occurs when, after specifying a peak and executing the CALC:MARK:FUNC:EXEC and CALC:FUNC:EXEC commands, the specified peak is not found in the marker search analysis.

220

### Phase lock loop unlocked

This error occurs when the PLL circuit of this instrument becomes unlocked while the measurement is in progress. The measurement value is not correct. This error may occur when an external reference out of specification is connected to this instrument. Should an error occur with an external reference not connected, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

221

### Port 1 receiver overload

The input to Test Port 1 exceeds the maximum input level. The measurement value is not correct. When a DUT is an amplifier or the like, this error may occur, damaging the receiver in the worst case. Should this error occur with a passive part used as the DUT or with nothing connected to the test port, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

**Port 2 receiver overload**

If this error occurs, the stimulus signal output is automatically turned to off.

222

**Port 2 receiver overload**

The input to Test Port 2 exceeds the maximum input level. The measurement value is not correct. When a DUT is an amplifier or the like, this error may occur, damaging the receiver in the worst case. Should this error occur with a passive part used as the DUT or with nothing connected to the test port, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

If this error occurs, the stimulus signal output is automatically turned to off.

223

**Port 3 receiver overload (for Options 313, 314, 413, and 414 only)**

The input to Test Port 3 exceeds the maximum input level. The measurement value is not correct. When a DUT is an amplifier or the like, this error may occur, damaging the receiver in the worst case. Should this error occur with a passive part used as the DUT or with nothing connected to the test port, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

If this error occurs, the stimulus signal output is automatically turned to off.

224

**Port 4 receiver overload (For Options 413 and 414 only)**

The input to Test Port 4 exceeds the maximum input level. The measurement value is not correct. When a DUT is an amplifier or the like, this error may occur, damaging the receiver in the worst case. Should this error occur with a passive part used as the DUT or with nothing connected to the test port, this instrument is faulty. Contact an Agilent Technology sales office or the company from which you bought the instrument.

If this error occurs, the stimulus signal output is automatically turned to off.

73

**Power meter not settled**

The measurement value of the power meter is unstable, or it goes outside the tolerance.

This error occurs when the power meter's measurement value does not become stable within about 10 seconds during measurement for power calibration data or that for scalar-mixer calibration data.

This error also occurs when the power calibration value exceeds the set tolerance.

In addition, it occurs when the power meter fails to respond for any reason, such as power-down for example, during measurement under the same conditions.

Ensure a firm connection of the power sensor.

241

**Power on test failed**

This error occurs when the power-on test fails, indicating a failure of this instrument. Contact an Agilent Technology sales office or the company from which you bought the instrument.

61

**Power unlevelled**

The out power level exceeds available range.

For example, if the level after correction exceeds the power level that can be outputted when correcting the power level with the power calibration and power slope feature, this error occurs.

Check that the power level is set correctly, the power calibration has been performed correctly and the correction value of the power slope is set correctly.

- 120           **Printer error**  
This error occurs when the previous printing is still in progress or the printer fails (offline, short of paper, etc.) at time of outputting the display image on the LCD screen to the printer (HCOP:IMM command).
- 121           **Print failed**  
This error occurs when printing fails for reasons other than Error 120, Printer error.
- 284           **Program currently running**  
This error occurs when the PROG:SEL:STAT RUN command is executed with the VBA program in the Run state.
- 112           **Program mnemonic too long**  
The length of the header exceeds 12 characters (see 7.6.1.4.1, IEEE488.2).
- 286           **Program runtime error**  
An error occurring when VBA is executed.
- Q**
- 430           **Query DEADLOCKED**  
The state that generates a “DEADLOCKED” Query error (see 6.3.1.7, IEEE488.2). This error occurs when both input and output buffers have become full, preventing the instrument from continuing processing, for example.
- 400           **Query error**  
A comprehensive query error has occurred showing that this instrument cannot detect a more detailed error. This code simply shows that a query error defined in 11.5.1.1.7 and 6.3, IEEE488.2 has occurred.
- 410           **Query INTERRUPTED**  
The state that generates a “INTERRUPTED” Query error (see 6.3.2.3, IEEE488.1). This error occurs when data bytes (DAB) or GET are received before the transmission of the response after a query has not been completed, for example.
- 420           **Query UNTERMINATED**  
The state that generates an “UNTERMINATED” Query error (see 6.3.2, IEEE488.2). This error occurs when this instrument is designated as the talker and an incomplete program message is received, for example.
- 440           **Query UNTERMINATED after indefinite response**  
After a query asking for an indefinite response has been run, another query is received in the same program message (See 6.5.7.5.7, IEEE488.2).
- 350           **Queue overflow**  
The queue contains a specific code in place of the code which caused this error. The code indicates that the error occurred because of no space available in the queue, but the error is not recorded.

Messages  
Recall failed

**R**

105

**Recall failed**

This error occurs when reading an instrument status file (State01.sta, etc.) (MMEM:LOAD:STAT command) fails.

**S**

106

**Save failed**

This error occurs when writing an instrument status file (State01.sta, etc.) (MMEM:STOR:STAT command) fails.

33

**Selected parameter not valid for confidence check**

This error occurs when the mix mode S parameter has been selected for the S parameter you want to check, while using the confidence check function for calibration coefficient.

57

**SnP request not valid for selected measurement**

This error occurs when you try to save data to a Touchstone file but no measurement has been executed.

This error also occurs when you try to save a Touchstone file with power sweep measurement specified or with the frequency offset function set to ON.

50

**Specified channel hidden**

This error occurs when an attempt is made to activate a channel not on display using the DISP:WIND:ACT command. This error is not generated by front key operations.

23

**Specified error term does not exist**

The error occurs when the calibration coefficient type of the parameter specified in the read/write command of the calibration coefficient (SENS:CORR:COEF) is invalid for the calibration type selected by the calibration type selection command (SENS:CORR:COEF:METH:xxxx). This error is not generated by front key operations.

21

**Specified ports overlapped**

This error occurs when a port number is duplicated in a command requiring two or more port numbers as parameters. Such commands are, for example, CALC:FSIM:BAL:TOP:SSB:PPOR 1,2,3,3. Specify port setup correctly to avoid duplication of ports. This error is not generated by front key operations.

51

**Specified trace dose not exist**

This error occurs when CALC:PAR:SEL command is executed to activate more traces than specified by CALC:PAR:COUN command. This error is not generated by front key operations.

26

**Standard not selected**

This error occurs when you execute the measurement under the condition that the standard is not selected for the subclass (the standard number is set to 0).

-150

**String data error**

When a character-string-data element is put to syntactic analysis, an error not corresponding to one of Error Numbers -151 through -159 occurs.



- 158           **String data not allowed**  
A character-string-data element has been received at a position where this instrument does not accept one.
- 138           **Suffix not allowed**  
A suffix is attached to a numeric value element to which a suffix is not allowed to be attached.
- 134           **Suffix too long**  
The unit is too long.  
The unit is expressed in 12 or more characters (see 7.7.3.4, IEEE488.2).
- 55             **Sweep mode changed to stepped sweep**  
You cannot change the sweep mode to the swept mode.  
This error occurs when you change the sweep mode to the swept mode/high speed swept mode under the conditions where the sweep type is set to power sweep, power slope function is enabled (ON, correction coefficient is other than zero), power calibration is ON, frequency offset is enabled, spurious avoidance of frequency offset is enabled, or external signal source control is enabled.
- 102           **Syntax error**  
A command or data type that is not recognized exists.
- 310           **System error**  
One of the errors designated as “system errors” in this instrument has occurred.
- T**
- 40             **Target value not found**  
This error occurs when the target is not found during the marker search analysis after specifying the target and executing the CALC:MARK:FUNC:EXEC and CALC:FUNC:EXEC commands. This error occurs also when the bandwidth is not found after executing the bandwidth marker command, CALC:MARK:BWID:DATA?
- 124           **Too many digits**  
The number of digits of the argument of the decimal numeric-value-data element exceeds 255 with the preceding 0 removed (see 7.7.2.4.1, IEEE488.2).
- 223           **Too much data**  
The block-, expression-, or character-string-type program data that has been received conforms with the standard. But it exceeds the amount that can be processed under the condition of the memory or conditions specific to memory-related devices. In this instrument, this error occurs when the number of characters exceeds 254 in a character-string parameter.

- 54                   **Transform, Gate not allowed**
- This message appears when you turn on the gating/conversion function of the time domain feature, while frequency offset is enabled, measurement points are set to two, or sweep type is set to other than linear sweep
- Turn off the frequency offset (SENS:OFFS OFF command), set the measurement points to three or more and the sweep type to linear sweep, and then turn on the gating/conversion function.
- 211               **Trigger ignored**
- This instrument receives and detects a trigger command (“TRIG”) or an external trigger signal. But it is ignored due to the timing condition (This instrument is not in the wait-for-trigger state, for example). Change the setup so that a trigger command or an external trigger signal can be sent after the instrument has entered the wait-for- trigger state.
- U**
- 300               **Unable to estimate adapter length**
- Adapter length can not be estimated at zero span. Change the frequency span other than 0.
- 113              **Undefined header**
- A command not defined in this instrument, though not illegal in the syntactic structure, has been received. For example, when a message “:DISP:WIND1:TABL:MEM ON” is sent to a correct program message “:DISP:WIND1:TRAC1:MEM ON,” the message sent is received as an undefined command by this instrument. See the command reference and use correct commands.
- This error occurs also when a port not existing on this model is specified in a command specifying a port number as an index. Such commands are  
CALC:FSIM:SEND:DEEM:PORTn:xxxx, CALC:FSIM:SEND:PMC:PORTn:xxxx,  
CALC:FSIM:SEND:ZCON:PORTn:ZO:R, and SENS:CORR:EXT:PORTn:TIME; they include PORTn as a part.
- 34                **User characterization not found in module**
- This error occurs when the selected user profile is not detected in the ECal memory, while reading it from the ECal module, written by the user definition ECal.
- V**
- 30                **Valid Ecal module not found**
- This error occurs when the number of ports of the ECal module connected is less than the necessary number of ports. This error occurs, for example, when a 4-port Cal executing command, SENS:CORR:COLL:ECAL:SOLT4, is executed with a 2-port ECal module connected. This error is not generated by front key operations.
- 71                **Valid power meter not found**
- Valid power meter is not connected. (refer to “Power Calibration” as described in E5070B/E5071B User’s Guide)
- This error occurs when the E5070B/5071B and the power meter is not connected with USB/GPIB interface, the GPIB addresses do not match between the power meter and the E5070B/5071B’s power meter, or the power meter is turned off, during the measurement

for power calibration data or for that in scalar-mixer calibration.

It also occurs when inoperable power meter is connected.

Ensure the connection of the power meter, GPIB addresses and power supply.

72

**Valid power sensor not found**

No valid sensor is connected to the power meter.

This error occurs when no power sensor is connected to the specified channel of the power meter, during the measurement for power calibration data or for that in scalar-mixer calibration.

Ensure the connection of the power sensor.

75

**Valid signal generator not found**

No valid external signal source is connected.

This error occurs when the specified type of external signal source is not connected to the specified GPIB address, though the control of the external signal source is enabled (SENS:OFFS:LOC:STAT ON and SENS:OFFS:LOC:CONT ON).

It also occurs when USB/GPIB interface is set but not connected.

Ensure the external signal source and the connection of USB/GPIB interface.

## 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 as follows:

### Auto port extension not allowed

This message appears when you try to execute the auto port extension when the sweep type is the power sweep or the frequency offset function is ON.

If this message is displayed, the auto port extension is not available.

### Calibration extrapolated

The frequency range that can be calibrated with the ECal module is exceeded. In this case, the calibration data for the minimum frequency or maximum frequency are used instead of the data exceeding the allowable frequency range for calibration.

### Fixture simulator not allowed

This message appears when enabling the frequency offset, while the fixture simulator function is turned on.

If this message is displayed, the fixture simulator function is automatically turned off.

### Log sweep requires 2 octave minimum span

If you change the sweep range that does not satisfy the necessary condition of the frequency span (the stop frequency is about 4 times or more of the start frequency) when the sweep type is set to the log sweep, this message is displayed.

If this message is displayed, the sweep type is automatically set to the linear sweep.

For example, if you attempt to change the log type to the log sweep when the start frequency is set to 1 MHz and the stop frequency to 2 MHz, this error occurs.

Set the stop frequency to a value of about 4 times or more the start frequency and then set the low sweep.

### Peak not found

This warning message is displayed when, with the tracking turned on, the peak specified by the marker search has not been found by the time the sweep is finished (with the tracking executed).

### Segment table changed

This warning message is displayed when the setting specified segment by segment in the segment table is automatically changed by a change in the other setting.

For example, this warning message is displayed when, with the power specified segment by segment in the segment table, the power setting for a segment is adjusted by a change in the power range setting.

**Sweep mode changed to stepped sweep**

This message appears when you set the sweep type to power sweep, power slope function to enabled (ON, correction coefficient is other than zero), power calibration to ON, frequency offset to enabled, spurious avoidance of frequency offset to enabled, or external signal source control to enabled, while the sweep mode is set to swept mode or high speed swept mode.

When this message is displayed, the sweep mode is automatically set to step mode (during swept mode) or high speed step mode (during high speed swept mode).

**Target value not found**

This warning message is displayed when, with the tracking turned on, the target specified by the marker search has not been found by the time the sweep is finished (with the tracking executed).

This warning message is displayed also when, with the bandwidth marker displayed, the setting for the bandwidth marker is changed at the end of the sweep, or when, with the active marker changed or moved, the bandwidth is not found.

**Transform, Gate not allowed**

This message appears when you have set the measurement points to two, sweep type to other than linear sweep, or frequency offset to enabled, while the gating/conversion function of the time domain feature is turned on.

If this message is displayed, the gating/conversion function is automatically turned off.

**User Preset File not found**

This warning message is displayed if no user preset file (D:\UserPreset.sta) exists when executing the SYST:UPR command.

If this message is displayed, a normal preset (SYST:PRES) will be performed.

Messages  
User Preset File not found

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