Keysight E5071C
ENA Network Analyzers

KEYSIGHT TECHNOLOGIES

Service Guide

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

Notices

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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.

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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.

Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

NOTE The E5071C complies with INSTALLATION CATEGORY II as well as POLLUTION DEGREE 2 in IEC61010-1. The E5071C is an INDOOR USE product.

NOTE The LEDs in the E5071C are Class 1 in accordance with IEC60825-1, CLASS 1 LED PRODUCT.

NOTE This equipment is MEASUREMENT CATEGORY I (CAT I). Do not use for CAT II, III, or IV.

NOTE This equipment is tested with stand-alone condition or with the combination with the accessories supplied by Keysight Technologies against the requirement of the standards described in the Declaration of Conformity. If it is used as a system component, compliance of related regulations and safety requirements are to be confirmed by the builder of the system.

- Ground the Instrument

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

- DO NOT Operate In An Explosive Atmosphere

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

- Keep Away From Live Circuits

  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 the Instrument

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

- Dangerous Procedure Warnings

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

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

Safety Symbol

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


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

Alternating current.

Direct current.

On (Supply).


Off (Supply).


In position of push-button switch.


Out position of push-button switch.


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


Stand-by.

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

CAUTION This Caution sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

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

Certification

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

Documentation Warranty

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Assistance

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

For any assistance, contact your nearest Keysight Technologies Sales and Service Office.

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.

Documentation Map

The online Help files are embedded in the analyzer, offering quick reference to programming and user documentation. From the Help drop-down menu, you can access the Help system in five different languages. Also, you can view the Analyzer Product Overview multimedia presentation and access the analyzer’s Web page.

The Installation and Quick Start Guide helps you to quickly familiarize yourself with the analyzer. Procedures are provided for installing, configuring, and verifying the operation of the analyzer.

Printing Copies of Documentation from the Web

To print copies of documentation from the Web, download the PDF file from the Keysight web site:

• Go to http://www.keysight.com.

• Enter the document’s part number (located on the title page) in the Quick Search box.

• Click GO.

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1 General Information

The Service Manual is a guide to servicing the E5071C ENA Series Network Analyzer. The manual contains information requisite to do performance tests, adjustments, troubleshooting, and repairs.

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Precautions

This section describes cautions that must be observed in operating the E5071C.

Software Installed

The Windows operating system installed in this machine is customized for more effective operation, and has different functions that are not part of the Windows operating system for ordinary PCs (personal computers).
Therefore, do not attempt to use the system in ways other than those described in this manual as doing so may cause malfunction.

Also note the following:

- The E5071C is always shipped with the latest service packs and critical updates that were available at the time when firmware was updated. We recommend that you maintain the latest available protection for your ENA by automatically accepting and installing the latest critical security patches from the Microsoft Windows Update website:
  http://windowsupdate.microsoft.com.
- The E5071C does NOT have antivirus protection when shipped. Use of an antivirus program is strongly recommended if you connect the E5071C to the LAN (Internet). In addition, the use of a firewall could help to protect the E5071C from viruses. However, some firewalls could limit DCOM connectivity of the E5071C.
- Do not update pre-installed software unless recommended by Keysight. Before updating or installing software, refer to Windows Support Information in http://www.keysight.com/find/ena_support.
- 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 malfunction.
- Users may install commercial application software for Windows on the E5071C at their own responsibility. Some application software may affect the measurement performance, especially measurement speed.
- Do not modify or reconfigure the operating system. The Microsoft Windows operating system has been configured by Keysight to improve the performance of the E5071C.

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

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

Organization of Service 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 E5071C ENA Series Network Analyzer. The manual contains information requisite to do performance tests, adjustments, troubleshooting, and repairs.

Chapter 2 , "Performance Test,"

This chapter provides information on how to verify the E5071C performance.

Chapter 3 , "Adjustment,"

This chapter provides the adjustment information for the E5071C ENA Series Network Analyzer to ensure that it is within its specifications. The adjustment must be performed Keysight's qualified service personnel. If you need the adjustment for your E5071C, it should be sent to the nearest Keysight Technologies service office.

Chapter 4 , "Troubleshooting,"

This chapter provides procedure to isolate a faulty assembly in the E5071C Network Analyzer.

Chapter 5 , "Replaceable Parts,"

This chapter contains information for ordering replacement parts for the E5071C ENA Series RF Network Analyzers.

Chapter 6 , "Replacement Procedure,"

This chapter provides procedure for removing and replacing the major assemblies in the E5071C ENA Series Network Analyzer.

Chapter 7 , "Post-Repair Procedures,"

This chapter lists the procedures required to verify the E5071C 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 E5071C manufactured earlier than the current printing date of this manual. The information in this manual applies directly to E5071C 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 operating system) when the operating system has been damaged.

Appendix C , "Firmware Update,"

This appendix describes how to update the E5071C firmware. When you want to update the E5071C firmware, refer to this appendix.

Appendix D , “Power Requirement,”

Appendix E, “Messages,”

The E5071C 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

Keysight 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, Keysight 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 Keysight 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 Keysight Technologies office.

Analyzer Options Available

Table 1-1 lists the applicable model and options for E5071C

Table 1-1 Applicable Model and Options

Opt#	Status	Description	Available FW	Up to 8.5 GHz Option	Over 8.5 GHz Option	2 Port Option	4 Port Option
	Active	ENA SERIES NETWORK ANALYZER					
1E5	Active	High Stability Timebase	7.01 or later	N/A	N/A	N/A	N/A
230	Support only	2-port Test Set, 9 kHz to 3 GHz	7.01 or 9.10	Yes	No	Yes	No
235	Support only	2-port Test Set, 100 kHz to 3 GHz with Bias Tees	7.01 or 9.10	Yes	No	Yes	No
430	Support only	4-port Test Set, 9 kHz to 3 GHz	7.01 or 9.10	Yes	No	No	Yes
435	Support only	4-port Test Set, 100 kHz to 3 GHz with Bias Tees	7.01 or 9.10	Yes	No	No	Yes
240	Active	2-port Test Set, 9 kHz to 4.5 GHz	7.01 or later	Yes	No	Yes	No
245	Active	2-port Test Set, 100 kHz to 4.5 GHz with Bias Tees	7.01 or later	Yes	No	Yes	No
440	Active	4-port Test Set, 9 kHz to 4.5 GHz	7.01 or later	Yes	No	No	Yes
445	Active	4-port Test Set, 100 kHz to 4.5 GHz with Bias Tees	7.01 or later	Yes	No	No	Yes
260	Active	2-port Test Set, 9 kHz to 6.5 GHz	9.30 or later	Yes	No	Yes	No
265	Active	2-port Test Set, 100 kHz to 6.5 GHz with Bias Tees	9.30 or later	Yes	No	Yes	No
460	Active	4-port Test Set, 9 kHz to 6.5 GHz	9.30 or later	Yes	No	No	Yes
465	Active	4-port Test Set, 100 kHz to 6.5 GHz with Bias Tees	9.30 or later	Yes	No	No	Yes
280	Active	2-port Test Set, 9 kHz to 8.5 GHz	7.01 or later	Yes	No	Yes	No
285	Active	2-port Test Set, 100 kHz to 8.5 GHz with Bias Tees	7.01 or later	Yes	No	Yes	No

Table 1-1 Applicable Model and Options

Opt#	Status	Description	Available FW	Up to 8.5 GHz Option	Over 8.5 GHz Option	2 Port Option	4 Port Option
480	Active	4-port Test Set, 9 kHz to 8.5 GHz	7.01 or later	Yes	No	No	Yes
485	Active	4-port Test Set, 100 kHz to 8.5 GHz with Bias Tees	7.01 or later	Yes	No	No	Yes
2D5	Active	2-port Test Set, 300 k to 14 GHz with Bias Tees	9.30 or later	No	Yes	Yes	No
4D5	Active	4-port Test Set, 300 k to 14 GHz with Bias Tees	9.30 or later	No	Yes	No	Yes
2K5	Active	2-port Test Set, 300 k to 20 GHz with Bias Tees	9.30 or later	No	Yes	Yes	No
4K5	Active	4-port Test Set, 300 k to 20 GHz with Bias Tees	9.30 or later	No	Yes	No	Yes

Required Equipment

1) Up to 8.5 GHz Options

Table 1-2 lists the recommended equipment for performing maintenance on the E5071C.

Table 1-2 Recommended Test Equipment

Equipment	Critical specifications	Recommended Model	Qty.	Use*1
Frequency Counter	Frequency: 50 MHz to 8.5 GHz Accuracy: < 2.5 ppm	Keysight 53181A with Opt.010 & 124	1	P,A
Frequency Standard	Frequency: 10 MHz, Time Base Error: ≤ ± 1×10^{-10}/year	Symmetricom 5071A	1	A
Power Meter	No Substitute	Keysight E4419A/B*2 or Keysight N1914A with Opt. 005 and 101	1	P,A
Power Sensor	No Substitute	Keysight 8482A or N8482A	1	P
Power Sensor	No Substitute	Keysight E9304A with Opt. H18	1	P,A
Function Generator		Keysight 33120A	1	P,A
Multimeter		Keysight 3458A or 34401A	1	P,A
Dynamic Accuracy Test Kit	No substitute	Keysight Z5623A with Opt. H01	1	P
Gain Compression Test Set		Keysight Z5623A-K01	1	P
Attenuator/ Switch Driver		Keysight 11713B or 11713A	1	P
Step Attenuator	No Substitute	Keysight 8496G Opt.H52 or 8496G-001&H60	1	P
Calibration Kit	No Substitute	Keysight 85032F	1	P,A,T
Short	Type-N(m)	part of Keysight 85032F/54D/33E/50D with type-N adapter	1	P,T
Short	Type-N(f)	Keysight p/n 85032-6001585032-60015	1	P,T
Short	Type-N(m)	Keysight p/n 85032-60016	4	P,T
Load	Type-N(m)	Keysight p/n 85032-60018 or 1250-1744	4	P

Table 1-2 Recommended Test Equipment

Equipment	Critical specifications	Recommended Model	Qty.	Use*1
BNC Short		Keysight p/n 1250-0929	2	P,A
Fixed attenuator (6 dB)	50 Ω, N(m)-N(f), VSWR ≤ 1.015	Keysight 8491A w/Opt.006 and H60	1	P
Fixed attenuator (10 dB)	50 Ω, N(m)-N(f)	Keysight 8491A/B/C	1	T
Handler I/O Test Kit	No substitute	Keysight p/n E5070-65071	1	T
Cable	BNC(m)-BNC(m) Cable, 61 cm Coaxial cable with Type-N (m) connectors, 61 cm (24 in), 2 ea.	Keysight p/n 8120-1839 Keysight N6314A (p/n 8120-8862)	4 1	P,A P,A,T
Cable	20 inch 50 ohm cable	Keysight p/n 8120-1840	1	P,T
Adapter	N(m)-BNC(f) Adapter	Keysight p/n 1250-0780	1	P,A
Adapter	Adapter 3.5mm(f)-2.4mm(f)	Keysight p/n 1250-1745		P
Adapter	Adapter 3.5mm(f)-2.4mm(f)	Keysight 11901B	2	P
Adapter	Adapter BNC Tee	Keysight p/n 1250-0781	2	P
Adapter	Adapter BNC(f)-Dual Banana	Keysight p/n 1251-2277		P
Adapter	N(m)-3.5mm(f)	Keysight p/n 1250-2879	2	P
Torque Wrench	Size: 3/4 inch Torque: 136 N-cm	Keysight p/n 8710-1766	1	P,A
Personal Computer with GPIB board	Windows XP, VEE7.5 or later		1	P,A

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

*2. The accuracy of a standard E4419A/B of ±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 higer accuracy specification. If an Option G12 or H12 power meter is not available, a test is provided on "Power Meter Accuracy Test" on page 30 to verify the accuracy of a standard power meter.

Table 1-3 Alternative Test Equipment

Equipment	Critical specifications	Model	Qty.	Use*1
Frequency Counter	Frequency: 50 MHz to 8.5 GHz Accuracy: < 2.5 ppm	Keysight 53131/2A with Opt.010 and 124	1	P,A
Multimeter		Keysight 34401A Keysight 34410A Keysight 34411A	1 1 1	P,T P,T P,T

Table 1-3 Alternative Test Equipment

Equipment	Critical specifications	Model	Qty.	Use*1
Function Generator		Keysight 33220A Keysight 33250A	1 1	P,T P,T
Power Sensor	No Substitute	Keysight E9304A with Opt. H19	1	P,A
Short	Type-N(m)	Keysight 11512A	4	P,T
Load	Type-N(m)	Keysight 909F Opt. 012	4	P

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

NOTE For the latest ETE lists, refer to Keysight Test Management Environment (TME) Software Portal. The complete ETE lists are available in E5071C Calibration Application WebHelp. http://calsw.tm.keysight.com/

2) Over 8.5 GHz Options

Table 1-4 lists the recommended equipment for performing maintenance on the E5071C.

Table 1-4 Recommended Test Equipment

Equipment	Critical specifications	Recommended Model	Qty.	Use*1
Frequency Counter 1	Frequency: 50 MHz to 8.5 GHz Accuracy: < 2.5 ppm	Keysight 53181A with Opt.010 & 124	1	P,A
Frequency Counter 2	Frequency: 50 MHz to 20 GHz Accuracy: > 0.1 ppm	Keysight 53151A with Opt.001	1	P
Frequency Standard	Frequency: 10 MHz, Time Base Error: $\leq \pm 1\times10^{-10}$/year	Symmetricom 5071A	1	A
Power Meter	No Substitute	Keysight E4419A/B*2 or Keysight N1914A with Opt.005 and 101	1	P,A
Power Sensor	No Substitute	Keysight 8482A or N8482A	1	P
Power Sensor	No Substitute	Keysight E4413A	1	P,A
Power Sensor	No Substitute	Keysight E9304A with Opt. H18	1	A
Function Generator		Keysight 33120A	1	P,A
Multimeter		Keysight 3458A or 34401A	1	P,A
Attenuator/ Switch Driver		Keysight 11713B or 11713A	1	P
Dynamic Accuracy Test Kit	No substitute	Keysight Z5623A with Opt. H01	1	P
Gain Compression Test Set		Keysight Z5623A-K01	1	P
Step Attenuator	No Substitute	Keysight 8496G Opt.H52 or 8496G-001&H60	1	P
Calibration Kit	No Substitute	Keysight 85052D	1	P,A,T
Short	50ohm 3.5mm (f) Short Termination	Keysight p/n 85052-60007	4	P,T
Short	50ohm 3.5mm (m) Short Termination	Keysight p/n 85052-60006	1	P,T
Load	Type 3.5mm (f)	part of Keysight 85052D	4	P, A
BNC Short		Keysight p/n 1250-0929	2	P,A

Table 1-4 Recommended Test Equipment

Equipment	Critical specifications	Recommended Model	Qty.	Use*1
Fixed attenuator (6 dB)	50 Ω, N(m)-N(f), VSWR ≤ 1.015	Keysight 8491A w/Opt.006 and H60	1	P
Fixed attenuator (10 dB)	50 Ω, N(m)-N(f)	Keysight 8491A/B/C	1	T
Handler I/O Test Kit	No substitute	Keysight p/n E5070-65071	1	T
Low Pass Filter	No substitute	Keysight p/n 9135 -5852	1	P
Cable	BNC(m)-BNC(m) Cable, 61 cm Coaxial cable with Type-N (m) connectors, 61 cm (24 in), 2 ea.	Keysight p/n 8120-1839 Keysight N6314A (p/n 8120-8862)	4 1	P,A P,A,T
Cable	20 inch 50 ohm cable	Keysight p/n 8120-1840	1	P,T
Adapter	N(m)-BNC(f) Adapter	Keysight p/n 1250-0780	1	P,A
Adapter	APC 3.5 (f)-(f) Adapter	Keysight p/n 85027-60005	4	P,A
Adapter	APC 2.5 (m)-N(f) Adapter	Keysight p/n 1250-1811	1	P,A
Adapter	Adapter 3.5mm(f)-2.4mm(f)	Keysight p/n 1250-1745		P
Adapter	Adapter 3.5mm(f)-2.4mm(f)	Keysight 11901B	2	P
Adapter	Adapter BNC Tee	Keysight p/n 1250-0781	2	P
Adapter	Adapter BNC(f)-Dual Banana	Keysight p/n 1251-2277		P
Adapter	N(m)-3.5mm(f)	Keysight p/n 1250-2879	2	P
Torque Wrench	Size: 3/4 inch Torque: 136 N-cm	Keysight p/n 8710-1766	1	P,A
Personal Computer with GPIB board	Windows XP, VEE7.5 or later		1	P,A

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

*2. The accuracy of a standard E4419A/B of ±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 higer accuracy specification. If an Option G12 or H12 power meter is not available, a test is provided on "Power Meter Accuracy Test" on page 30 to verify the accuracy of a standard power meter.

Table 1-5 Alternative Test Equipment

Equipment	Critical specifications	Model	Qty.	Use*1
Frequency Counter 1	Frequency: 50 MHz to 8.5 GHz Accuracy: < 2.5 ppm	Keysight 53131/2A with Opt.010 and 124	1	P,A

Table 1-5 Alternative Test Equipment

Equipment	Critical specifications	Model	Qty.	Use*1
Multimeter		Keysight 34401A Keysight 34410A Keysight 34411A	1 1 1	P,T P,T P,T
Function Generator		Keysight 33220A Keysight 33250A	1 1	P,T P,T
Power Sensor	No Substitute	Keysight E9304A with Opt. H19	1	P,A
Short	Type-N(m)	Keysight 11512A	4	P,T
Load	Type-N(m)	Keysight 909F Opt. 012	4	P

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

NOTE For the latest ETE lists, refer to Keysight Test Management Environment (TME) Software Portal. The complete ETE lists are available in E5071C Calibration Application WebHelp. http://calsw.tm.keysight.com/

Power Meter Accuracy Test

This test is intended for power meters used in testing the E5071C. 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	Keysight 11683A	None
Precision digital voltmeter	Keysight 3458A	Any with the required accuracy and resolution*1
Power sensor cable	Keysight 11730A, p/n 8120-8319	Any equivalent
Cable, BNC, 50 Ω	Any	Any
Adapter for connecting BNC cable to DVM inputs	Any	Any

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

Description of the Test

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

NOTE It is recommended that a copy of the test record on page 34 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.

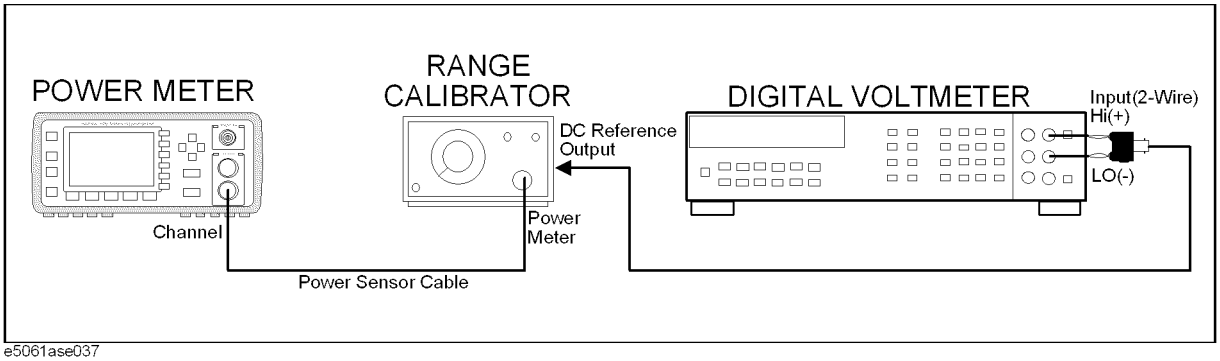
Step 1. Setup the equipment as shown in Figure 1-2.

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



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:

- 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 34.

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±0.001 dBm.

Step 12. Switch the range calibrator RANGE to 300 µW.

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 µW.

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 A86 measurement assembly associated with the failed channel will correct the problem.

Test Record for Power Meter Accuracy Test

Power Meter Tested			
Model Number:		Test Date:	
Serial Number:		Tested by:	

Test Equipment Used

Range Calibrator: Model No.:		Serial No.:	
Digital Voltmeter: 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 = $S=10^{(C/10)}$ = % ERROR=((R-S)/R)x100 = Limits: ±0.13% Pass __ Fail __	R=B/A = $S=10^{(C/10)}$ = % ERROR=((R-S)/R)x100 = Limits: ±0.13% Pass __ Fail __
100 µW	T=D/A = $U=10^{(E/10)}$ = % ERROR=((T-U)/T)x100 = Limits: ±0.10% Pass __ Fail __	T=D/A = $U=10^{(E/10)}$ = % ERROR=((T-U)/T)x100 = Limits: ±0.10% Pass __ Fail __

Keysight Support, Services and Assistance

Information on the following topics is included in this section.

Services and Support Options

The analyzer's standard warranty is a one-year return to Keysight Technologies service warranty.

NOTE There are many other repair and calibration options available from the Keysight Technologies support organization. These options cover a range of service agreements with varying response times. Contact Keysight for additional information on available service agreements for this product. Refer to See "Contacting Keysight" on page 35.

Contacting Keysight

Assistance with test and measurements needs and information or finding a local Keysight office are available on the Web at: http://www.keysight.com/find/assist If you do not have access to the Internet, contact your Keysight field engineer.

NOTE In any correspondence or telephone conversation, refer to the Keysight product by its model number and full serial number. With this information, the Keysight representative can determine whether your product is still within its warranty period.

Shipping Your Analyzer to Keysight for Service or Repair

NOTE In any correspondence or telephone conversation, refer to the Keysight product by its model number and full serial number. With this information, the Keysight representative can determine whether your product is still within its warranty period.

IMPORTANT Keysight Technologies reserves the right to reformat or replace the internal hard disk drive in your analyzer as part of its repair. This will erase all user information stored on the hard disk. It is imperative, therefore, make a backup copy of your critical test data located on the analyzer's hard disk before shipping it to Keysight for repair.

If you wish to send your network analyzer to Keysight Technologies for service or repair:

• Include a complete description of the service requested or of the failure and a description of any failed test and any error message.

• Remove and retain the front handles and all rack mount hardware. The analyzer should be sent to Keysight in the same configuration as it was originally shipped.

• Ship the analyzer using the original or comparable antistatic packaging materials.

• Contact Keysight for instructions on where to ship your analyzer.

2 Performance Test

This chapter provides information on how to verify the E5071C performance.

Introduction

This literature provides the performance test procedures for the Keysight E5071C 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.

NOTE Allow the analyzer to warm up for at least 90 minutes before you execute any of the performance tests.

Perform all performance tests in an ambient temperature of 23 ± 5 °C

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

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

Table 2-1 The E5071C performance test procedure

Para.	Title
1	Receiver Compression - Low Frequency (Up to 8.5 GHz Options)
2	Receiver Compression - Low Frequency (Over 8.5 GHz Options)
3	Dynamic Accuracy - 1 MHz
4	RF Output Level Accuracy and Flatness
5	RF Output Level Linearity
6	Noise Floor
7	Receiver Compression - High Frequency
8	Frequency Accuracy
9	AUX Input Accuracy
10	Dynamic Accuracy - 1.195 GHz
11	Crosstalk and System Dynamic Range
12	Trace Noise
13	Uncorrected System Performance

Test Equipment Required

The required equipment for the performance test is listed on Table 1-2, Table 1-3, Table 1-4 and Table 1-5. Use only calibrated equipment when doing the performance test.

NOTE For the latest ETE lists, refer to Keysight Test Management Environment (TME) Software Portal. The complete ETE lists are available in E5071C Calibration Application WebHelp. http://calsw.tm.keysight.com/

Softkey Selection Procedure for Performance Test

NOTE The procedure of the softkey selection depends on the firmware revision. Note that some softkey selection procedures for your E5071C might be a little bit different from the procedure described in this chapter.

1. RECEIVER COMPRESSION - Low Frequency (Up to 8.5 GHz option)

Description

This test measures the compression at the specified maximum power level for the receivers. This compression test is only for options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485 at low frequencies. The test process measures two power deltas, one at the top of the receiver input power range, and another at an expected linear part of the input power range. The difference between the deltas represents the compression at the top of the power range. A negative test result indicates compression while a positive result indicates expansion. There will be a note in the report stating:

A Fail result in this test implies that Dynamic Accuracy specification cannot be guaranteed in the Compression range of the receiver.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**
Power Meter (Power Meter 1)	N1914A
Power Sensor 1 (Power Sensor RF 1)	E9304A (Opt H18)
10 dB Step Attenuator (10 dB Step Attenuator 1)	8496G (Opt H52)
Attenuator Switch Driver (Attenuator Driver 1)	11713B
Type-N(m) to 3.5 mm(f) (N/A) (2 required)	1250-2879
3.5 mm (f) to Type-N (f) (N/A)	1250-1745
3.5 mm cable (2 requried)	8121-1834

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.

2. RECEIVER COMPRESSION - Low Frequency (Over 8.5 GHz Options)

Description

This test measures the compression at the specified maximum power level for the receivers. This test is only for 2D5/4D5/2K5/4K5 options in low frequencies. First the function generator power is measured using the power meter, then the test process measures four power deltas, one at the top of the receiver input power range, and three in the middle of the input power range. The difference between the deltas represents the compression at the top of the power range. A negative test result indicates "compression" while a positive result indicates amplitude "expansion." If this test fails, there will be a note in the report stating that the dynamic accuracy result is not valid.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**
Function Generator (Function Generator 1)	33250A
Power Meter (Power Meter 1)	N1914A
Power Sensor 2 (Power Sensor RF 2)	N8482A
10 dB Step Attenuator (10 dB Step Attenuator 1)	8496G (Opt H52)
Attenuator Switch Driver (Attenuator Driver 1)	11713B
MW Power Splitter (Power Splitter 1 3.5 mm F)	11667B
BNC (f) to 3.5 mm (m) adapter	
3.5 mm (f) to Type-N (f) adapter	1250-1745
3.5 mm (f) to 3.5 mm (f) adapter (2 or 4 required)[*2]	85027-60005
3.5 mm cable (Cable 3.5 mm: M-3.5 mm: M 1) (3 required)	8121-1834
BNC Cable	8120-1840

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.

*2. Two required for 2-port E5071C; four required for 4-port E5071C

3. DYNAMIC ACCURACY - 1 MHz

Description

This test checks the dynamic accuracy of the E5071C at 1 MHz. The dynamic accuracy is tested at 1 MHz for each receiver port at 0, -10, -20, -30, -40, -50, -60 using step attenuators. The following footnote will be added to the measurement report to explain why the test does not test points below -60 dBm:

Dynamic Accuracy of a receiver consists of three regions: Compression, Linear, and Noise & Crosstalk. Measurements below -60 dBm are simply measuring noise variability in the Noise & Crosstalk region rather than the true linearity of the receiver! Since the receiver is linear by design at these lower levels, there is no need to measure linearity below this threshold. Making measurements above this threshold and below the compression region are sufficient to warrant linearity performance of a receiver.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**	**Over 8.5 GHz Option**[*2]	**Up to 8.5 GHz Option**[*3]
Power Meter (Power Meter 1)	N1914A	X	X
Power Sensor 1 (Power Sensor RF 1)	E9340A (Opt H18)		X
Power Sensor 2 (Power Sensor RF 2)	N8482A	X	
10 dB Step Attenuator (10 dB Step Attenuator 1)	8496G (Opt H52)	X	X
Attenuator Switch Driver (Attenuator Driver 1)	11713B	X	X
3.5 mm (f) to 3.5 mm (f) adapter (Adapter 3.5 mm: F-3.5 mm: F 1) (2 or 4 required)[*4]	85027-60005	X	X
3.5 mm Cable (cable 3.5 mm: M-3.5 mm: M 1) (2 required)	8121-1834	X	X

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.

*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.

*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.

*4. Two required for 2-port E5071C; four required for 4-port E5071C.

4. RF OUTPUT LEVEL ACCURACY AND FLATNESS

Description

This test checks the level accuracy and frequency flatness of the E5071C test port output signal. The level accuracy is checked for an output power level setting of 0 dBm (for Up to 8.5 GHz option) or -5 dBm (for Over 8.5 GHz Option) at 50 MHz using a power meter. The frequency flatness is tested by measuring the power level at several frequency points from 9 kHz to 20 GHz (depending on the option) and calculating the differences between them and the power meter reading at 50 MHz.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**	**Over 8.5 GHz Option**[*2]	**Up to 8.5 GHz Option**[*3]
Power Meter (Power Meter 1)	N1914A	X	X
Power Sensor 1 (Power Sensor RF 1)	E9340A (Opt H18)		X
Power Sensor 2 (Power Sensor RF 2)	N8482A	X	
Power Sensor 3 (Power Sensor MW 1)	E4413A	X	
3.5 mm (m) to Type-N (f) adapter (Adapter 3.5 mm: M-N-Type:F 1)	1250-1750	X	
3.5 mm (f) to 3.5 mm (f) adapter (Adapter 3.5 mm: F-3.5 mm: F 1)	85027-60005	X	

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.
*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.
*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.

5. RF OUTPUT LEVEL LINEARITY

Description

This test checks the output level linearity of the E5071C test port output signal across the specified level range. The RF output level is measured for power level settings of -20 dBm (for Up to 8.5 GHz Option) or -25 dBm (for Over 8.5 GHz Option) to 10 dBm in 2.5 dB steps. (Ranges fluctuate with various frequency ranges. See the spec sheet or the data sheet for details). The linearity of the source power is measured and then the differences from the source power at the 0 dBm (for Up to 8.5 GHz Option) or 5 dBm (for Over 8.5 GHz Option) setting and the measurement value are compared.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**	**Over 8.5 GHz Option**[*2]	**Up to 8.5 GHz Option**[*3]
Power Meter (Power Meter 1)	N1914A	X	X
Power Sensor 1 (Power Sensor RF 1)	E9340A (Opt H18)		X
Power Sensor 2 (Power Sensor RF 2)	N8482A	X	
Power Sensor 3 (Power Sensor MW 1)	E4413A	X	
3.5 mm (f) to 3.5 mm(f) adapter (Adapter 3.5 mm: F-3.5 mm: F 1)	85027-60005	X	
3.5 mm (m) to Type-N (f) adapter (Adapter 3.5 mm:M-N-Type:F 1)	1250-1750	X	

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.

*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.

*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.

6. NOISE FLOOR

Description

This test checks the noise floor for all the receiver ports of the ENA. The noise floor is tested by performing load-ended absolute measurements with the test ports terminated with "Load" devices, 16 times with segment sweep points for specified frequency ranges. The measurement data is calculated from the RMS deviation value from the 16 measurement data for each sweep frequency point.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**	**Over 8.5 GHz Option**[*2]	**Up to 8.5 GHz Option**[*3]
Power Meter (Power Meter 1)	N1914A	X	X
Power Sensor 1 (Power Sensor RF 1)	E9340A (Opt H18)		X
Power Sensor 2 (Power Sensor RF 2)	N8482A	X	
Power Sensor 3 (Power Sensor MW 1)	E4413A	X	
Load (2 or 4 required)[*4]	909D	X	
Load (2 or 4 required)[*4]	85032-60018		X
3.5 mm cable	8121-1834	X	X
3.5 mm (f) to 3.5 mm (f) adapter (2 or 4 required)[*4]	85027-60005	X	
Type-N (m) to 3.5 mm (f) (2 or 4 required)[*4]	1250-2879	X	

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.

*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.

*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.

*4. Two required for 2-port E5071C; four required for 4-port E5071C.

7. RECEIVER COMPRESSION - HIGH FREQUENCY

Description

This test measures the compression at the specified maximum power level for the receivers with the use of the compression test set for high frequencies. The test process measures two power deltas, one at the top of the receiver input power range, and one in the middle of the input power range. The difference between the deltas represents the compression at the top of the power range. A negative test result indicates "compression" while a positive result indicates amplitude "expansion." If this test fails, there will be a note in the report stating that the dynamic accuracy result is not valid.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**	**Over 8.5 GHz Option**[*2]	**Up to 8.5 GHz Option**[*3]
Power Meter (Power Meter 1)	N1914A	X	X
Power Sensor 1 (Power Sensor RF 1)	E9340A (Opt H18)		X
Power Sensor 3 (Power Sensor MW 1)	E4413A	X	
Compression Test Set (Compression Test Set 1)	Z5623A-K01	X	X
3.5 mm cable (2 required)	8121-1834	X	
Type-N cable (2 required)	8120-8862		X
3.5 mm (f) to 2.4 mm (f) adapter (2 required)	11910B	X	X
3.5 mm (f) to 3.5 mm (f) adapter (2 or 4 required)[*4]	85027-60005	X	
Type-N (m) to 2.4 mm (f) adapter (N/A) (2 required)	11903B		X

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.

*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.

*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.

*4. Two required for 2-port E5071C; four required for 4-port E5071C.

8. FREQUENCY ACCURACY

Description

This test checks the frequency accuracy of the E5071C test-port output signal. The frequency accuracy is checked at several frequencies with a frequency counter. Since the E5071C employs a PLL frequency synthesizer for the signal source, a Frequency Accuracy Test at certain frequency points can verify the accuracy for the entire frequency range.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**	**Over 8.5 GHz Option**[*2]	**Up to 8.5 GHz Option**[*3]
Frequency Counter 1	53132A (Option 124)	X	X
Frequency Counter 2	53151A	X	
Frequency Standard 1[*4]	Symmetricom 5071A	X	X
BNC Cable	8120-1840	X	X
Type-N (m) to BNC adapter	1250-0780		X
3.5 mm Cable	8121-1834	X	
3.5 mm (f) to 3.5 mm (f) adapter	85027-60005	X	
3.5 mm (m) to BNC adapter	1250-1200	X	

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.

*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.

*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.

*4. If the frequency counters have high-stability oven timebase options installed (53132A Option 010 or 012, 53131A/53181 Option 010, 53151A Option 001), then it is not necessary to require an external 10 MHz reference. To use the frequency counters high stability timebase, select "Internal Reference" when mapping the Frequency Standard DSG.

9. AUX INPUT ACCURACY

Description

This test checks the measurement accuracy of AUX Input. The AUX Input measurement is compared with the measured value of the multimeter by inputting a DC voltage to AUX IN 1, AUX IN 2, and the multimeter ports from the function generator. The difference in the readings is the measurement error.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**
Function Generator	33250A
Multimeter	3458A
BNC Cable	8120-1840
BNC T Adapter (2 required)	1250-0781
BNC to Dual Banana adapter	1251-2277
BNC Short Termination (2 requried)	1250-0929

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.

10. DYNAMIC ACCURACY - 1.195 GHz

Description

This test checks the dynamic accuracy of the E5071C. The dynamic accuracy is tested at 1.195 GHz for each receiver port using the Keysight Z5623A (with Option H01) Dynamic Accuracy Test Set. The 1.195 GHz source signal of the E5071C 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 60 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. The following footnote will be added to the measurement report to explain why the test does not test points below -60 dBm:

Dynamic Accuracy of a receiver consists of three regions: Compression, Linear, and Noise & Crosstalk. Measurements below -60 dBm are simply measuring noise variability in the Noise & Crosstalk region rather than the true linearity of the receiver! Since the receiver is linear by design at these lower levels, there is no need to measure linearity below this threshold. Making measurements above this threshold and below the compression region are sufficient to warrant linearity performance of a receiver.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**	**Over 8.5 GHz Option**[*2]	**Up to 8.5 GHz Option**[*3]
Power Meter (Power Meter 1)	N1914A	X	X
Power Sensor 2 (Power Sensor RF 2)	N8482A	X	X
Dynamic Accuracy Test Set (Dynamic Accuracy Test Set 1)	Z5623A (Opt H01)	X	X
Type-N Cable (2 required)	8120-8862		X
3.5 mm Cable (2 required)	8121-1834	X	
6 dB Fixed Attenuator (Attenuator Fixed 6dB 1)	8491A (Opt 006)	X	X
Low Pass Filter (Filter Low Pass 2.0 GHz 1)	TLP 2000-5E4F	X	

Type-N (m) t o 3.5 mm (m) adapter (2 required)	1250-2879	X	
3.5 mm (f) to 3.5 mm (f) adapter (2 or 4 required)*4	85027-60005	X	

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.
*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.
*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.
*4. Two required for 2-port E5071C; four required for 4-port E5071C.

11. CROSSTALK AND SYSTEM DYNAMIC RANGE

Description

This test checks the crosstalk between test ports of the E5071C, and the system dynamic range for the receiver ports of the E5071C. The crosstalk is tested by performing the "through measurements" with two test ports connected together, and the short-ended "isolation measurements" with the test ports terminated with "Short" devices. A "through" calibration is performed to have the "through measurements" data as the reference to which the "isolation measurements" 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.

For crosstalk, average 16 times what is measured through minimum IFBW, and take the effect for noise away as much as possible. For dynamic range, deduct for crosstalk value and calculate noise value. To measure through worst case, connect the short termination to the port.

The short-ended isolation measurement is all that is needed to compute the crosstalk. The through needed for System Dynamic Range will not be measured during the Crosstalk measurement.

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.

This test will utilize the "Isolation" measurement deduced from crosstalk, but will not measure "Through" measurement in order to shorten testing time. The "Through" measurement will be included in the measurement uncertainty analysis (major contributor is transmission tracking).

NOTE Two Channels are required in order to run the Crosstalk and System Dynamic Range test. If only one channel is allocated, then the first connection check will fail even when properly connected, and the test will not run correctly.

Test equipment

Test Equipment (DSG)*1	Model Number	Over 8.5 GHz Option*2	Up to 8.5 GHz Option*3
Type-N (m) Short (N/A)	85032-60008		X
3.5 mm (m) Short (N/A)	85052-60006	X	

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.
*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.
*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.

12. TRACE NOISE

Description

This test checks the trace noise level for each test port of the E5071C. The trace noise levels for S12, S21, S34, S43 are quantified by performing a "through" measurement 32 times over the full frequency range of the analyzer with a cable connected between two ports. The trace noise level for S11, S22, S33 and S44 are quantified by performing a "short" measurement 32 times over the full frequency range of the analyzer with a cable (terminated with "short" device) connected to each port (1,2,3, and 4).

Standard deviation of the measured values at each frequency is calculated and then translated into a noise level expressed in magnitude (dB rms) and phase (deg rms).

Test equipment

Test Equipment (DSG)[*1]	**Model Number**	**Over 8.5 GHz Option**[*2]	**Up to 8.5 GHz Option**[*3]
Type-N Cable (Cable N:M-N:M 1)	8120-8862		X
Type-N (f) Short Termination (N/A)	85032-60009		X
3.5 mm Cable (Cable 3.5 mm: M-3.5 mm:M 1)	8121-1834	X	
3.5 mm (f) Short (N/A)	85052-60007	X	
3.5 mm (f) to 3.5 mm (f) adapter (Adapter 3.5 mm: F-3.5 mm: F1)	85027-60005	X	

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.
*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.
*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.

13. UNCORRECTED SYSTEM PERFORMANCE

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 Keysight 85052D (Over 8.5 GHz Option *2) or Keysight 85032F (Up to 8.5 GHz Option *3) Calibration Kit with segment sweep points for a specified frequency range. After a full two-port (Options 230, 235, 240, 245, 260, 265, 460, 465, 280, 285, 2D5, and 2K5) or a full four-port (Options 430, 435, 440, 445, 480 ,485, 4D5, and 4K5) calibration is performed for each test port, the test will output the directivity, source match, reflection tracking, and transmission tracking and load match data to the report.

Test equipment

Test Equipment (DSG)[*1]	**Model Number**	**Over 8.5 GHz Option**[*2]	**Up to 8.5 GHz Option**[*3]
Calibration Kit, Type-N (Calibration Kit N-Type 1)	850032F		X
Type-N Cable (Cable N:M-N:M 1)	8120-8862		X
Calibration Kit, 3.5 mm (Calibration Kit 3.5 mm 1)	85052D	X	
3.5 mm Cable (Cable 3.5 mm: M-3.5 mm: M 1)	8121-1834	X	
3.5 mm (f) to 3.5 mm (f) adapter (Adapter 3.5 mm: F-3.5 mm: F 1)	85027-60005	X	

*1. The DSG (Device Substitution Group) is listed below the equipment description, if applicable. These devices are required to be mapped in TME to execute a test. DSGs require either GPIB communication or are important for dynamic measurement uncertainty calculations. N/A refers to required equipment that is not mapped as DSGs in TME.

*2. Over 8.5 GHz are Options 2D5/2K5/4D5/4K5.

*3. Up to 8.5 GHz are Options 230/235/430/435/240/245/440/445/260/265/460/465/280/285/480/485.

13. UNCORRECTED SYSTEM PERFORMANCE

3 Adjustment

This chapter provides the adjustment information for the E5071C ENA Series Network Analyzer to ensure that it is within its specifications. The adjustment must be performed Keysight's qualified service personnel. If you need the adjustment for your E5071C, it should be sent to the nearest Keysight 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 Keysight'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 E5071C for at least 90 minutes before performing any of the following adjustment procedures to ensure proper results and correct instrument operation.

Required Equipment

Table 1-2 on page 24 lists the equipment required to perform the adjustment procedures described in this chapter. Use only calibrated test equipment when adjusting the E5071C.

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 Keysight's qualified service personnel. If you need the adjustment for your E5071C, it should be sent to the nearest Keysight Technologies service office.

Required Adjustment Item after Replacing Assembly

Table 3-1 Up to 8.5 GHz Options

Replaced Assembly	Adjustment Item										
	Writing ID	OCXO	Frequency Reference	AUX Input	Synthesizer Gain	Virtual Bridge Coefficient	Source Output Power	Receiver IF Range	Receiver Port Characteristics	Receiver Absolute Gain	Receiver RF Range
Reference Oven Board (OCXO)		√									
Analog Base Module (BAS)		√		√							
Synthesizer Module for Source (SYN-SRC)					√		√				
Synthesizer Module for Local (SYN-LCL)					√		√				
Level Vernier Module (VNR)							√				
Receiver Module (RCV)						√	√	√	√	√	√
Hard Disk Drive (HDD)	√										
Distributor Module (DIS)							√		√	√	
RF Switch (T2-SW)							√		√	√	

Table 3-2 Over 8.5 GHz Options

Replaced Assembly	Adjustment Item								
	Writing ID	OCXO	Frequency Reference	AUX Input	Synthesizer Gain	Source Output Power	Receiver IF Range	Receiver Port Characteristics	Receiver Absolute Gain
PCI-DSP Card (PCI/DSP)	√								
Reference Oven Board (OCXO)		√							
Analogue Base Module (BAS)			√	√					
Synthesizer Module (SYN)					√	√		√	√
Receiver Module (RCV)						√	√	√	√
Doubler Module (DBL)						√			√
Distributor Module (DIS)							√	√	√
Imix (IMX)						√		√	√
Front End Module (FEM)						√		√	√
Hark Disk Drive (HDD)		√							

Writing ID

This item writes the serial number and the option structure into the E5071C.

Required equipment for the writing ID

None

OCXO Adjustment

The purpose of this procedure is to adjust the 10 MHz OCXO.

Required equipment for OCXO adjustment

Description	Recommended Model
Frequency Counter	Keysight 53181A with Opt. 010 and 124 or Keysight 53131/2A with Opt. 010 and 124
Frequency Standard	Symmetricom 5071A
BNC(m)-BNC(m) Cable, 61 cm	Keysight p/n 8120-1839

Frequency Reference Adjustment

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

Required equipment for frequency reference adjustment

Description	Recommended Model
Frequency Counter	Keysight 53181A with Opt. 010 and 124 or Keysight 53131/2A with Opt. 010 and 124
Frequency Standard	Symmetricom 5071A
BNC(m)-BNC(m) Cable, 61 cm	Keysight p/n 8120-1839

AUX Input Adjustment

The purpose of this procedure is to adjust the offset error and proportional error of AUX Input.

Required equipment for the AUX input adjustment

Description	Recommended Model
Function Generator	Keysight 33120A or 33250A
Multi Meter	Keysight 34401, 34410, 34411 or 3458A
BNC(m)-BNC(m) Cable, 61 cm x 4 ea	Keysight p/n 8120-1839
BNC T Adapter x 2ea	Common Parts
Banana BNC	Common Parts

Synthesizer Gain Adjustment

The purpose of this procedure is to adjust 2Bit ATT of RF Path in Synsthesizer for Source.

Required equipment for the synthesizer gain adjustment

None

Virtual Bridge Coefficient Adjustment

This item writes the coefficient factors to the E5071C.

Required equipment for the virtual bridge coefficient adjustment

None

NOTE This item is for up to 8.5 GHz Options.

Source Output Power Adjustment

For up to 8.5 GHz Options, the purpose of this procedure is to adjust the variable attenuator in Level Vernier board, and the gains among Level Vernier, Distributor and Receiver.

For over 8.5 GHz Options, the purpose of this procedure is to adjust the characteristic fluctuation of TC709C variable attenuator used in A86 Doubler Board.

Required equipment for the source output power adjustment

1) Up to 8.5 GHz Options

Description	Recommended Model
Power Meter	Keysight E4419A/B
Power Sensor	Keysight E9304A Opt H18

2) Over 8.5 GHz Options

Description	Recommended Model
Power Meter	Keysight E4419A/B
Power Sensor	Keysight 8482A
Power Sensor	Keysight E4413A
APC 3.5(m) - N(f)Adapter	Keysight p/n 1250-1811
APC 3.5(f) -(m) Adapter	Keysight p/n 85027-60005

Receiver IF Range Adjustment

The purpose of this procedure is to adjust IF Range.

Required equipment for the receiver IF range adjustment

1) Up to 8.5 GHz Options

Description	Recommended Model
N(m)-N(m) Cable	Keysight N6314A (p/n 8120-8862)

2) Over 8.5 GHz Options

Description	Recommended Model
SMA Cable	Keysight p/n 5062-6693

Receiver Ports Characteristics Adjustment

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

Required equipment for the receiver ports characteristics adjustment

1) Up to 8.5 GHz Options

Description	Recommended Model
Calibration Kit	Keysight 85032F
N(m)-N(m) Cable	Keysight N6314A (p/n 8120-8862)

2) Over 8.5 GHz Options

Description	Recommended Model
Calibration Kit	Keysight 85052D
SMA Cable	Keysight p/n 5062-6693

Receiver Absolute Gain Adjustment

This item writes the coefficient in Absolute measurement.

Required equipment for the receiver absolute gain adjustment

None

Receiver RF Range Adjustment

This item writes the coefficient of RF Range.

Required equipment for the receiver RF range adjustment

None

NOTE This item is for up to 8.5 GHz Options.

4 Troubleshooting

This chapter provides procedure to isolate a faulty assembly in the E5071C 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 E5071C Measurement View

You need to exit from the E5071C Measurement View to perform some troubleshooting. The following is the procedure to exit from the E5071C Measurement View.

Step 1. Connect the mouse and external keyboard to the connectors on the E5071C 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 E5071C exit the Measurement View, then.windows desktop screen appears with 3 icons (Network Analyzer, Recycle Bin, and Internet Explorer.)

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

NOTE If you need to shut down the E5071C 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 "Turn off Computer" in the pull down menu. "Turn off Computer" dialog box opens.

c. Click "Turn off" button in the dialog box.

To Troubleshoot the Instrument

This section describes basic procedural flow of troubleshooting when servicing the E5071C. 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 E5071C. Figure 4-2 shows the trouble isolation flow chart.

Step 1. Turn the instrument power on

About a few minutes after the E5071C is turned on, the measurement view is displayed on the screen. The display on the screen should be similar to Figure 4-8, "Measurement view," on page 75.

Step 2. Check the display

- If no display appears on the LCD after the E5071C is turned on, go to "No Display troubleshooting" on page 70.
- If the E5071C stops in booting process despite something being displayed on the LCD, go to "Boot Process Troubleshooting" on page 72.
- The power-on self test is performed once automatically after the E5071C measurement view is displayed. If the power-on self test fails, go to "Troubleshooting Using Diagnostics Test" on page 76.

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 89.

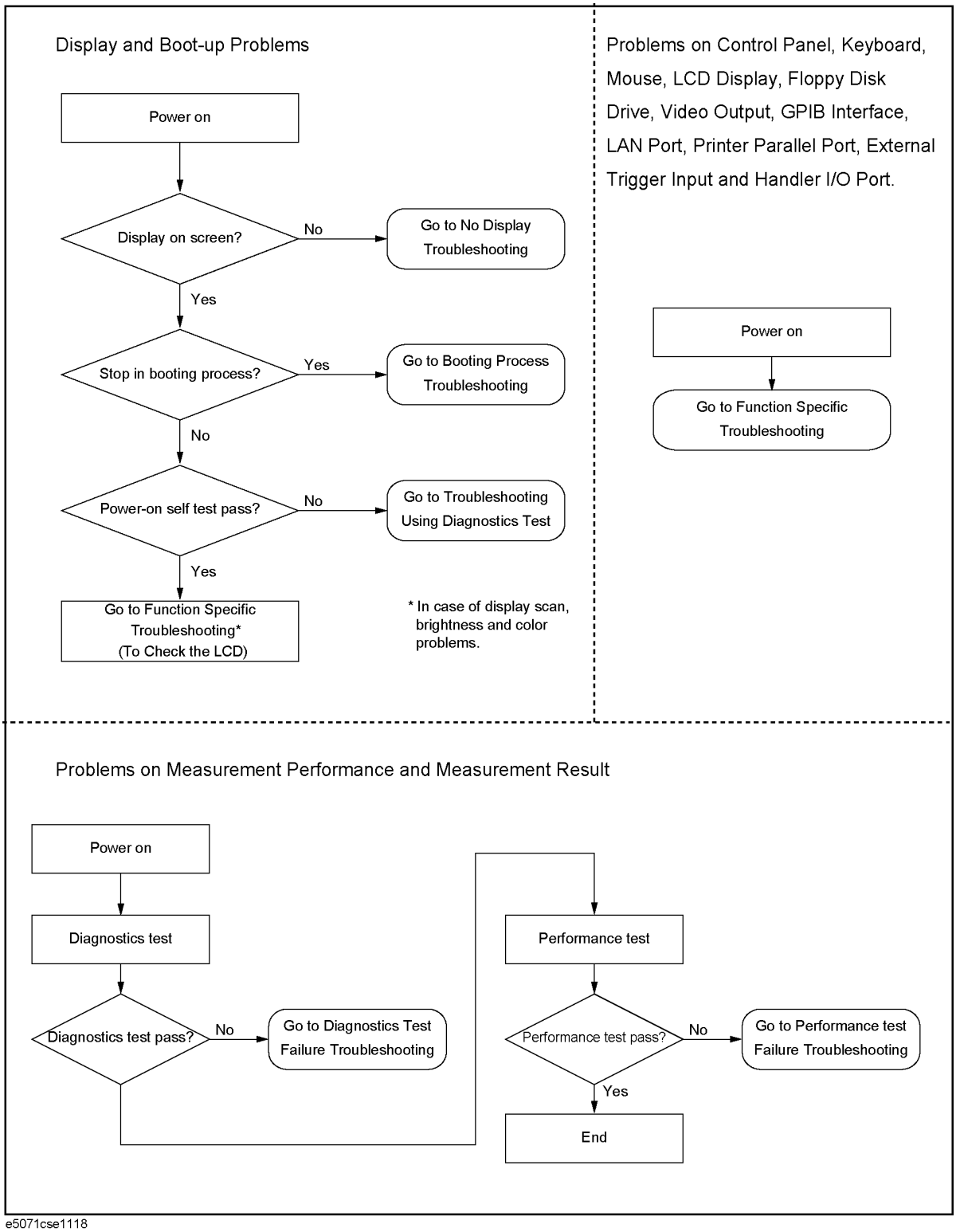
Step 4. Check the measurement function

If the instrument fails on performance test, go to "Performance test failure troubleshooting" on page 96.

If the measurement function does not work correctly, perform the diagnostics test provided in the E5071C's service function. When the diagnostics test fails, go to "Troubleshooting Using Diagnostics Test" on page 76.

NOTE The diagnostics 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 this test even if the power-on self test passed.

Figure 4-2 Primary trouble isolation flowchart



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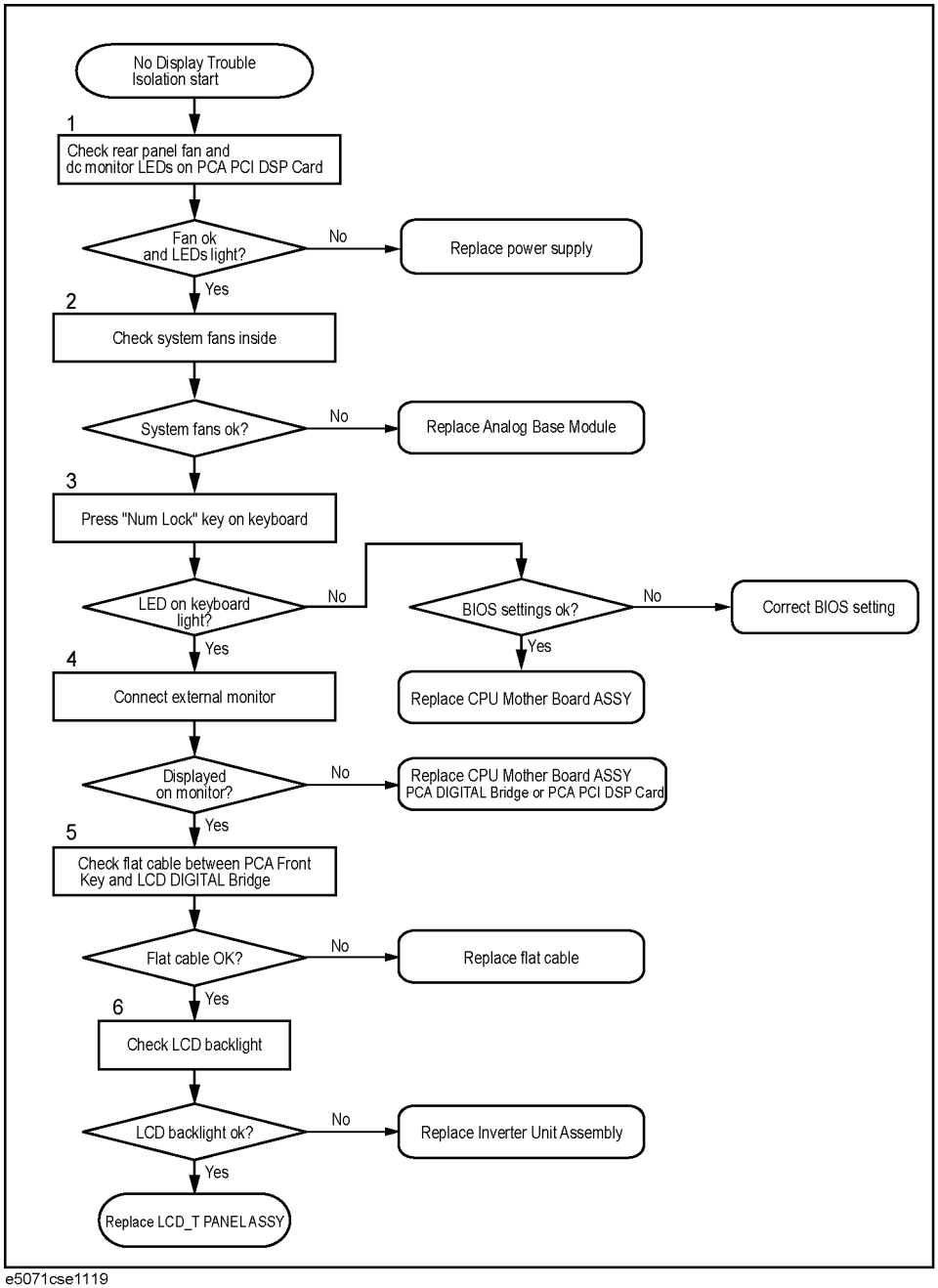
No Display troubleshooting

If the E5071C 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 E5071C rear panel USB 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**



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Step 1. Check fan operation and DC monitor LED

If the rear panel fan (blower) doesn't run, a failure in the power supply is assumed. Remove the E5071C outer cover and check if the following LEDs light:

- +3.3 V and +5 V dc monitor LED on the PCA PCI DSP Card.

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

Step 2. Check system fans inside.

If the system fans on the chassis inside the E5071C don't run, problem seems in the analog base module. In this case, remove the E5071C outer cover and make sure whether the fans run or not.

NOTE If the power shutdown occurs without a beep, the problem seems in the analog base module or the CPU Mother Board Assembly. Check BIOS status of CPU Mother Board Assembly is correct as described in "To configure the CPU Mother Board Assembly and BIOS" on page 109.

Step 3. Checking with the external monitor

Connect an external XGA monitor to the VIDEO output on the E5071C rear panel.

- If something is displayed on the external monitor, the problem is present around the LCD. Also check the PCA Front Key and PCA Digital Bridge because the ON/OFF setting of the LCD backlight is controlled by the PCA Front Key through the PCA Digital Bridge.
- If nothing is displayed even on the external monitor, the problem seems in the CPU Mother Board Assembly or PCA Digital Bridge.

NOTE Check if the PCA Digital Bridge and PCA PCI DSP Board are securely connected to the CPU Mother Board Assembly.

Step 4. Checking flat cable

Check a flat cable between the PCA Front Key and the PCA Digital Bridge.

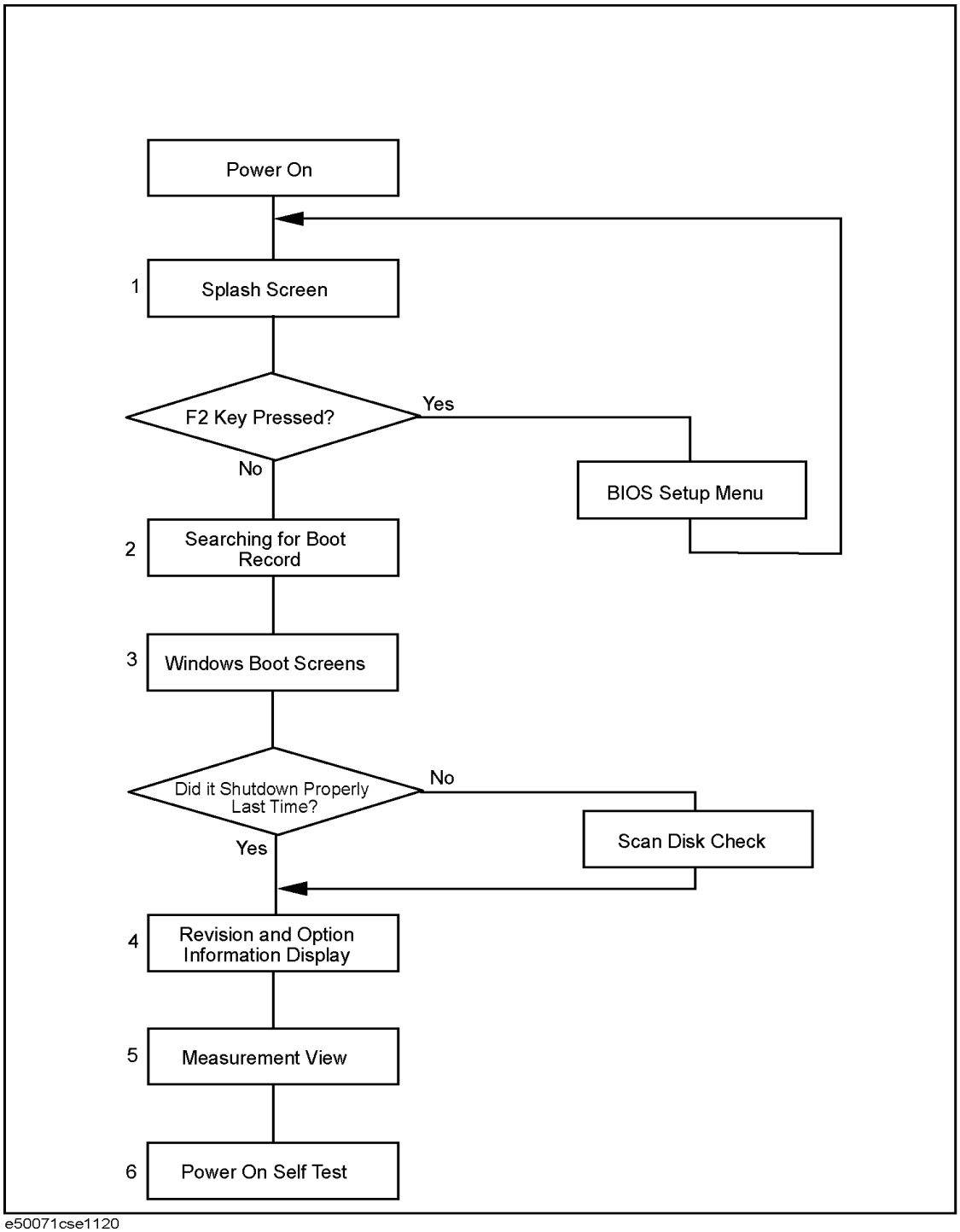
Step 5. Check around the backlight

Check Inverter Unit Assembly and a cable between the Inverter Unit Assembly and the PCA Front Key. Also check the cables between the LCD-TPANEL ASSY and PCA Front Key. If the cables are normal, check the LCD-TPANEL ASSY.

Boot Process Troubleshooting

Figure 4-4 represents the booting process flow in the E5071C. If the E5071C stops in the booting process, troubleshoot using the following step-by-step procedure.

Figure 4-4 Booting process flowchart



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Step 1. Splash Screen

The splash screen is displayed with Keysight logo as shown in Figure 4-5.

If the splash screen is displayed, you can assume that the CPU Mother Board Assembly 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 4-5 Splash Screen

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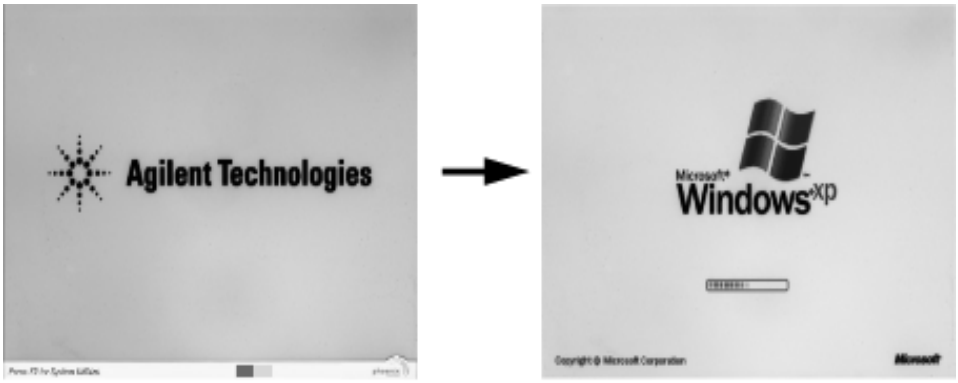
Step 2. Windows boot screens

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 4-6. If the Windows boot screens are displayed, it is assumed that the Hard Disk Drive works. While the Window screens are displayed, Windows operating system is starting up.

Figure 4-6 Windows boot screens



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If you encounter the following problems, try to reinstall the operating system before replacing the Hard Disk Drive.

- "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 E5071C 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 291. If the operating system still doesn't boot up properly after reinstallation, replace the Hard Disk Drive.

NOTE The operating system automatically checks the device drivers, which are necessary to use the E5071C functions and are installed in the system before the E5071C is shipped from Keysight 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 4-7. The E5071C 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 4-7 Firmware revision and option information

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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 PCA PCI DSP card 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 PCA PCI DSP Card doesn't work or is not properly connected to the CPU Mother Board Assembly.

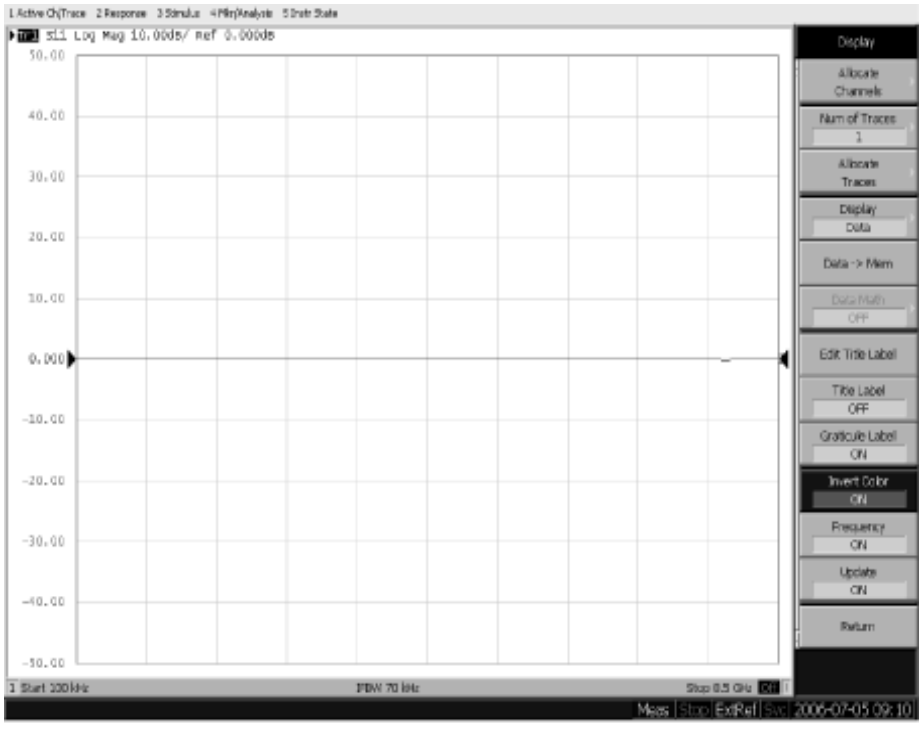
"Fatal Error: Failed to Update DSP Code":

If this happened, the PCA PCI DSP Card failed in writing DSP program into flash ROM when the firmware was installed first or updated to the newest version. A problem in the PCA PCI DSP Card or CPU Mother Board Assembly is suspected.

Step 4. Measurement view

The measurement view as shown in Figure 4-8 is displayed after the system initialization is completed without problem.

Figure 4-8 Measurement view



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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 Diagnostics Test" on page 76.

Troubleshooting Using Diagnostics Test

The Keysight E5071C has the diagnostics test function to diagnose the analog measurement section and internal dc power supply voltages. The diagnostics 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 diagnostics test.

Power On Self Test

Power-on self-test always takes place once after the E5071C 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 diagnostics test program and includes the dc power supply voltage, source PLL synthesizer and level controller (ALC) tests. When the self-test failed, perform the diagnostics 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.

Table 4-1 Power on Self Test Error Message

Error Message	Meaning	Error Priority
Power on test failed (A6 not found)	A6 Analog Base module is not found on Board ID check	1
Power on test failed (A6 DC-bus, 0x%08X)	DC-BUS Test on A6 Analog Base module failed	2
Power on test failed (A1-1 not found)	No synthesizers are found on Board ID check	3
Power on test failed (A1-1 DC-bus, 0x%08X)	DC-BUS Test on A1 Source Synthesizer failed	4
Power on test failed (A1-2 not found)	A1 Source Synthesizer or A1 Local Synthesizer is not found on Board ID check	5
Power on test failed (A1-2 DC-bus, 0x%08X)	DC-BUS Test on A1 Local Synthesizer failed	6
Power on test failed (A2-1 not found)	No receiver board is found on Board ID check or Port-1 receiver board ID does not match frequency option	7

Table 4-1 Power on Self Test Error Message

Error Message	Meaning	Error Priority
Power on test failed (A2-2 not found)	Only 1 receiver board is found on Board ID check or Port-2 receiver board ID does not match frequency option	8
Power on test failed (A2-3 not found)	Only 2 receiver boards are found on Board ID check or Port-3 receiver board ID does not match frequency option	9
Power on test failed (A2-4 not found)	Only 3 receiver boards are found on Board ID check or Port-4 receiver board ID does not match frequency option	10
Power on test failed (A86 not found)	A86 Doubler is not found on Board ID check or A3 Vernier is found with Over 8.5GHz option	11
Power on test failed (A86 DC-bus, 0x%08X)	DC-BUS Test on A86 Doubler failed	12
Power on test failed (A3 not found)	A3 Level Vernier is not found on Board ID check	13
Power on test failed (A3 DC-bus, 0x%08X)	DC-BUS Test on A3 Level Vernier failed	14
Power on test failed (A4 not found)	A4 distributor is not found on Board ID check	15
Power on test failed (A23 not found)	A23 Handler I/O is not found on Board ID check	16

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, Synthesizer Module may be 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), 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.

NOTE With Firmware 9.26 or later, Power On Test result is recorded as “PowerOnTest_NNNN.txt” in Log folder under E:\Log\PowerOnTest.

Contents of the diagnostics test

The diagnostics test contains 7 test groups shown in Table 4-2. Each test group can be

performed independently and verifies one of various operating characteristics of the analog measurement section.

Table 4-2 Diagnostic test group menu

Number	Test Name
1	DCBUS TEST
2	INTERNAL LEVEL MONITOR TEST
3	RF OUTPUT LEVEL POWER SEEP
4	RF OUTPUT LEVEL RANGE TEST
5	RECEIVER ABSOLUTE MEASUREMENT TEST
6	RECEIVER COMPRESSION TEST
7	RECEIVER IF RANGING TEST

Required Test Equipment

Table 4-3 shows the equipment required for performing the diagnostic test.

Table 4-3 Required Equipment

Required Test Equipment	Qty	Recommended Model
24 inch 50 Ohm cable	1	Keysight p/n 8120-8862

To Execute the diagnostics Test

To isolate faulty board assembly in analog section, execute the diagnostics 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 diagnostics test properly, the following conditions must be met:

1. Allow the analyzer to warm up for at least 90 minutes before you execute any of the diagnostic test.
2. Perform all diagnostic tests in an ambient temperature of 23 °C ± 5 °C.

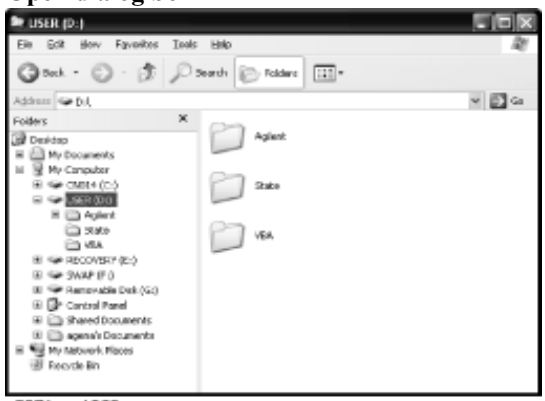
NOTE Do not operate front panel keys, keyboard and mouse during the diagnostics test. Changing the instrument settings while the diagnostics test is in progress will cause incorrect test results.

Step 1. Connect a mouse to the rear panel USB connector

Step 2. Press [Macro Setup] key.

Step 3. Press **Load Project** to select **Load Project** function."Open" dialog box will be displayed as shown in Figure 4-9.

Figure 4-9 **Open dialog box**



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Step 4. Select "User [D]" (preset state) from menu in the "Lock in:" box.

Step 5. Double-click "Keysight" folder to open it and to access its menu.

Step 6. Double-click "Service" folder to open it.

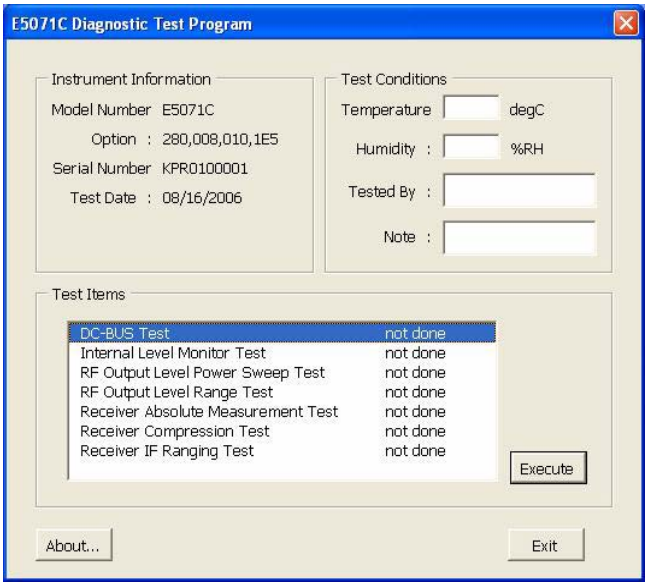
Step 7. Click "DiagnosticsTest.vba" program file to select it from program menu.

Step 8. Click "Open" button to download the diagnostics test program.

Step 9. Press **Select Macro** to select function.

Step 10. Press [Enter] (or click **Module1 main**) to open the **Module1 main** program file. "Diagnostics Test" dialog box will appear as shown in Figure 4-10. The dialog box shows the menu of test groups to choose from.

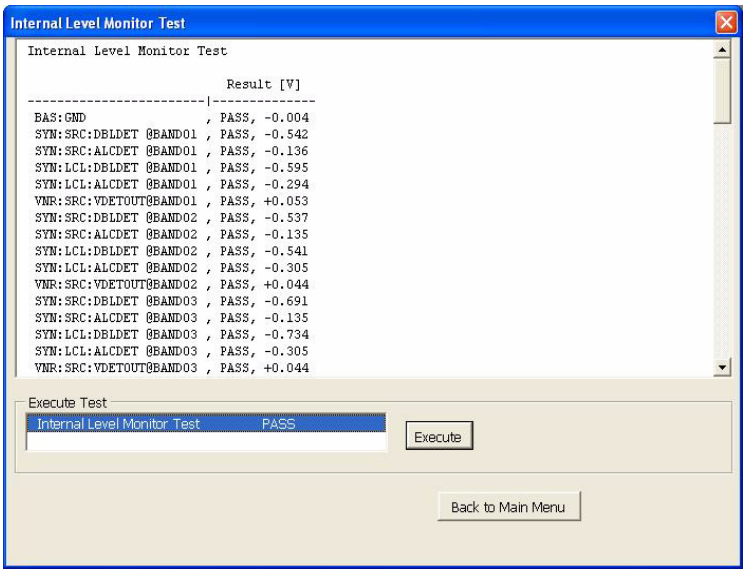
Figure 4-10 **Diagnostics Test dialog box**



Step 11. Select the Test item and Click "Execute" button to run the test program. The dialog box displays "In process..." while the test is in progress.

Step 12. When the diagnostics test is completed, the dialog box displays Pass or Fail for each test group as an example shown in Figure 4-11.

Figure 4-11 **Diagnostics test result display example (Pass)**



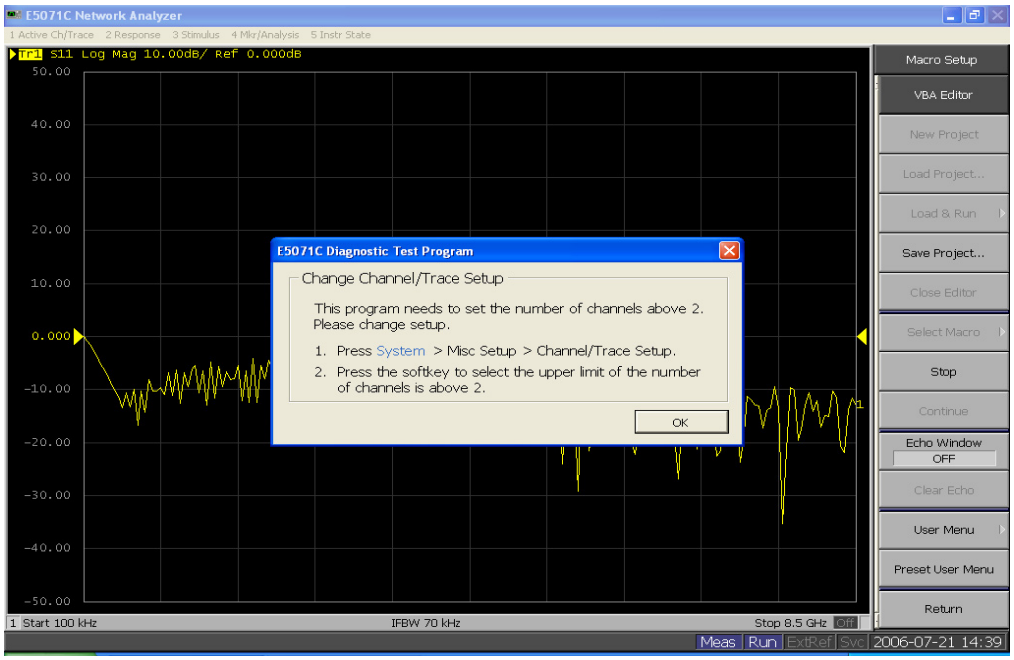
Step 13. To exit the diagnostics test, click "Exit" button.

NOTE Test result is recorded as “resultDT.txt” in Log folder under D:\Keysight\Service.

This test is cannot be executed under 1ch/4tr (20001 points mode). If it is executed with

this mode, error message is displayed shown in Figure 4-12.

Figure 4-12 Error message on Diagnostic



Diagnostics Test Failure Troubleshooting

Table 4-4 represents the contents of the diagnostics tests and the relationships of failed tests to probable faulty board assemblies. If the instrument fails the diagnostics test, replace the faulty board assembly as shown in Table 4-4.

It is recommended to perform the diagnostic test in accordance with the main menu. Also if it is failed on DCBUS TEST, troubleshooting is refer to Figure 4-17, and if it is failed on Internal Level Monitor, troubleshooting is refer to Figure 4-18.

Table 4-4 Diagnostic Test Failure Troubleshooting

Test No.	Group	Failed Test	Probable faulty Board Assembly							
			BAS	SRC	LCL	DBL	VNR	RCV	IMX	FEM
1	DC-BUS	ALL	###			##		#		
		BAS	###			##		#		
		SRC	#	###		##				
		LCL	#		###	##				
		VNR	#			##	###			

Table 4-4 Diagnostic Test Failure Troubleshooting

Test No.	Group	Failed Test	Probable faulty Board Assembly								
			BAS	SRC	LCL	DBL	VNR	RCV	IMX	FEM	T2-SW
2	Internal Level Monitor	ALL	###	#	#		#	##			
		SRC	#	###				##			
		LCL	#		###			##			
		VNR	#	##			###	##			#
3	RF Output Level Power Sweep	Port 1	#	#	#	##	###	#	###	##	#
4	RF Output Level Range	Each B'd						###			#
		All	#	##	#		###	#			#
5	Receiver Absolute Measurement	Each B'd						###			#
		All	#	#	#		#	#			#
6	Receiver Compression	Each B'd						###			#
		All	#	#	#		#	#			#
7	Receiver IF Ranging	Each B'd						###			#
		All	#	#	#		#	#			#

###: Most suspiciuos assembly

##: Suspicious assembly

#: Possible faulty assembly

NOTE The meaning of abbreviations are shown in Table 4-5.

Table 4-5 The meaning of abbreviations

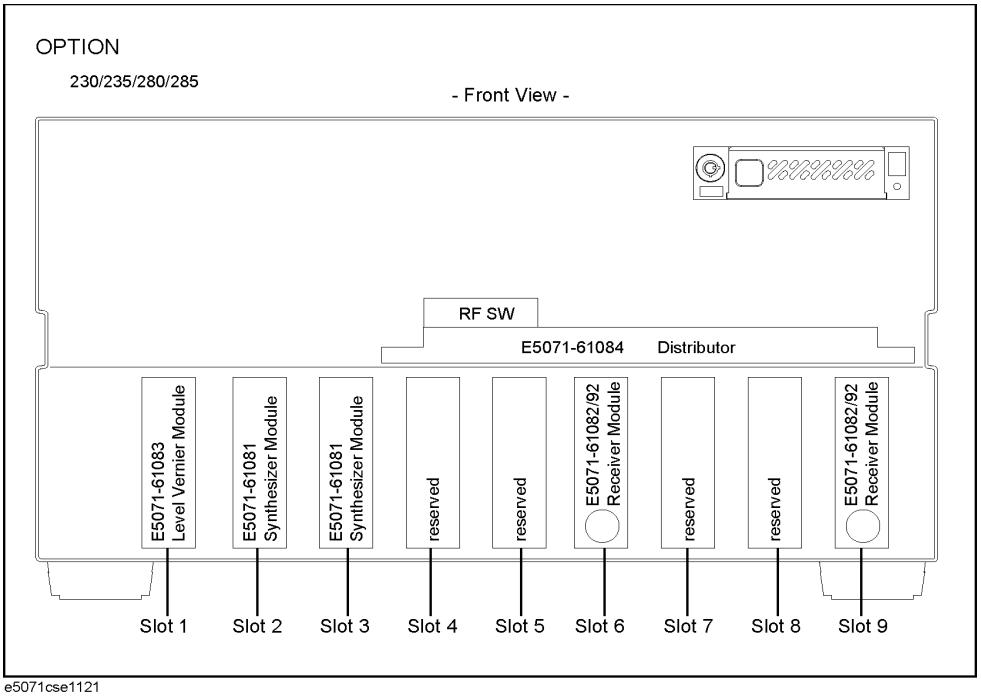
Abbreviation	Meaning (Description)
BAS	Analog Base Board
SRC	TESTED Synthesizer Module (Source)
LCL	TESTED Synthesizer Module (Local)
DBL	TESTED Doubler Module (For over 8.5 GHz Options)
VNR	TESTED Level Vervier Module
RCV	TESTED Receiver Module

Table 4-5 The meaning of abbreviations

Abbreviation	Meaning (Description)
IMX	IMIX (For over 8.5 GHz Options)
FEM	Front End Module (For over 8.5 GHz Options)

NOTE Module configulation is shown Figure 4-13 for 2-port, and Figure 4-15 for 4-port.

Figure 4-13 Module configulation for 2-port



e5071cse1121

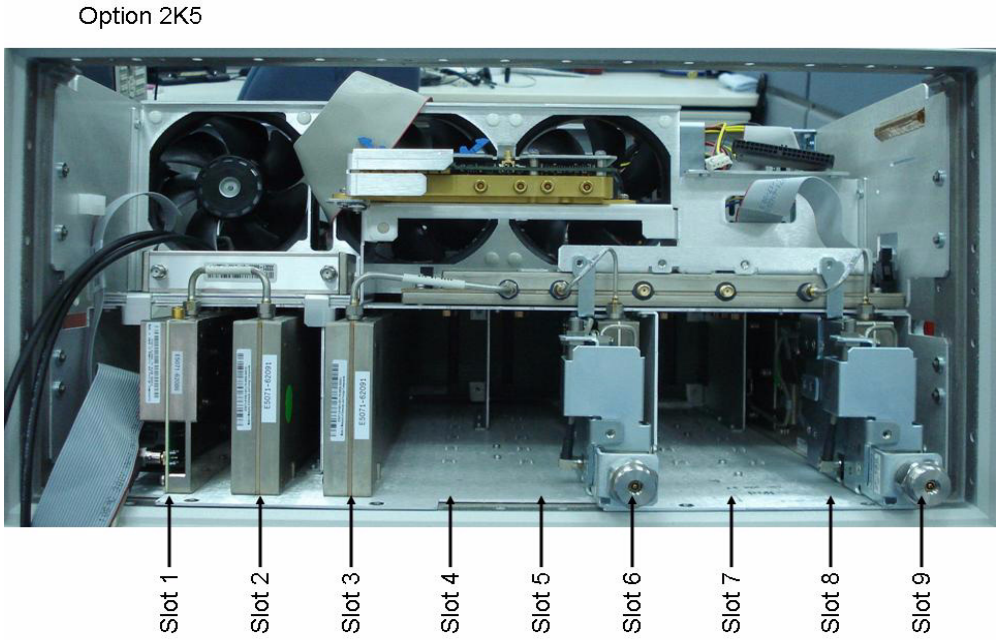
Slot 2: Synthesizer Module for Source

Slot 3: Synthesizer Module for Local

Slot 6: Receiver Module for Port 1

Slot 9: Receiver Module for Port 2

Figure 4-14 Module configulation for 2-port of option



Slot 1:TBR Tested Level Doubler Module

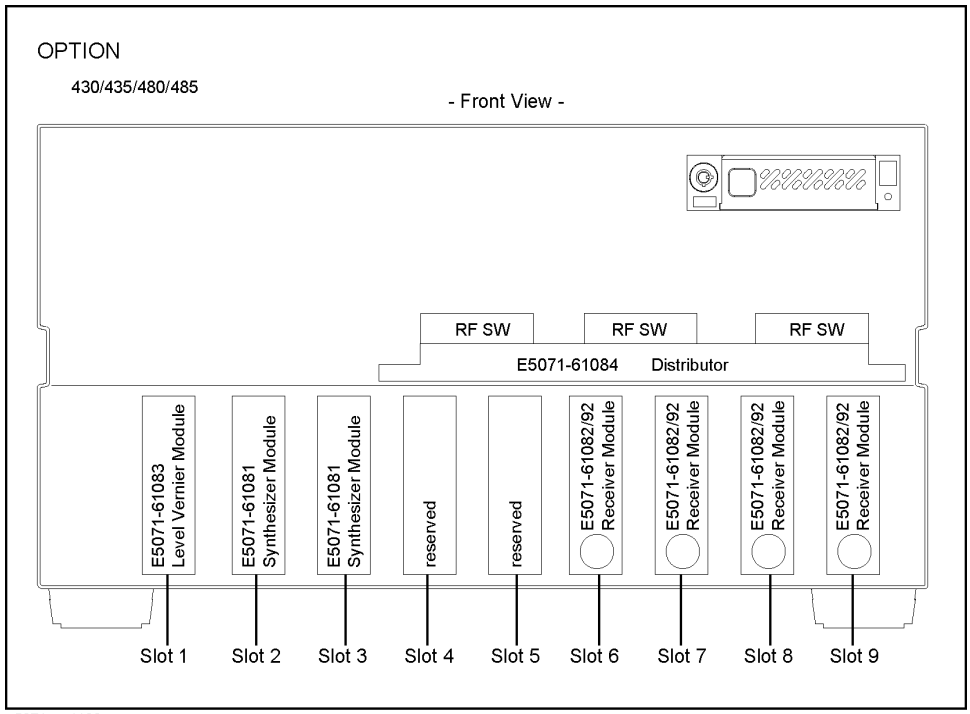
Slot 2: Synthesizer Module for Source

Slot 3: Synthesizer Module for Local

Slot 6: Receiver Board of port 1

Slot 9: Receiver Board of port 2

Figure 4-15 Module configulation for 4-port



e5071cse1122

Slot 2: Synthesizer Module for Source

Slot 3: Synthesizer Module for Local

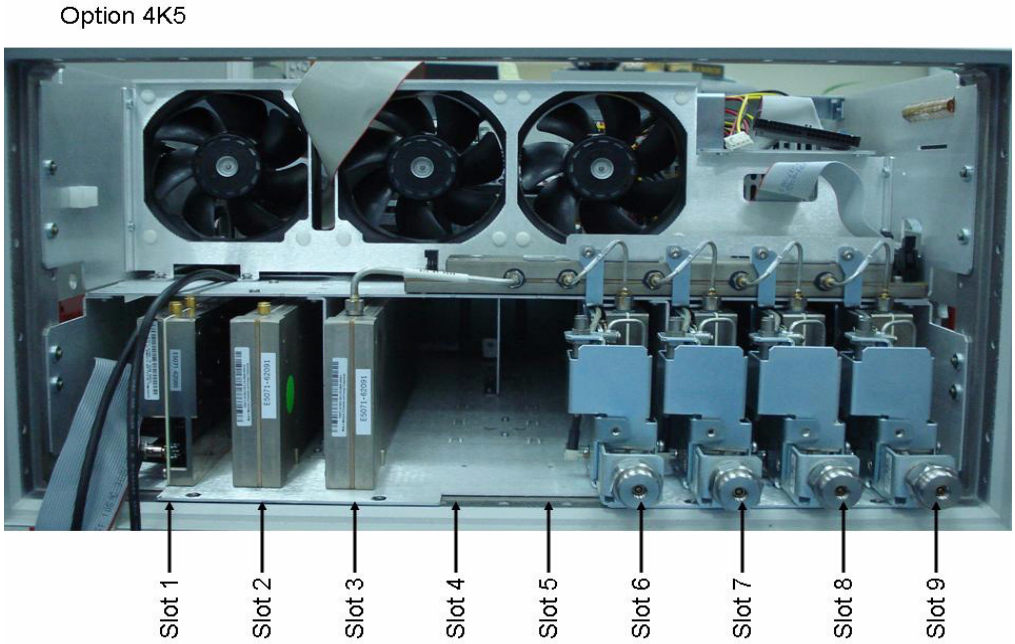
Slot 6: Receiver Module for Port 1

Slot 7: Receiver Module for Port 2

Slot 8: Receiver Module for Port 3

Slot 9: Receiver Module for Port 4

Figure 4-16 Module configulation for 4-port of option



Slot 1:TBR Tested Level Doubler Module

Slot 2: Synthesizer Module for Source

Slot 3: Synthesizer Module for Local

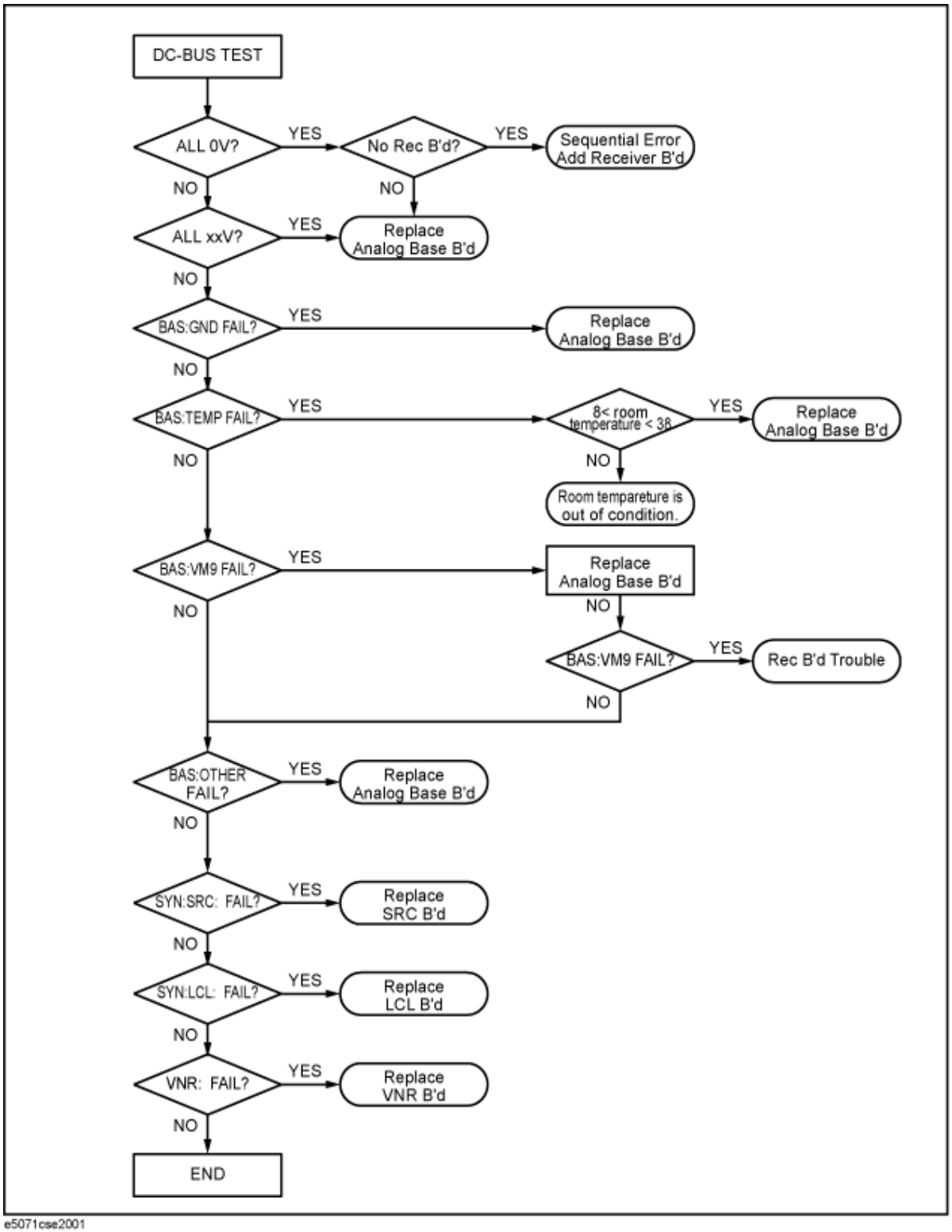
Slot 6: Receiver Board of port 1

Slot 7: Receiver Board of port 2

Slot 8: Receiver Board of port 3

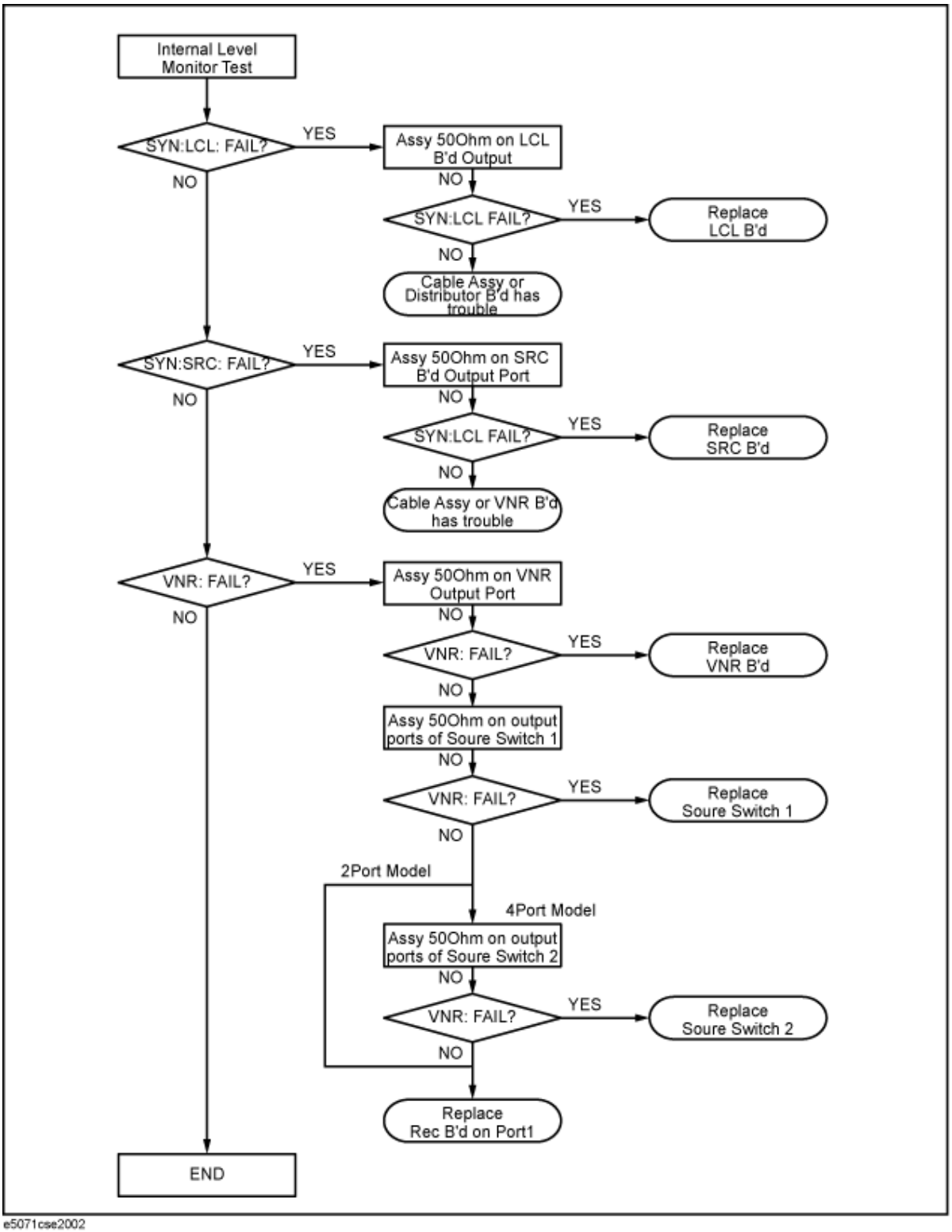
Slot 9: Receiver Board of port 4

Figure 4-17 Flowchart for troubleshooting on DC-BUS Test



e5071cse2001

Figure 4-18 Flowchart for troubleshooting on Internal Level Monitor Test



Function Specific Troubleshooting

If the E5071C 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, external trigger, external keyboard or mouse, isolate the trouble using the Function Specific Troubleshooting procedures described below. The major functions of the E5071C and the troubleshooting procedure for each function are shown in Table 4-6.

Table 4-6 Major functions and troubleshooting procedures

Function	Description	Troubleshooting
Front panel keys	All the E5071C 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 92.
Touch panel	The E5071C equipped with standard option has a touch screen display that allows all the functions in the menu bars, setup windows and dialog boxes to be set by a touch to the screen panel.	Refer to "To Check the Touch Panel" on page 92.
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 93.
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 (USB) on the rear panel.	Refer to "To Check the External Keyboard" on page 93.
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 (USB) on the rear panel.	Refer to "To Check the Mouse" on page 93.
Video output	An external color monitor can be used to display the same information as the E5071C 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 94.
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 94.
GPIB interface	The GPIB compatibility allows the E5071C to be operated as a talker/listener or system controller on IEEE 488 interface bus.	Refer to "To Check the GPIB" on page 94.
Removable Hard disk drive*1	The removable hard disk drive on the front panel is used to save the E5071C setup state and measurement data.	Refer to "To Check the Removable Hard Disk Drive" on page 95.

*1. Removable hard disk use only.

To Check the Device Driver

Make sure first whether the E5071C device drivers are installed properly or not by the following procedure, if a function of specific device in the E5071C doesn't work.

Step 1. Exit from the E5071C measurement view in accordance with the procedure described in "How to exit from the E5071C Measurement View" on page 67. Then, Windows desktop screen is displayed.

Step 2. Click "My Computer" with the right button and select "Properties" as shown in Figure 4-19. Then, the System Properties(Figure 4-20) will appear.

Figure 4-19 Opening System Property Window

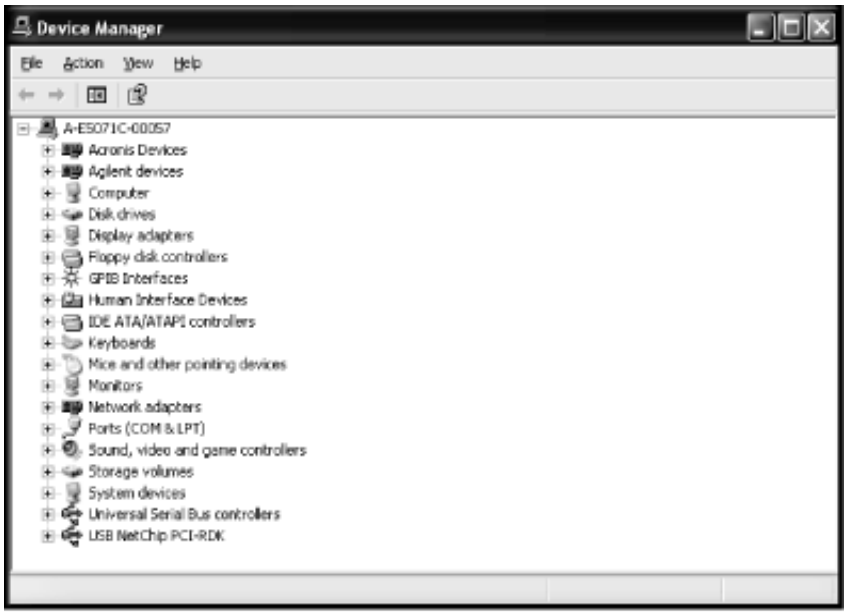
e5071cse1063

Figure 4-20 System Properties Window (General)

e5071cse1064

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 4-21.

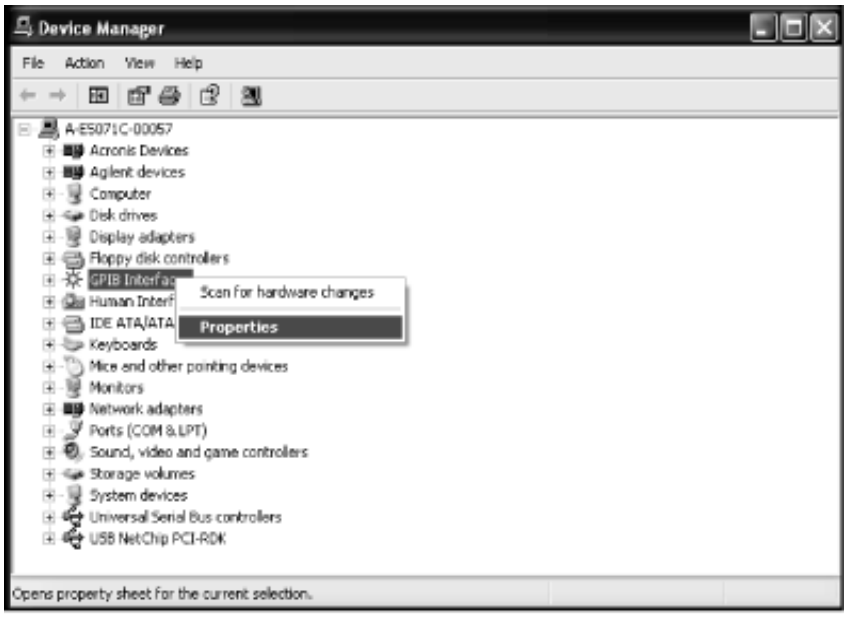
Figure 4-21 System Properties Window (Hardware)



e5071cse1065

Click the icon with the right button and click Property to show the detail of the status. as shown in Figure 4-22.

Figure 4-22 Opening Device Driver Property



e5071cse1066

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 4-23.

Figure 4-23 Front Panel Test dialog box

e5071cse1067

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 4-24. Turn the rotary knob clockwise or counterclockwise. The dialog box indicates the direction of the turned knob and a count of RPG output.

Figure 4-24 Key code and key name display example

e5071cse1068

Step 5. To exit the front panel test, press Preset key three times.

- If multiple keys fail to work, a problem in PCA Front Key is suspected. Also check the flat cable between the PCA Front Key and PCA Digital Bridge.
- 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 PCA Front Key involving the RPG.

To Check the Touch Panel

Procedure

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

- If the touch panel doesn't work correctly whereas the hardkeys function normally, a failure seems in the touch screen controller assembly (CNTR TOUCH PANEL) or touch-panel LCD assembly (LCD-TPANEL ASSY). (The touch panel is not

replaceable independently of the LCD.)

- Check the cable between the touch screen controller and the serial interface connector on the CPU Mother Board Assembly.
- If no problem is found in the above checks, a failure in the CPU Mother Board Assembly 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 E5071C rear panel.

- If the monitor screen view is the same as the LCD display, the problem seems in the PCA PCI DSP Card. Check first if the PCA PCI DSP Card is securely connected to the CPU Mother Board Assembly.
- If only the LCD display has a problem, check the flat cable between the PCA Front Key and PCA Digital Bridge.
- If the LCD is not illuminated with backlight, check the Inverter Unit Assembly and the cable between the Inverter Unit Assembly and PCA Front Key. Also check the cables between the LCD-TPANEL Assembly and Inverter Unit Assembly.
- If the cables are normal, check the LCD-TPANEL Assembly.

To Check the External Keyboard

Procedure

Step 1. Connect the external keyboard to the E5071C rear panel USB 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 CPU Mother Board Assembly may be faulty.

To Check the Mouse

Procedure

Step 1. Connect the mouse to the E5071C rear panel USB 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 CPU Mother Board Assembly is suspected.

To Check the Video Output

Procedure

Step 1. Connect an external XGA color monitor to the Video output port on the E5071C 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 PCA PCI DSP Card.

To Check the External Trigger Input

Procedure

Step 1. Press Preset and Enter to initialize the E5071C.

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 Ω 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 PCA PCI DSP Card is suspected.

To Check the GPIB

Procedure

Perform the E5071C performance test program. If the controller cannot detect the E5071C, the problem seems in the GPIB card or the connection of the GPIB cable.

To Check the USB Interface Card

Procedure

Connect the USB cable between the controller PC and the E5071C. Turn the controller PC on. If the E5071C cannot detect the controller PC, the problem seems in the USB Interface Card or the CPU Mother Board Assembly is suspected.

To Check the Removable Hard Disk Drive

Procedure

When the power is turned on, it is required to confirm the notch geometry is set as follows.

NOTE If the notch geometry is not set as follows, the error message “OS not found” will be shown when you turn on the power.

Figure 4-25 Removable Hard Disk Drive

e5071cse3009

Figure 4-26 Removable Hard Disk Drive for Option 017

e5071cse3008

Performance test failure troubleshooting

This section describes the adjustment and troubleshooting procedures when the E5071C 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". This is for the purpose to find the parts should be replaced on the fail of the performance test, so it is recommended to execute all of the adjustment and performance test as final step, in the case of finishing the troubleshooting.

Recommended adjustment for performance test failure

Table 4-7 and Table 4-8 show 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 trace noise, crosstalk and system dynamic range.

Table 4-7 Recommended adjustment for performance test failure

First Failed Test	Recommended Adjustment									
	OCXO	Frequency Reference	AUX Input	Synthesizer Gain	Virtual Bridge Coefficient	Source Output Power	Receiver IF Range	Receiver Port Characteristics	Receiver Absolute Gain	Receiver RF Range
AUX Input			###							
Frequency Accuracy (Standard)		###								
Frequency Accuracy (1E5)	###									
RF Output Level Accuracy&Flatness						###			###	
RF Output Level Linearity						###			###	
Trace Noise										
Crosstalk										
System Dynamic Range										
Noise Floor										
Dynamic Accuracy							###			
Uncorrected System Performance								###	###	

Table 4-8 Recommended adjustment for performance test failure (Over 8.5 GHz Options)

First Failed Test	Recommended Adjustment							
	OCXO	Frequency Reference	AUX Input	Synthesizer Gain	Source Output Power	Receiver IF Range	Receiver Port Characteristics	Receiver Absolute Gain
AUX Input			###					
Frequency Accuracy (Standard)		###						
Frequency Accuracy (1E5)	###							
RF Output Level Accuracy&Flatness					###			###
RF Output Level Linearity					###			###
Trace Noise								
Crosstalk								
System Dynamic Range								
Noise Floor								
Dynamic Accuracy						###		
Uncorrected System Performance							###	###

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

Performance test failure troubleshooting

Table 4-9 and Table 4-10 represent 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 diagnostics 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 4-9 Performance test failure troubleshooting information (Up to 8.5 GHz Options)

First failed test	Probable faulty board assembly or parts										
	OCXO	BAS	SYN -SRC	SYN -LCL	VNR	RCV -1	RCV -2	RCV -3	RCV -4	T2 -SW	CBL
AUX Input		###									
Frequency Accuracy (Standard)		#	###		##					#	
Frequency Accuracy (1E5)	#	#	###		##					#	
RF Output Level Accuracy & Flatness			##		###					#	
RF Output Level Linearity			##		###					#	
Trace Noise (S11)			##	##	#	###				#	
Trace Noise (S22)			##	##	#		###			#	
Trace Noise (S33)			##	##	#			###		#	
Trace Noise (S44)			##	##	#				###	#	
Trace Noise (S21, S12)			##	##	#	###	###			#	
Trace Noise (S43, S34)			##	##	#			###	###	#	
Crosstalk (S21, S12)			#	#	#	##	##			###	###
Crosstalk (S32)			#	#	#		##	##		###	###
Crosstalk (S43)			#	#	#			##	##	###	###
Crosstalk (S14)			#	#	#	##			##	###	###
System Dynamic Range (S21)			##	##	#		###			#	
System Dynamic Range (S32)			##	##	#			###		#	
System Dynamic Range (S43)			##	##	#				###	#	
System Dynamic Range (S14, S12)			##	##	#	###				#	
Noise Floor Port-1				#		###					
Noise Floor Port-2				#			###				
Noise Floor Port-3				#				###			
Noise Floor Port-4				#					###		

Table 4-9 Performance test failure troubleshooting information (Up to 8.5 GHz Options)

First failed test	Probable faulty board assembly or parts										
	OCXO	BAS	SYN -SRC	SYN -LCL	VNR	RCV -1	RCV -2	RCV -3	RCV -4	T2 -SW	CBL
Dynamic Accuracy (T1)			#	#	#	###				#	
Dynamic Accuracy (T2)			#	#	#		###			#	
Dynamic Accuracy (T3)			#	#	#			###		#	
Dynamic Accuracy (T4)			#	#	#				###	#	
Uncorrected System Performance (S1, D1, R1)			##	##	#	###				#	
Uncorrected System Performance (S2, D2, R2)			##	##	#		###			#	
Uncorrected System Performance (S3, D3, R3)			##	##	#			###		#	
Uncorrected System Performance (S4, D4, R4)			##	##	#				###	#	
Uncorrected System Performance (L21,L12,T21,T12)			#	#		###	###			##	
Uncorrected System Performance (L31,L13,T31,T13)			#	#		###		###		##	
Uncorrected System Performance (L41,L14,T41,T14)			#	#		###			###	##	
Uncorrected System Performance (L32,L23,T32,T23)			#	#			###	###		##	
Uncorrected System Performance (L42,L24,T42,T24)			#	#			###		###	##	
Uncorrected System Performance (L43,L34,T43,T34)			#	#				###	###	##	

Table 4-10 Performance test failure troubleshooting information (Over 8.5 GHz Options)

First failed test	Probable faulty board assembly or parts														
	OCXO	BAS	SYN -SRC	SYN -LCL	DBL	RCV -1	RCV -2	RCV -3	RCV -4	DIS	DCB	IMX	FEM	FUSE	CBL
AUX Input		###													
Frequency Accuracy (Standard)		#	###		##							#			
Frequency Accuracy (1E5)	#	#	###		##							#			
RF Output Level Accuracy & Flatness			#		##							###			
RF Output Level Linearity			#		##							###			
Trace Noise (S11)			##	##	#	###						#			
Trace Noise (S22)			##	##	#		###					#			
Trace Noise (S33)			##	##	#			###				#			
Trace Noise (S44)			##	##	#				###			#			
Trace Noise (S21, S12)			##	##	#	###	###					#			
Trace Noise (S43, S34)			##	##	#			###	###			#			
Crosstalk (S21, S12)			#	#	#	##	##					###			###
Crosstalk (S32)			#	#	#		##	##				###			###
Crosstalk (S43)			#	#	#			##	##			###			###
Crosstalk (S14)			#	#	#	##			##			###			###
System Dynamic Range (S21)			##	##	#		###					#			
System Dynamic Range (S32)			##	##	#			###				#			
System Dynamic Range (S43)			##	##	#				###			#			
System Dynamic Range (S14, S12)			##	##	#	###						#			
Noise Floor Port-1				#		###									
Noise Floor Port-2				#			###								
Noise Floor Port-3				#				###							
Noise Floor Port-4				#					###						
Dynamic Accuracy (T1)			#	#	#	###						#			
Dynamic Accuracy (T2)			#	#	#		###					#			

Table 4-10 Performance test failure troubleshooting information (Over 8.5 GHz Options)

First failed test	Probable faulty board assembly or parts														
	OCXO	BAS	SYN -SRC	SYN -LCL	DBL	RCV -1	RCV -2	RCV -3	RCV -4	DIS	DCB	IMX	FEM	FUSE	CBL
Dynamic Accuracy (T3)			#	#	#			###				#			
Dynamic Accuracy (T4)			#	#	#				###			#			
Uncorrected System Performance (Sx)													##		
Uncorrected System Performance (D1)						#							##		
Uncorrected System Performance (D2)							#						##		
Uncorrected System Performance (D3)								#					##		
Uncorrected System Performance (D4)									#				##		
Uncorrected System Performance (R1)						##							#		
Uncorrected System Performance (R2)							##						#		
Uncorrected System Performance (R3)								##					#		
Uncorrected System Performance (R4)									##				#		
Uncorrected System Performance (L21,L12)												#	##		
Uncorrected System Performance (L31,L13)												#	##		
Uncorrected System Performance (L41,L14)												#	##		
Uncorrected System Performance (L32,L23)												#	##		
Uncorrected System Performance (L42,L24)												#	##		
Uncorrected System Performance (L43,L34)												#	##		
Uncorrected System Performance (T21,T12)						##	##					#	#		
Uncorrected System Performance (T31,T13)						##		##				#	#		
Uncorrected System Performance (T41,T14)						##			##			#	#		

Table 4-10 Performance test failure troubleshooting information (Over 8.5 GHz Options)

First failed test	Probable faulty board assembly or parts														
	OCXO	BAS	SYN -SRC	SYN -LCL	DBL	RCV -1	RCV -2	RCV -3	RCV -4	DIS	DCB	IMX	FEM	FUSE	CBL
Uncorrected System Performance (T32,T23)							##	##				#	#		
Uncorrected System Performance (T42,T24)							##		##			#	#		
Uncorrected System Performance (T43,T34)								##	##			#	#		

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

NOTE The meaning of abbreviations are shown in Table 4-11.

Table 4-11 The meaning of abbreviations

Abbreviation	Meaning (Description)
OCXO	OCXO Board
BAS	Analog Base Module
SYN -SRC	TESTED Synthesizer Module for Source
SYN -LCL	TESTED Synthesizer Module for Local
BDL	Doubler Module
VNR	TESTED Level Vervier Module
RCV -1	TESTED Receiver Module Port 1
RCV -2	TESTED Receiver Module Port 2
RCV -3	TESTED Receiver Module Port 3
RCV -4	TESTED Receiver Module Port 4
DIS	Distributer Module
DCB	DC Bias Board
IMX	Imix
FEM	Front End Module
FUSE	Fuse of DC Bias Input

Table 4-11 **The meaning of abbreviations**

Abbreviation	Meaning (Description)
T2 -SW	T2 Switch
CBL	Test Cable connection, Semi-Rgd Cable

NOTE Module configulation is shown Figure 4-13 for 2-port, and Figure 4-15 for 4-port.

Probable faulty board assembly or parts on Adjustment failure

Table 4-12 and Table 4-13 represent the relationships between the failed adjustment and probable faulty assembly. If the adjustment failures in this troubleshooting, 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 diagnostics test procedures.

Table 4-12 **Adjustment failure troubleshooting information (Up to 8.5 GHz Options)**

		Probable faulty board assembly or parts											
Failed Adjustment	**Failed test item**	**OCXO**	**BAS**	**SYN-SRC**	**SYN-LCL**	**VNR**	**RCV-1**	**RCV-2**	**RCV-3**	**RCV-4**	**DIS**	**T2-SW**	**CONN**
OCXO		###											
Frequency Reference			##										###
AUX Input			###										
Synthesizer Gain	vSrcDblDet / vSrcAlcDet			###									
	vLrcDblDet / vLrcAlcDet			###									
Source Output Power	ccSrcVnr{1|2}Vref					###							
	RchGain		#	#	#	##	###				#	#	
	ccSrcATT{1|2|					###	#					##	
	matPowSrc[1000]					###							
	matPowSrc[4000]					###	#					##	
Receiver IF Range	ccIFRange[{R1|T1}]		#				###				#	##	
	ccIFRange[{21|T2}]		#					###			#	##	
	ccIFRange[{R3|T3}]		#						###		#	##	
	ccIFRange[{R4|T4}]		#							###	#	##	

Table 4-12 Adjustment failure troubleshooting information (Up to 8.5 GHz Options)

		Probable faulty board assembly or parts											
Failed Adjustment	**Failed test item**	**OCXO**	**BAS**	**SYN-SRC**	**SYN-LCL**	**VNR**	**RCV-1**	**RCV-2**	**RCV-3**	**RCV-4**	**DIS**	**T2-SW**	**CONN**
Receiver Port Characteristics	S1,D1,R1						##						###
	S2,D2,R2							##					###
	S3,D3,R3								##				###
	S4,D4,R4									##			###
	L21,L12,T21,T12						##	##				#	###
	L31,L13,T31,T13						##		##			#	###
	L41,L14,T41,T14						##			##		#	###
	L32,L23,T32,T23							##	##			#	###
	L42,L24,T42,T24							##		##		#	###
	L43,L34,T43,T34								##	##		#	###

Table 4-13 Adjustment failure troubleshooting information (Over 8.5 GHz Options)

		Probable faulty board assembly or parts												
Failed Adjustment	**Failed test item**	**OCXO**	**BAS**	**SYN-SRC**	**SYN-LCL**	**DBL**	**RCV-1**	**RCV-2**	**RCV-3**	**RCV-4**	**DIS**	**IMX**	**FEM**	**CONN**
OCXO		###												
Frequency Reference			##											###
AUX Input			###											
Synthesizer Gain	vSrcDblDet / vSrcAlcDet			###										
	vLrcDblDet / vLrcAlcDet				##									
Source Output Power	ccSrcDblVref			##		###						#		
	ccSrcDblVctrl			##		###						#		
	ccSrcMasVofs					###								
	RchGain		#	#	#	##					#	#		
	matPowSrc[1000]					###								
	matPowSrc[4000]					###						##		
Receiver IF Range	ccIFRange[{R1|T1}]		#				###				#	##		
	ccIFRange[{R1|T2}]		#					###			#	##		
	ccIFRange[{R3|T3}]		#						###		#	##		
	ccIFRange[{R4|T4}]		#							###	#	##		

Table 4-13 Adjustment failure troubleshooting information (Over 8.5 GHz Options)

		Probable faulty board assembly or parts												
Failed Adjustment	**Failed test item**	**OCXO**	**BAS**	**SYN-SRC**	**SYN-LCL**	**DBL**	**RCV-1**	**RCV-2**	**RCV-3**	**RCV-4**	**DIS**	**IMX**	**FEM**	**CONN**
Receiver Port Characteristics	SX												##	###
	D1						#						##	###
	D2							#					##	###
	D3								#				##	###
	D4									#			##	###
	R1						##						#	###
	R2							##					#	###
	R3								##				#	###
	R4									##			#	###
	L21, L12											#	##	###
	L31, L13											#	##	###
	L41, L14											#	##	###
	L32, L23											#	##	###
	L42, L24											#	##	###
	L43, L34											#	##	###
	T21, T12						##	##				#	##	###
	T31, T13						##		##			#	##	###
	T41, T14						##			##		#	##	###
	T32, T23							##	##			#	##	###
	T42, T24							##		##		#	##	###
	T43, T34								##	##		#	##	###

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

NOTE The meaning of abbreviations are shown in Table 4-14.

Table 4-14 The meaning of abbreviations

Abbreviation	Meaning (Description)
OCXO	OCXO Board
BAS	Analog Base Module
SYN -SRC	TESTED Synthesizer Module for Source
SYN -LCL	TESTED Synthesizer Module for Local
DBL	Doubler Module
VNR	TESTED Level Vervier Module
RCV -1	TESTED Receiver Module Port 1
RCV -2	TESTED Receiver Module Port 2
RCV -3	TESTED Receiver Module Port 3
RCV -4	TESTED Receiver Module Port 4
DIS	Distributer Module
IMX	Imix
FEM	Front End Module
T2 -SW	T2 Switch
CONN	Connection Error on the system calibration

NOTE Module configulation is shown Figure 4-13 for 2-port, and Figure 4-15 for 4-port.

To configure the CPU Mother Board Assembly and BIOS

When you replace the CPU Mother Board Assembly , you 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 110.

Testing DRAM on the Motherboard

When the CPU Mother Board Assembly 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 E5071C rear panel connectors.

Step 2. Turn the instrument on. Wait until the E5071C boots up. Do not press any key until the E5071C measurement view appears.

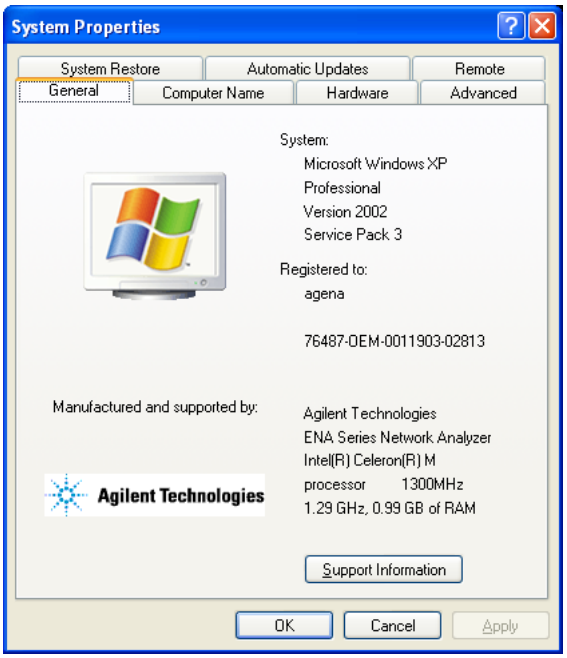
Step 3. Press System key on the front panel.

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 4-27.

Figure 4-27 **System Properties window**



Step 7. Verify that the amount of RAM installed is correct. Table 4-15 shows the amount of RAM memory installed depending on the Digital Motherboard. If the amoutn of RAM installed

is not correct, the CPU Mother Board Assembly is faulty.

Table 4-15 **RAM memory installed**

Digital Motherboard Part Number	Serial Number Prefix	RAM installed
E5071-62001	MY461	0.99 GB
E5070-62060	MY462	1.99 GB
E5070-62080	MY463	3.42 GB

Step 8. Click "OK" button to close the window.

Step 9. Turn the E5071C 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 E5071C starts up first with the BIOS when the power is turned on. If the Digital Motherboard is E5071-62001 (Celeron M 1.3 GHz), it is necessary to load the setup default when the board is replaced. It is not necessary to change the BIOS settings for other Digital Motherboard.

Table 4-16 **BIOS Options**

Digital Motherboard Part Number	CPU	Unit Prefix at Factory Shipment	BIOS Password	BIOS Setup After Digital Motherboard Replacement
E5071-62001	Celeron M 1.3 GHz	MY461	e507xa	Execute the load Setup Default according to the following procedure
E5070-62060	Celeron M 1.86 GHz	MY462	Agt0nly	Not necessary
E5070-62080	Core i7 2.53 GHz	MY463	No password	Not necessary

Run the BIOS setup utility to load Setup Default

Procedure

Step 1. Connect the external keyboard to the E5071C rear panel USB connector.

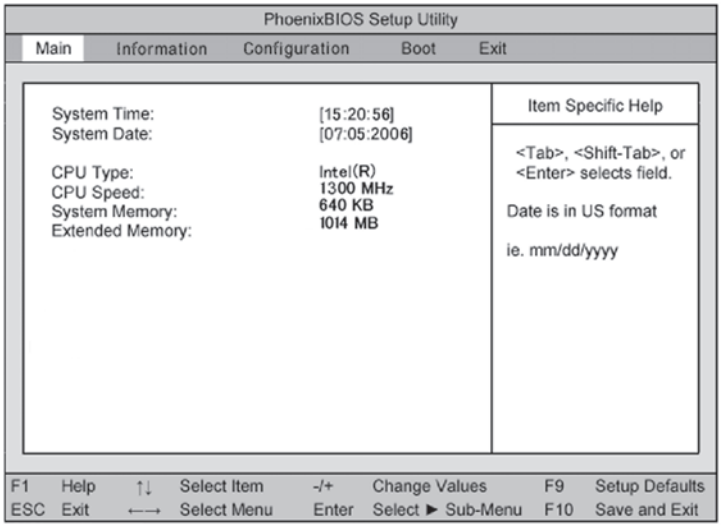
Step 2. Turn the instrument on.

Step 3. Press **[F2]** key as soon as the splash screen as shown in Figure 4-5 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 displayed as shown in Figure 4-28.

Figure 4-28 BIOS setup utility main menu



e5071cse1072

Step 6. Choose “Exit” using ← → keys and select “Load Setup Defaults” using ↑ ↓ keys. The dialog box “Setup Confirmation” prompts you to select Y (Yes) or N (No). Press Y and Enter 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 E5071C.

When the E5071C Cannot Boot Up

If the Digital Motherboard is E5070-62080 (Core i7 2.53 GHz), changing one of the BIOS setting (“State After G3”) causes the E5071C to not boot up. In that case, follow the procedure below to recover the BIOS setting.

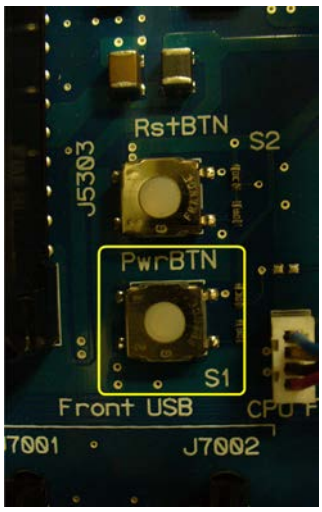
Step 1. Open the cover.

Step 2. Connect a USB keyboard with the E5071C.

Step 3. Turn on the E5071C.

Step 4. Press the PwrBTN on the Digital Motherboard as shown in Figure 4-29.

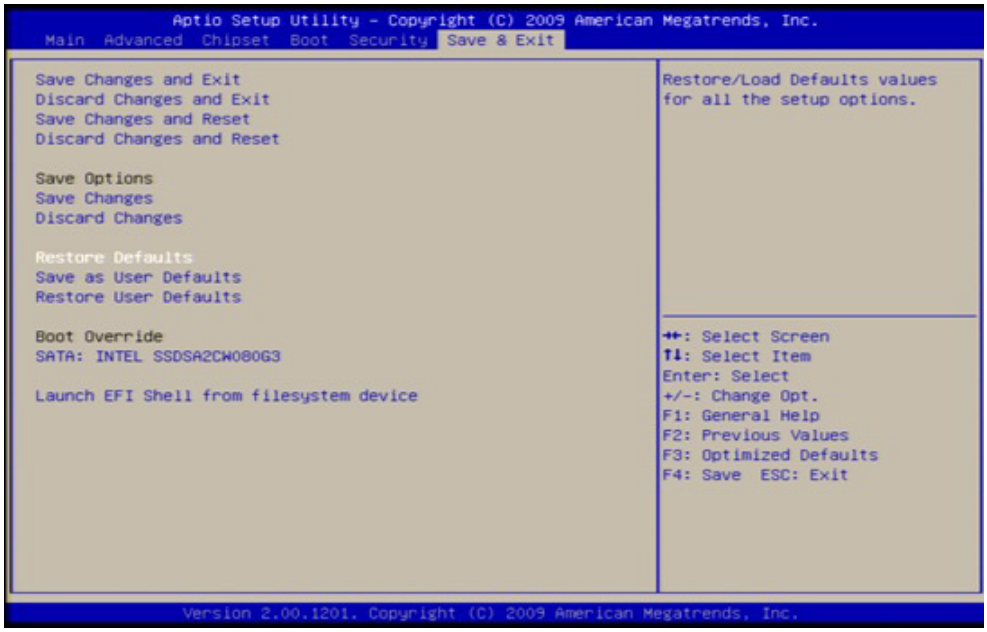
Figure 4-29 **PwrBTN on Digital Motherboard**



Step 5. Press the F7 key and select “ENTER SETUP” to start the BIOS Setup.

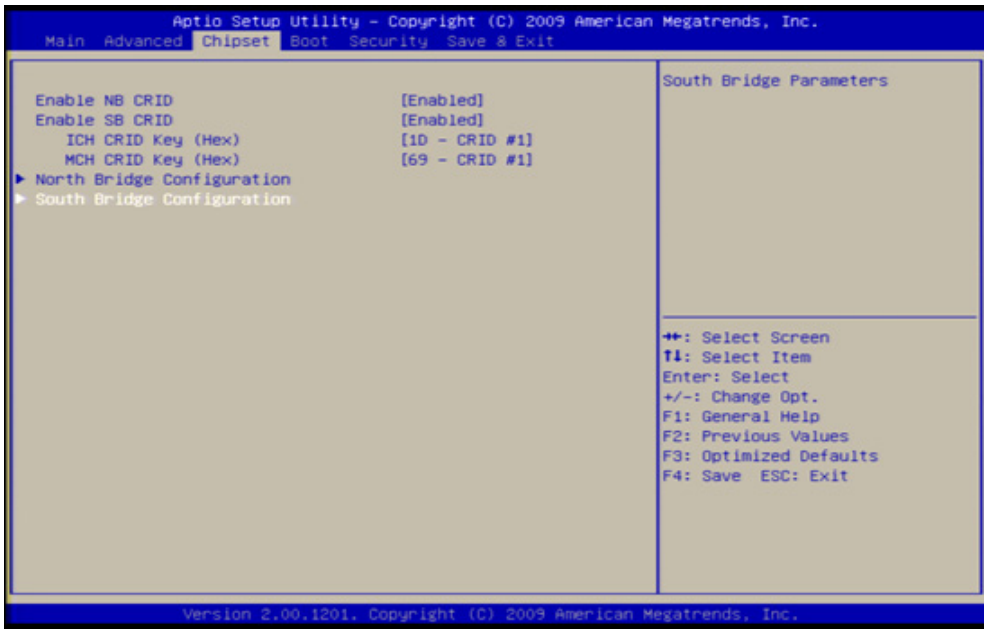
Step 6. Select “Save & Exit” > “Restore Defaults”, then select Yes as shown in Figure 4-30.

Figure 4-30 **BIOS Setup 1/9**



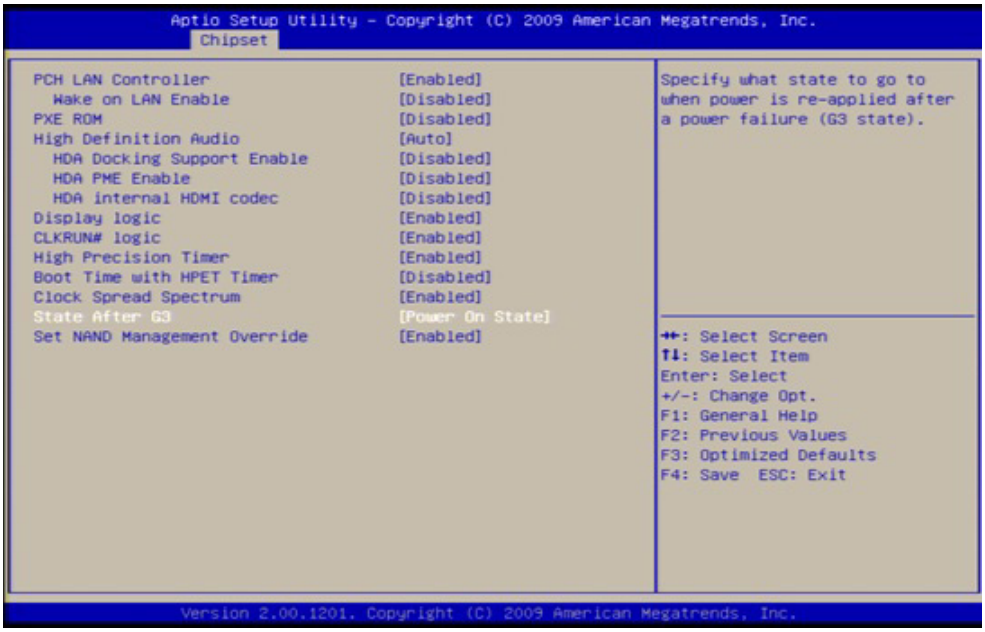
Step 7. Select “Chipset” > “South Bridge Configuration” as shown in Figure 4-31.

Figure 4-31 **BIOS Setup 2/9**



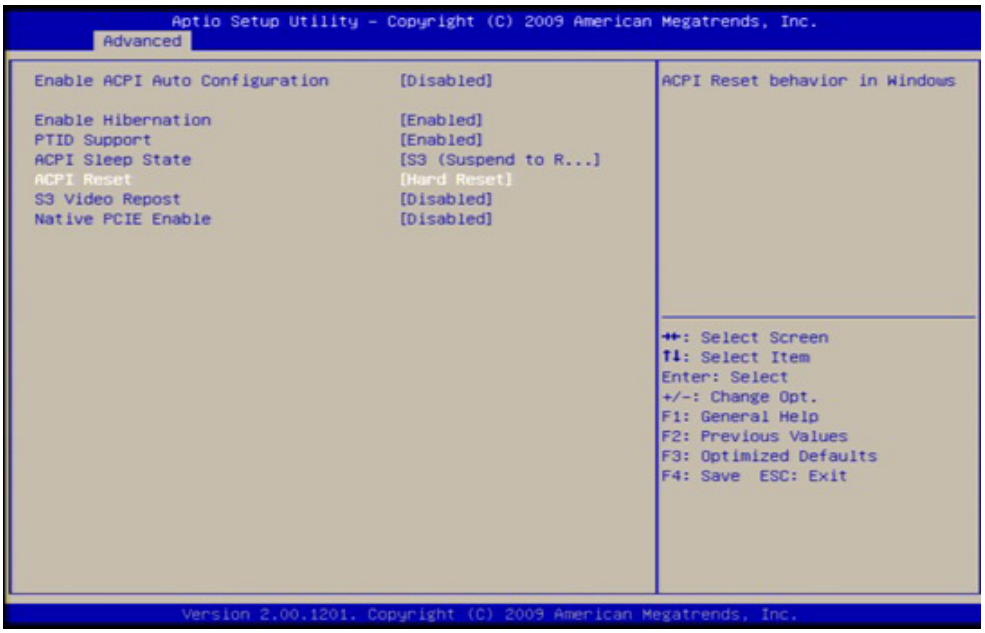
Step 8. Select “SB PCH options” and change “State After G3” to “Power On State” as shown in Figure 4-32.

Figure 4-32 **BIOS Setup 3/9**



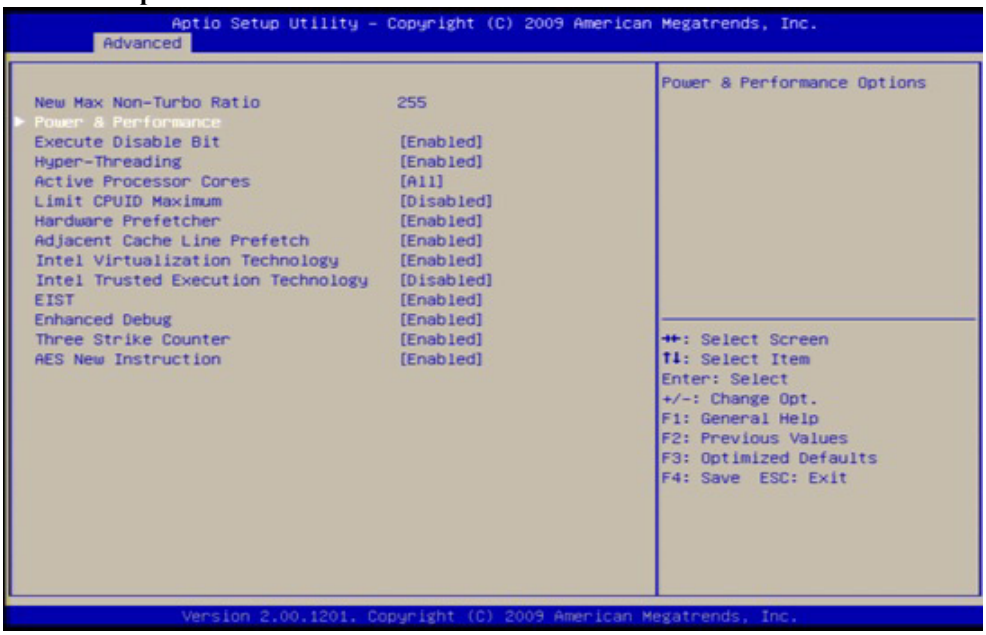
Step 9. Select “Advanced” > “ACPI Settings” and change “ACPI Reset” to“Hard Reset” as shown in Figure 4-33.

Figure 4-33 BIOS Setup 4/9



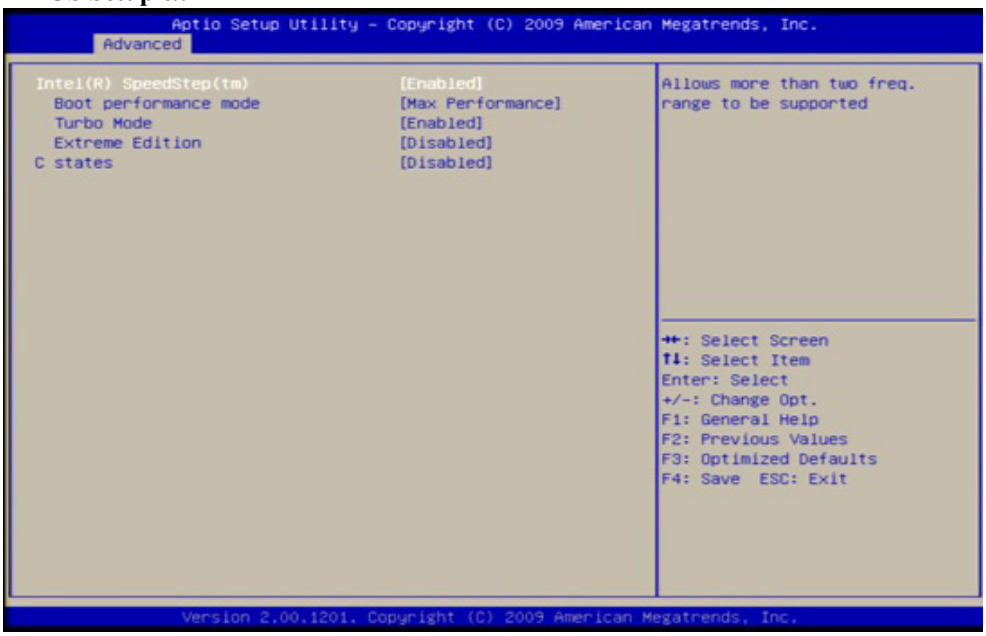
Step 10. Select “Advanced” > “CPU Configuration” > “Power & Performance” as shown in Figure 4-34.

Figure 4-34 BIOS Setup 5/9



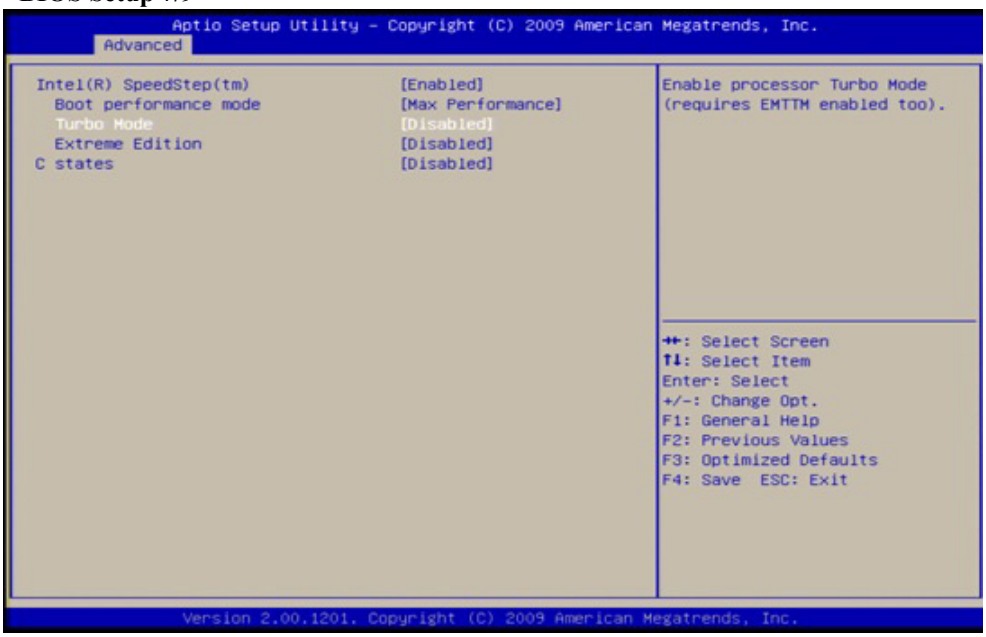
Step 11. Enable “Intel (R) SpeedStep (tm)” as shown in Figure 4-35.

Figure 4-35 **BIOS Setup 6/9**



Step 12. Disable “Turbo Mode” as shown in Figure 4-36.

Figure 4-36 **BIOS Setup 7/9**



Step 13. Select “Save & Exit” > “Save as User Defaults”, then select “Yes” for confirmation as shown in Figure 4-37.

Figure 4-37 **BIOS Setup 8/9**

Step 14. Select “Save & Exit” > “Save Changes and Reset”, then select “Yes” for confirmation as shown in Figure 4-37.

Figure 4-38 **BIOS Setup 8/9**

5 Replaceable Parts

This chapter contains information for ordering replacement parts for the E5071C ENA Series RF Network Analyzers.

KEYSIGHT TECHNOLOGIES

NOTE The assemblies described are segregated by serial number prefixes. If the unit has been upgraded, serial number prefixes are not accurate indicators of the assemblies. In this case, check through the different assemblies to correctly identify the appropriate assembly.

Ordering Information

To order part listed in the replaceable part lists, quote the Keysight part number, indicate the quantity required, and address the order to the nearest Keysight office. The check digit will ensure accurate and timely processing of the order.

https://onlinestore.tm.keysight.com/Keysight/en/US/direct/onlinestore

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 Keysight office.

Direct Mail Order System

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

- Direct ordering and shipping from the Keysight 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 Keysight office when the orders require billing and invoicing)
- Prepaid transportation (there is a small handling charge for each order).
- No invoices.

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

Mail order forms and specific ordering information are available through your local Keysight sales office. Addresses and telephone numbers are located in a separate document shipped with the manuals.

Exchange Assemblies

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

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

Replaceable Parts List

Top View (Major Assemblies)

Figure 5-1 **Top View (Major Assemblies) (Serial number prefix MY461 or SG461)**

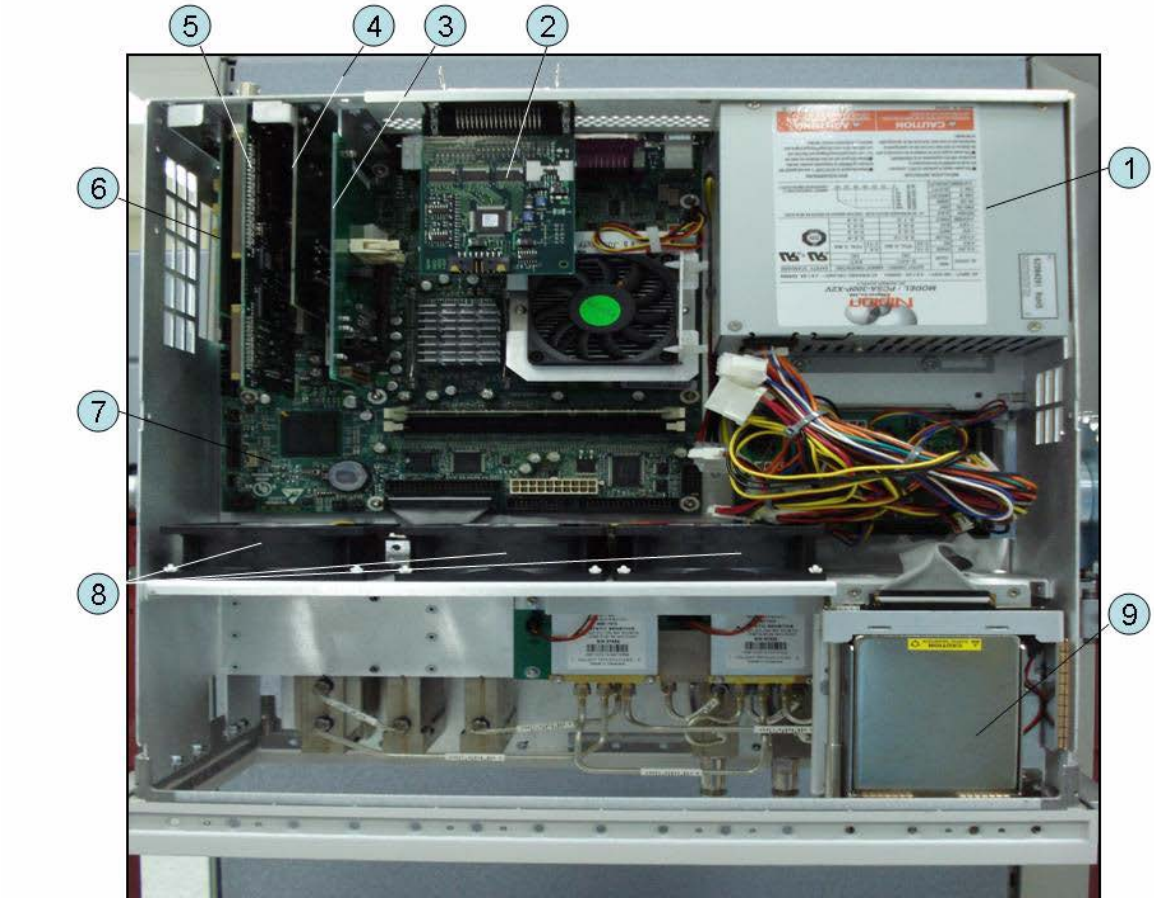


Table 5-1 Top View (Major Assemblies) (Serial number prefix MY461 or SG461)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	See Table 5-47	1	POWER SUPPLY ASSEMBLY
2	E5070-66625 (A23)	1	HANDLER I/O BOARD
3	See Table 5-42	1	PCA DIGITAL BOARD
4	See Table 5-40	1	GPIB CARD ASSEMBLY
5	See Table 5-40	1	PCA PCI-DSP/GPIB CARD ASSEMBLY
6	See Table 5-40	1	USB (USBTMC) INTERFACE CARD ASSEMBLY
7	E5071-62001	1	DIGITAL MOTHERBOARD
8	See Table 5-46	1	FAN ASSEMBLY
9	See Table 5-34	1	REMOVABLE HARD DISK DRIVE ASSEMBLY

Figure 5-2 **Top View (Major Assemblies) (Serial number prefix MY462 or SG462)**

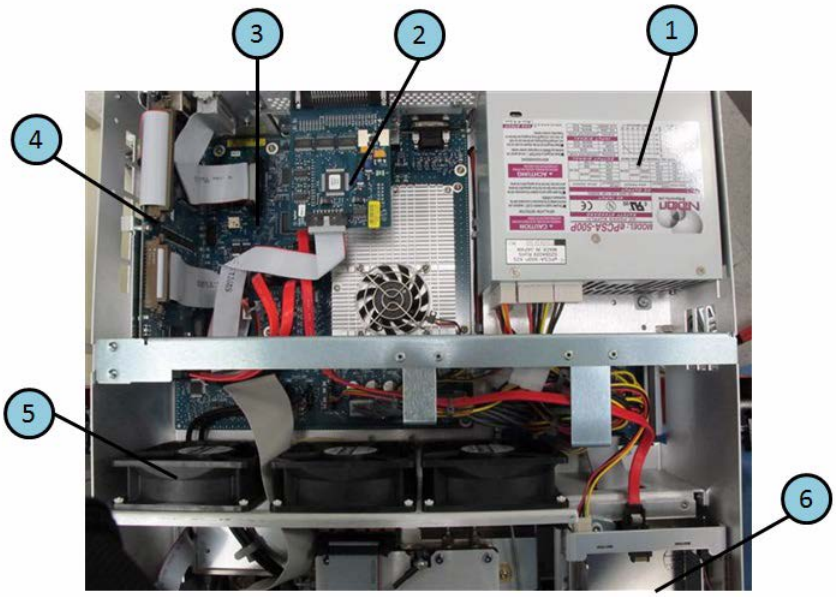


Table 5-2 **Top View (Major Assemblies) (Serial number prefix MY462 or SG462)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	See Table 5-48	1	POWER SUPPLY ASSEMBLY
2	E5070-66625 (A23)	1	HANDLER I/O BOARD
3	See Table 5-41	1	PCI-E DSP BOARD ASSEMBLY
4	E5070-62060	1	DIGITAL MOTHERBOARD
5	See Table 5-46	1	FAN ASSEMBLY
6	See Table 5-35	1	REMOVABLE HARD DISK DRIVE ASSEMBLY

Figure 5-3 **Top View (Major Assemblies) (Serial number prefix MY463 or SG463)**

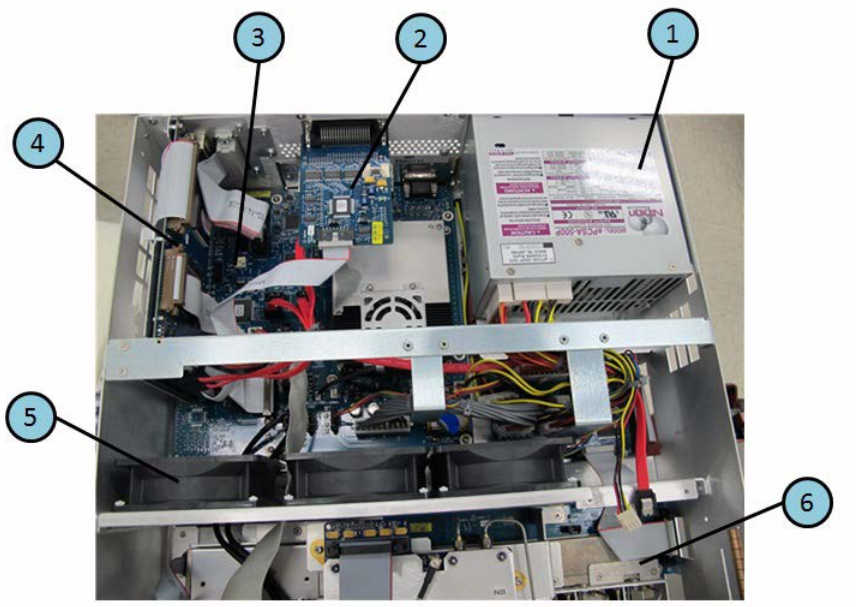


Table 5-3 **Top View (Major Assemblies) (Serial number prefix MY463 or SG463)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	See Table 5-48	1	POWER SUPPLY ASSEMBLY
2	E5070-66625 (A23)	1	HANDLER I/O BOARD
3	See Table 5-41	1	PCI-E DSP BOARD ASSEMBLY
4	E5070-62080	1	DIGITAL MOTHERBOARD
5	See Table 5-46	1	FAN ASSEMBLY
6	See Table 5-36	1	REMOVABLE HARD DISK DRIVE ASSEMBLY (Not shown)

Top View Up to 8.5 GHz Options (Cables)

Figure 5-4 **Top View Up to 8.5 GHz Options (Cables) (Serial number prefix MY461 or SG461)**

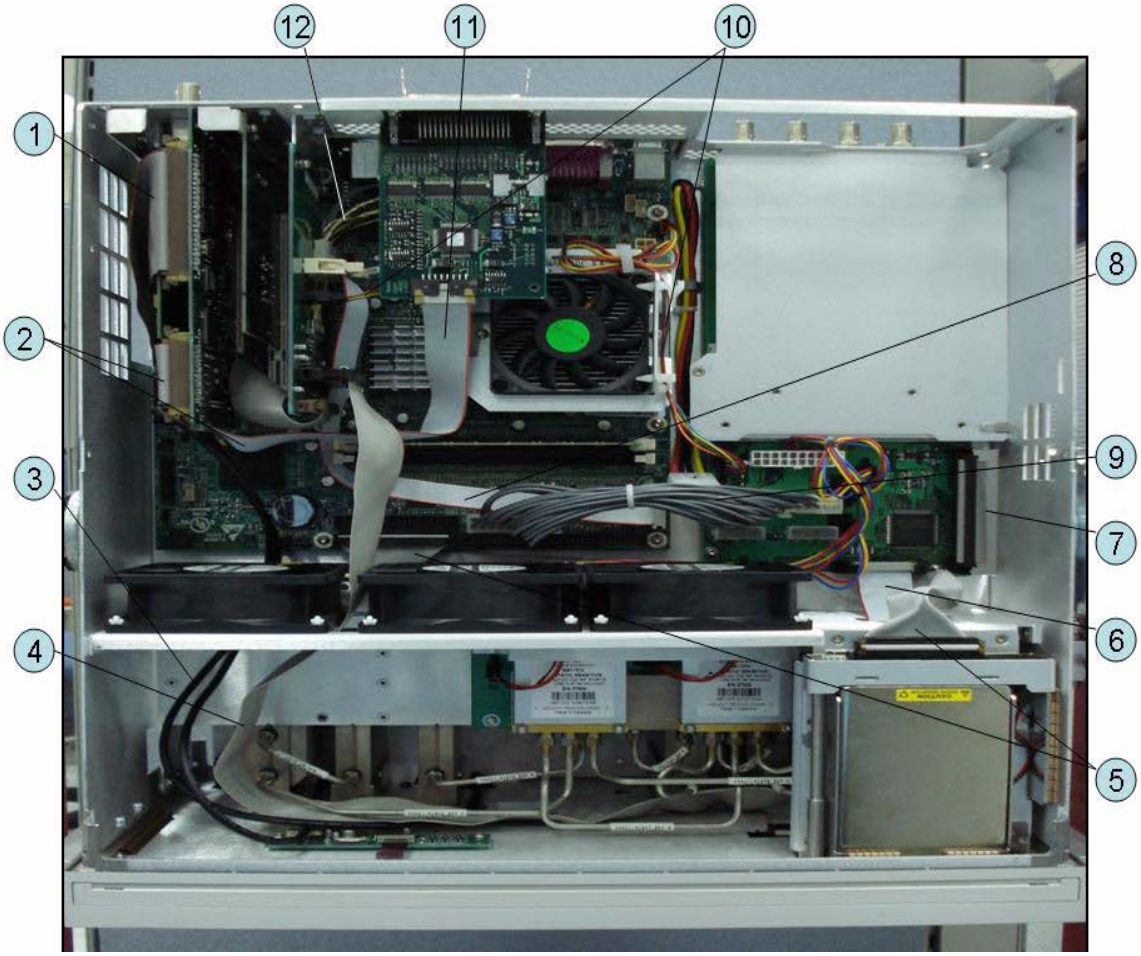


Table 5-4 Top View Up to 8.5 GHz Options (Cables) (Serial number prefix MY461 or SG461)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61603	1	FLAT CABLE ASSY
2	E5071-61601	1	FLAT CABLE ASSY
3	E5071-61609	2	CABLE ASSY
4	E5071-61605	1	FLAT CABLE ASSY
5	E5071-61612	1	FLAT CABLE ASSY
6	E5071-61620	1	FLAT CABLE ASSY
7	E5071-61604	1	FLAT CABLE ASSY
8	E5071-61614	1	FLAT CABLE ASSY
9	E5071-61615	1	WIRE ASSY
10	E5071-61610	1	WIRE ASSY
11	E5070-61616	1	FLAT CABLE ASSY
12	E5071-61617	1	FLAT CABLE ASSY

Figure 5-5 **Top View Up to 8.5 GHz Options (Cables) (Serial number prefix MY462 or SG462)**

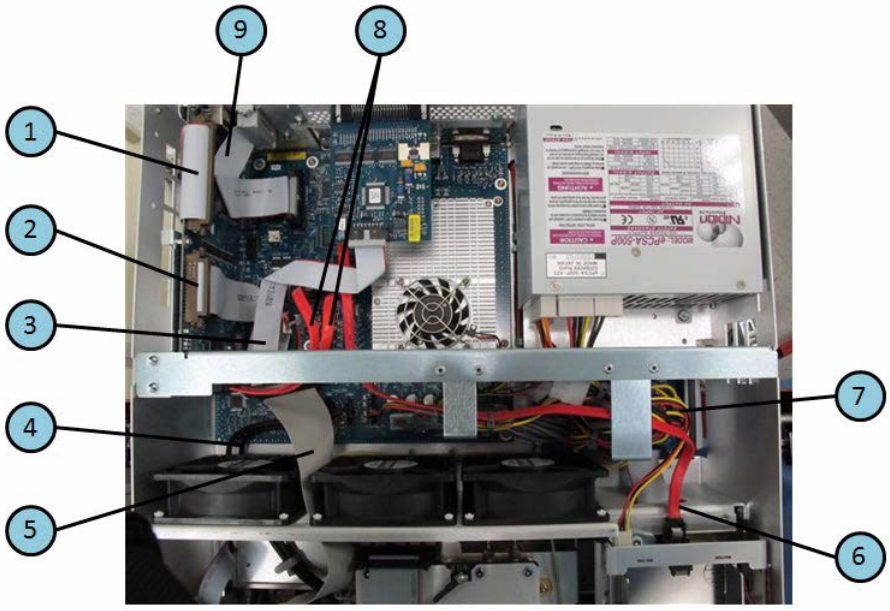


Table 5-5 **Top View Up to 8.5 GHz Options (Cables) (Serial number prefix MY462 or SG462)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61655	1	FLAT CABLE ASSY
2	E5071-61601	1	FLAT CABLE ASSY
3	E5071-61656	1	FLAT CABLE ASSY
4	E5071-61609	2	CABLE ASSY
5	E5071-61605	1	FLAT CABLE ASSY
6	8121-1710	1	CABLE ASSY
7	E5071-61667	1	CABLE ASSY
	E5071-61668	1	CABLY ASSY
	E5071-61686	1	CABLE ASSY
8	E5061-61613	2	CABLE ASSY, SERIAL ATA
9	E5071-61651	1	CABLE GPIB

Figure 5-6 **Top View Up to 8.5 GHz Options (Cables) (Serial number prefix MY463 or SG463)**

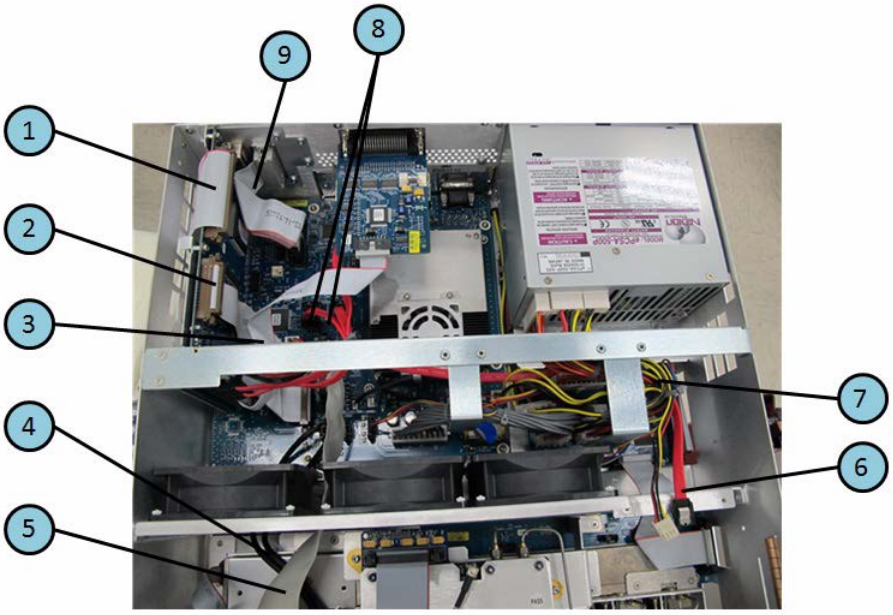


Table 5-6 **Top View Up to 8.5 GHz Options (Cables) (Serial number prefix MY463 or SG463)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61655	1	FLAT CABLE ASSY
2	E5071-61601	1	FLAT CABLE ASSY
3	E5071-61656	1	FLAT CABLE ASSY
4	E5071-61609	2	CABLE ASSY
5	E5071-61605	1	FLAT CABLE ASSY
6	8121-1710	1	CABLE ASSY
7	E5071-61667	1	CABLE ASSY
	E5071-61668	1	CABLY ASSY
	E5071-61686	1	CABLE ASSY
8	E5061-61613	2	CABLE ASSY, SERIAL ATA
9	E5071-61651	1	CABLE GPIB

Top View Over 8.5 GHz Options (Cables)

Figure 5-7 **Top View Over 8.5 GHz Options (Cables) (Serial number prefix MY461 or SG461)**

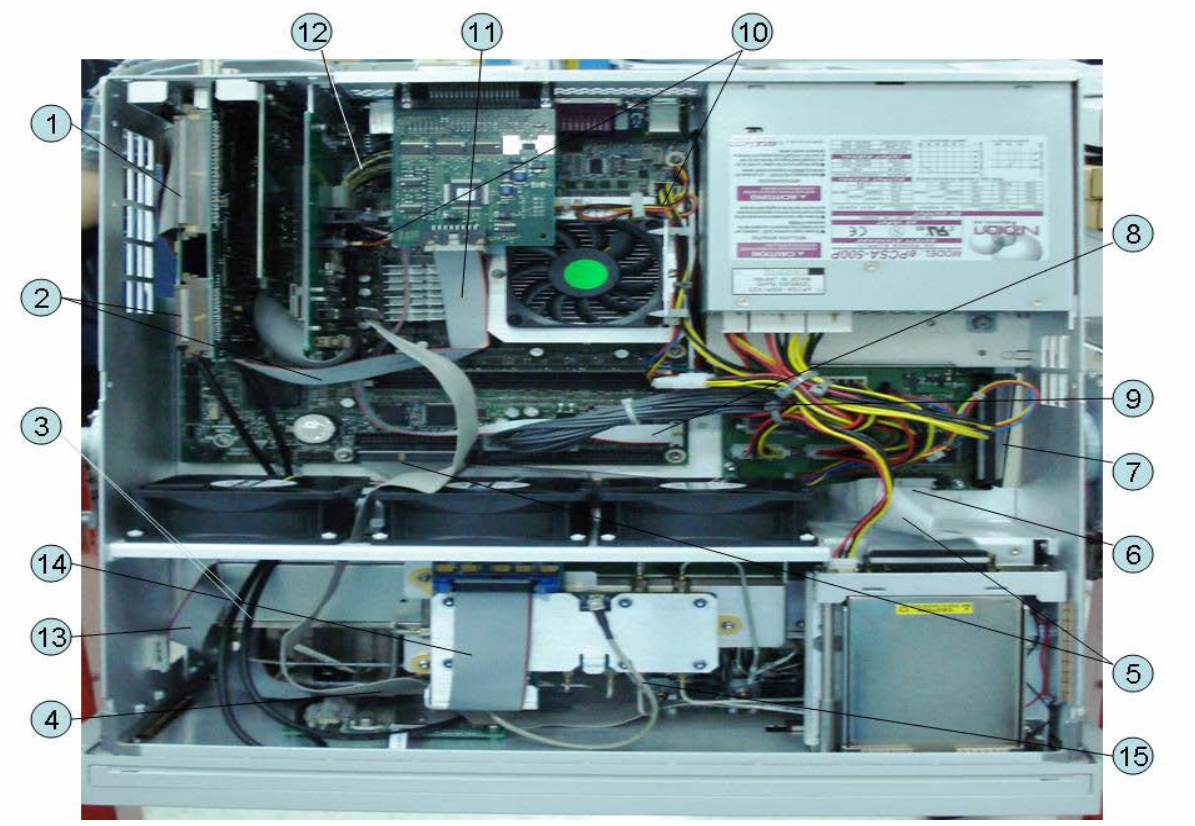


Table 5-7 Top View Over 8.5 GHz Options (Cables) (Serial number prefix MY461 or SG461)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61603	1	FLAT CABLE ASSY
2	E5071-61601	1	FLAT CABLE ASSY
3	E5071-61609	2	CABLE ASSY
4	E5071-61605	1	FLAT CABLE ASSY
5	E5071-61612	1	FLAT CABLE ASSY
6	E5071-61620	1	FLAT CABLE ASSY
7	E5071-61604	1	FLAT CABLE ASSY
8	E5071-61614	1	FLAT CABLE ASSY
9	E5071-61615	1	WIRE ASSY
10	E5071-61610	1	WIRE ASSY
11	E5070-61616	1	FLAT CABLE ASSY
12	E5071-61617	1	FLAT CABLE ASSY
13	E5071-61665	1	FLAT CABLE ASSY
14	E5071-61664	1	FLAT CABLE ASSY
15	5188-1257	1	RF CABLE ASSY

Figure 5-8 **Top View Over 8.5 GHz Options (Cables) (Serial number prefix MY462 or SG462)**

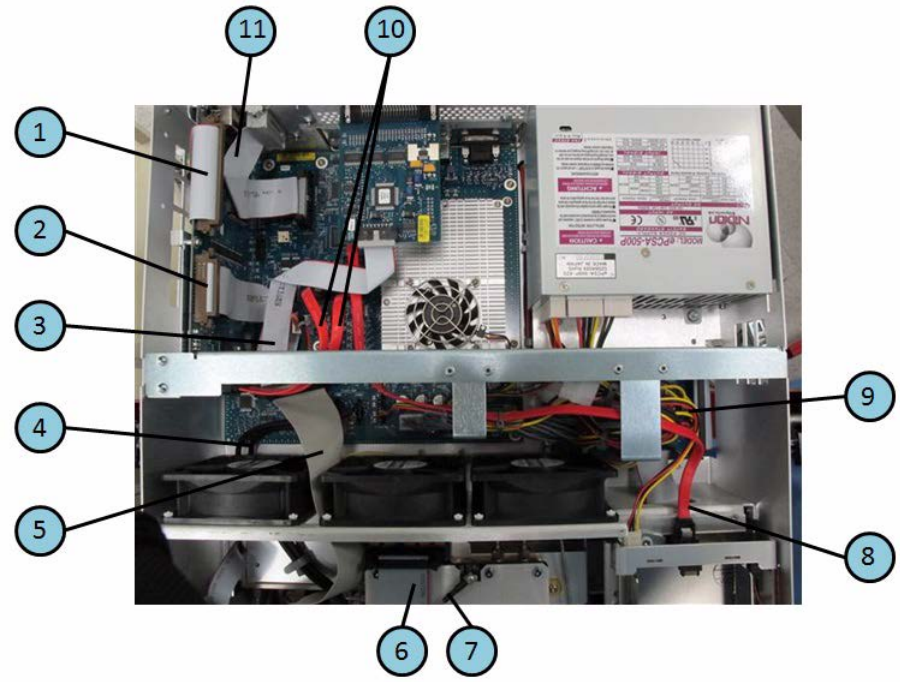


Table 5-8 **Top View Over 8.5 GHz Options (Cables) (Serial number prefix MY462 or SG462)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61655	1	FLAT CABLE ASSY
2	E5071-61601	1	FLAT CABLE ASSY
3	E5071-61656	1	FLAT CABLE ASSY
4	E5071-61609	2	CABLE ASSY
5	E5071-61605	1	FLAT CABLE ASSY
6	E5071-61664	1	FLAT CABLE ASSY
7	5188-1257	1	RF CABLE ASSY
8	8121-1710	1	CABLE ASSY
9	E5071-61667	1	CABLE ASSY
	E5071-61668	1	CABLY ASSY
	E5071-61686	1	CABLE ASSY
10	E5061-61613	2	CABLE ASSY, SERIAL ATA
11	E5071-61651	1	CABLE GPIB

Figure 5-9 **Top View Over 8.5 GHz Options (Cables) (Serial number prefix MY463 or SG463)**

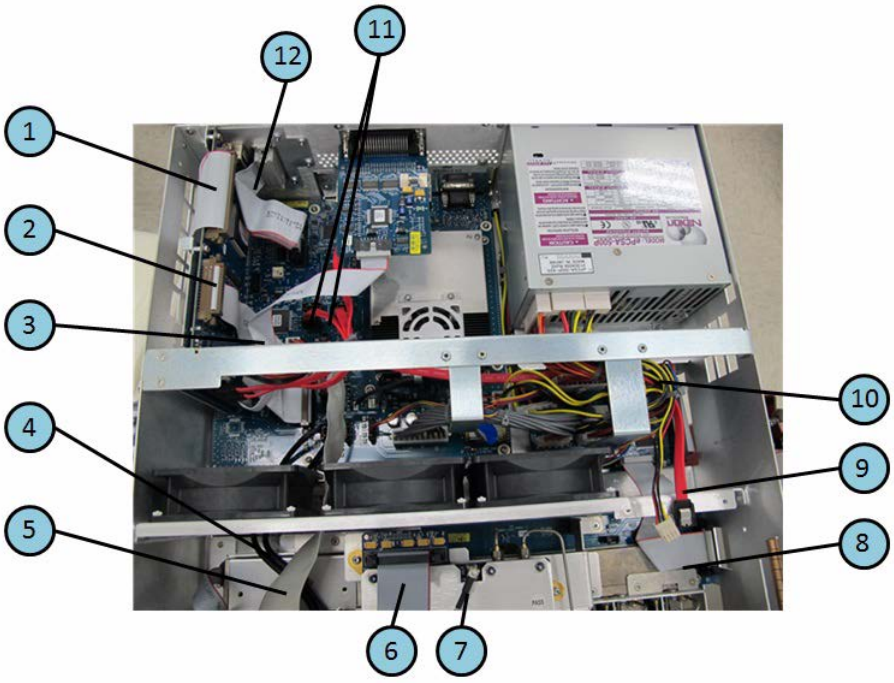


Table 5-9 **Top View Over 8.5 GHz Options (Cables) (Serial number prefix MY463 or SG463)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61655	1	FLAT CABLE ASSY
2	E5071-61601	1	FLAT CABLE ASSY
3	E5071-61656	1	FLAT CABLE ASSY
4	E5071-61609	2	CABLE ASSY
5	E5071-61605	1	FLAT CABLE ASSY
6	E5071-61664	1	FLAT CABLE ASSY
7	5188-1257	1	RF CABLE ASSY
8	E5071-61685	1	FLAT CABLE ASSY
9	8121-1710	1	CABLE ASSY
10	E5071-61667	1	CABLE ASSY
	E5071-61668	1	CABLY ASSY
	E5071-61686	1	CABLE ASSY
11	E5061-61613	2	CABLE ASSY, SERIAL ATA
12	E5071-61651	1	CABLE GPIB

Top View (Miscellaneous Parts)

Figure 5-10 **Top View (Miscellaneous Parts) (Serial number prefix MY461 or SG461)**

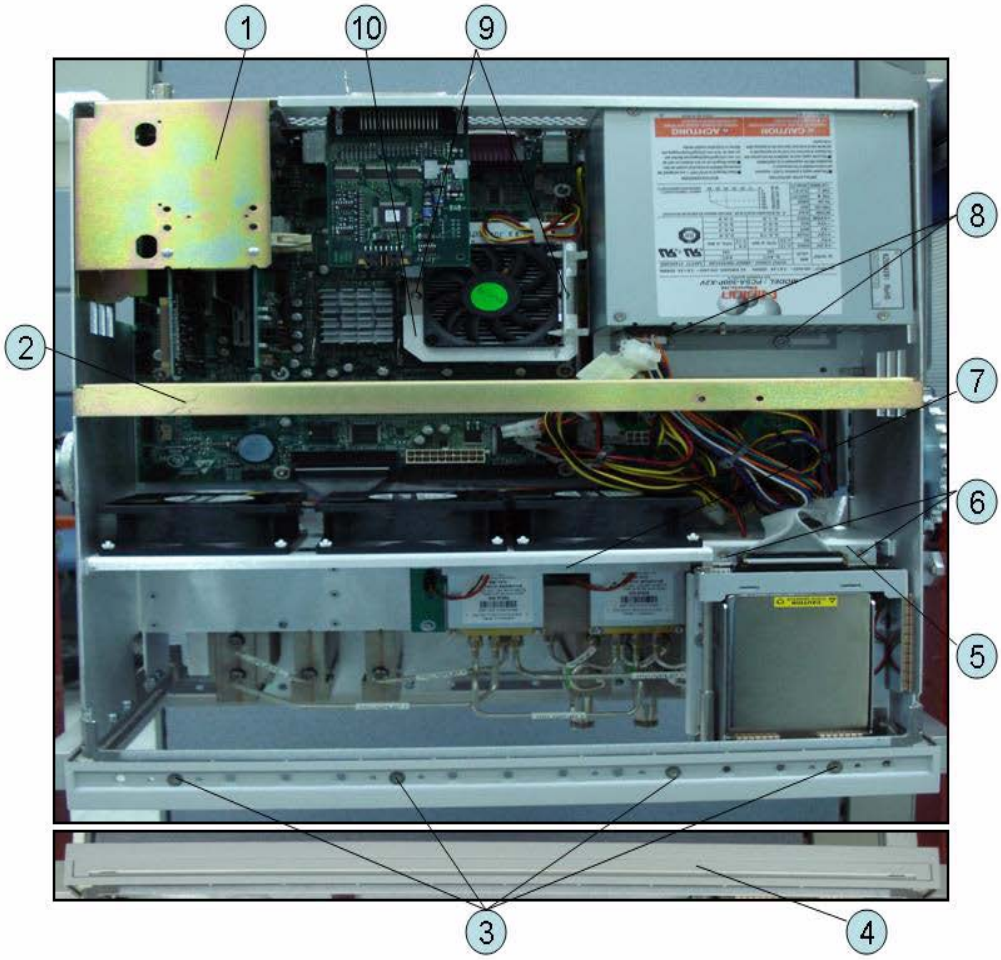


Table 5-10 Top View (Miscellaneous Parts) (Serial number prefix MY461 or SG461)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-01224	1	ANGLE PCI CARD
2	E5071-01205	1	GUIDE BAR
3	0515-1382	4	SCREW-MACH M3.5 x L6 FL T15
4	5041-9176	1	TRIM STRIP
5	E5071-01201	1	BRACKET
6	0515-1946	2	SCREW-MACH M3.0 x L6 FL T10
7	E5071-01212	1	GUARD
8	0515-1946	2	SCREW-MACH M3.0 x L6 FL T10
	3050-2247	2	WASHER
9	0515-0430	2	SCREW-MACH M3.0 x L6 PN T10
	E5071-01206	2	HOOK
10	E5071-00605	2	PLATE

Figure 5-11 **Top View (Miscellaneous Parts) (Serial number prefix MY462/MY463 or SG462/SG463)**

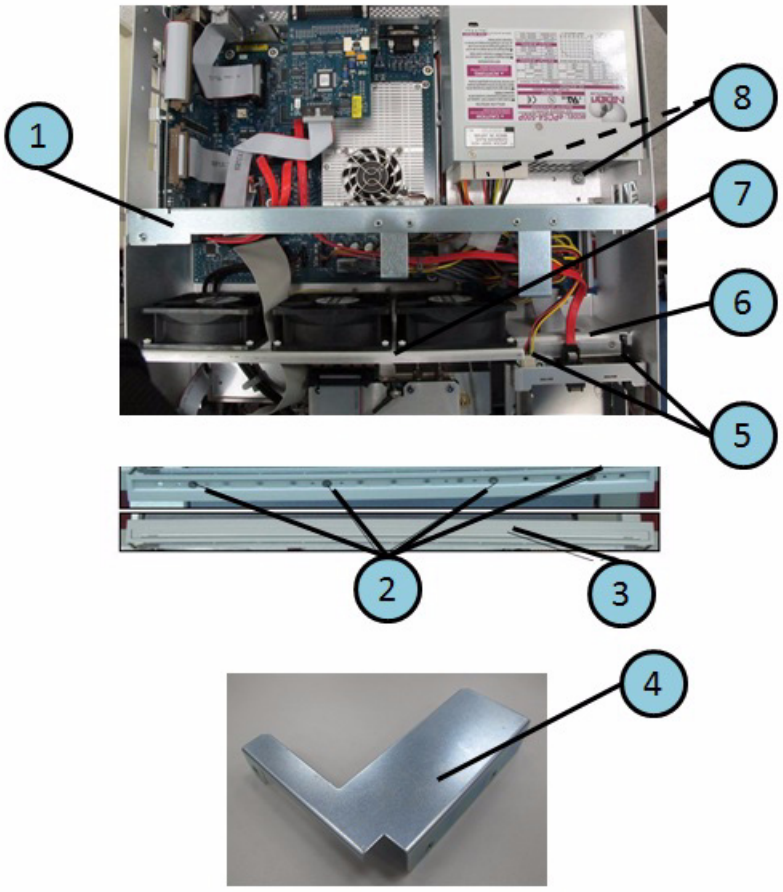


Table 5-11 Top View (Miscellaneous Parts) (Serial number prefix MY462/MY463 or SG462/SG463)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-01230	1	GUIDE BAR
2	0515-1382	4	SCREW-MACH M3.5 x L6 FL T15
3	5041-9176	1	TRIM STRIP
4	E5071-01234	1	ANGLE PCI CARD
5	0515-1946	2	SCREW-MACH M3.0 x L6 FL T10
6	E5071-01201	1	BRACKET
7	E5071-01212	1	GUARD
8	0515-1946	2	SCREW-MACH M3.0 x L6 FL T10
	3050-2247	2	WASHER

Top View Up to 8.5 GHz Options (Under Power Supply)

Figure 5-12 **Top View Up to 8.5 GHz Options (Under Power Supply) (Serial number prefix MY461 or SG461)**

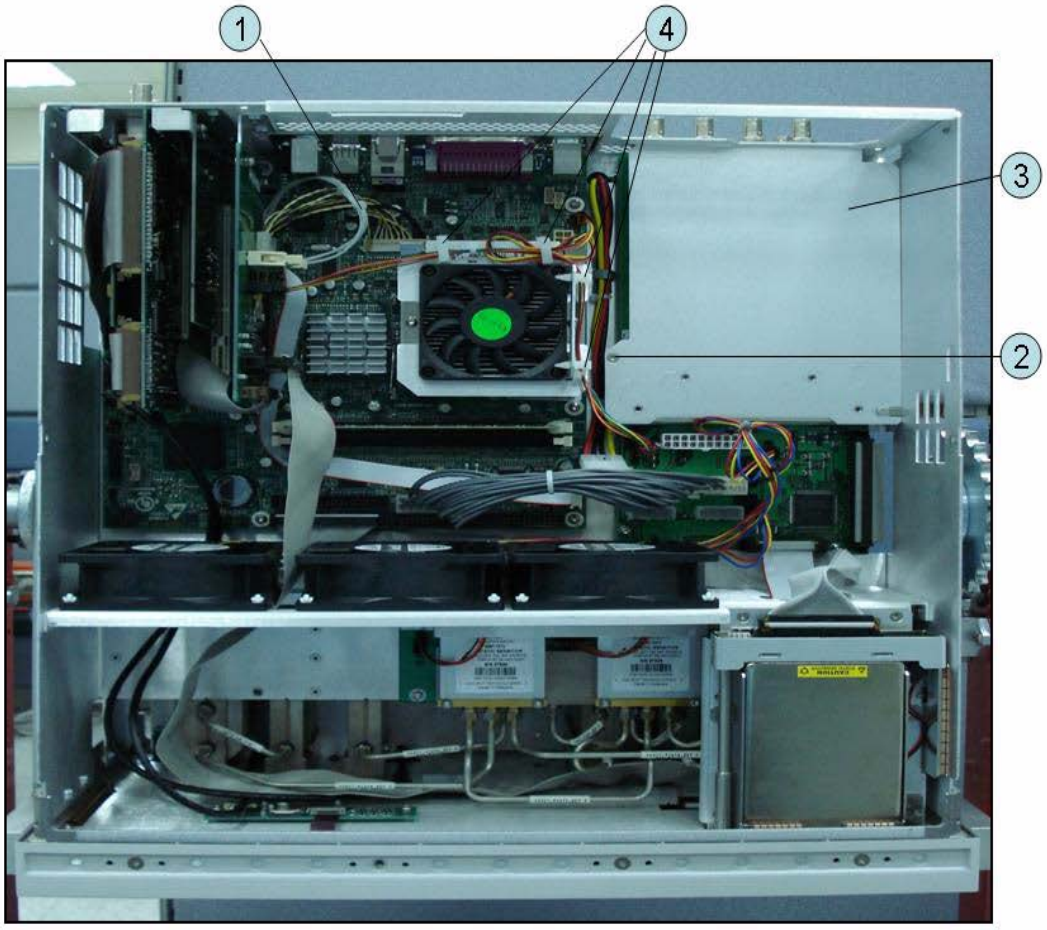


Table 5-12 **Top View Up to 8.5 GHz Options (Under Power Supply) (Serial number prefix MY461 or SG461)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61606	1	WIRE ASSY
2	0515-1946	1	SCREW-MACH M3.0 x L6 FL T10
3	E5071-00600	1	BRACKET
4	1400-0866	4	CLAMP-CABLE

Top View Up to 8.5 GHz Options (Motherboard and Other Parts)

Figure 5-13 **Top View Up to 8.5 GHz Options (Motherboard and Other Parts) (Serial number prefix MY461 or SG461)**

Table 5-13 Top View Up to 8.5 GHz Options (Motherboard and Other Parts) (Serial number prefix MY461 or SG461)

Ref. Desig.	Keysight Part Number	Qty.	Abbreviation	Description
1	1420-0356	1		BATTERY LITHIUM (CR2032), 3V, .22A-HR
2	0515-0430	2		SCREW-MACH M3.0 x L6 PN T10
3	0363-0170	1		GASKET 10 UNITS
4	0515-0664	5		SCREW-MACH M3.0 x L12 PN T10
5	0515-0430	3		SCREW-MACH M3.0 x L6 PN T10
6	E5071-61180 (A6)	1	BAS	ANALOG BASE MODULE
7	E5071-06001	1		SPACER
8	1400-1334	2		CLAMP CABLE
9	0515-0430	7		SCREW-MACH M3.0 x L6 PN T10
10	0515-0372	1		SCREW-MACH M3.0 x L8 PN T10

Figure 5-14 **Top View Up to 8.5 GHz Options (Motherboard and Other Parts) (Serial number prefix MY462/MY463 or SG462/SG463)**

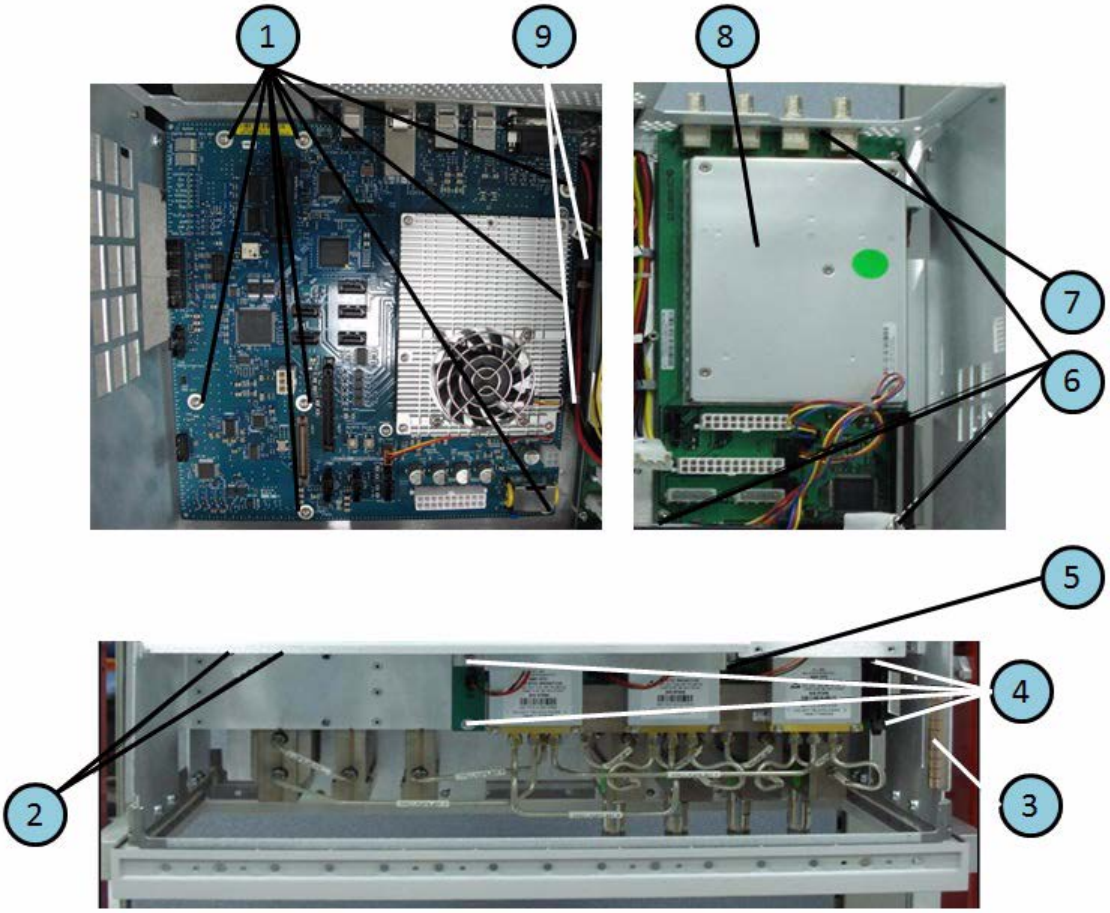


Table 5-14 Top View Up to 8.5 GHz Options (Motherboard and Other Parts) (Serial number prefix MY462/MY463 or SG462/SG463)

Ref. Desig.	Keysight Part Number	Qty.	Abbreviation	Description
1	0515-0430	8		SCREW-MACH M3.0 x L6 PN T10
2	0515-0430	2		SCREW-MACH M3.0 x L6 PN T10
3	0363-0170	1		GASKET 10 UNITS
4	0515-0664	5		SCREW-MACH M3.0 x L12 PN T10
5	0515-0372	1		SCREW-MACH M3.0 x L8 PN T10
6	0515-0430	3		SCREW-MACH M3.0 x L6 PN T10
7	E5071-06001	1		SPACER
8	E5071-61180 (A6)	1	BAS	ANALOG BASE MODULE
9	1400-1334	2		CLAMP CABLE

Bottom View

Figure 5-15 **Bottom View**

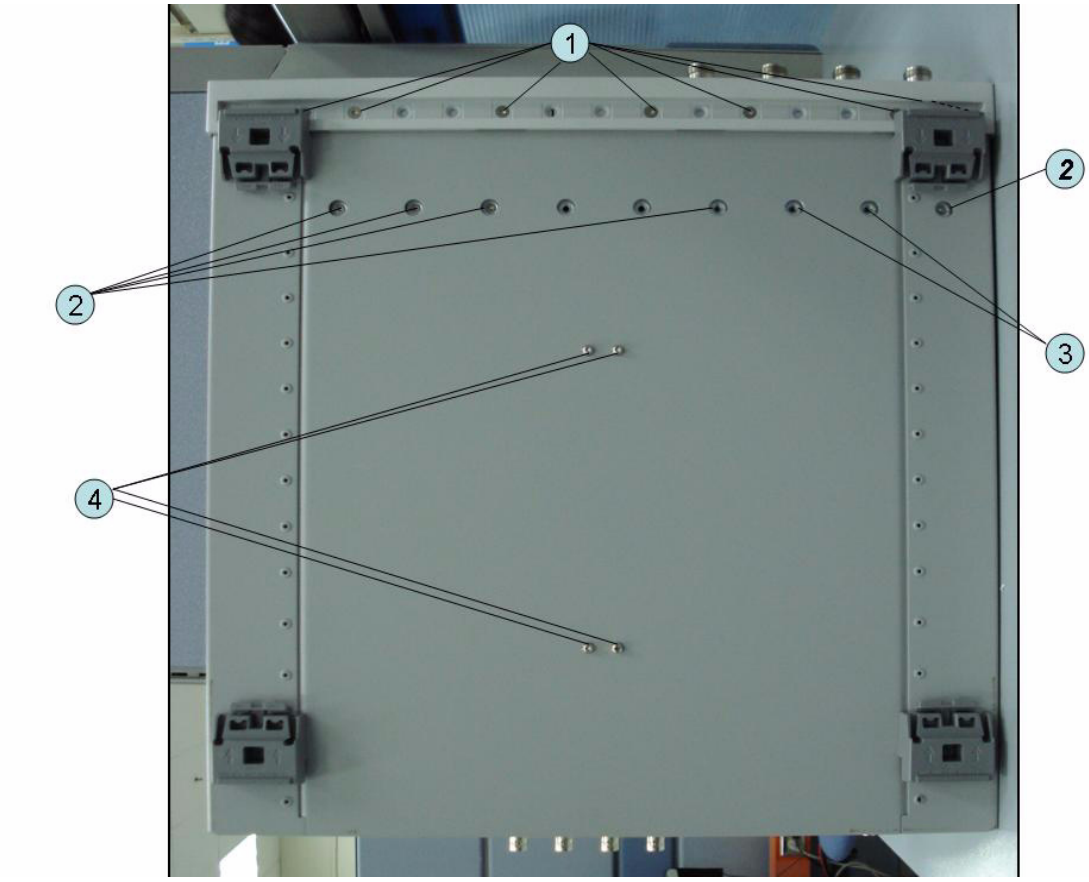


Table 5-15 Bottom View

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-1382	7	SCREW-MACH M3.5 x L6 FL T15
2	0515-1946	5	SCREW-MACH M3.0 x L6 FL T10
3	0515-1946	2	SCREW-MACH M3.0 x L6 FL T10 (4 Port Options)
4	0515-0430	4	SCREW-MACH M3.0 x L6 PN T10

Front View Up to 8.5 GHz Options (Analog)

Figure 5-16 **Front View Up to 8.5 GHz Options (Analog)**

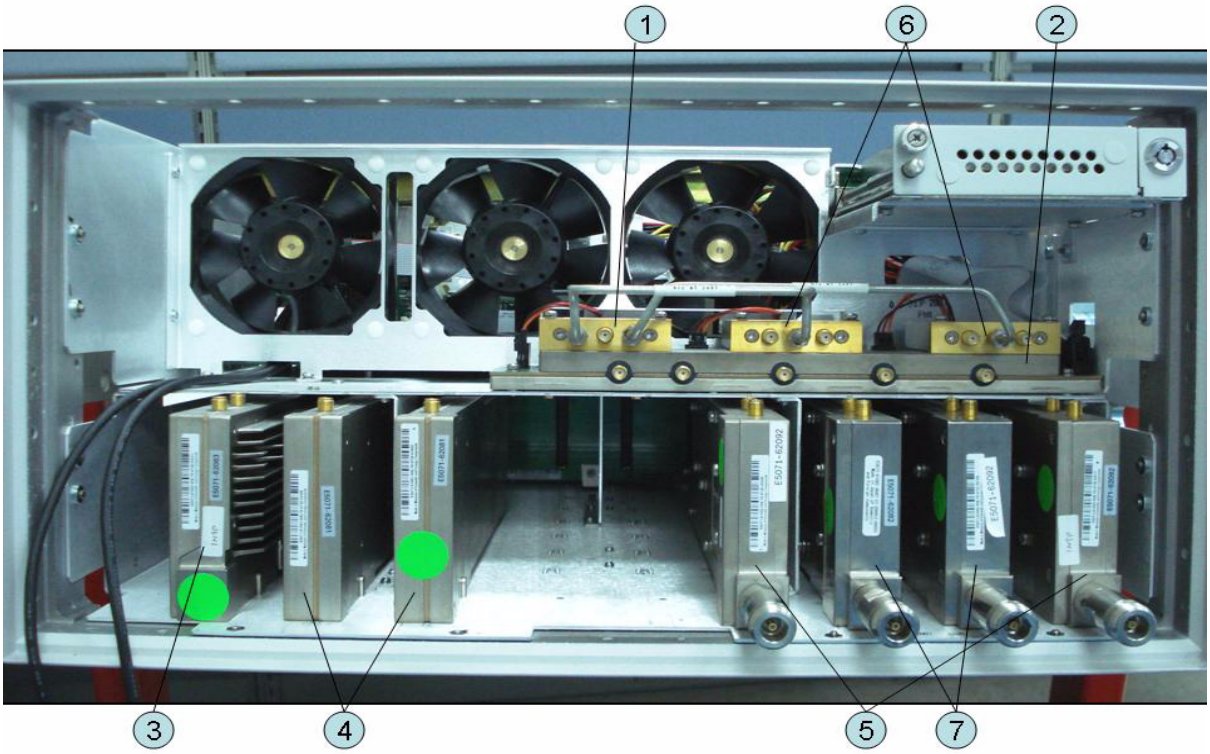


Table 5-16 **Front View Up to 8.5 GHz Options (Analog)**

Ref. Desig.	Keysight Part Number	Qty.	Abbreviation	Description
1	5087-7746	1	T2-SW	SWITCH RF SPDT
2	E5071-61184 (A4)	1	DIS	DISTRIBUTOR MODULE
3	E5071-62383 (A3)	1	VNR	LEVEL VERNIER BOARD
4	E5071-62291 (A1)	2	SYN	SYNTHESIZER BOARD
5	E5071-62482 (A2)	2	RCV	RECEIVER BOARD (Opt. xx0)
	E5071-62492 (A2)	2		RECEIVER BOARD (Opt. xx5)
6	5087-7746	2	T2-SW	SWITCH RF SPDT (Opt. 4xx)
7	E5071-62482 (A2)	2	RCV	RECEIVER BOARD (Opt. 4x0)
	E5071-62492 (A2)	2		RECEIVER BOARD (Opt. 4x5)

Front View Over 8.5 GHz Options (Analog)

Figure 5-17 **Front View Over 8.5 GHz Options (Analog)**

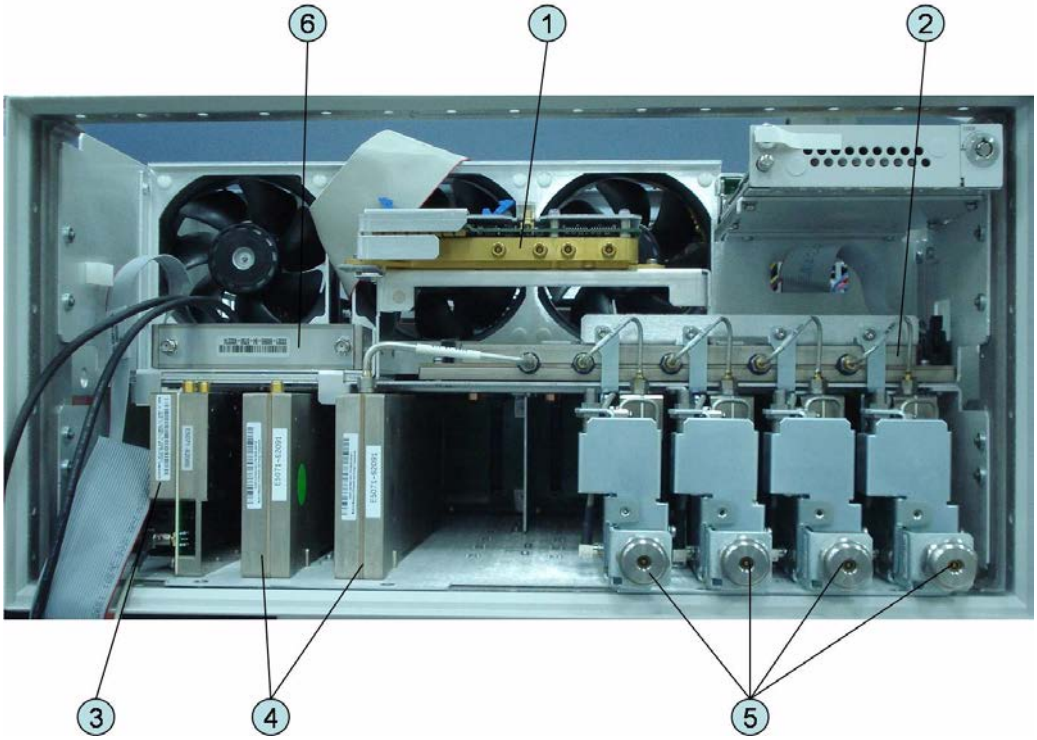


Table 5-17 **Front View Over 8.5 GHz Options (Analog)**

Ref. Desig.	Keysight Part Number	Qty.	Abbreviation	Description
1	5087-7747	1	IMX	IMIX
2	E5071-61184 (A4)	1	DIS	DISTRIBUTOR MODULE
3	E5071-62186 (A86)	1	DBL	TESTED LEVEL DOUBLER MODULE
	E5071-69186	1		TESTED LEVEL DOUBLER MODULE (Exchange)
4	E5071-62091 (A1)	2	SYN	SYNTHESIZER BOARD
	E5071-69091	2		SYNTHESIZER BOARD (Exchange)
5	See Table 5-44	1	RCV	RECEIVER MODULE ASSEMBLY
6	33321-60082	1	ATT	ATTENUATOR 60 dB 20 GHz, PB FREE

Front View Over 8.5 GHz Options (Miscellaneous Parts)

Figure 5-18 **Front View Over 8.5 GHz Options (Miscellaneous Parts)**

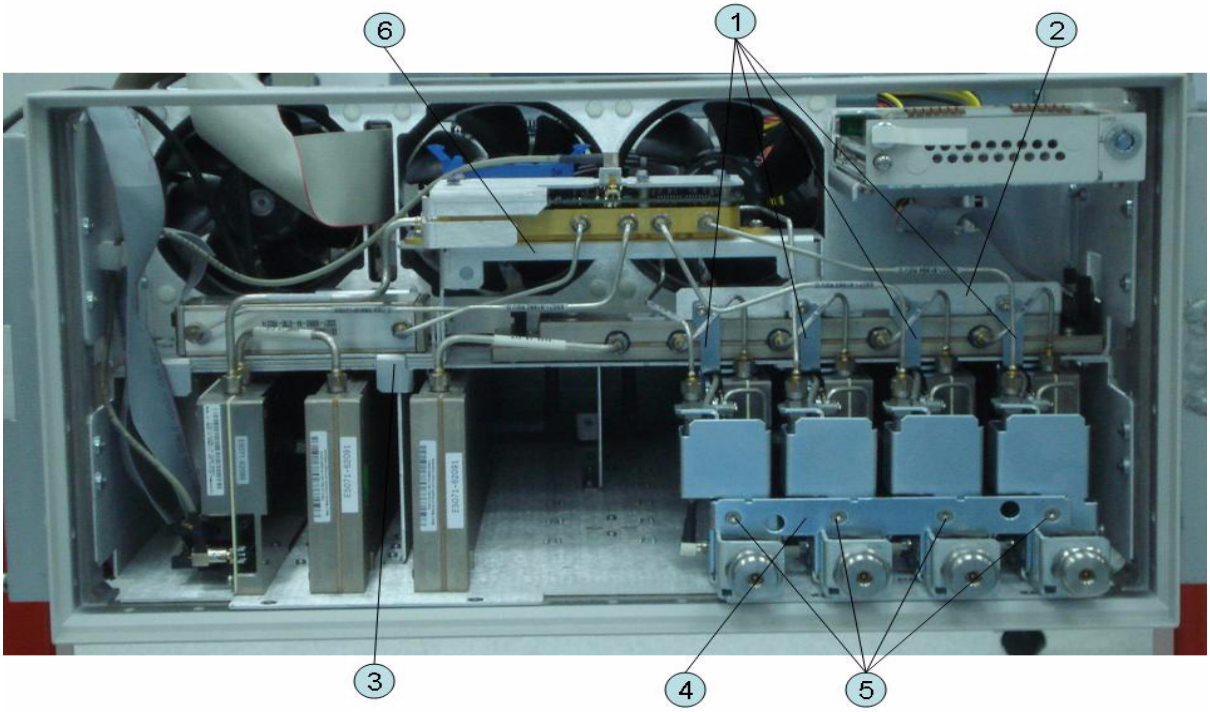


Table 5-18 **Front View Over 8.5 GHz Options (Miscellenous Parts)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5070-01296	2	ANGLE (Opt. 2xx)
	E5070-01296	4	ANGLE (Opt. 4xx)
2	E5070-01295	1	ANGLE
3	E5070-01292	1	ANGLE ATTENUATOR
4	E5071-00614	1	PLATE
5	0515-1946	2	SCREW -MACH FLT -HD (Opt. 2xx)
	0515-1946	4	SCREW -MACH FLT -HD (Opt. 4xx)
6	E5070-01268	1	BRACKET MASSQUAD

Front View (Semirigid Cables) (Up to 8.5 GHz Options)

Figure 5-19 **Front View (Semirigid Cables) (Up to 8.5 GHz Options)**

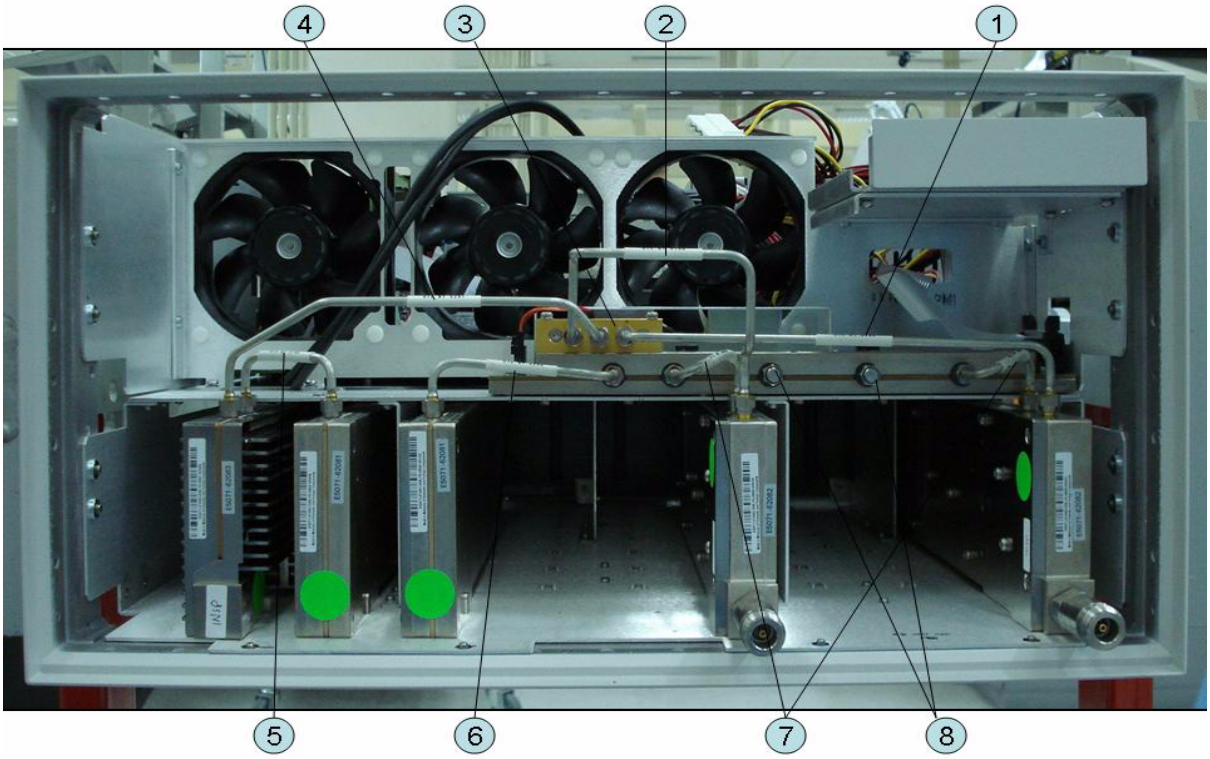


Table 5-19 **Front View (Semirigid Cables) (Up to 8.5 GHz Options)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61641	1	RF CABLE ASSY SRGD
2	E5071-61640	1	RF CABLE ASSY SRGD
3	0955-0301	1	ATTENUATOR
4	E5071-61639	1	RF CABLE ASSY SRGD
5	E5071-61635	1	RF CABLE ASSY SRGD
6	E5071-61634	1	RF CABLE ASSY SRGD
7	E5071-61631	2	RF CABLE ASSY SRGD
8	1810-0118	2	TERMINATION

Front View (Semirigid Cables) (Up to 8.5 GHz Options)

Figure 5-20 **Front View (Semirigid Cables) (Up to 8.5 GHz Options)**

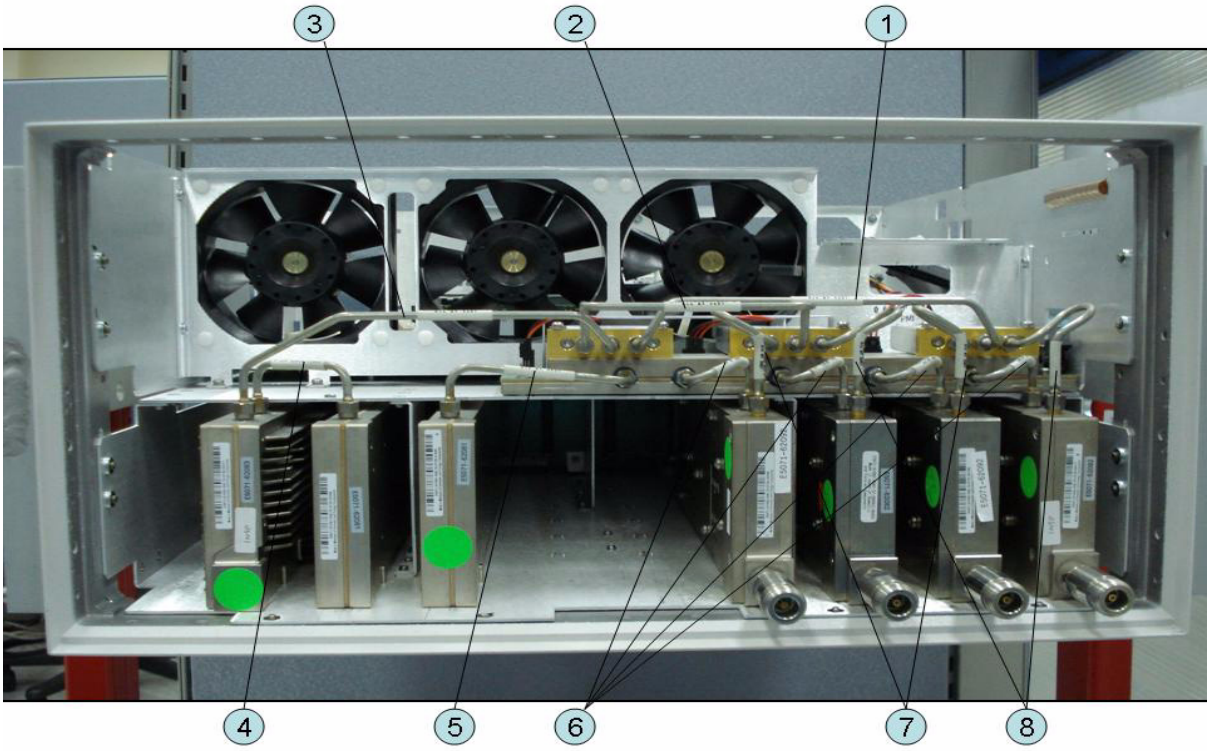


Table 5-20 **Front View (Semirigid Cables) (Up to 8.5 GHz Options)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61638	1	RF CABLE ASSY SRGD
2	E5071-61637	1	RF CABLE ASSY SRGD
3	E5071-61636	1	RF CABLE ASSY SRGD
4	E5071-61635	1	RF CABLE ASSY SRGD
5	E5071-61634	1	RF CABLE ASSY SRGD
6	E5071-61631	4	RF CABLE ASSY SRGD
7	E5071-61632	2	RF CABLE ASSY SRGD
8	E5071-61633	2	RF CABLE ASSY SRGD

Front View (Semirigid Cables) (Over 8.5 GHz Options - 2 Port)

Figure 5-21 **Front View (Semirigid Cables) (Over 8.5 GHz Options - 2 Port)**

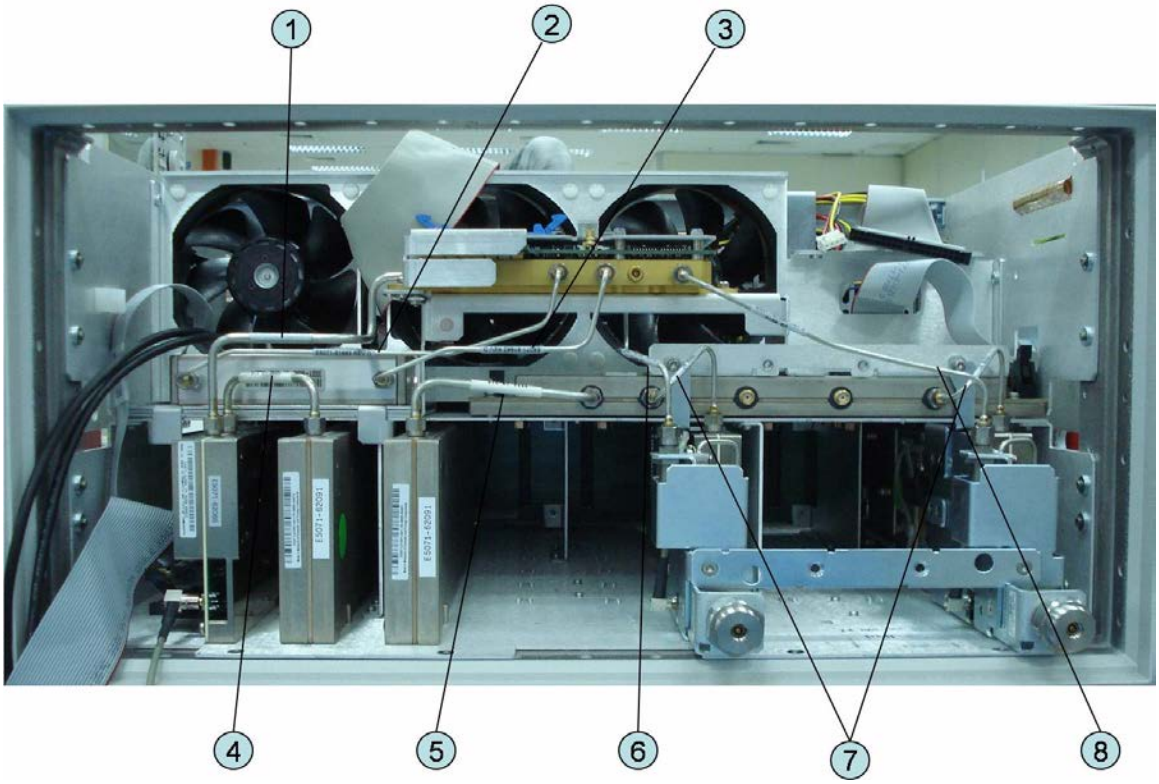


Table 5-21 **Front View (Semirigid Cables) (Opt. 2xx)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61661	1	RF CABLE ASSY SRGD
2	E5071-61663	1	RF CABLE ASSY SRGD
3	E5071-61662	1	RF CABLE ASSY SRGD
4	E5071-61635	1	RF CABLE ASSY SRGD
5	E5071-61634	1	RF CABLE ASSY SRGD
6	E5071-61691	1	RF CABLE ASSY SRGD
7	E5071-61643	2	RF CABLE ASSY SRGD
8	E5071-61694	1	RF CABLE ASSY SRGD

Front View (Semirigid Cables) (Over 8.5 GHz Options - 4 Port)

Figure 5-22 **Front View (Semirigid Cables) (Opt. 4xx)**

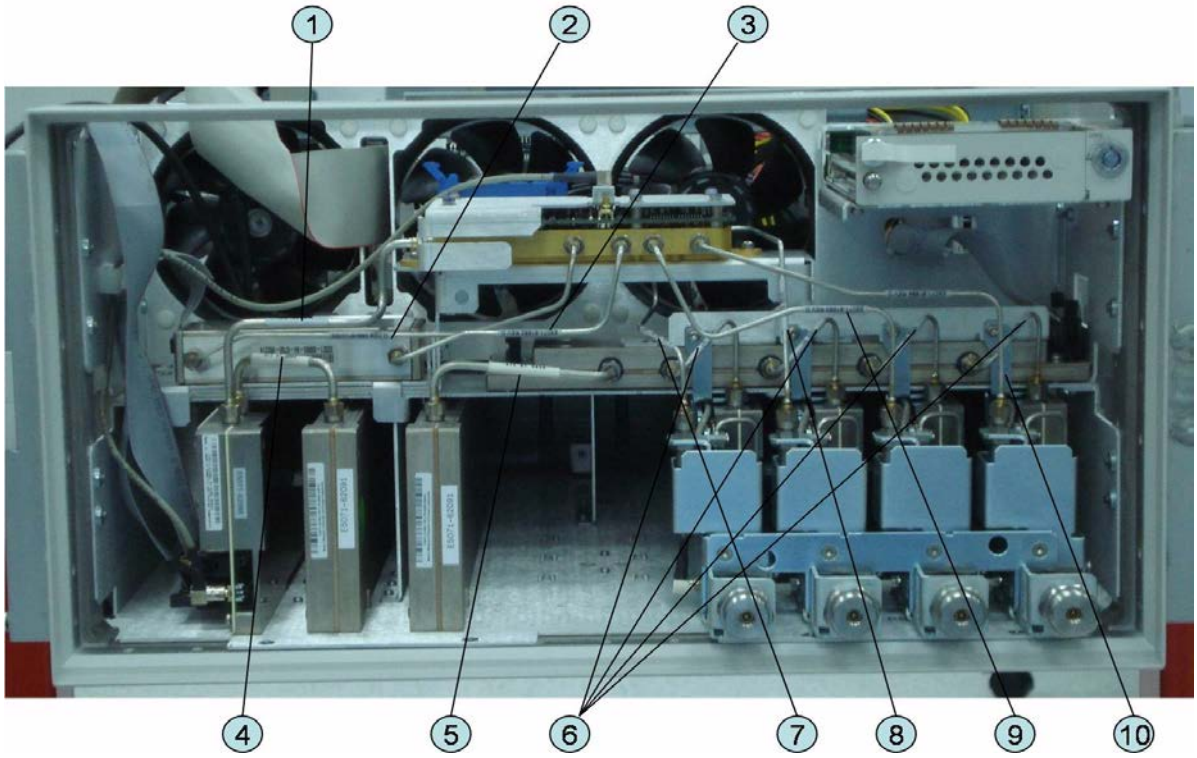


Table 5-22 **Front View (Semirigid Cables) (Opt. 4xx)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61661	1	RF CABLE ASSY SRGD
2	E5071-61663	1	RF CABLE ASSY SRGD
3	E5071-61662	1	RF CABLE ASSY SRGD
4	E5071-61635	1	RF CABLE ASSY SRGD
5	E5071-61634	1	RF CABLE ASSY SRGD
6	E5071-61643	4	RF CABLE ASSY SRGD
7	E5071-61691	1	RF CABLE ASSY SRGD
8	E5071-61692	1	RF CABLE ASSY SRGD
9	E5071-61693	1	RF CABLE ASSY SRGD
10	E5071-61694	1	RF CABLE ASSY SRGD

Front Panel

Figure 5-23 Front Panel

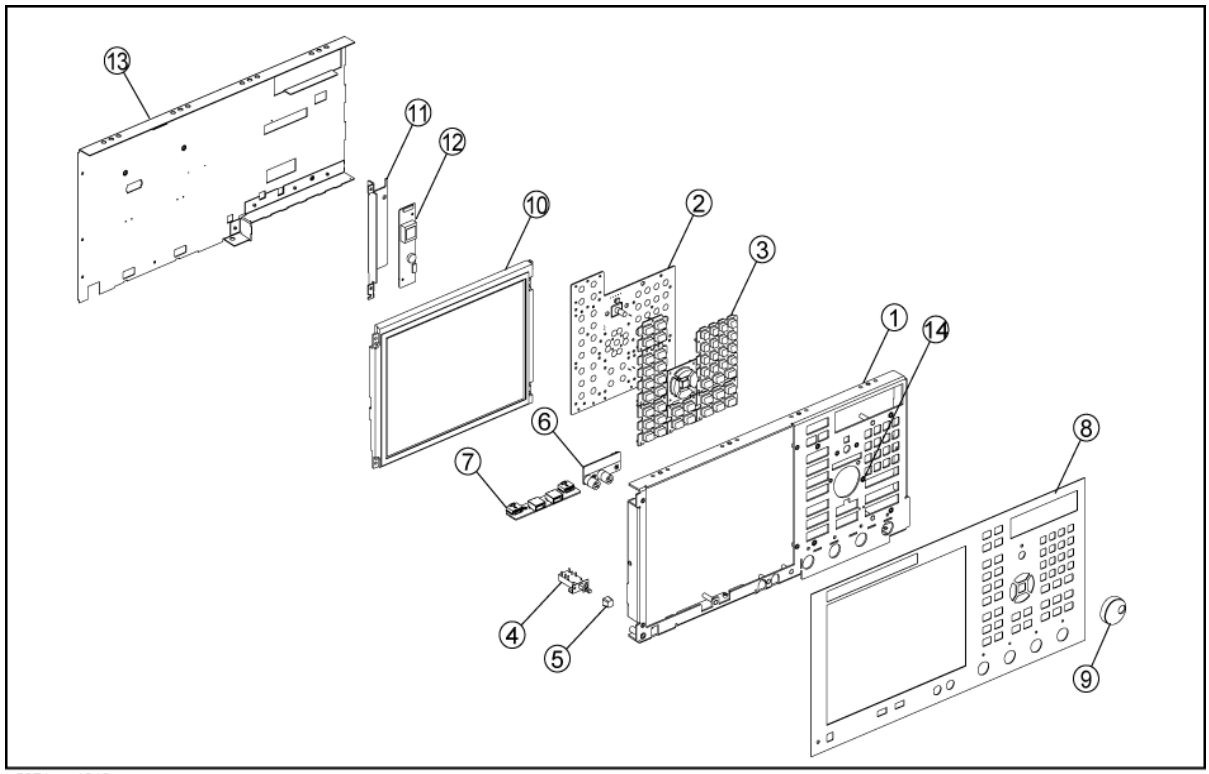


Table 5-23 Front Panel

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-00222	1	PANEL SUB
2	E5070-66652	1	FRONT PANEL KEYBOARD
3	E5071-25122	1	KEYPAD RUBBER
4	See Table 5-56	1	STANDBY SWITCH ASSEMBLY
5	0371-3953	1	KEY CAP
6	See Table 5-56	1	PCA PROBE POWER
7	See Table 5-56	1	PCA FRONT USB
8	E5071-00252	1	PANEL FRONT (Opt. 2xx)
	E5070-00273	1	PANEL FRONT (Opt. 2D5, 2K5)
	E5071-00254	1	PANEL FRONT (Opt. 4xx)
	E5070-00271	1	PANEL FRONT (Opt. 4D5, 4K5)
9	5188-4479	1	KNOB
10	E5070-60112	1	LCD-TPANEL ASSY
		1	BACKLIGHT (included in LCD-TPANEL ASSY)
11	See Table 5-55	1	BRACKET INVERTER
12	See Table 5-55	1	INVERTER LS700
13	E5071-00621	1	COVER SHIELD
14	04191-08000	1	SPRING

NOTE The following parts in the table below can be combined as a single sub-assembly under part number E5071-60021 (Up to 8.5 GHz Options) and E5071-60022 (Over 8.5 GHz Options).

Table 5-24 E5071-60021 Sub-Assembly Up to 8.5 GHz Options

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-00222	1	PANEL SUB
2	E5070-66652	1	FRONT PANEL KEYBOARD
3	E5071-25122	1	KEYPAD RUBBER
4	See Table 5-56	1	STANDBY SWITCH ASSEMBLY
5	0371-3953	1	KEY CAP

Table 5-24 **E5071-60021 Sub-Assembly Up to 8.5 GHz Options**

Ref. Desig.	Keysight Part Number	Qty.	Description
6	See Table 5-56	1	PCA PROBE POWER
7	See Table 5-56	1	PCA FRONT USB
10	E5070-60112	1	LCD-TPANEL ASSY
		1	BACKLIGHT (included in LCD-TPANEL ASSY)
11	See Table 5-55	1	BRACKET INVERTER
12	See Table 5-55	1	INVERTER LS700
13	E5071-00621	1	COVER SHIELD

Table 5-25 **E5071-60022 Sub-Assembly Over 8.5 GHz Options**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5070-00272	1	PANEL SUB
2	E5070-66652	1	FRONT PANEL KEYBOARD
3	E5071-25122	1	KEYPAD RUBBER
4	See Table 5-56	1	STANDBY SWITCH ASSEMBLY
5	0371-3953	1	KEY CAP
6	See Table 5-56	1	PCA PROBE POWER
7	See Table 5-56	1	PCA FRONT USB
10	E5070-60112	1	LCD-TPANEL ASSY
		1	BACKLIGHT (included in LCD-TPANEL ASSY)
11	See Table 5-55	1	BRACKET INVERTER
12	See Table 5-55	1	INVERTER LS700
13	E5070-00672	1	COVER SHIELD

Rear View (1)

Figure 5-24 **Rear View (1) (Serial number prefix MY461 or SG461)**

Table 5-26 **Rear View (1) (Serial number prefix MY461 or SG461)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-0372	6	SCREW-MACH M3.0 x L8 PN T10
2	8160-1677	1	I/O SHIELD
3	0515-0372	2	SCREW-MACH M3.0 x L8 PN T10
4	2950-0054	4	NUT
	2190-0054	4	WASHER-LK INTL T
5	1250-0252	1	BNC CONNECTOR (Opt. 1E5)
	2950-0035	1	NUT-HEX-DBL-CHAM (Opt. 1E5)
	2190-0102	1	WSHR-LK INTL T (Opt. 1E5)
	E5071-00610	1	SPACER (Opt. 1E5)
	6960-0041	1	PLUG HOLE (Opt. UNQ)
6	0515-1402	3	SCREW-MACH M3.5 x L8 PN T15
7	0515-1402	2	SCREW-MACH M3.5 x L8 PN T15
8	5185-3720	1	LABEL

Figure 5-25 **Rear View (1) (Serial number prefix MY462/MY463 or SG462/SG463)**

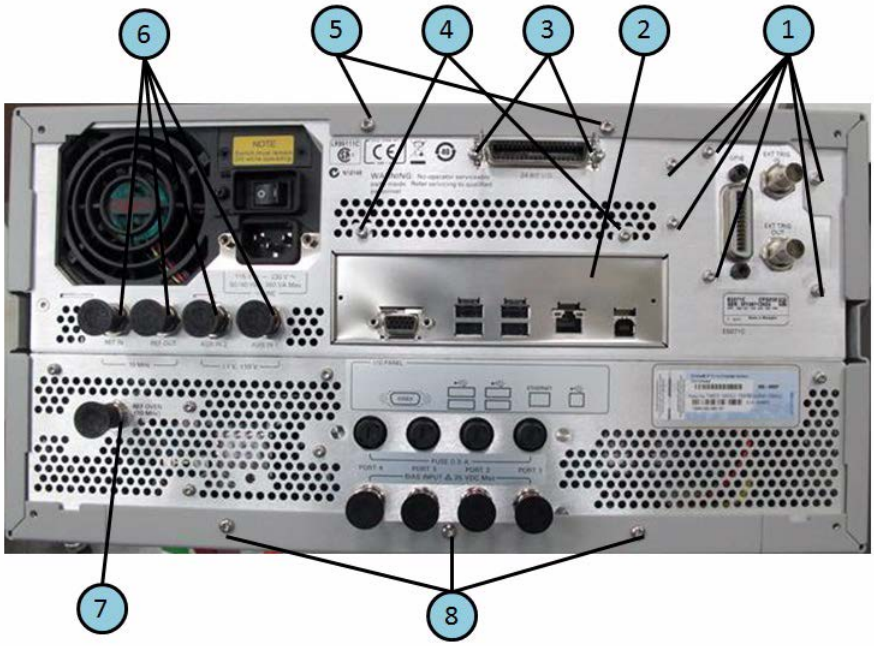


Table 5-27 **Rear View (1) (Serial number prefix MY462/MY463 or SG462/MY463)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-0372	6	SCREW-MACH M3.0 x L8 PN T10
2	E5070-00667	1	I/O SHIELD
3	0515-0372	2	SCREW-MACH M3.0 x L8 PN T10
4	0515-0430	2	SCREW-MACH M3.0 x L6 PN T10
5	0515-1402	2	SCREW-MACH M3.5 x L8 PN T15
6	2950-0054	4	NUT
	2190-0054	4	WASHER-LK INTL T
7	1250-0252	1	BNC CONNECTOR (Opt. 1E5)
	2950-0035	1	NUT-HEX-DBL-CHAM (Opt. 1E5)
	2190-0102	1	WSHR-LK INTL T (Opt. 1E5)
	E5071-00610	1	SPACER (Opt. 1E5)
	6960-0041	1	PLUG HOLE (Opt. UNQ)
8	0515-1402	3	SCREW-MACH M3.5 x L8 PN T15

Rear View (2)

Figure 5-26 **Rear View (2) (Serial number prefix MY461 or SG461)**

Table 5-28 **Rear View (2) (Serial number prefix MY461 or SG461)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-1946	3	SCREW-MACH M3.0 x L6 FL T10
2	0515-0430	6	SCREW-MACH M3.0 x L6 PN T10
3	0515-1946	3	SCREW-MACH M3.0 x L6 FL T10
4	2950-0035	2	NUT (Opt. 2x5)
	2190-0102	2	WASHER (Opt. 2x5)
	6960-0524	2	PLUG-HOLE (Opt. 2x5)
	2950-0035	4	NUT (Opt. 4x5)
	2190-0102	4	WASHER (Opt. 4x5)
	6960-0524	4	PLUG-HOLE (Opt. xx0)
5	2110-0046	2	FUSE 0.5A 125V (Opt. 2x5)
	1400-0112	2	FUSE HOLDER CAP (Opt. 2x5)
	6960-0309	2	PLUG-HOLE (Opt. 2x5)
	2110-0046	4	FUSE 0.5A 125V (Opt. 4x5)
	1400-0112	4	FUSE HOLDER CAP (Opt. 4x5)
	6960-0309	4	PLUG-HOLE (Opt. 4x0)

Figure 5-27 **Rear View (2) (Serial number prefix MY462/MY463 or SG462/SG463)**

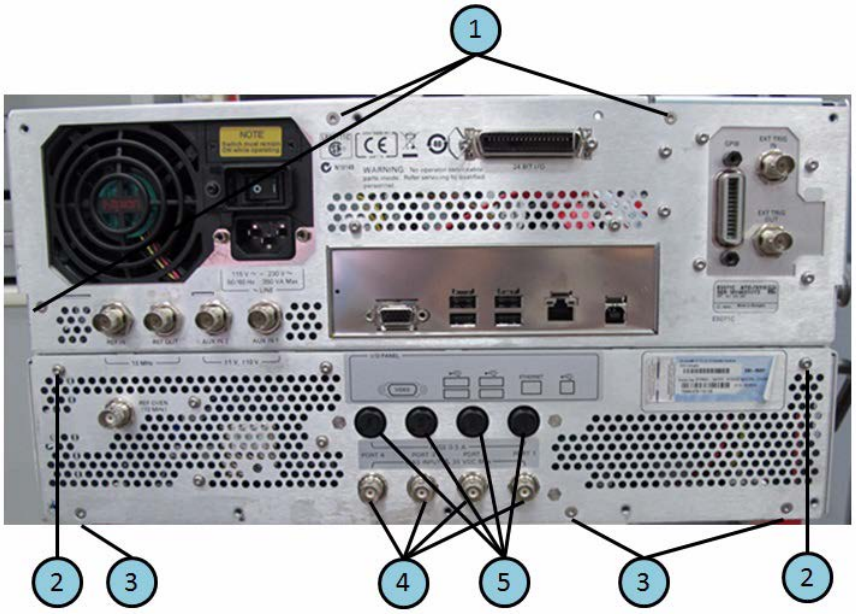


Table 5-29 **Rear View (2) (Serial number prefix MY462/MY463 or SG462/SG463)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-1946	3	SCREW-MACH M3.0 x L6 FL T10
2	0515-0430	6	SCREW-MACH M3.0 x L6 PN T10
3	0515-1946	3	SCREW-MACH M3.0 x L6 FL T10
4	2950-0035	2	NUT (Opt. 2x5)
	2190-0102	2	WASHER (Opt. 2x5)
	6960-0524	2	PLUG-HOLE (Opt. 2x5)
	2950-0035	4	NUT (Opt. 4x5)
	2190-0102	4	WASHER (Opt. 4x5)
	6960-0524	4	PLUG-HOLE (Opt. xx0)
5	2110-0046	2	FUSE 0.5A 125V (Opt. 2x5)
	1400-0112	2	FUSE HOLDER CAP (Opt. 2x5)
	6960-0309	2	PLUG-HOLE (Opt. 2x5)
	2110-0046	4	FUSE 0.5A 125V (Opt. 4x5)
	1400-0112	4	FUSE HOLDER CAP (Opt. 4x5)
	6960-0309	4	PLUG-HOLE (Opt. 4x0)

Cover Assembly

Figure 5-28 **Cover Assembly**

Table 5-30 **Cover Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-04002	1	COVER ASSY
2	5041-9186	2	STRAP HANDLE FRT
	0515-2049	2	SCREW-MACH M5.0 x L16 FL T20
3	5041-9173	2	SIDE TRIM 221.5
4	5041-9167	4	FOOT FL
	1460-1345	2	WIREFORM
	5021-2840	4	KEY LOCK
5	E5100-40002	4	STANDOFF
	0515-1402	4	SCREW-MACH M3.5 x L8 PN T15
6	5041-9187	2	STRAP HANDLE REAR
	0515-2049	2	SCREW-MACH M5.0 x L16 FL T20
7	08720-00081	2	STRAP HANDLE

Left Side View

Figure 5-29 **Left Side View**

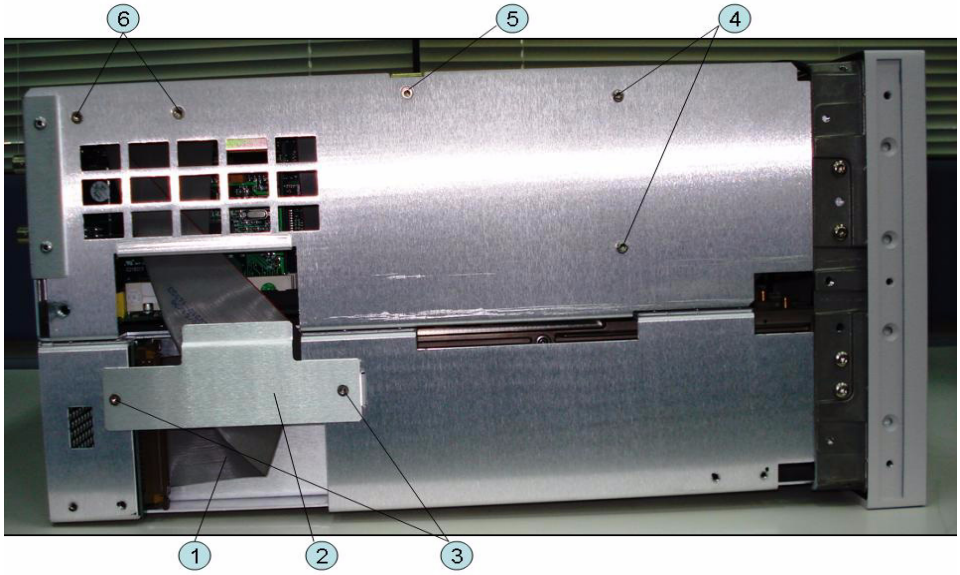


Table 5-31 **Left Side View**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61603	1	FLAT CABLE ASSY
2	E5071-00607	1	PLATE
3	0515-1946	2	SCREW-MACH M3.0 x L6 FL T10
4	0515-0430	2	SCREW-MACH M3.0 x L6 PN T10
5	0515-2146	1	SCREW-MACH M3.0 x L4 FL T10
6	0515-1946	2	SCREW-MACH M3.0 x L6 FL T10

Right Side View

Figure 5-30 **Right Side View**

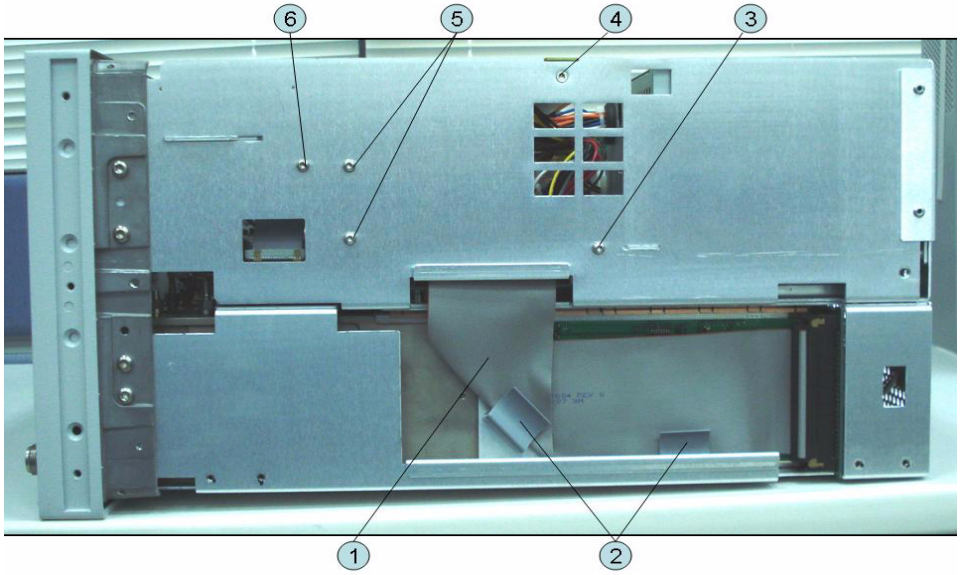


Table 5-32 **Right Side View**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-61604	1	FLAT CABLE ASSY
2	1400-0611	2	CLAMP CABLE
3	0515-1946 & 3050-2247	1	SCREW-MACH M3.0 x L6 PN T10
4	0515-2146	1	SCREW-MACH M3.0 x L4 FL T10
5	0515-0430	2	SCREW-MACH M3.0 x L6 PN T10
6	0515-0372	1	SCREW-MACH M3.0 x L8 PN T10

Removable Hard Disk Drive Assembly (Obsolete)

Figure 5-31 **Removable Hard Disk Drive Assembly (Obsolete)**

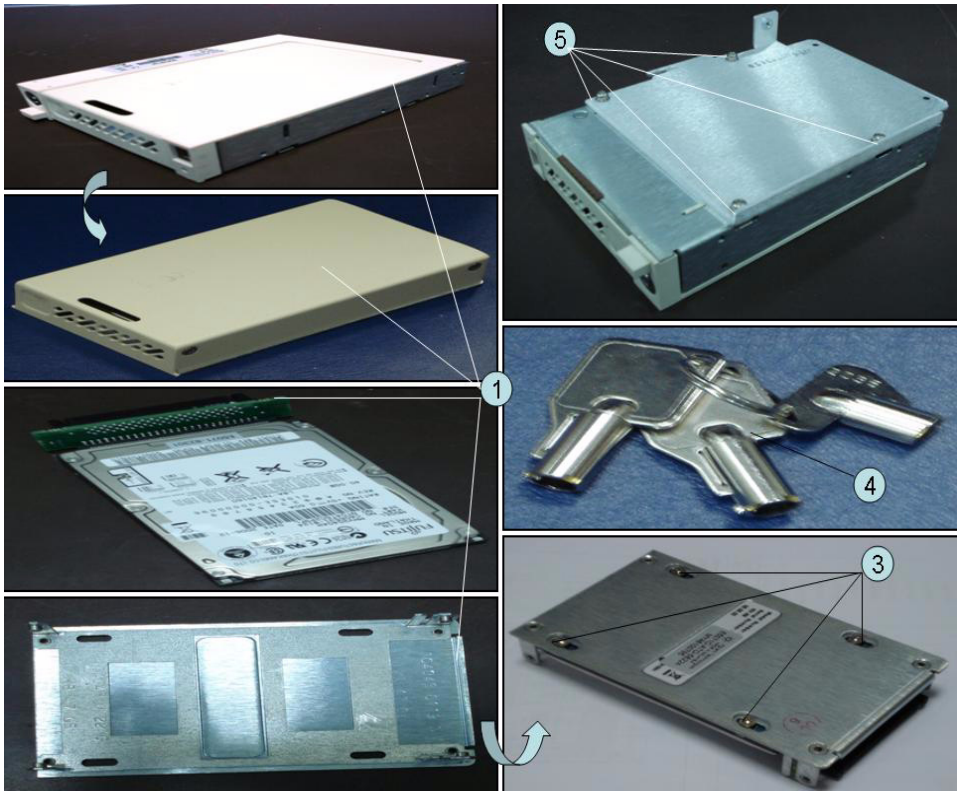


Table 5-33 **Removable Hard Disk Drive Assembly (Obsolete)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5052-60101	1	HDD CARRIER (Service Center Only)
2	E5071-82301	1	HDD INSTALLED (Service Center Only)
3	0515-4353	4	SCREW-MACH M3.0 x L3 PN T10 (Service Center Only)
4	0960-2562	1	HDD KEYS
5	0515-0430	4	SCREW-MACH M3.0 x L6 PN T10

Removable Hard Disk Drive Assembly Option 017

Figure 5-32 **Removable Hard Disk Drive Assembly Option 017 (Serial number prefix MY461 or SG461)**

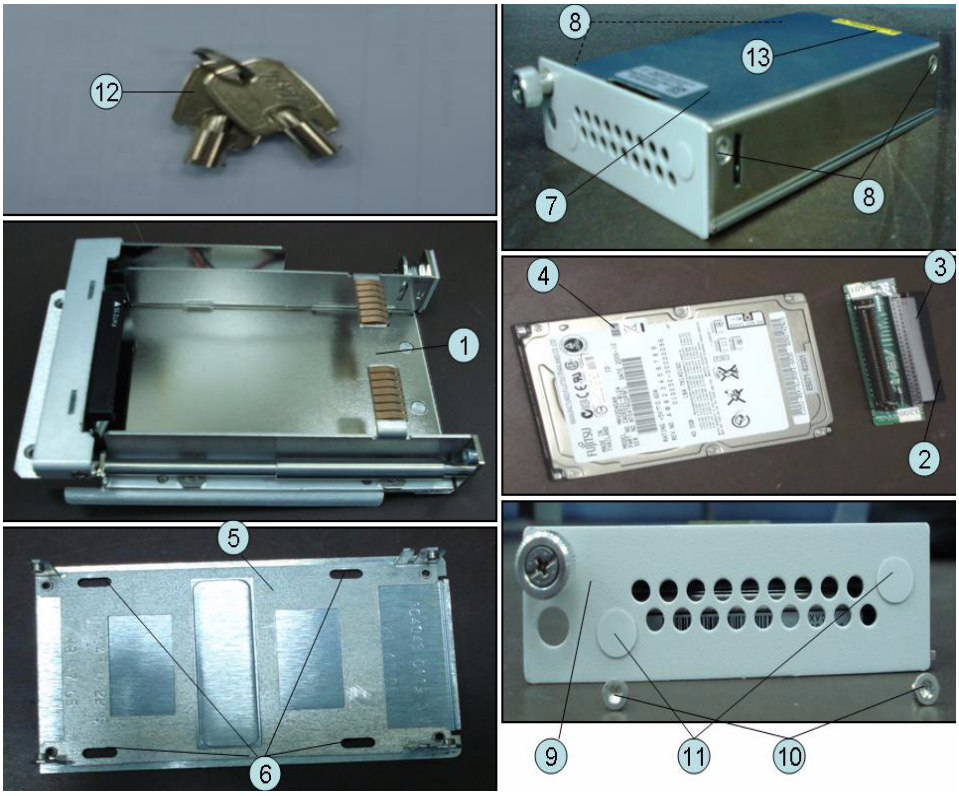


Table 5-34 Removable Hard Disk Drive Assembly (Serial number prefix MY461 or SG461)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5052-60101	1	REMOVABLE HDD 2.5INCH RECEIVING FRAME ASSY
2	E5070-66638	1	CONNECTOR BD PCA
3	E5070-61668	1	FLAT CBL ASSY
4	E5071-82302	1	HDD INSTALLED (Service Center Only)
5	E5070-00650	1	PLATE BOTTOM
6	0515-2146	4	SCREW-MACH M3.0 x L4 FL T10
7	E5070-04006	1	COVER
8	0515-1946	4	SCREW-MACH M3.0 x L6 FL T10
9	E5070-00655	1	PLATE FRONT
10	0515-2146	2	SCREW-MACH M3.0 x L4 FL T10
11	E5070-87301	2	LABEL
12	1390-1375	1	HDD KEYS
13	7121-5441	1	LABEL (Service Center Only)

Figure 5-33 **Removable Hard Disk Drive Assembly Option 017 (Serial number prefix MY462/MY463 or SG462/SG463)**

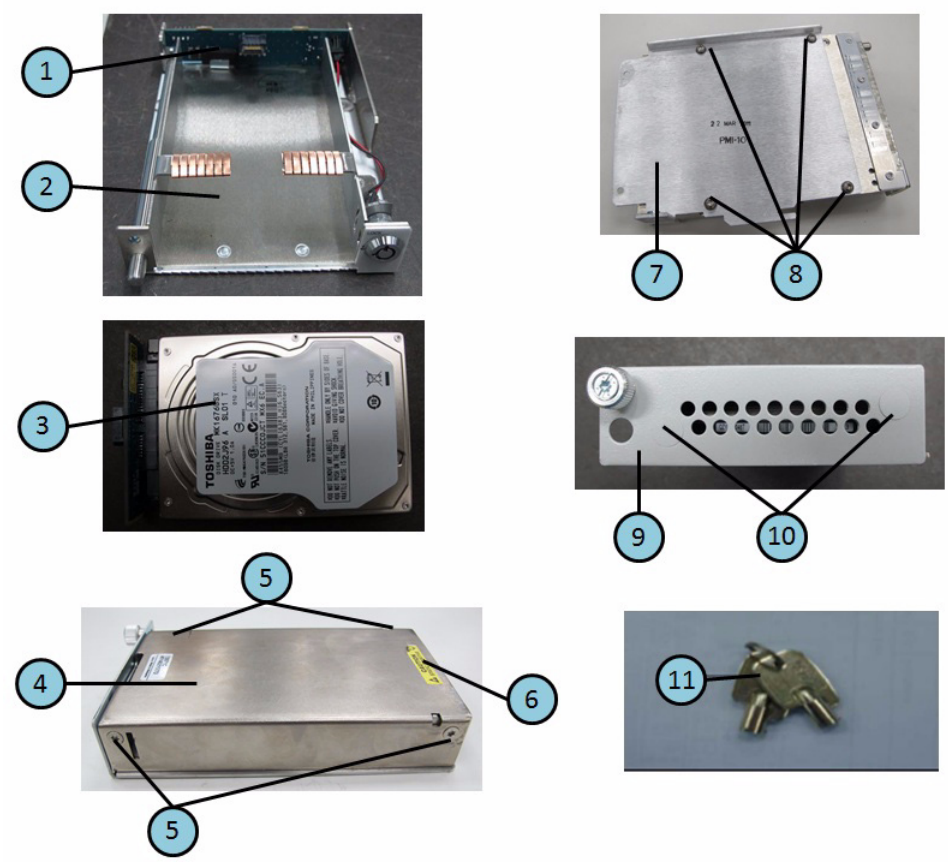


Table 5-35 Removable Hard Disk Drive Assembly (Serial number prefix MY462 or SG462)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5070-66648	1	CONNECTOR BD PCA
2	E5052-60111	1	REMOVABLE HDD 2.5INCH RECEIVING FRAME ASSY
3	E5071-82303	1	HDD INSTALLED (Service Center Only)
4	E5070-04016	1	COVER
5	0515-1946	4	SCREW-MACH M3.0 x L4 FL T10
6	7121-5441	1	LABEL (Service Center Only)
7	E5071-01201	1	BRACKET
8	0515-0430	4	SCREW-MACH M3.0 x L6 PN T10
9	E5070-00655	1	PLATE FRONT
10	0515-2146	2	SCREW-MACH M3.0 x L4 FL T10
	E5070-87301	2	LABEL
11	1390-1375	1	HDD KEYS

Table 5-36 Removable Hard Disk Drive Assembly (Serial number prefix MY463 or SG463)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5070-66648	1	CONNECTOR BD PCA FOR SATA
2	E5052-60111	1	REMOVABLE SATA HDD 2.5INCH RECEIVING FRAME ASSY
3	E5071-82304	1	SSD INSTALLED (Service Center Only)
4	E5070-04016	1	COVER
5	0515-1946	4	SCREW-MACH M3.0 x L4 FL T10
6	7121-5441	1	LABEL (Service Center Only)
7	E5071-01201	1	BRACKET
8	0515-0430	4	SCREW-MACH M3.0 x L6 PN T10
9	E5070-00655	1	PLATE FRONT
10	0515-2146	2	SCREW-MACH M3.0 x L4 FL T10
	E5070-87301	2	LABEL
11	1390-1375	1	HDD KEYS

Hard Disk Drive Assembly Option 019

Figure 5-34 **Hard Disk Drive Assembly Option 019 (Serial number prefix MY461 or SG461)**

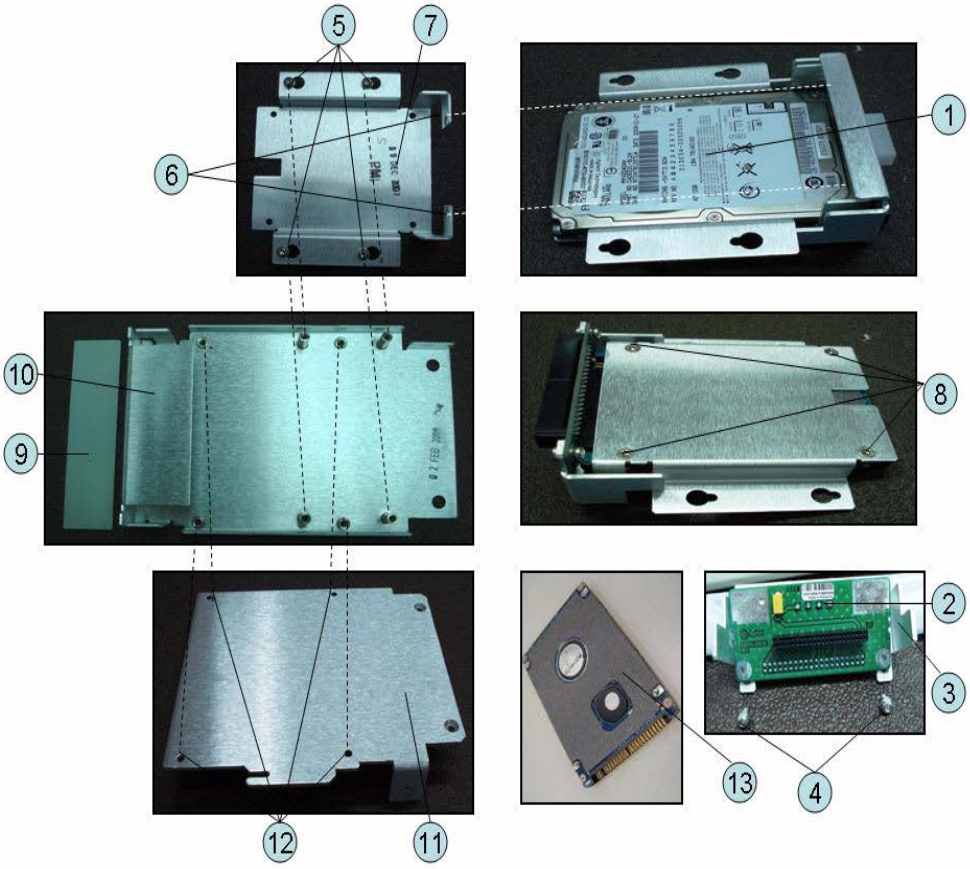


Table 5-37 Hard Disk Drive Assembly (Serial number prefix MY461 or SG461)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-82302	1	HDD INSTALLED (Service Center Only)
2	E5070-66636	1	CONNECTOR BD PCA
3	E5071-01222	1	HDD BRACKET
4	0515-0430	2	SCREW-MACH M3.0 x L6 PN T10
5	0515-0374	4	SCREW-MACH M3.0 x L10 PN T10
6	0515-2028	2	SCREW-MACH M2.5 x L6 FL T8
7	E5070-01255	1	BRACKET HDD
8	0515-2146	4	SCREW-MACH M3.0 x L4 FL T10
9	E5071-01220	1	HDD BRACKET
10	E5071-01223	1	HDD BRACKET
11	E5071-01201	1	HDD BRACKET
12	0515-0430	4	SCREW-MACH M3.0 x L6 PN T10
13	E5070-25061	1	TM SHEET 0.5T

Figure 5-35 **Hard Disk Drive Assembly Option 019 (Serial number prefix MY462/MY463 or SG462/SG463)**

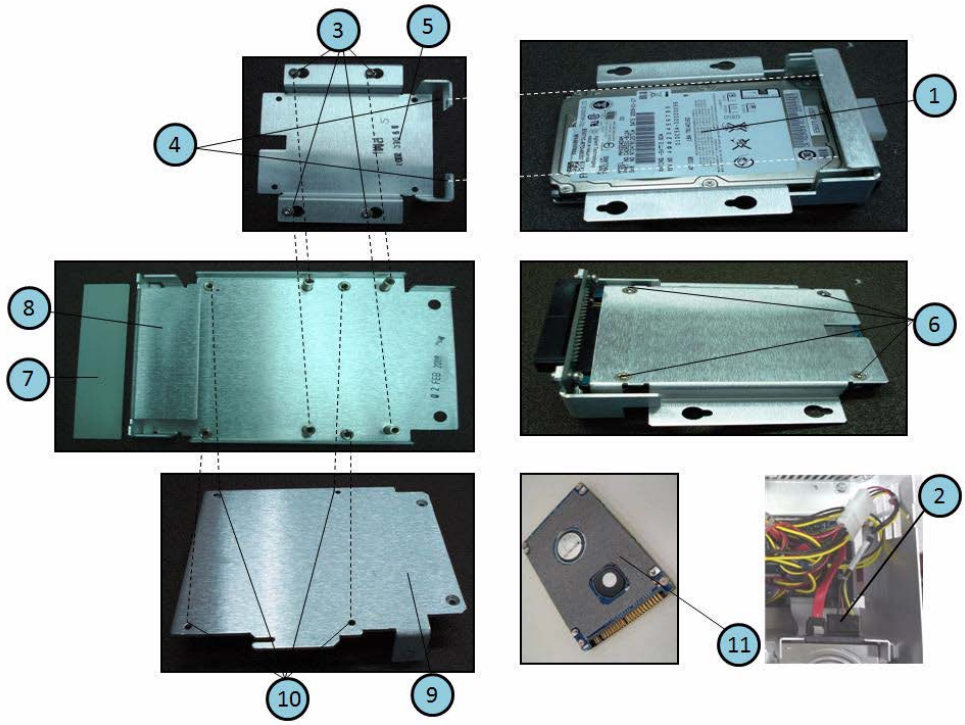


Table 5-38 Hard Disk Drive Assembly (Serial number prefix MY462 or SG462)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-82303	1	HDD INSTALLED (Service Center Only)
2	E5071-61650	1	CABLE ASSY
3	0515-0374	4	SCREW-MACH M3.0 x L10 PN T10
4	0515-2028	2	SCREW-MACH M2.5 x L6 FL T8
5	E5070-01255	1	BRACKET HDD
6	0515-2146	4	SCREW-MACH M3.0 x L4 FL T10
7	E5071-01220	1	HDD BRACKET
8	E5071-01223	1	HDD BRACKET
9	E5071-01201	1	HDD BRACKET
10	0515-0430	4	SCREW-MACH M3.0 x L6 PN T10
11	E5070-25061	1	TM SHEET 0.5T

Table 5-39 Hard Disk Drive Assembly (Serial number prefix MY463 or SG463)

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-82304	1	SSD INSTALLED (Service Center Only)
2	E5071-61650	1	CABLE ASSY
3	0515-0374	4	SCREW-MACH M3.0 x L10 PN T10
4	0515-2028	2	SCREW-MACH M2.5 x L6 FL T8
5	E5070-01255	1	BRACKET HDD
6	0515-2146	4	SCREW-MACH M3.0 x L4 FL T10
7	E5071-01220	1	HDD BRACKET
8	E5071-01223	1	HDD BRACKET
9	E5071-01201	1	HDD BRACKET
10	0515-0430	4	SCREW-MACH M3.0 x L6 PN T10

PCI DSP Card, GPIB Card and USB Card Assembly

Figure 5-36 **PCI DSP Card, GPIB Card AND USB Card Assembly (Serial number prefix MY461 or SG461)**

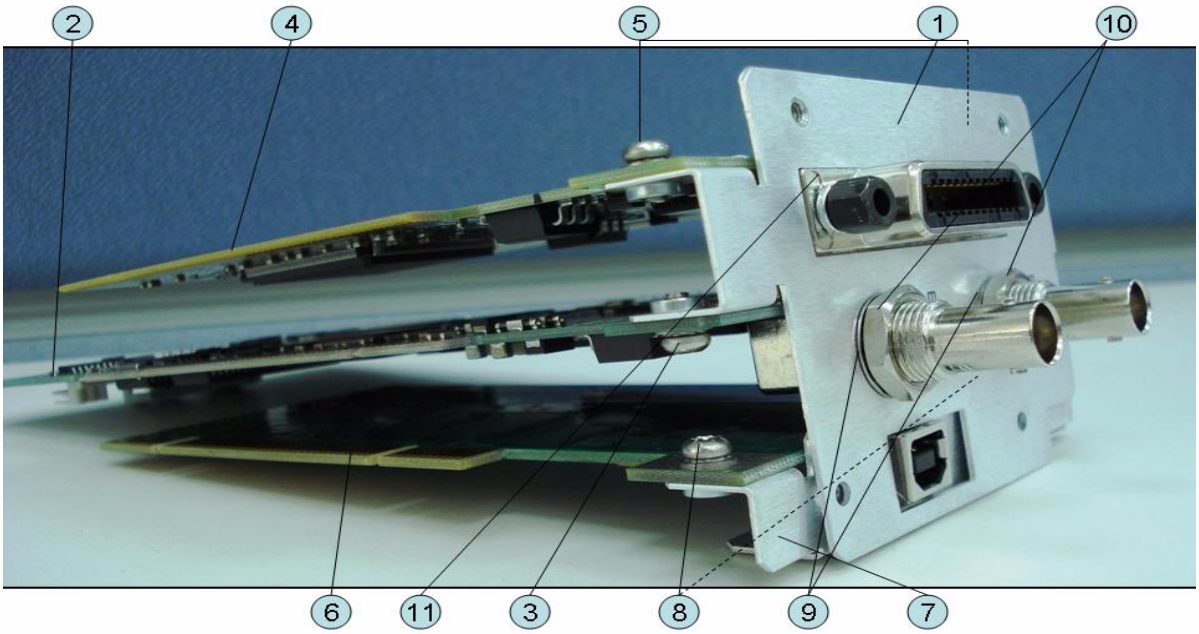


Table 5-40 **PCI DSP Card, GPIB Card AND USB Card Assembly (Serial number prefix MY461 or SG461)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-01204	1	BRACKET BOARD
2	E5070-66651 (A51)	1	PCI DSP CARD
3	0515-0430	1	SCREW-MACH M3.0 x 6 PN T10
4	82350-66512	1	PCI GPIB CARD (Service Center Only)
5	0515-0430	2	SCREW-MACH M3.0 x 6 PN T10
6	0960-2357	1	USB ADAPTER CARD (USBTMC)
7	E5071-01218	1	BRACKET USB
8	0515-0430	2	SCREW-MACH M3.0 x 6 PN T10
9	2190-0054	2	WSHR-LK INTL T
10	2950-0054	2	NUT-HEX-DBL-CHAM

Table 5-40 **PCI DSP Card, GPIB Card AND USB Card Assembly (Serial number prefix MY461 or SG461)**

Ref. Desig.	Keysight Part Number	Qty.	Description
11	1253-6142	1	SHIELD

Figure 5-37 **PCI DSP Card, GPIB Card AND USB Card Assembly (Serial number prefix MY462/MY463 or SG462/SG463)**

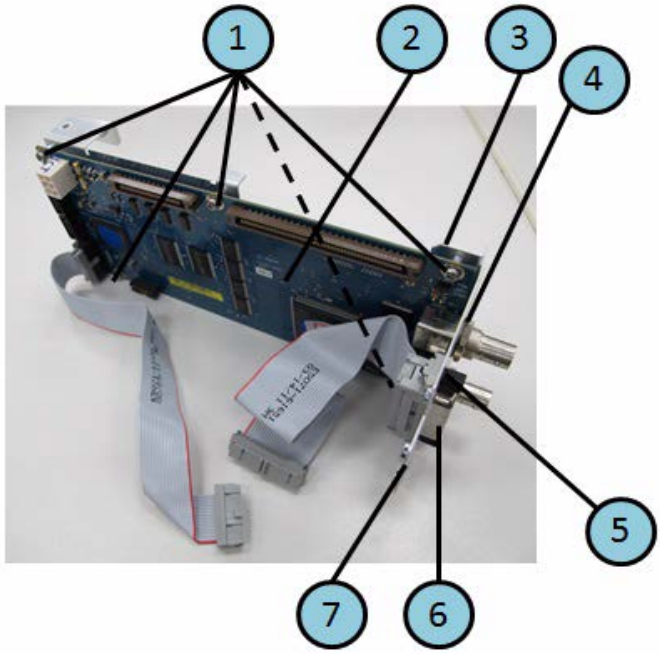


Table 5-41 **PCI DSP Card, GPIB Card AND USB Card Assembly (Serial number prefix MY462/MY463 or SG462/SG463)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-0430	5	SCREW-MACH M3.0 x 6 PN T10
2	E5070-66671	1	PCI-E DSP PCA BOARD
3	E5071-01235	1	BRACKET
4	2190-0054	2	WASHER-LK INTL T
	2950-0054	2	NUT-HEX-DBL-CHAM
5	0380-4870	2	STANDOFF-HEX
6	E5071-61651	1	CABLE GPIB
7	E5071-01236	1	PLATE

PCA Digital Board Assembly

Figure 5-38 **PCA Digital Board Assembly**

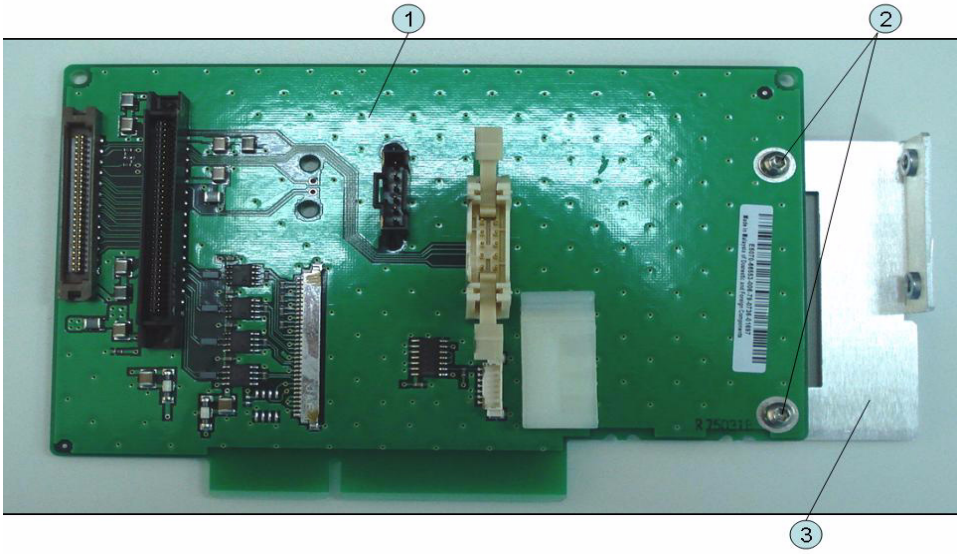


Table 5-42 **PCA Digital Board Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5070-66653 (A53)	1	PCA DIGITAL BRIDGE
2	0515-0430	2	SCREW-MACH M3.0 x 6 PN T10
3	E5071-01210	1	STAY

T2 Switch (Up to 8.5 GHz Options) Assembly

Figure 5-39 **T2 Switch Opt. (Up to 8.5 GHz Options) Assembly**

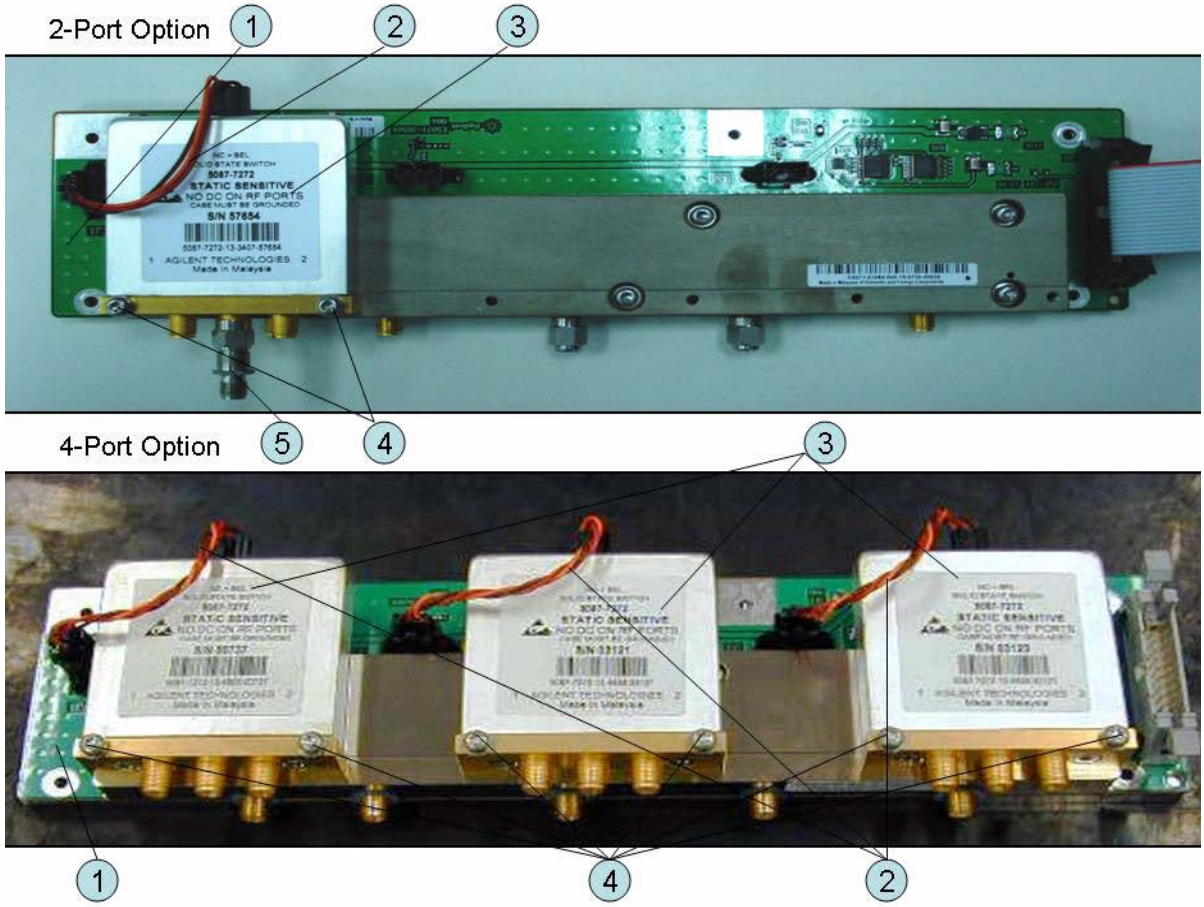


Table 5-43 **T2 Switch (Up to 8.5 GHz Options) Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Abbreviation	Description
1	E5071-61184 (A4)	1	DIS	DISTRIBUTOR MODULE
2	E5071-61619	1		WIRE ASSY (Opt.2xx)
		3		WIRE ASSY (Opt.4xx)
3	5087-7746	1	T2-SW	SWITCH RF SPDT (Opt.2xx)
		3		SWITCH RF SPDT (Opt.4xx)
4	0515-1410	2		SCREW-MACH M3.0 x L20 PN T10 (Opt.2xx)
		6		SCREW-MACH M3.0 x L20 PN T10 (Opt.4xx)
5	0955-0301	1		ATTENUATOR (Opt.2xx)

Receiver Module (Over 8.5 GHz Options) Assembly

Figure 5-40 **Receiver (Over 8.5 GHz Options) Assembly**

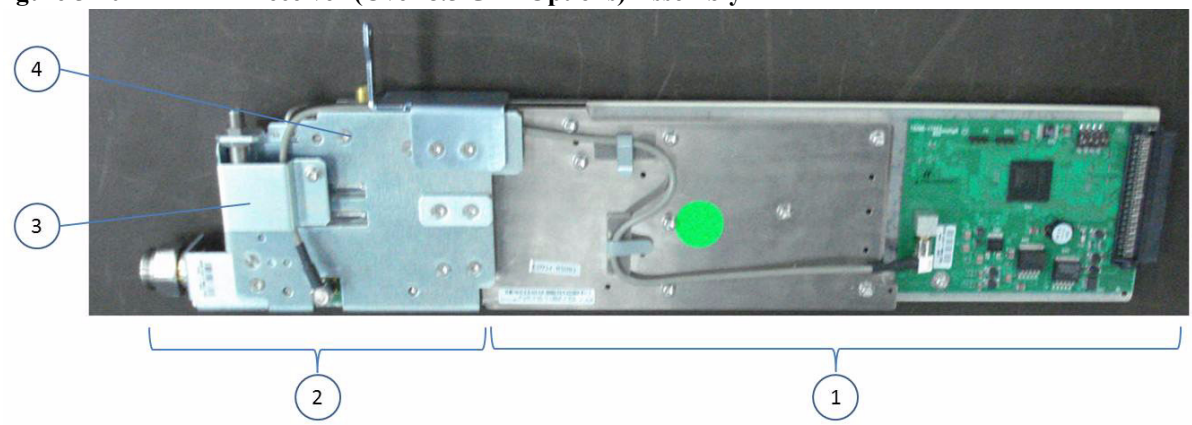


Table 5-44 **Receiver (Over 8.5 GHz Options) Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Abbreviation	Description
1	E5071-62297 (A7)	2	RCV	TESTED RECEIVER BOARD (Opt. 2xx)
	E5071-69097	2		TESTED RECEIVER BOARD (Opt. 2xx) (Exchange)
	E5071-62297 (A7)	4		TESTED RECEIVER BOARD (Opt. 4xx)
	E5071-69097	4		TESTED RECEIVER BOARD (Opt. 4xx) (Exchange)
2	E5071-62189 (A9)	2	FEM	TESTED LEVEL POWER SPLITTER & BIAS TEE MODULE (Opt. 2xx)
	E5071-69089	2		TESTED LEVEL POWER SPLITTER & BIAS TEE MODULE (Opt. 2xx) (Exchange)
	E5071-62189 (A9)	4		TESTED LEVEL POWER SPLITTER & BIAS TEE MODULE (Opt. 4xx)
	E5071-69089	4		TESTED LEVEL POWER SPLITTER & BIAS TEE MODULE (Opt. 4xx) (Exchange)
3	E5070-01294			BRACKET
4	E5070-01293			BRACKET MODULE

Attenuator (Over 8.5 GHz Options) Assembly

Figure 5-41 Attenuator (Over 8.5 GHz Options) Assembly

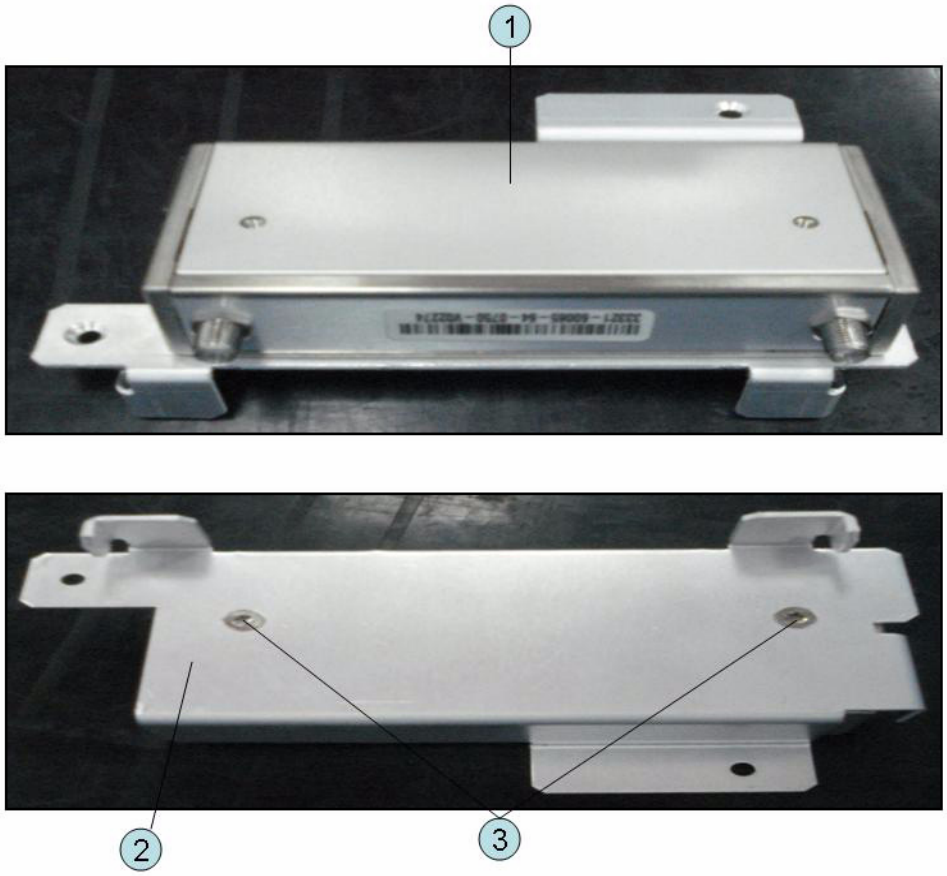


Table 5-45 Attenuator (Over 8.5 GHz Options) Assembly

Ref. Desig.	Keysight Part Number	Qty.	Description
1	33321-60082	1	ATTENUATOR 60 dB 20 GHz, PB FREE
2	E5070-01292	1	ANGLE ATTENUATOR
3	0515-1946	2	SCREW -MACH FLT -HD M3X0.5 6MM -LG SST

Fan Assembly

Figure 5-42 Fan Assembly

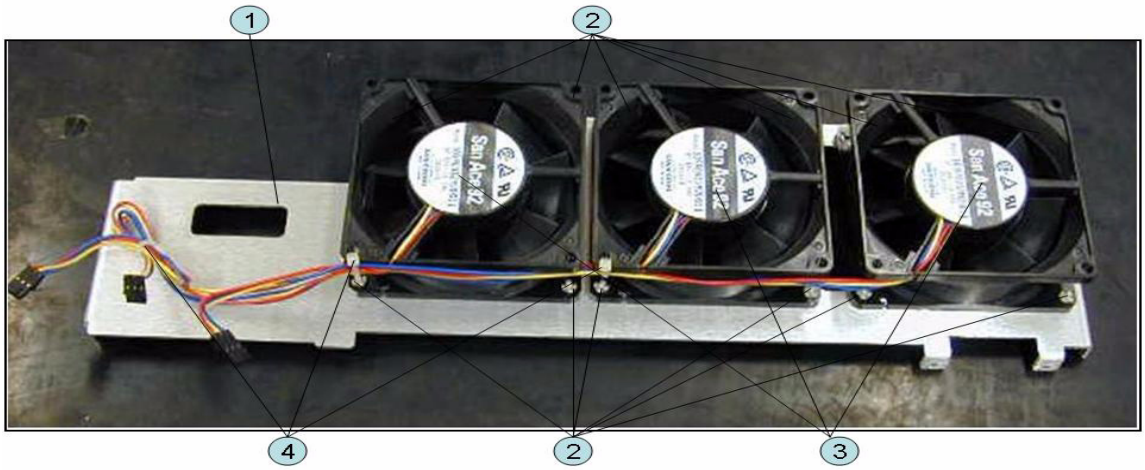


Table 5-46 Fan Assembly

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-01200	1	BRACKET FAN
2	0361-1885	12	RIVET PLASTIC
3	E5071-61618	3	FAN ASSY
4	1400-0249	3	CABLE TIE

Power Supply (Up to 8.5 GHz Options) Assembly

Figure 5-43 **Power Supply (Up to 8.5 GHz Options) Assembly (Serial number prefix MY461/MY462 or SG461/SG462)**

Table 5-47 **Power Supply (Up to 8.5 GHz Options) Assembly (Serial number prefix MY461/MY462 or SG461/SG462)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0950-4989	1	POWER SUPPLY
2	E5071-00601	1	PLATE
3	0515-1946	3	SCREW-MACH M3.0 x L6 FL T10

Figure 5-44 **Power Supply (Up to 8.5 GHz Options) Assembly (Serial number prefix MY463 or SG463)**

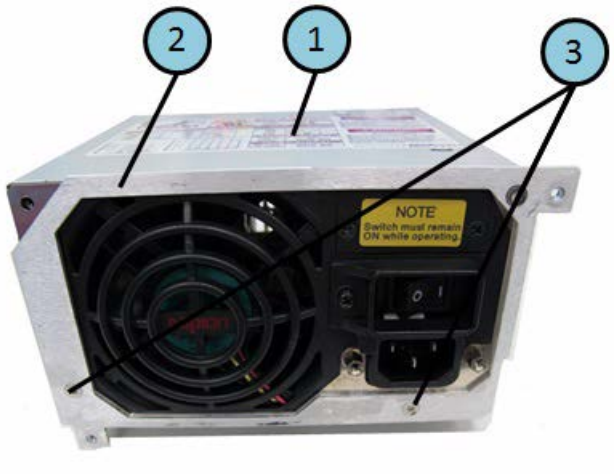


Table 5-48 **Power Supply (Up to 8.5 GHz Options) Assembly (Serial number prefix MY463 or SG463)**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0950-4989	1	POWER SUPPLY
2	E5071-00601	1	PLATE
3	0515-1946	3	SCREW-MACH M3.0 x L6 FL T10

Power Supply (Over 8.5 GHz Options)Assembly

Figure 5-45 **Power Supply (Over 8.5 GHz Options) Assembly**

Table 5-49 **Power Supply (Over 8.5 GHz Options)Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0950-4989	1	POWER SUPPLY
2	E5071-00601	1	PLATE
3	0515-1946	3	SCREW-MACH M3.0 x L6 FL T10

PCA DC Bias and Oven Assembly

Figure 5-46 PCA DC Bias and Oven Assembly

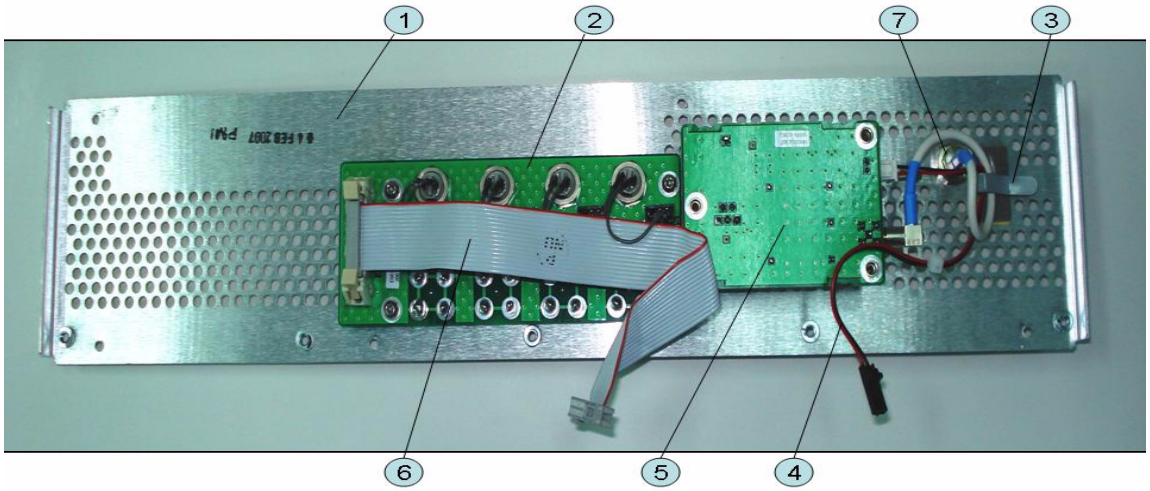


Table 5-50 PCA DC Bias and Oven Assembly

Ref. Desig.	Keysight Part Number	Qty.	Abbreviation	Description
1	E5071-00205	1		PANEL REAR
2	E5070-66657 (A57)	1	DCB	PCA DC BIAS 2-PORT (Opt.2x5)
	E5070-66658 (A58)	1		PCA DC BIAS 4-PORT (Opt.4x5)
3	1400-1391	1		CLAMP CABLE (Opt.1E5)
4	E5071-61602	1		WIRE ASSY (Opt.1E5)
5	E5071-66605 (A5)	1	OCXO	REFERENCE OVEN PCA (Opt.1E5)
6	E5070-61616	1		FLAT CBL ASSY
7	43521-61622	1		RF CABLE ASSY
8	1250-1859	1		ADAPTER COAXIAL RIGHT ANGLE BNC (m) - BNC (m)

Analog Motherboard Assembly

Figure 5-47 Analog Motherboard Assembly

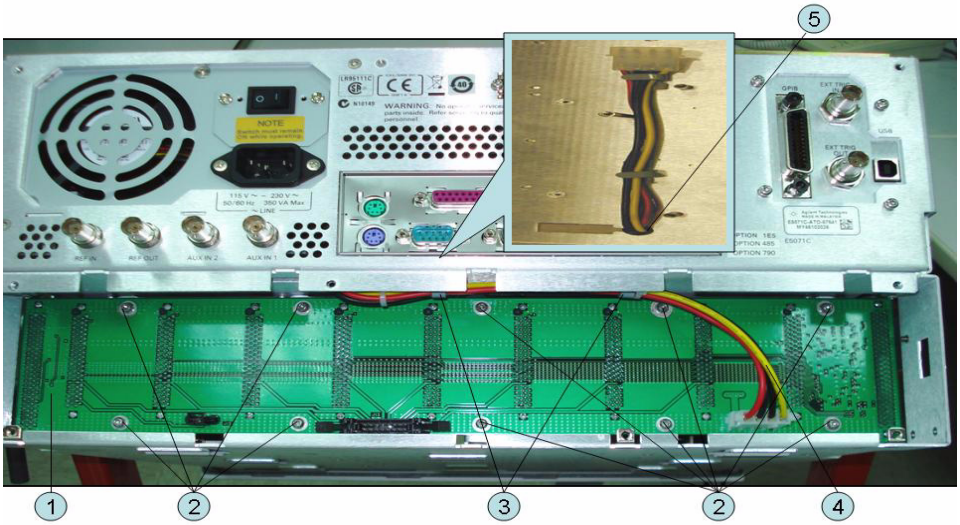


Table 5-51 Analog Motherboard Assembly

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5070-66650 (A50)	1	ANALOG MOTHER BOARD
2	0515-0430	10	SCREW-MACH M3.0 x 6 PN T10
3	1400-1334	2	CLAMP CABLE
4	E5071-61613	1	WIRE ASSY
5	0340-1259	1	GROMMET

Chassis Assembly

Figure 5-48 Chassis Assembly

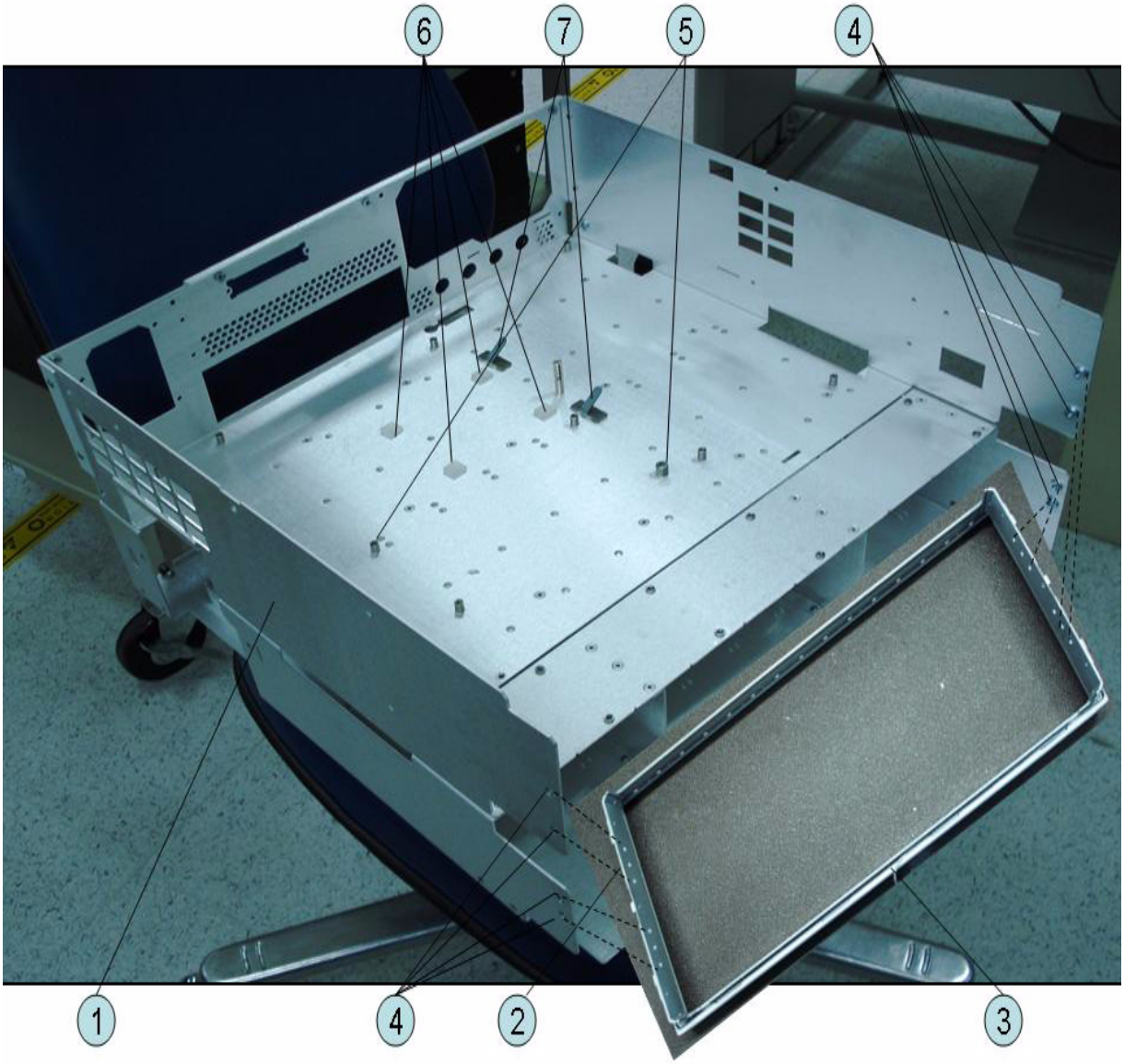


Table 5-52 Chassis Assembly

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-60001	1	CHASSIS
2	5022-1190	1	FRONT FRAME
3	8160-0641	1	GASKET (125 cm)
4	0515-2113	8	SCREW-MACH M4.0 x L8 PN T20
5	E5071-24007	2	SPACER
6	1520-0685	4	DAMPER
7	1400-1334	2	CLAMP CABLE

Keyboard Assembly

Figure 5-49 **Keyboard Assembly**

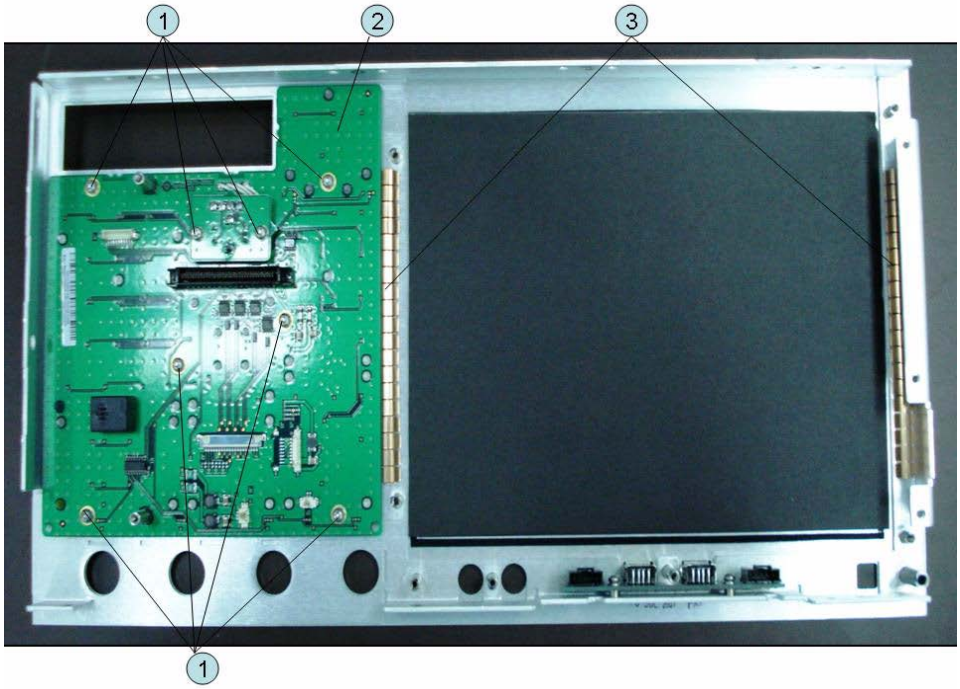


Table 5-53 **Keyboard Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-0430	8	SCREW-MACH M3.0 x 6 PN T10
2	E5070-66552	1	PCA FRONT KEY
3	0363-0170	2	GASKET 19-UNITS

LCD Assembly

Figure 5-50 LCD Assembly

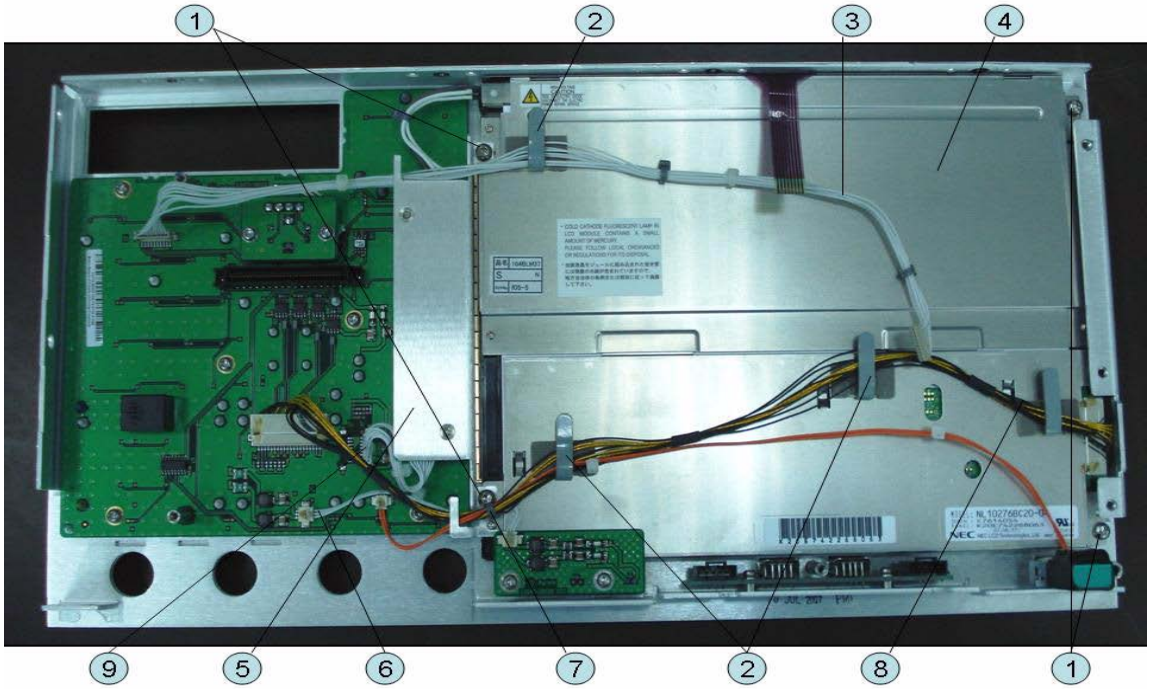


Table 5-54 LCD Assembly

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-1402	4	SCREW-MACH M3.5 x L8 PN T15
2	1400-1391	3	CLANP CABLE
3	E5070-61628	1	WIRE ASSY
4	E5070-60112	1	LCD-TPANEL ASSY
5	See Table 5-51	1	INVERTER ASSY
6	E5071-61611	1	WIRE ASSY
7	1400-0249	1	CABLE TIE
8	E5071-61616	1	FLAT CBL ASSY
9	E5071-61608	1	WIRE ASSY

Inverter Assembly

Figure 5-51 **Inverter Assembly**

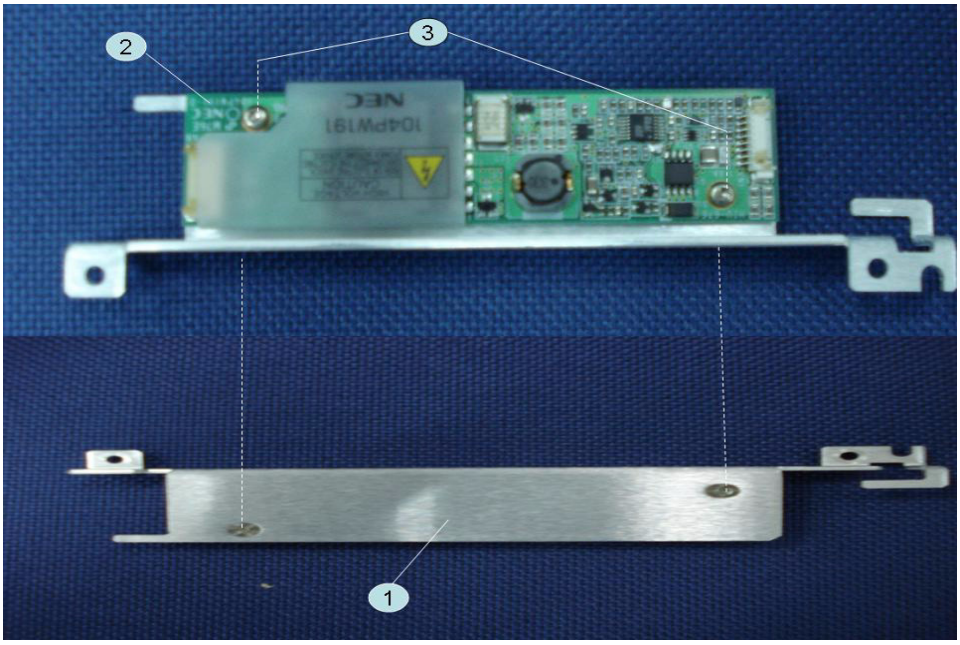


Table 5-55 **Inverter Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5071-01211	1	BRACKET (Up to 8.5 GHz Options)
	E5071-01278	1	BRACKET (Over 8.5 GHz Options)
2	0950-4420	1	INVERTER
3	0515-1974	2	SCREW-MACH M2.5 x L4 PN T8

Standby Switch Assembly

Figure 5-52 **Standby Switch Assembly**

Table 5-56 **Standby Switch Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-0430	2	SCREW-MACH M3.0 x L6 PN T10
2	E5070-66656 (A56)	1	PCA PROBE POWER
3	E5070-66655 (A55)	1	PCA FRONT USB
4	E5070-61901	1	WIRE ASSY W/STANDBY SWITCH
5	0515-2028	2	SCREW-MACH M2.5 x L6 FL T8
6	0515-0430	2	SCREW-MACH M3.0 x L6 PN T10
7	E5071-04004	1	COVER USB LARGE

Cover (Up to 8.5 GHz Options) Assembly

Figure 5-53 **Cover (Up to 8.5 Options) Assembly**

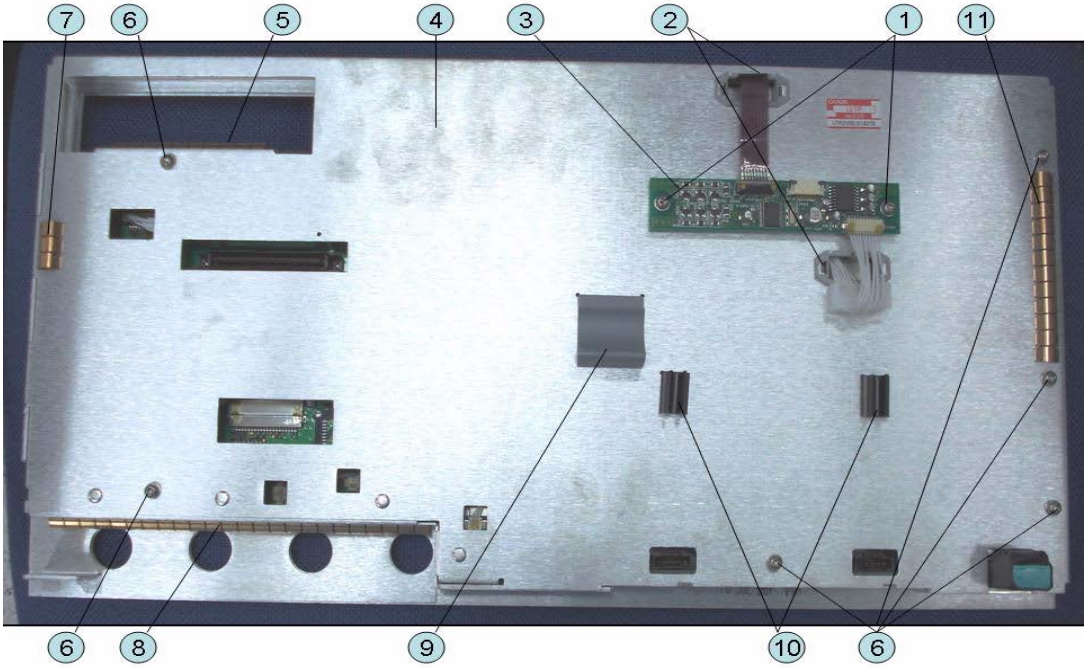


Table 5-57 **Cover (Up to 8.5 GHz Options) Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-0430	2	SCREW-MACH M3.0 x L6 PN T10
2	1400-3156	2	CLAMP-CABLE NYLON 6/6
3	5183-4184	1	CNTR TOUCH PANEL
4	E5071-00621	1	COVER
5	0363-0170	1	GASKET 10-UNITS
6	0515-0430	6	SCREW-MACH M3.0 x L6 PN T10
7	0363-0170	1	GASKET 3-UNITS
8	0363-0170	1	GASKET 24-UNITS
9	1400-0611	1	CLAMP CABLE
10	1400-3337	2	CLAMP CABLE
11	0363-0170	1	GASKET 12-UNITS

Cover (Over 8.5 GHz Options) Assembly

Figure 5-54 **Cover (Over 8.5 GHz Options) Assembly**

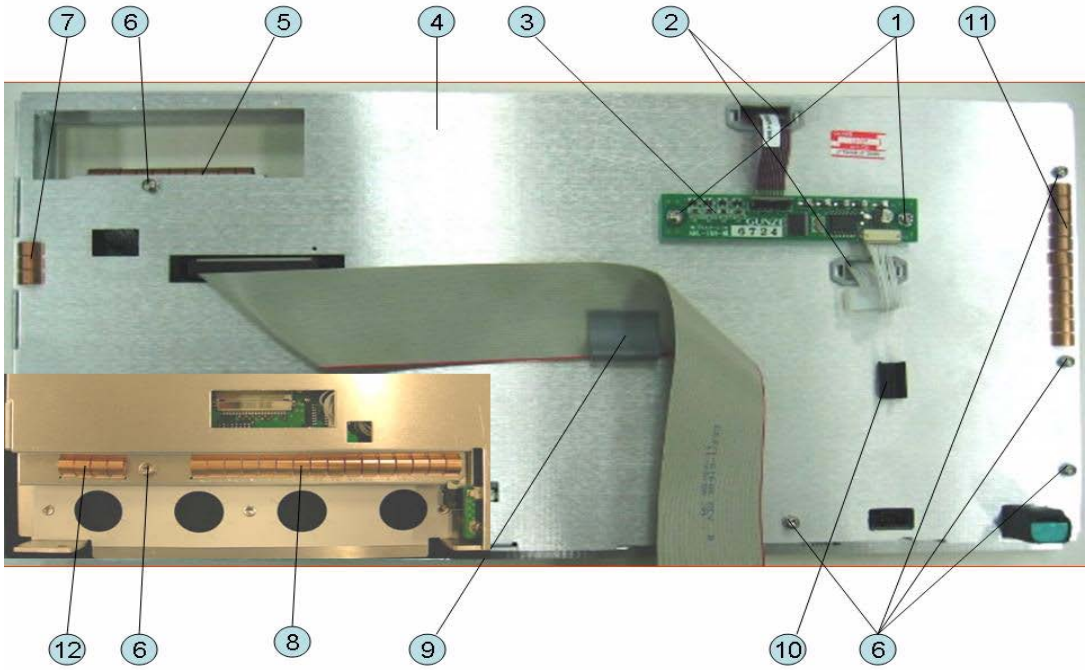


Table 5-58 **Cover Over 8.5 GHz Options Assembly**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	0515-0430	2	SCREW-MACH M3.0 x L6 PN T10
2	1400-3156	2	CLAMP-CABLE NYLON 6/6
3	5183-4184	1	CNTR TOUCH PANEL
4	E5070-00672	1	FRONT COVER SHIELD
5	0363-0170	1	GASKET 10-UNITS
6	0515-0430	6	SCREW-MACH M3.0 x L6 PN T10
7	0363-0170	1	GASKET 3-UNITS
8	0363-0170	1	GASKET 16-UNITS
9	1400-0611	1	CLAMP CABLE
10	1400-3337	2	CLAMP CABLE
11	0363-0170	1	GASKET 12-UNITS
12	0363-0170	1	GASKET 4-UNITS

Label on Front Face

Figure 5-55 **Label on Front Face**

Table 5-59 **Label on Front Face**

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5070-87125	1	LABEL (CAUTION)
2	1401-0247	2	CAP-PROT (Opt. 2xx)
		4	CAP-PROT (Opt. 4xx)
3	E5070-87009	1	LABEL (Opt. 230, 430)
	E5070-87010	1	LABEL (Opt. 235, 435)
	E5071-87309	1	LABEL (Opt. 240, 440)
	E5071-87310	1	LABEL (Opt. 245, 445)
	E5071-87131	1	LABEL (Opt. 260, 460)
	E5071-87132	1	LABEL (Opt. 265, 465)
	E5071-87110	1	LABEL (Opt. 285, 485)
	E5071-87119	1	LABEL (Opt. 280, 480)
	E5071-87133	1	LABEL (Opt. 2D5, 4D5)
	E5071-87130	1	LABEL (Opt. 2K5, 4K5)

Label on Rear Face

Figure 5-56 Label on Rear Face

Table 5-60 Label on Rear Face

Ref. Desig.	Keysight Part Number	Qty.	Description
1	E5070-87103	1	LABEL (NOTE for Switch)
2	E5071-87107	1	LABEL (Opt. 235, 285)
	E5071-87109	1	LABEL (Opt. 435, 485)
3	5188-1387	1	LABEL (Opt. 230)
	5188-1388	1	LABEL (Opt. 235)
	5188-1391	1	LABEL (Opt. 430)
	5188-1392	1	LABEL (Opt. 435)
	5188-4421	1	LABEL (Opt. 240)
	5188-4422	1	LABEL (Opt. 245)
	5188-4423	1	LABEL (Opt. 440)
	5188-4424	1	LABEL (Opt. 445)
	5188-1394	1	LABEL (Opt. 280)
	5188-1395	1	LABEL (Opt. 285)

Table 5-60 Label on Rear Face

Ref. Desig.	Keysight Part Number	Qty.	Description
	5188-1398	1	LABEL (Opt. 480)
	5188-1399	1	LABEL (Opt. 485)
	5185-3795	1	LABEL (Opt. 008) (Service Center Only)
	5080-3939	1	LABEL (Opt. 010) (Service Center Only)
	5185-3722	1	LABEL (Opt. 1E5)
	5188-4412	1	LABEL (Opt. 790) (Service Center Only)
	5185-3721	1	LABEL (Opt. UNQ)
	5185-3775	1	LABEL (Opt. 017)
	5185-3777	1	LABEL (Opt. 019)

Other Parts

Table 5-61 Other Parts

Keysight Part Number	Qty.	Description
E5071-901x0*1	1	SERVICE GUIDE
5012-8615 (which is equivalent to 1150-7799 with 9100-1793)	1	MOUSE
5188-4407	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.

6 Replacement Procedure

This chapter provides procedure for removing and replacing the major assemblies in the E5071C ENA Series Network Analyzer.

Replacing an Assembly

The following steps show the sequence for replacing an assembly in a E5071C 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 Test."

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

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

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

Refer to the following table for the tightening torque of screws if no torque is specified by this chapter.

Screw	Driver	Recommended Torque
M2.5	T8	0.56 N-m (5.0 lb-in)
M3	T10	1.02 N-m (9.0 lb-in)
M3.5	T15	1.58 N-m (14.0 lb-in)
M4	T20	2.37N-m (21.0 lb-in)

Required Tools

The following tools are required for repair of E5071C.

Table 6-1 Required Tools

Assembly	TORX screwdriver				flat edge screwdriver	torque screwdriver TORX T10	cutting plier	hex key	open torque wrench			open torque driver set[*1]
	T8	T10	T15	T20				1.5 mm	9/16 in.	5/8 in.	5/16 in.	
Outer Cover		√	√	√								
Front Panel		√	√	√	√							
Removable Hard Disk Assembly Removal		√	√	√	√							
Removable Hard Disk Drive Replacement		√				√						
Removable Hard Disk Assembly Removal Opt.017		√	√	√	√							
Removable Hard Disk Drive Replacement Opt.017		√				√						
Hard Disk Assembly Removal Opt.019		√	√	√	√							
Hard Disk Drive Replacement Opt.019		√				√						
Power Supply		√	√	√		√						
Digital Bridge		√	√	√								
Handler I/O		√	√	√								
USB (USBTMC) Interface Card		√	√	√								
PCI DSP Card and GPIB Card		√	√	√						√		
Digital Motherboard		√	√	√								
Analog Base Module		√	√	√						√		
Level Vernier Module		√	√	√	√						√	√
Synthesizer Module		√	√	√	√						√	√
Receiver Module		√	√	√	√					√	√	√
Switch		√	√	√	√					√	√	√
Fan		√	√	√	√		√	√				
PCA DC Bias Board		√	√	√					√			
Crystal Oven Board		√	√	√								
Analog Motherboard		√	√	√	√					√	√	√
Front Panel		√	√	√	√							
Control Touch Panel		√	√	√	√							
Inverter	√	√	√	√	√							
LCD		√	√	√	√							

Table 6-1 Required Tools

Assembly	TORX screwdriver				flat edge screwdriver	torque screwdriver TORX T10	cutting plier	hex key	open torque wrench			open torque driver set[*1]
	T8	T10	T15	T20				1.5 mm	9/16 in.	5/8 in.	5/16 in.	
Front Panel Keyboard		√	√	√	√			√				
Front USB Board		√	√	√	√			√				
Probe Power and Power Switch Board	√	√	√	√	√		√					

*1. It's recommended to use E5070-65100.

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 E5071C.

Step 2. Remove the four bottom feet (item 1).

Step 3. Remove the four TORX T10 screws (item 2) from the bottom.

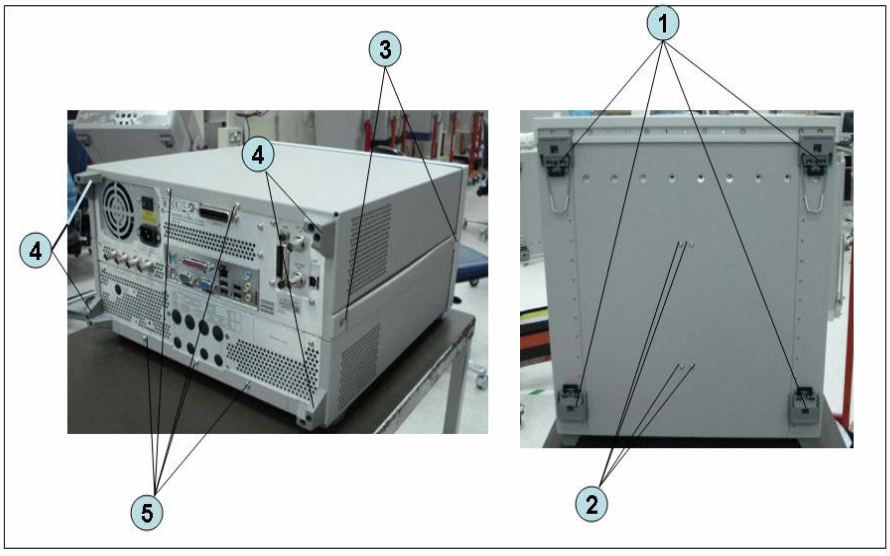
Step 4. Remove the four TORX T20 screws (item 3) fastening the side strap handles.

Step 5. Remove the four TORX T15 screws (item 4) fastening the four rear foot

Step 6. Remove the five TORX T15 screws (item 5) fastening the cover.

Step 7. Slide up the outer cover and remove it carefully.

Figure 6-1 **Outer Cover Removal**



Front Panel Removal

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 199.

Step 2. Remove the top trim (item 1) using a flat edge driver.

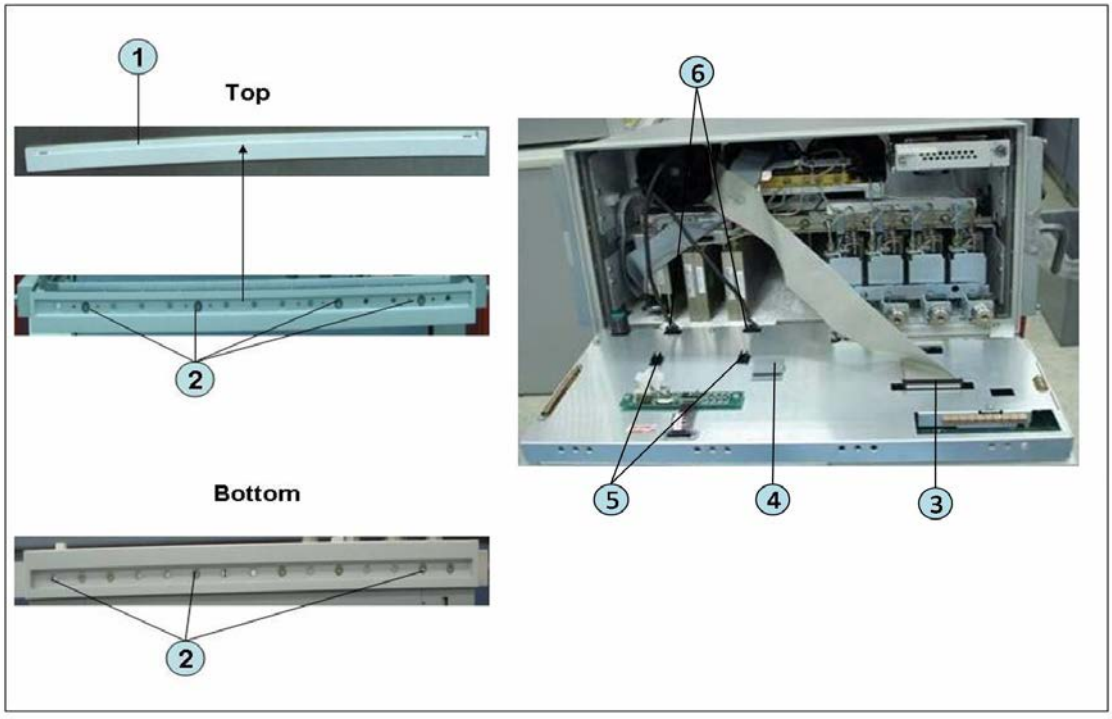
Step 3. Remove the seven TORX T15 screws (item 2) fastening front panel.

Step 4. Release the cable (item 3) from the cable clamp (item 4).

Step 5. Release the two cable (item 6) from the cable clamp (item 5).

Step 6. Gradually push the front panel assembly towards the outside.

Figure 6-2 **Front Panel Removal**



Removable Hard Disk Assembly Removal (Obsolete)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver

Removal Procedure

Refer to Figure 6-3 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

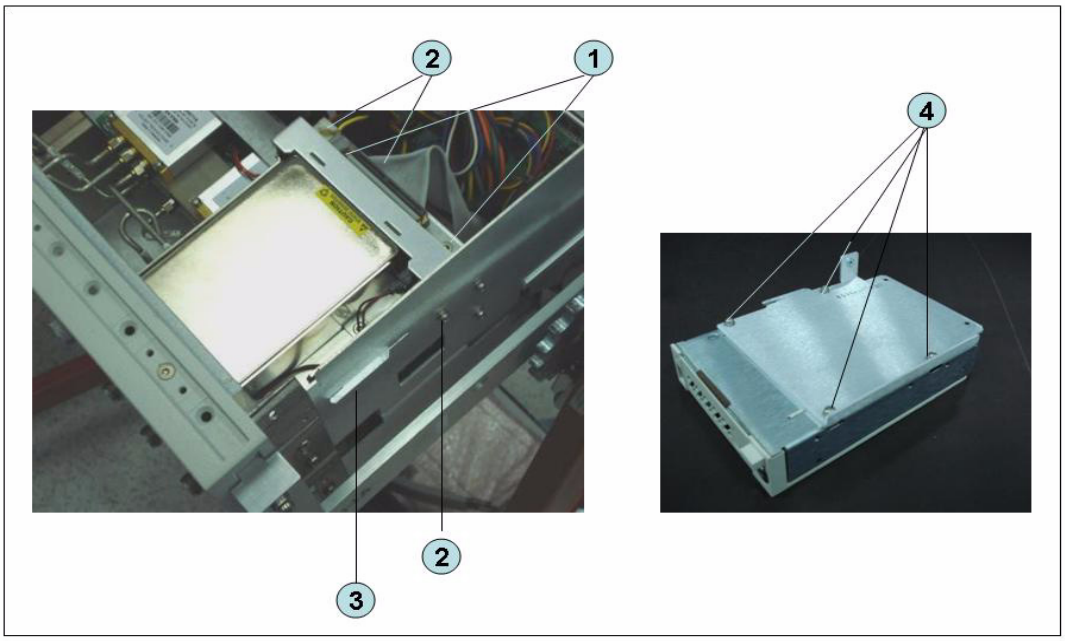
Step 3. Disconnect the two cables (item 1).

Step 4. Remove the three TORX T10 screws (item 2) fastening the removable hard disk assembly.

Step 5. Be careful to release the hook from chassis (item3) and lift the removable hard disk assembly.

Step 6. Remove the four TORX T10 screws (item 4) fastening the bracket.

Figure 6-3 Removable Hard Disk Assembly Replacement (Obsolete)



Removable Hard Disk Drive Replacement (Obsolete)

Tools Required

- TORX screwdriver, T10
- Torque screwdriver, TORX T10 (set to 0.29 N-m / 2.6 lb-in)

Removal procedure

Refer to Figure 6-4 for this procedure.

Step 1. Insert the key (P/N 0960-2562) in the lock and turn clockwise (item 1).

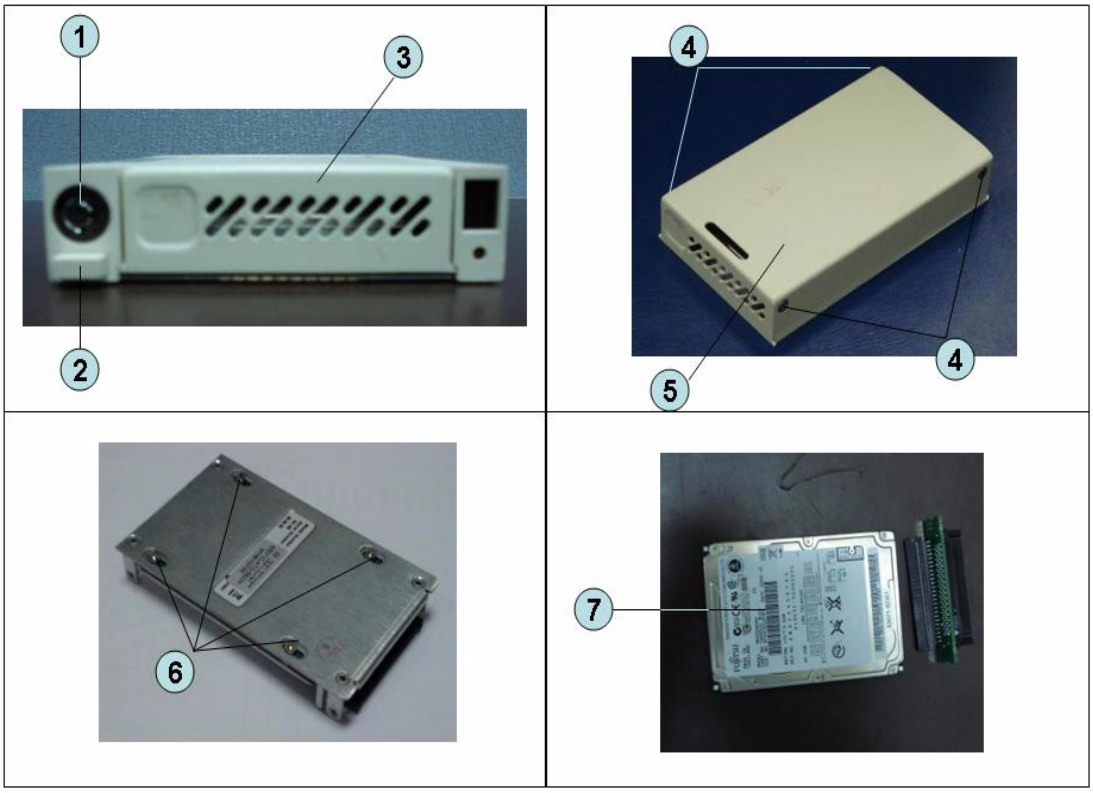
Step 2. Press the button under the lock (item 2) and remove the hard disk (item 3).

Step 3. Remove the four TORX T10 screws (item 4), and remove the removable hard disk drive's lid (item 5).

Step 4. Remove the four TORX T10 screws (item 6) fastening the HDD bracket and remove it.

Step 5. Remove the hard disk drive (item 7) from the connector board.

Figure 6-4 **Removable Hard Disk Drive Removal (Obsolete)**



Replacement Procedure

Step 1. Replace the removable hard disk drive by inverse procedure of removal.

NOTE Fasten the TORX T10 screws (item 6) using a torque screwdriver.

Step 2. Insert the hard disk into the slot.

Step 3. Turn the key to the left until it is locked, then remove the key.

NOTE The “U” is displayed at the 8 segment LED on next to the removal hard disk when E5071C is turned on without key lock.

Step 4. Restore backup files onto the new removable hard disk drive as described in “Restore Backup Files onto the New Hard Disk Drive” on page 205.

Step 5. Calibrate the touch screen as described in “Calibration of the Touch Screen” on page 205.

Restore Backup Files onto the New Hard Disk Drive

The following procedure shows how to write the system correction data stored in the backup memory to the newly mounted hard disk.

Step 1. Turn on the E5071C.

Step 1. Press Macro Setup.

Step 2. Click **Load Project...** in the softkey menu.

Step 3. Select **RestoreSysCorFile.vba** from the **D:\Keysight\Service** folder and then press the **Open** button.

Step 1. Press Macro Run.

Step 2. The RestoreSysCorFile dialog box appears.

Step 3. Click **OK**.

NOTE Once the program has terminated, restart the E5071C to enable the system correction data.

Calibration of the Touch Screen

When you have replaced the HDD on a E5071C equipped, 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 6-5) appears.

Figure 6-5 **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 (Option 017)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver

Removal Procedure

For units with serial number prefix MY461 or SG461, refer to Figure 6-6 for this procedure.

For units with serial number prefix MY462/MY463 or SG462/SG463, refer to Figure 6-7 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Disconnect the two cables (item 1).

Step 4. Remove the three TORX T10 screws (item 2) fastening the removable hard disk assembly.

Step 5. Be careful to release the hook from chassis (item3) and lift the removable hard disk assembly.

Step 6. Remove the four TORX T10 screws (item 4) fastening the bracket.

Figure 6-6 **Removable Hard Disk Assembly Replacement Opton 017 (Serial number prefix MY461 or SG461)**

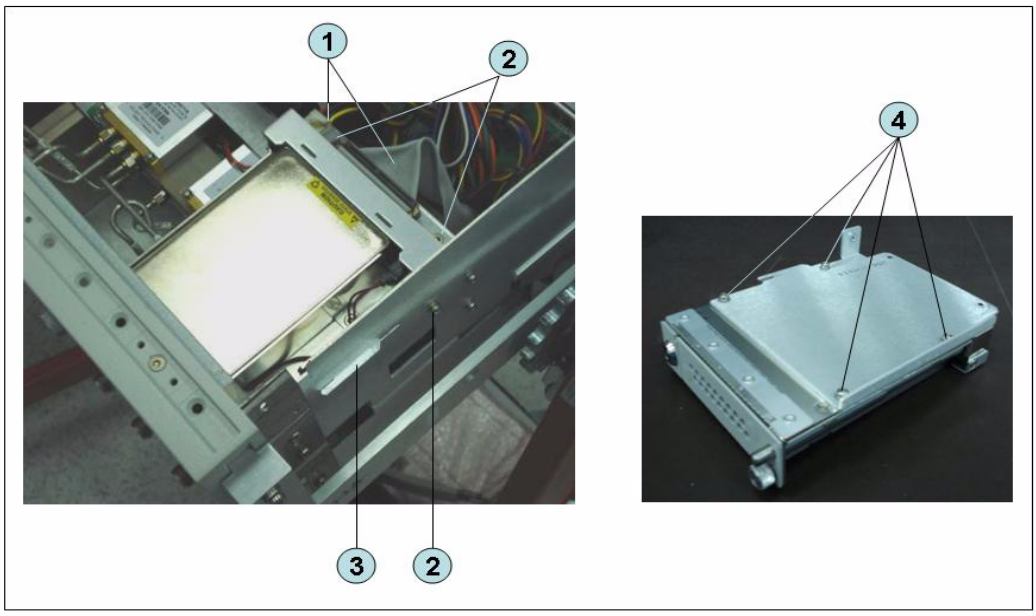
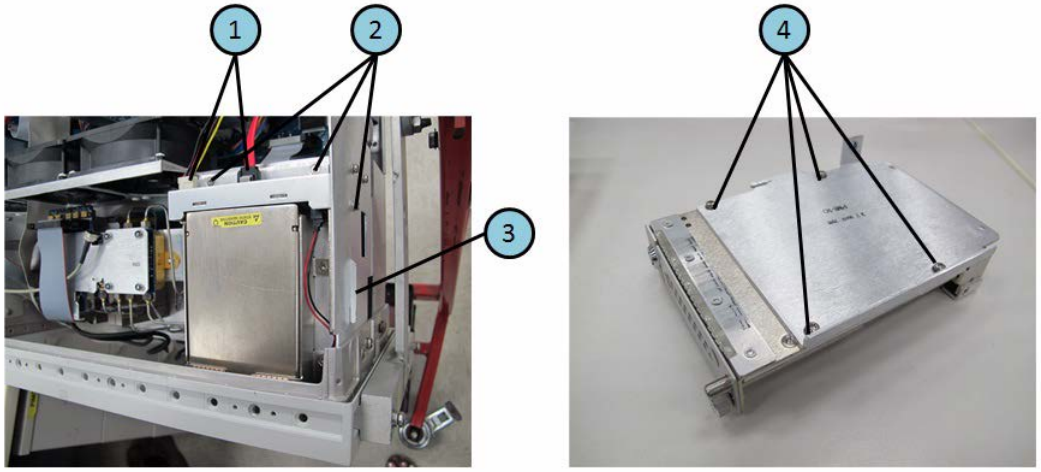


Figure 6-7 **Removable Hard Disk Assembly Replacement Opton 017 (Serial number prefix MY462/MY463 or SG462/SG463)**



Removable Hard Disk Drive Replacement Option 017

Tools Required

- TORX screwdriver, T10
- Torque screwdriver, TORX T10 (set to 0.50 N-m / 4.4 lb-in)

Removal procedure

Refer to Figure 6-8 for this procedure.

Step 1. Insert the key (P/N 1390-1375) in the lock and turn clockwise (item 1).

Step 2. Slacken the screw (item 2), then press the button (item 3) and remove the hard disk (item 4).

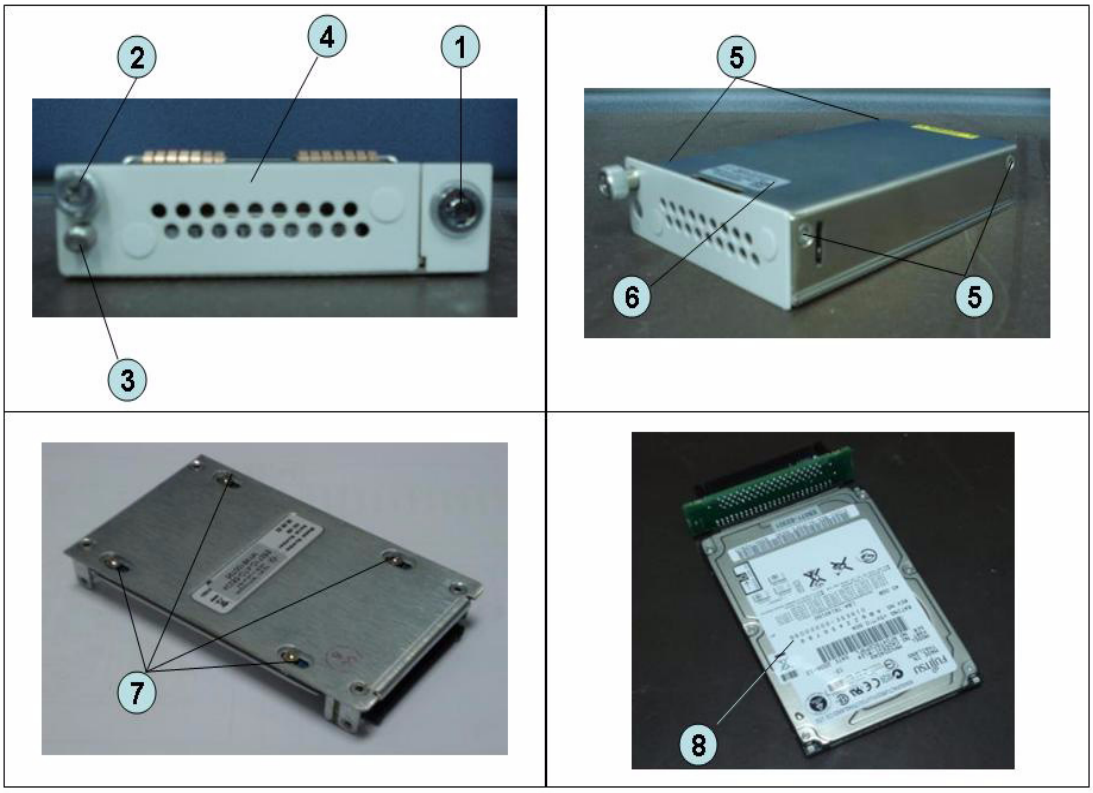
Step 3. Remove the four TORX T10 screws (item 5), and remove the removable hard disk drive's lid (item 6).

Step 4. Remove the four TORX T10 screws (item 7) fastening the HDD bracket and remove it.

Step 5. Remove the hard disk drive (item 8) from the connector board.

WARNING **From the volume label CN925, user recovery function is not prepared. It is required to inform this change to user before replacing the hard disk drive.**

Figure 6-8 Removable Hard Disk Drive Removal Option 017



Replacement Procedure

Step 1. Replace the removable hard disk drive by inverse procedure of removal.

NOTE Fasten the TORX T10 screws (item 7) using a torque screwdriver.

Step 2. Insert the hard disk into the slot.

Step 3. Turn the key to the left until it is locked, then remove the key.

Step 4. Restore backup files onto the new removable hard disk drive as described in “Restore Backup Files onto the New Hard Disk Drive” on page 205.

Step 5. Calibrate the touch screen as described in “Calibration of the Touch Screen” on page 205.

Hard Disk Assembly Removal Option 019

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver

Removal Procedure

Refer to Figure 6-9 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Disconnect the two cables (item 1).

Step 4. Remove the four TORX T10 screws (item 2) fastening the hard disk assembly.

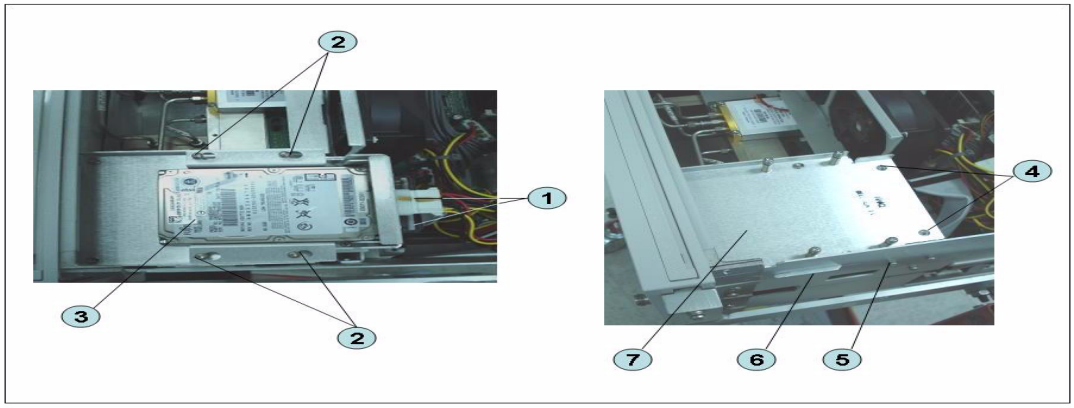
Step 5. Lift the hard disk assemby (item 3).

Step 6. Remove the two TORX T10 screws (item 4) fastening the bracket.

Step 7. Remove a TORX T10 screw (item 5) fastening the bracket.

Step 8. Be careful to release the hook from chassis (item 6) and lift the bracket (item 7).

Figure 6-9 Removable Hard Disk Assembly Replacement Opton 019



Hard Disk Drive Replacement Option 019

Tools Required

- TORX screwdriver, T10
- Torque screwdriver, TORX T10 (set to 0.50 N-m / 4.4 lb-in)

Removal procedure

Refer to Figure 6-10 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Disconnect the two cables (item 1).

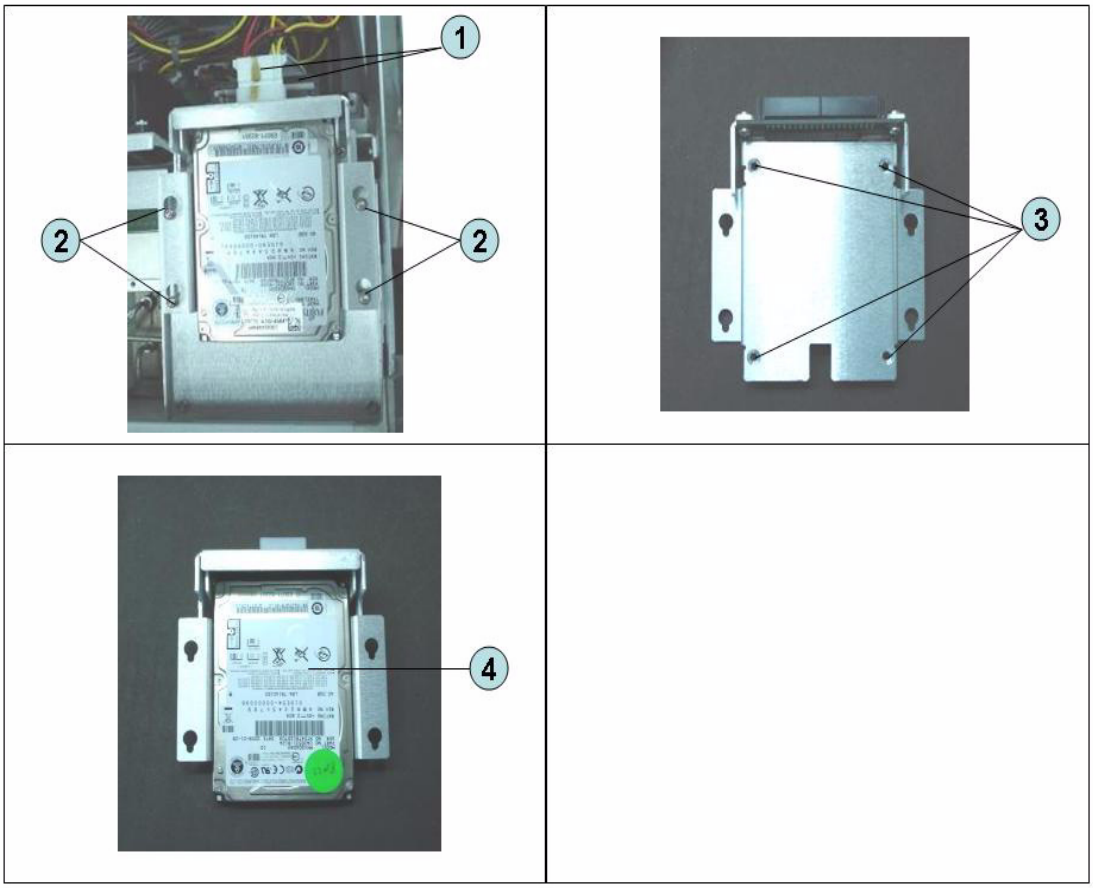
Step 3. Remove the four TORX T10 screws (item 2) fastening the hard disk assembly.

Step 4. Remove the four TORX T10 screws (item 3) fastening the hard disk bracket.

Step 5. Remove the hard disk drive (item 4) from the connector board.

WARNING **From the volume label CN925, user recovery function is not prepared. It is required to inform this change to user before replacing the hard disk drive.**

Figure 6-10 Removable Hard Disk Drive Removal Option 019



Replacement Procedure

Step 1. Paste the heat transfer sheet to the hard disk drive rear side.

Figure 6-11 **Removable Hard Disk Drive Removal Option 019**

Step 2. Replace the hard disk drive by inverse procedure of removal.

NOTE Fasten the TORX T10 screws (item 3) using a torque driver.

Step 3. Restore backup files onto the new removable hard disk drive as described in "Restore Backup Files onto the New Hard Disk Drive" on page 205.

Step 4. Calibrate the touch screen as described in "Calibration of the Touch Screen" on page 205.

Power Supply Assembly Replacement (Up to 8.5 GHz Options for Serial Number Prefix MY461/MY462 or SG461/SG462)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Torque screwdriver, TORX T10 (set to 0.79 N-m / 7 lb-in)

Removal Procedure

Refer to Figure 6-12 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the two TORX T10 screws (item 1) fasting the angle (item 2) and lift it.

Step 3. Disconnect the power supply cables (item 3).

Step 4. Disconnect the cable form analog motherboard(item 4).

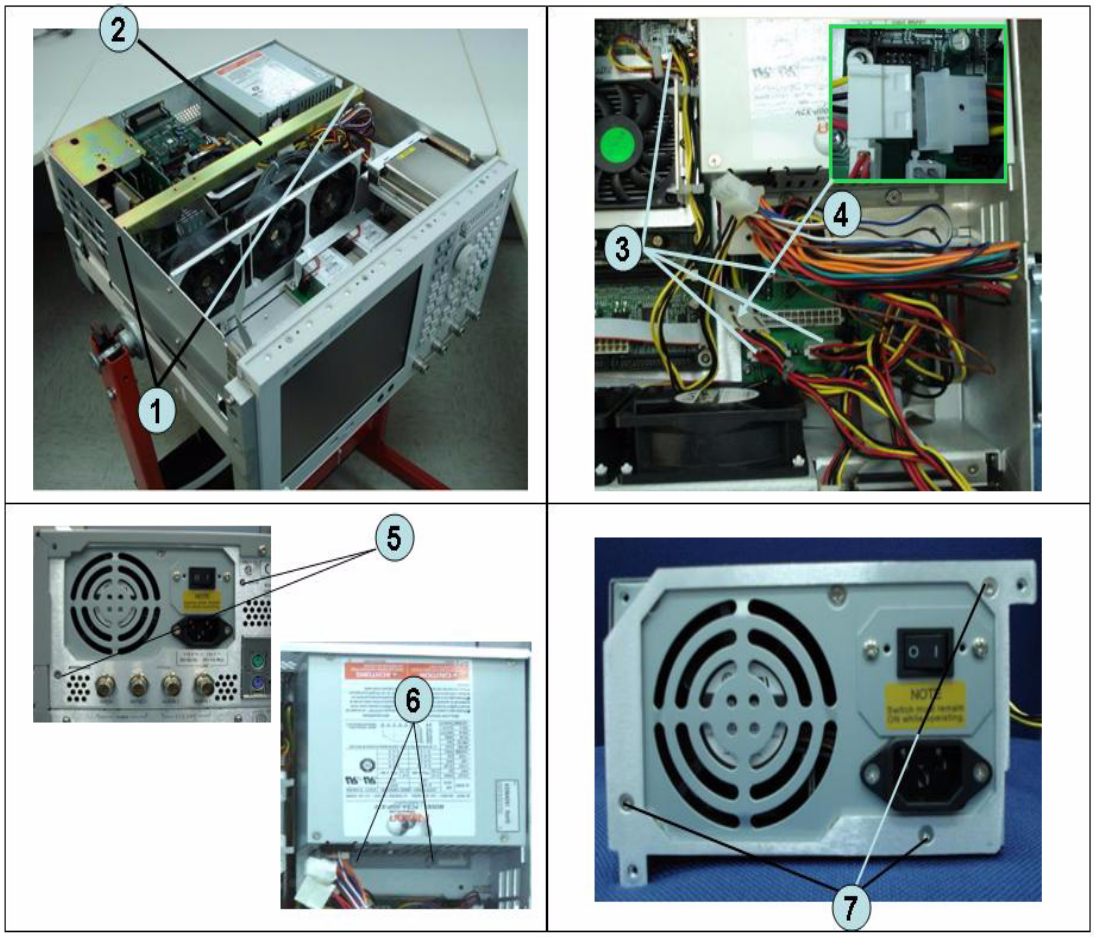
Step 5. Remove the two TORX T10 screws (item 5) from the rear panel.

Step 6. Remove the two TORX T10 screws and washers (item 6) fastening the power supply holder.

Step 7. Lift the power supply assembly toward front side.

Step 8. Remove the three TORX T10 screws (item 7) fasting the angle.

Figure 6-12 **Power Supply Assembly Removal (Up to 8.5 GHz Options for Serial Number Prefix MY461/MY462 or SG461/SG462)**



Replacement Procedure

Step 1. Replace the power supply assembly by inverse procedure of removal.

NOTE Fasten the TORX T10 screws (item 7) using a torque screwdriver.

Power Supply Assembly Replacement

Tools Required

- TORX screwdriver, T10, T15, and T20
- Torque screwdriver, TORX T10 (set to 0.79 N-m / 7 lb-in)

Removal Procedure

Refer to Figure 6-13 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the two TORX T10 screws (item 1) fasting the angle (item 2) and lift it.

Step 3. Disconnect the power supply cables (item 3).

Step 4. Disconnect the cable form fan on the analog base board (item 4).

Step 5. Disconnect the power supply cables (item 5).

Step 6. Disconnect the cable form analog motherboard (item 6 and item 7).

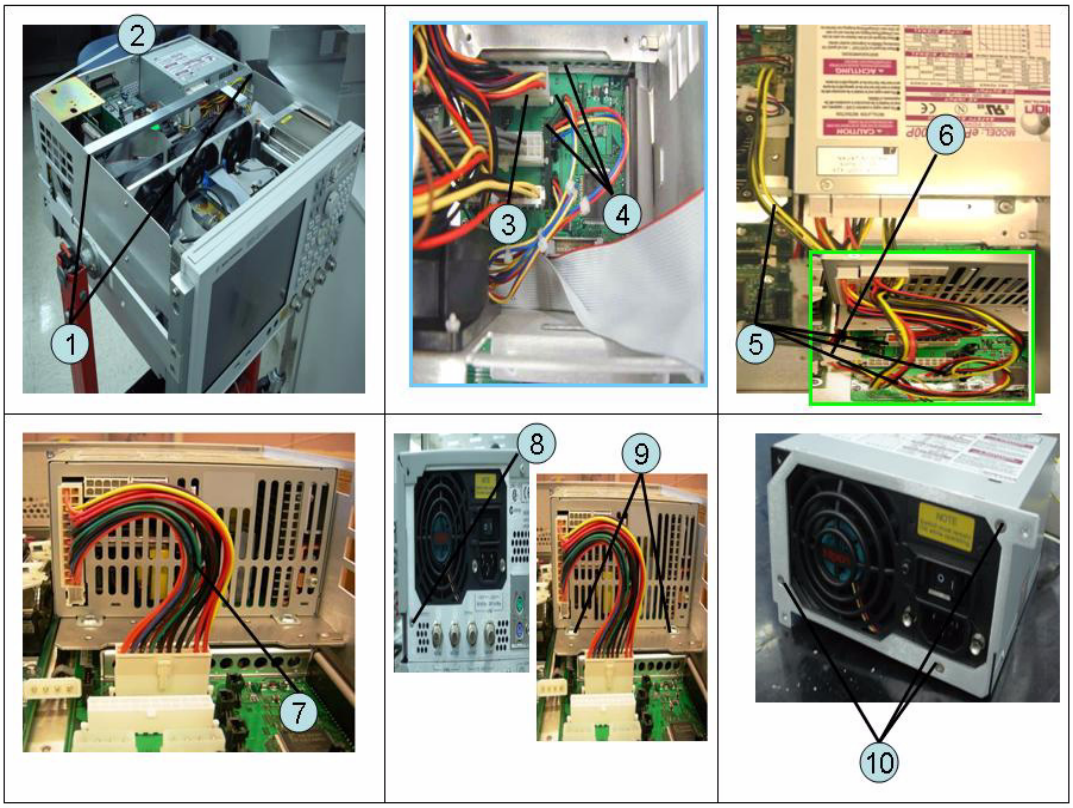
Step 7. Remove the two TORX T10 screws (item 8) from the rear panel.

Step 8. Remove the two TORX T10 screws and washers (item 9) fastening the power supply holder.

Step 9. Lift the power supply assembly toward front side.

Step 10. Remove the three TORX T10 screws (item 10) fasting the angle.

Figure 6-13 Power Supply Assembly Removal



Replacement Procedure

Step 1. Replace the power supply assembly by inverse procedure of removal.

NOTE Fasten the TORX T10 screws (item 10) using a torque screwdriver.

Digital Bridge Board Replacement (A53)

Tools Required

- TORX screwdriver, T10, T15, and T20

Removal Procedure

Refer to Figure 6-14 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the three TORX T10 screws (item 1) fastening the angle.

Step 3. Disconnect the flat cables (item 2) from the digital bridge board.

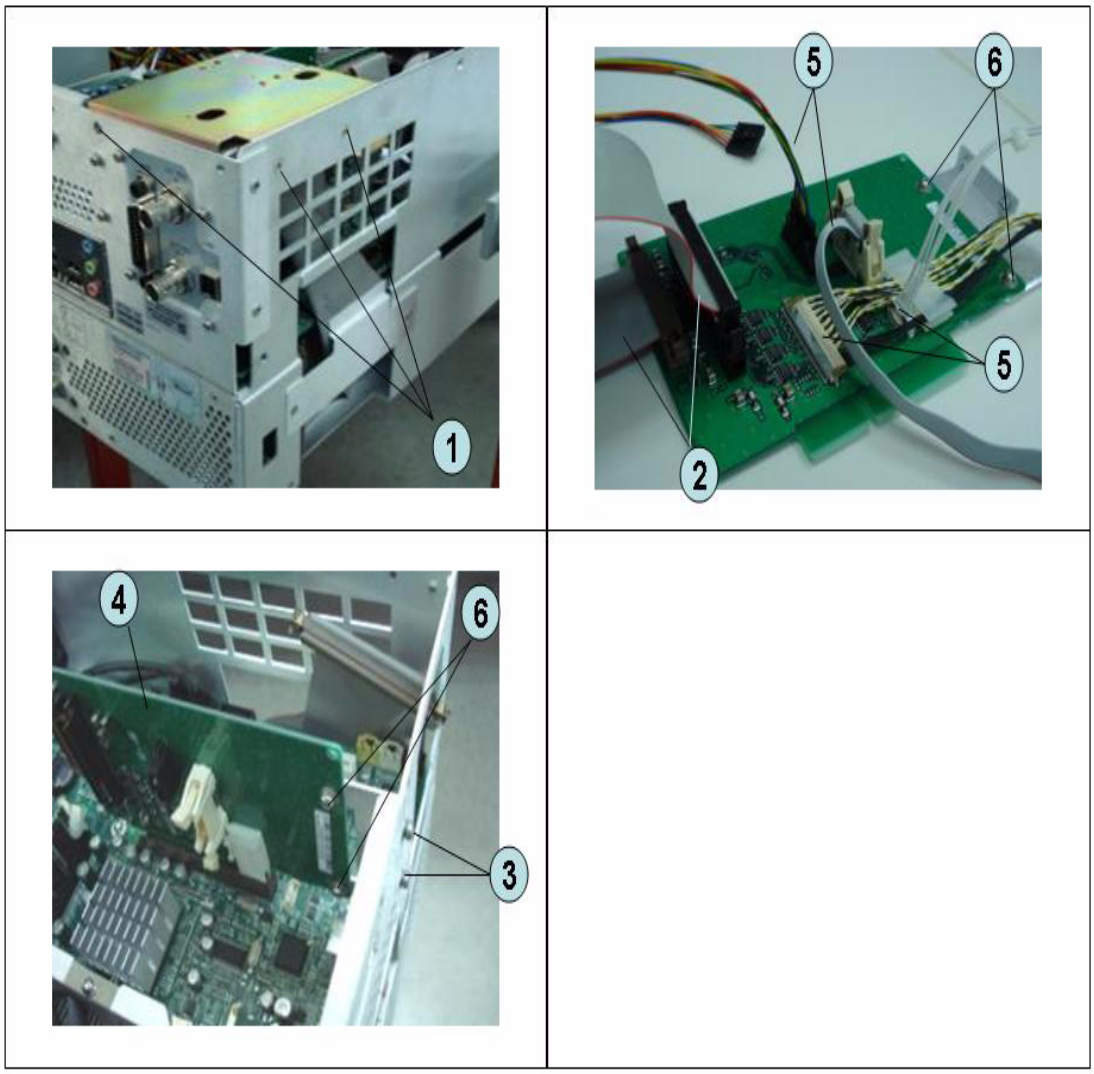
Step 4. Remove the two TORX T10 screws (item 3) fastening the board to the rear panel.

Step 5. Lift the digital bridge board (item 4).

Step 6. Disconnect the cables (item 5) from the digital bridge board.

Step 7. Remove the two TORX T10 screw (item 6) fastening the angle.

Figure 6-14 Digital Bridge Board Removal



Replacement Procedure

Step 1. Replace the digital bridge board by inverse procedure of removal.

Handler I/O Board Replacement (A23)

Tools Required

- TORX screwdriver, T10, T15, and T20

Removal Procedure

Refer to Figure 6-15 for this procedure.

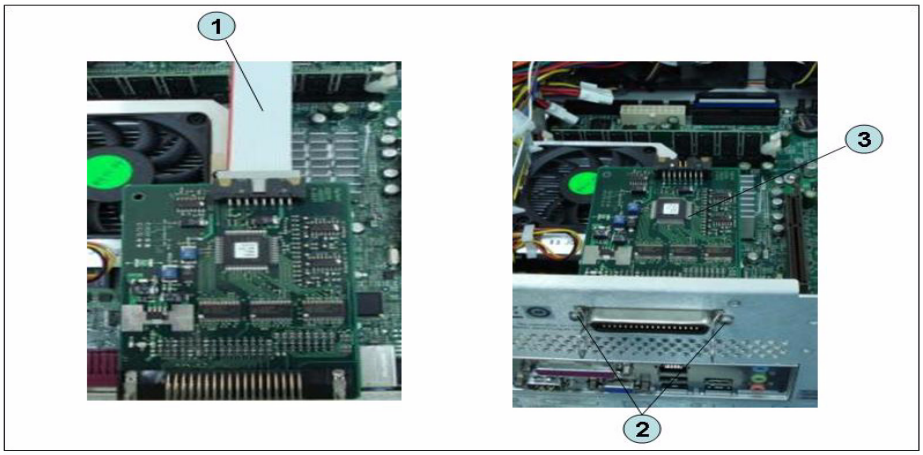
Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Disconnect the flat cable (item 1) from the handler I/O board.

Step 3. Remove the two TORX T10 screws (item 2) fastening the handler I/O board.

Step 4. Slide the handler I/O board toward backward (item 3).

Figure 6-15 Handler I/O Board Removal



Replacement Procedure

Step 1. Replace the handler I/O board by inverse procedure of removal.

USB (USBTMC) Interface Card Replacement (Serial number prefix MY461 or SG461)

Tools Required

- TORX screwdriver, T10, T15, and T20

Removal Procedure

Refer to Figure 6-16 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the three TORX T10 screw (item 1) fastening the angle and lift it.

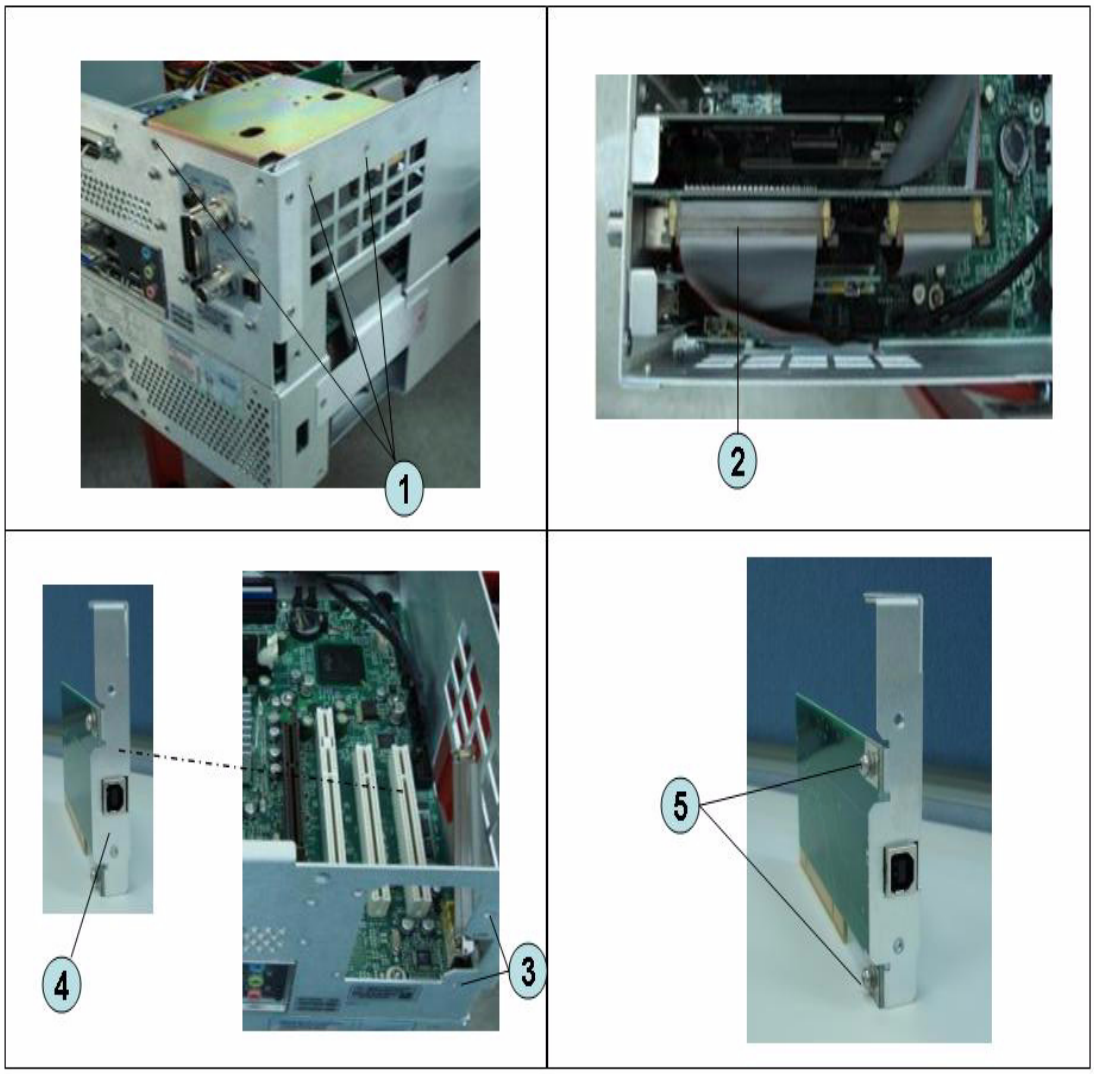
Step 3. Disconnect the flat cable (item 2) from the PCI DSP card.

Step 4. Remove the two TORX T10 screws (item 3) fastening the card to the rear panel.

Step 5. Disconnect the assembly (item 4) from the Digital Motherboard and lift it.

Step 6. Remove the two TORX T10 screws (item 5) fastening the angle.

Figure 6-16 **USB (USBTMC) Interface Card Removal (Serial number prefix MY461 or SG461)**



Replacement Procedure

Step 1. Replace the USB (USBTMC) interface card by inverse procedure of removal.

PCI DSP Card and GPIB Card Replacement (A51) (Serial number prefix MY461 or SG461)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Open-end torque wrench, 5/8 inch (set to 1.97 N-m / 17.4 lb-in)

Removal Procedure

Refer to Figure 6-17 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the three TORX T10 screw (item 1) fastening the angle and lift it.

Step 3. Remove the two TORX T10 screw (item 2) fastening the stay and lift it.

Step 4. Disconnect the flat cables (item 3).

Step 5. Disconnect the flat cable (item 4) from the handler I/O board.

Step 6. Remove the four TORX T10 screw (item 5) fastening the card to the rear panel.

Step 7. Disconnect the USB(USBTMC) interface card (item 6) from the Digital Motherboard and lift it.

Step 8. Disconnect the assembly (item 7) from the Digital Motherboard and lift it.

Step 9. Remove the PCI DSP Card or GPIB Card.

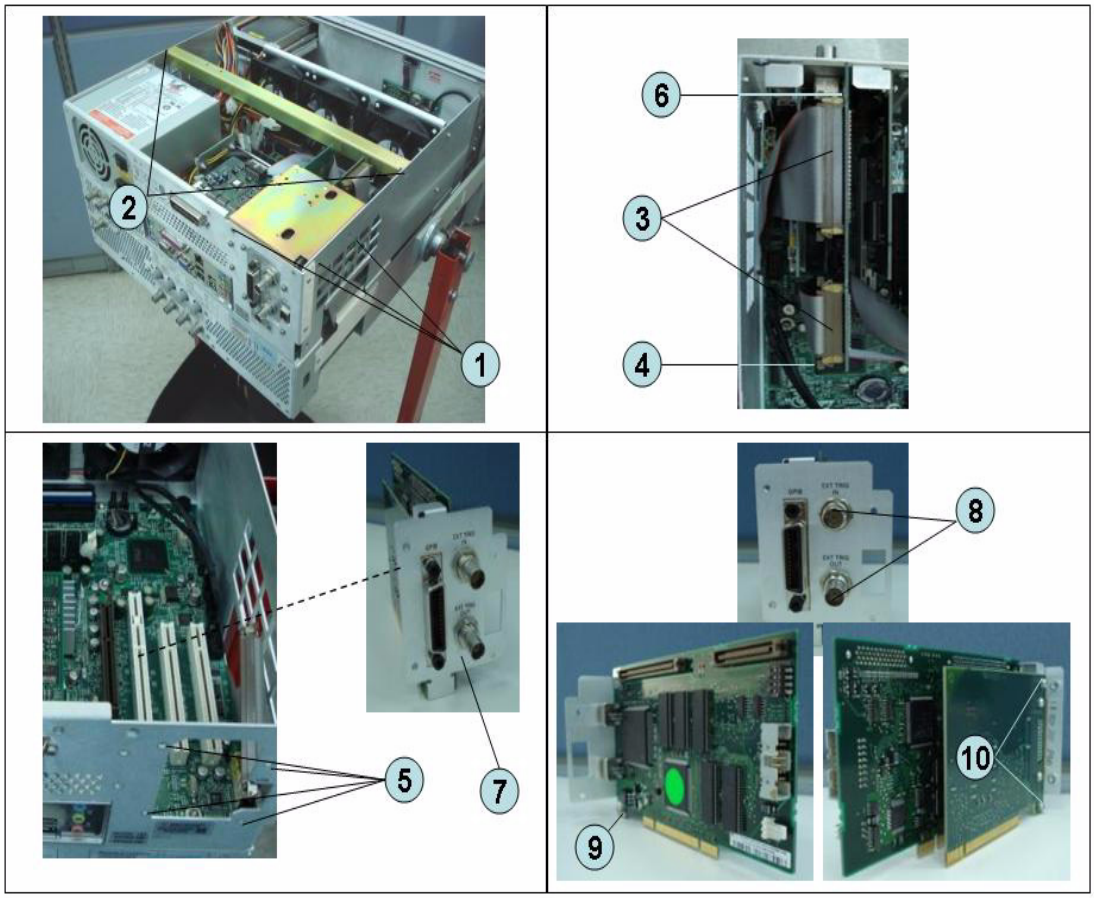
For removing the PCI DSP Card.

- Remove the two 5/8 inch nuts (item 8) fastening the angle.
- Remove a TORX T10 screw (item 9) fastening the angle.

For removing the GPIB Card.

- Remove the two TORX T10 screws (item 10) fastening the angle.

Figure 6-17 **PCI DSP Card and GPIB Card Removal (Serial number prefix MY461 or SG461)**



Replacement Procedure

Step 1. Replace the PCI DSP card and GPIB card by inverse procedure of removal.

NOTE Fasten the 5/8 inch nuts (item 8) using an open-end torque wrench.

PCI-E DSP Card and GPIB Cable Replacement (A51) (Serial number prefix MY462/MY463 or SG462/SG463)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Open-end torque wrench, 5/8 inch (set to 1.97 N-m / 17.4 lb-in)

Removal Procedure

Refer to Figure 6-17 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the three TORX T10 screw (item 1) fastening the stay and lift it.

Step 3. Remove the three TORX T10 screw (item 2) fastening the angle and lift it.

Step 4. Disconnect the cables (item 3).

Step 5. Remove the PCI-E DSP Card or GPIB Cable.

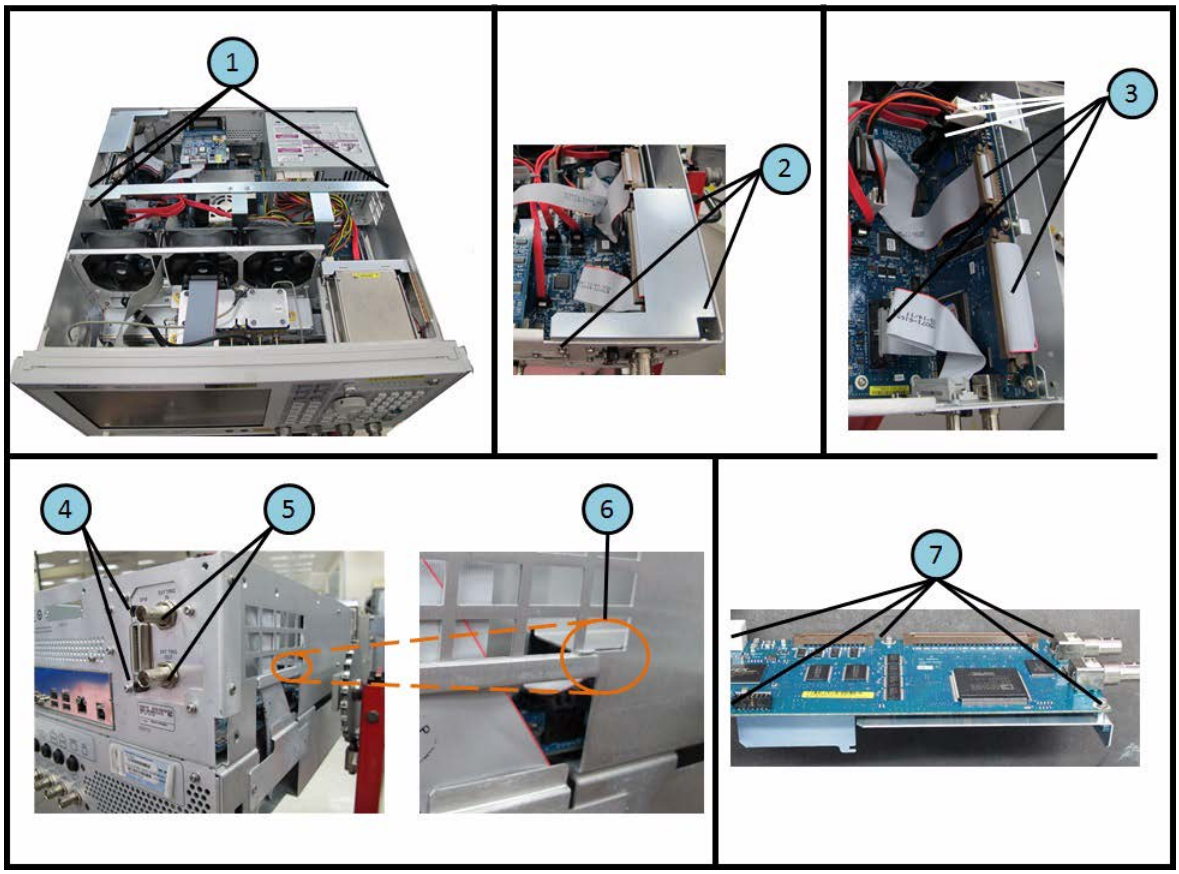
For removing the PCI-E DSP Card.

- Remove the two 5/8 inch nuts (item 5) fastening the angle.
- Remove the five TORX T10 screw (item 7) fastening PCI-E card to the bracket.

For removing the GPIB Cable.

- Remove the two HEX nuts (item 6) fastening the GPIB to the rear panel.

Figure 6-18 **PCI-E DSP Card and GPIB Cable Removal (Serial number prefix MY462/MY463 or SG462/SG463)**



Replacement Procedure

Step 1. Replace the PCI-E DSP card and GPIB cable by inverse procedure of removal.

NOTE Fasten the 5/8 inch nuts (item 8) using an open-end torque wrench.

Digital Motherboard Replacement (A01) (Serial number prefix MY461 or SG461)

Tools Required

- TORX screwdriver, T10, T15, and T20

Removal Procedure

Refer to Figure 6-19 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199

Step 2. Remove the following assemblies.

- Front Panel (refer to "Front Panel Removal" on page 200.)
- Removable Hard Disk Assembly (refer to "Removable Hard Disk Assembly Removal (Obsolete)" on page 201.)
- Power Supply Assembly (refer to "Power Supply Assembly Replacement (Up to 8.5 GHz Options for Serial Number Prefix MY461/MY462 or SG461/SG462)" on page 215.)
- Handler I/O board (refer to "Handler I/O Board Replacement (A23)" on page 221.)
- Digital Bridge board (refer to "Digital Bridge Board Replacement (A53)" on page 219.)
- PCI DSP Card and GPIB Card (refer to "PCI DSP Card and GPIB Card Replacement (A51) (Serial number prefix MY461 or SG461)" on page 225.)
- Fan Assembly (refer to "Fan Replacement" on page 260.)

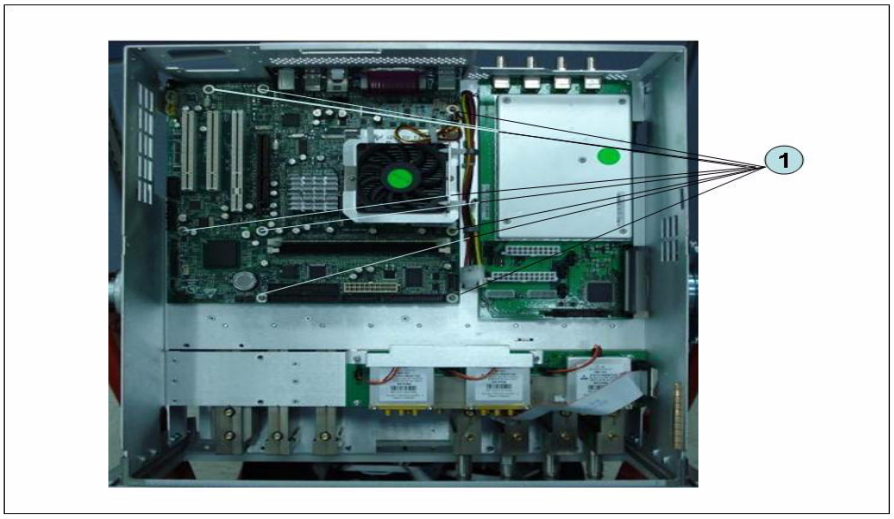
Step 3. Disconnect all cables from the digital motherboard.

Step 4. Remove the eight TORX T10 screws (item 1) fastening the digital motherboard.

Step 5. Lift the digital motherboard slowly.

NOTE Don't remove the CPU fan assembly and the DIMM memory from digital motherboard.

Figure 6-19 Digital Motherboard Removal (Serial number prefix MY461 or SG461)



Replacement Procedure

Step 1. Replace the digital motherboard by inverse procedure of removal.

Digital Motherboard Replacement (A01) (Serial number prefix MY462/MY463 or SG462/SG463)

Tools Required

- TORX screwdriver, T10, T15, and T20

Removal Procedure

Refer to Figure 6-19 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199

Step 2. Remove the following assemblies.

- Front Panel (refer to "Front Panel Removal" on page 200.)
- Removable Hard Disk Assembly (refer to "Removable Hard Disk Assembly Removal (Option 017)" on page 207.)
- Power Supply Assembly (refer to "Power Supply Assembly Replacement (Up to 8.5 GHz Options for Serial Number Prefix MY461/MY462 or SG461/SG462)" on page 215 or "Power Supply Assembly Replacement" on page 217)
- Handler I/O board (refer to "Handler I/O Board Replacement (A23)" on page 221.)
- Digital Bridge board (refer to "Digital Bridge Board Replacement (A53)" on page 219.)
- PCI DSP Card and GPIB Card (refer to "PCI-E DSP Card and GPIB Cable Replacement (A51) (Serial number prefix MY462/MY463 or SG462/SG463)" on page 227.)
- Fan Assembly (refer to "Fan Replacement" on page 260.)

Step 3. Disconnect all cables from the digital motherboard.

Step 4. Remove the eight TORX T10 screws (item 1) fastening the digital motherboard.

Step 5. Lift the digital motherboard slowly.

NOTE Don't remove the CPU fan assembly and the DIMM memory from digital motherboard.

Figure 6-20 **Digital Motherboard Removal (Serial number prefix MY462 or SG462)**

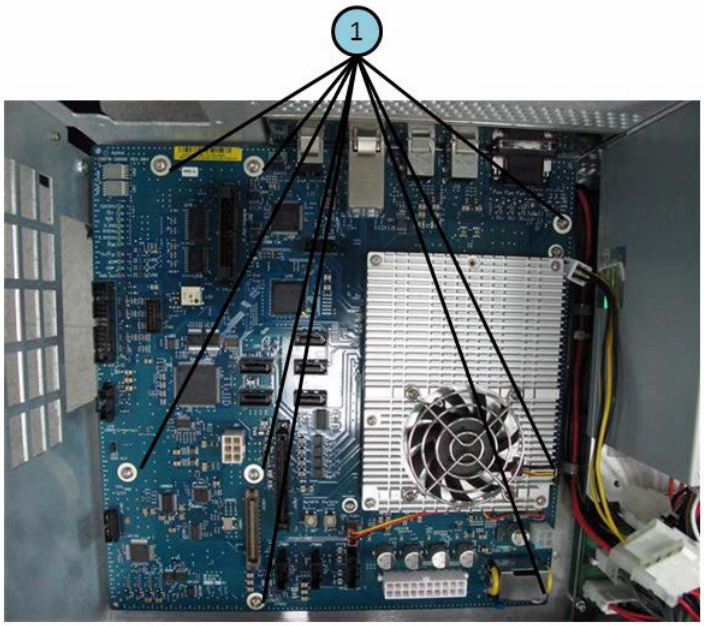
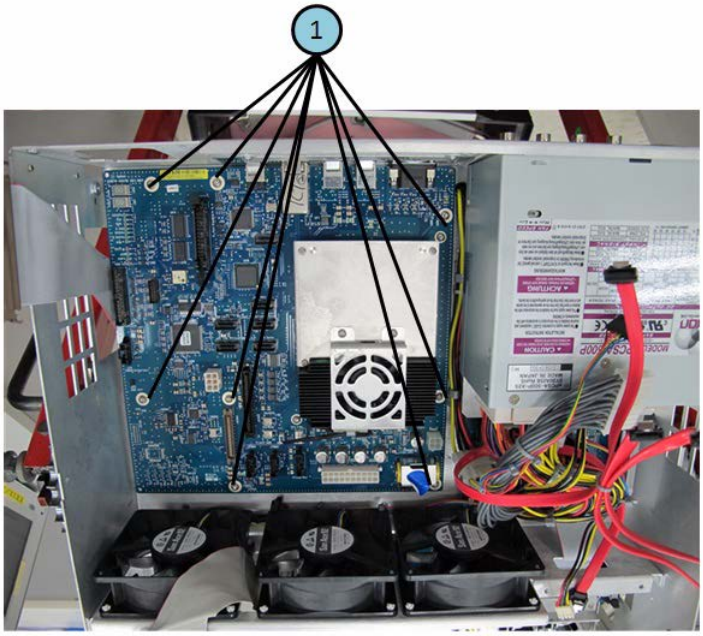


Figure 6-21 **Digital Motherboard Removal (Serial number prefix MY463 or SG463)**



Replacement Procedure

Step 1. Replace the digital motherboard by inverse procedure of removal.

Analog Base Module Replacement (A6)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Open-end torque wrench, 5/8 inch (set to 1.97 N-m / 17.4 lb-in)

Removal Procedure

Refer to Figure 6-22 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199

Step 2. Remove the Power Supply as described in "Power Supply Assembly Replacement (Up to 8.5 GHz Options for Serial Number Prefix MY461/MY462 or SG461/SG462)" on page 215 or "Power Supply Assembly Replacement" on page 217

Step 3. Remove the two TORX T10 screws (item 1) fastening the plate and lift it.

Step 4. Remove the four 5/8 inch nut (item 2) fastening the rear panel.

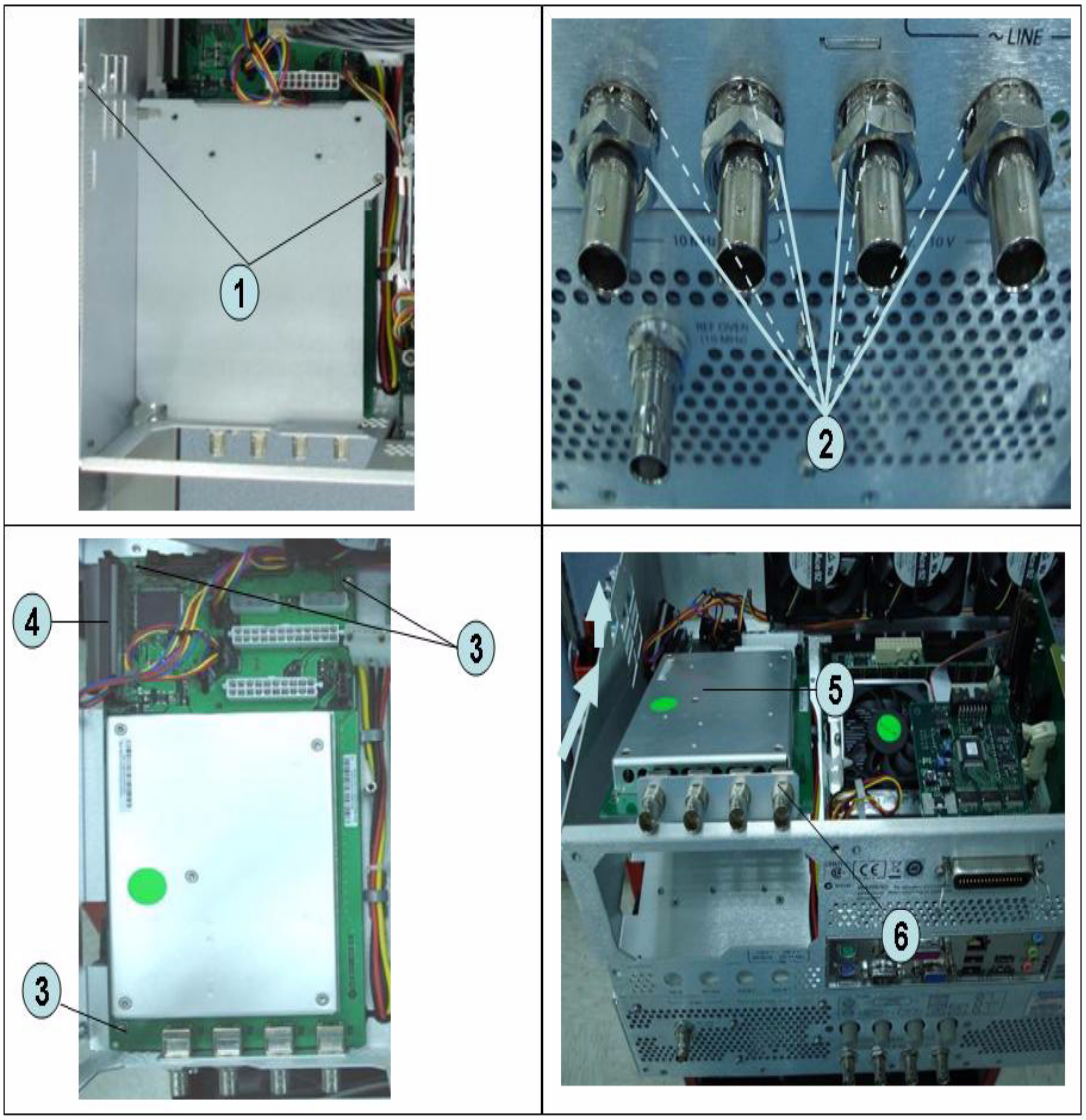
Step 5. Disconnect the flat cable (item 4) from analog motherboard.

Step 6. Remove the three TORX T10 screws (item 3) fastening the analog base module.

Step 7. Push the analog base module (item 5) till the end of the wall. Carefully lift it when the height of BNC connectors are higher than rear chassis wall.

Step 8. Remove the spacer (item 6) from analog base module.

Figure 6-22 **Analog Base Module Removal**



Replacement Procedure

Step 1. Replace the analog base module by inverse procedure of removal.

NOTE Fasten the 5/8 inch nuts (item 2) using an open-end torque wrench.

Level Vernier Module Replacement (A3)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)

Removal Procedure

Refer to Figure 6-23 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

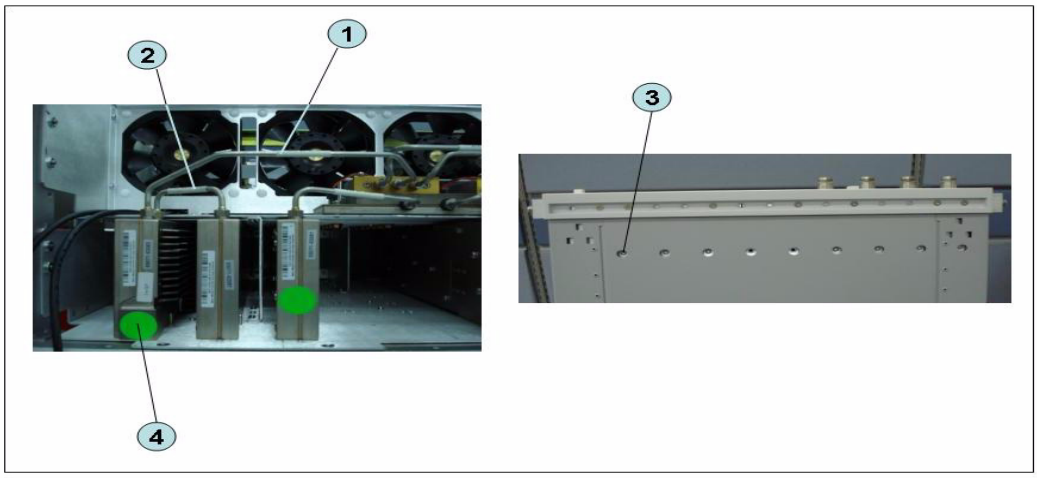
Step 3. Disconnect the semi-rigid cable (item 1).

Step 4. Disconnect the semi-rigid cable (item 2).

Step 5. Remove a TORX T10 screw fastening the module to the bottom. (item 3)

Step 6. Slide the level vernier module.

Figure 6-23 **Level Vernier Module Removal**



Replacement Procedure

Step 1. Replace the level vernier module by inverse procedure of removal.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

Doubler Module Replacement (A86)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)

Removal Procedure

Refer to Figure 6-24 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Disconnect the flat cable assembly from Imix board (item 1).

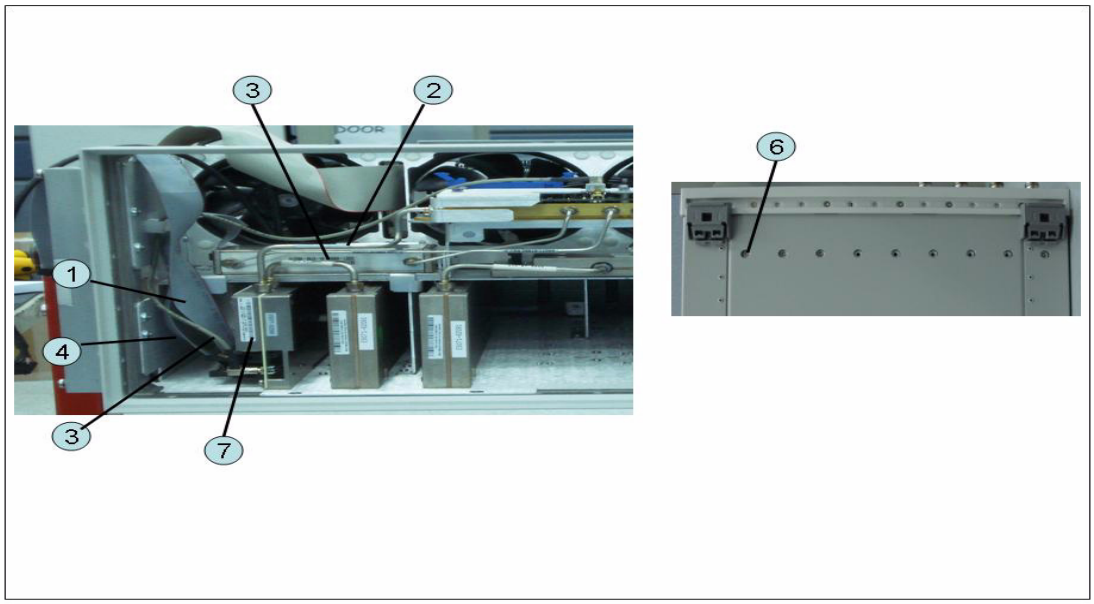
Step 4. Disconnect the semi-rigid cable (item 1).

Step 5. Disconnect the semi-rigid cable (item 2).

Step 6. Remove a TORX T10 screw fastening the module to the bottom. (item 3)

Step 7. Slide the doubler module.

Figure 6-24 Doubler Module Removal



Replacement Procedure

Step 1. Replace the doubler module by inverse procedure of removal.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

Synthesizer Module Replacement (A1)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)

Removal Procedure

Refer to Figure 6-25 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

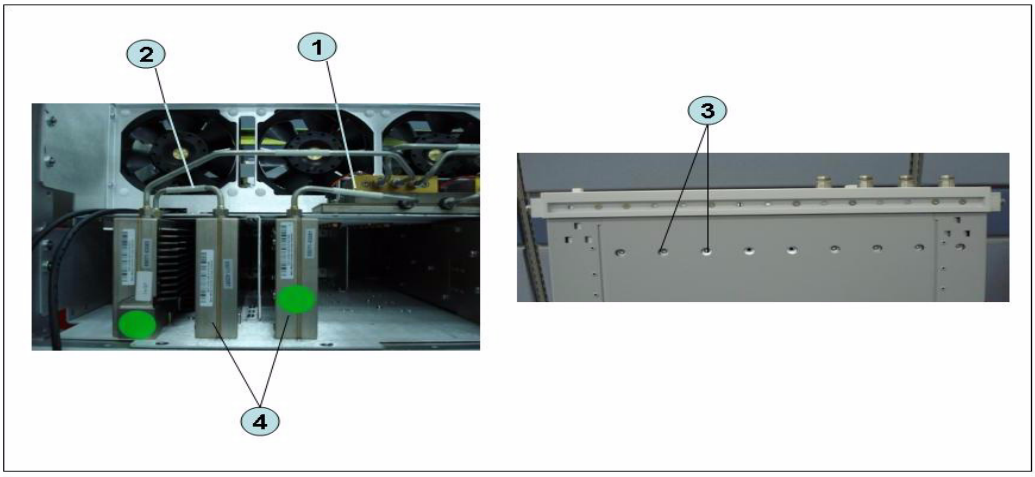
Step 3. Disconnect the semi-rigid cable (item 1).

Step 4. Disconnect the semi-rigid cable (item 2).

Step 5. Remove the two TORX T10 screws fastening the module to the bottom. (item 3)

Step 6. Slide the synthesizer module (item 4).

Figure 6-25 Synthesizer Module Removal



Replacement Procedure

Step 1. Replace the synthesizer module by inverse procedure of removal.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

Receiver Module Replacement for 2-Port model (A2/A7+A9)

1) Up to 8.5 GHz (A2)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (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 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Disconnect the semi-rigid cable (item 1).

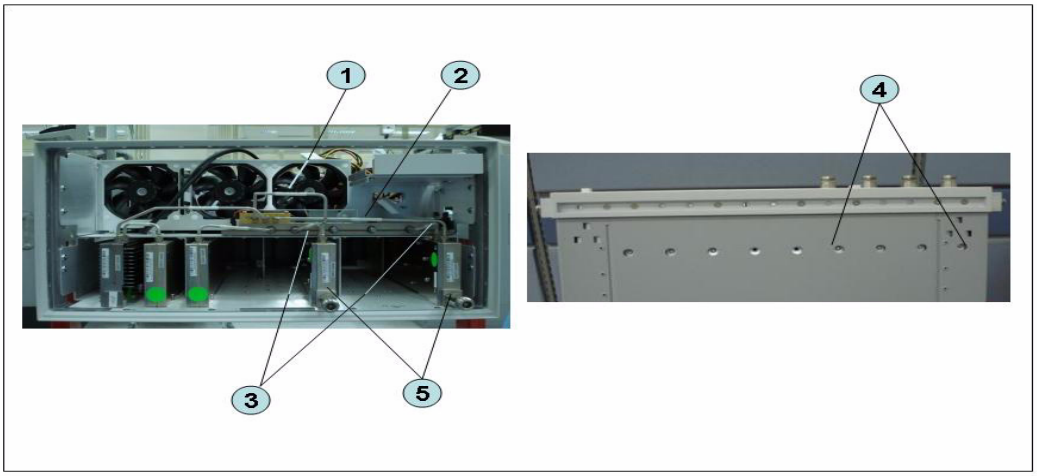
Step 4. Disconnect the semi-rigid cable (item 2).

Step 5. Disconnect the two semi-rigid cables (item 3).

Step 6. Remove the two TORX T10 screws fastening the module to the bottom. (item 4)

Step 7. Slide the receiver module (item 5).

Figure 6-26 Receiver Module Removal for 2-port model



Replacement Procedure

Step 1. Replace the receiver module by inverse procedure of removal.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

2) Over 8.5 GHz Options (A7&A9)

Tools Required

- TORX screwdriver, T10
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)

Removal Procedure

Refer to Figure 6-27 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Remove the hard disk assembly as described in "Removable Hard Disk Assembly Removal (Option 017)" on page 207.

Step 4. Remove the imix and distributor modules as described in "Imix, Attenuator and Distributor Module Replacement (IMX, ATT and A4)" on page 255.

NOTE The attenuator module does not need to be removed.

Step 5. Remove the two TORX T10 screws (item 1).

Step 6. Remove the plate (item 2).

Step 7. Remove the two TORX T10 screws (item 3)

Step 8. Remove the two TORX T10 screws fastening the module (item 4)

Step 9. Slide out the receiver module.

Step 10. Unplug the two ends of the RF cable (item 5)

Step 11. Unclip the RF cable (item 6).

Step 12. Remove the two TORX T10 screws fastening the angle (item 7).

Step 13. Remove the angle (item 8).

Step 14. Remove the RF cable (item 9).

Step 15. Remove the two TORX T10 screws fastening the front end module from the receiver module (item 10 and item 11).

Step 16. Unfasten the two semi-rigid cables (item 12).

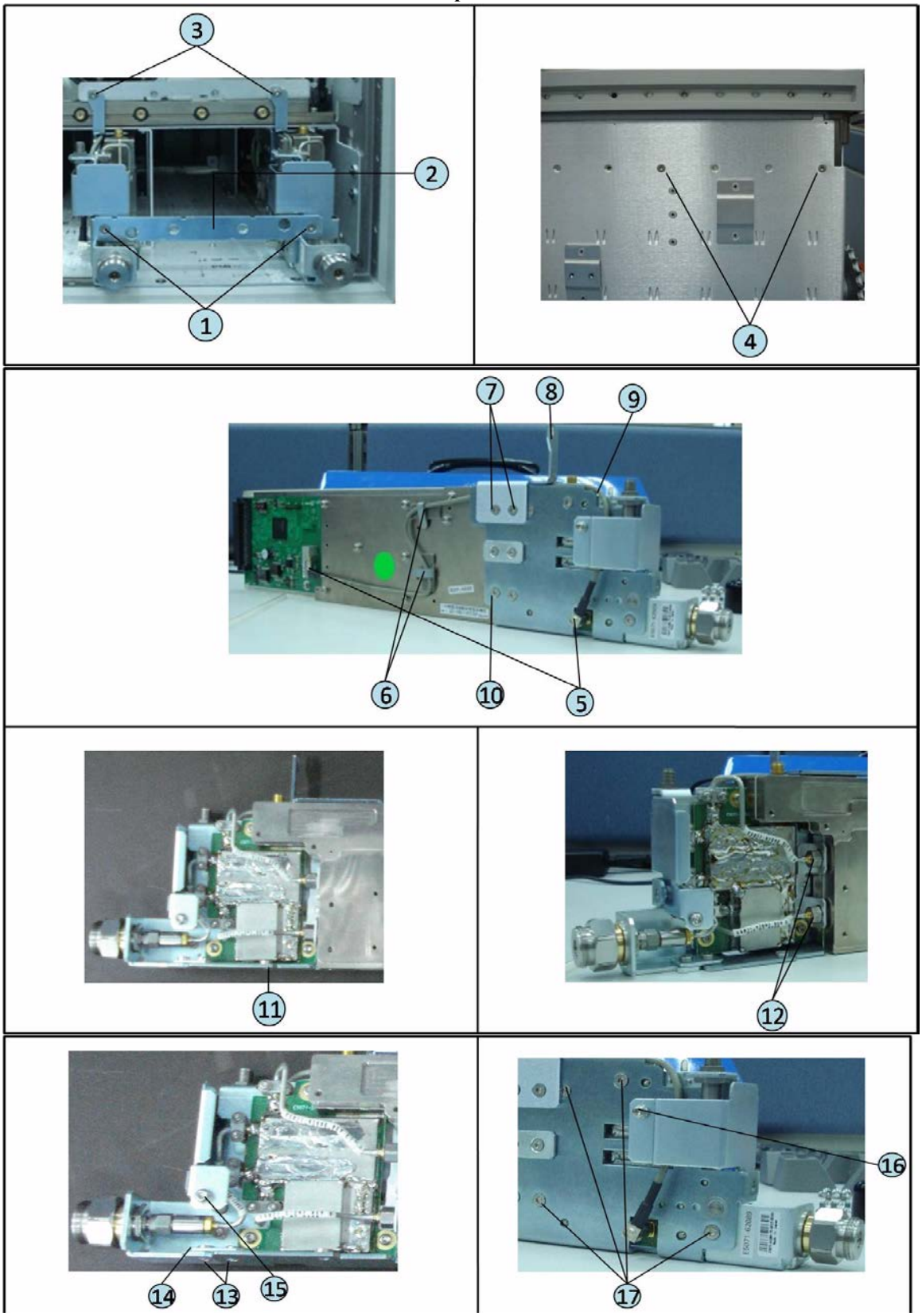
Step 17. Separate the front end module from the receiver module.

Step 18. Remove the two TORX T10 screws (item 13) and remove the plate (item 14).

Step 19. Remove the six TORX T10 screws (item 15, item 16 and item 17).

Step 20. Separate the plate from the front end module.

Figure 6-27 Receiver Module Removal for 2-port model



Replacement Procedure

Step 1. Replace the receiver module by inverse procedure of removal.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

Receiver Module Replacement for 4-Port model (A82/A87)

1) Up to 8.5 GHz Options (A2)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)

Removal Procedure

Refer to Figure 6-28 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Disconnect the two semi-rigid cable (item 1).

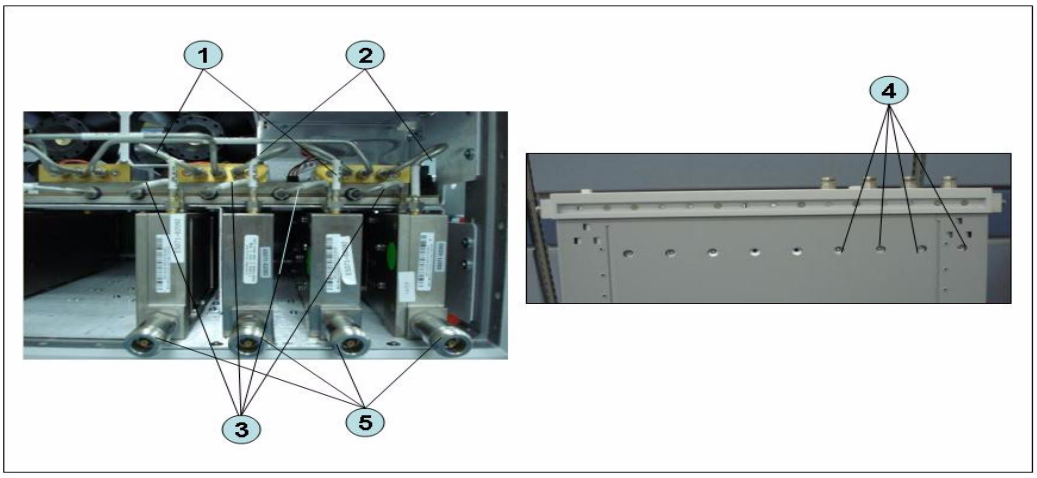
Step 4. Disconnect the two semi-rigid cable (item 2).

Step 5. Disconnect the four semi-rigid cables (item 3).

Step 6. Remove the four TORX T10 screws fastening the module to the bottom. (item 4)

Step 7. Slide the receiver module (item 5).

Figure 6-28 Receiver Module Removal for 4-port model



Replacement Procedure

Step 1. Replace the receiver module by inverse procedure of removal.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

2) Over 8.5 GHz Options (A7&A9)

Tools Required

- TORX screwdriver, T10
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)

Removal Procedure

Refer to Figure 6-29 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Remove the hard disk assembly as described in "Removable Hard Disk Assembly Removal (Option 017)" on page 207.

Step 4. Remove the imix and distributor modules as described in "Imix, Attenuator and Distributor Module Replacement (IMX, ATT and A4)" on page 255.

NOTE The attenuator module does not need to be removed.

Step 5. Remove the four TORX T10 screws (item 1).

Step 6. Remove the plate (item 2).

Step 7. Remove the four TORX T10 screws (item 3)

Step 8. Remove the four TORX T10 screws fastening the module (item 4)

Step 9. Slide the receiver module.

Step 10. Unplug the two ends of the RF cable (item 5)

Step 11. Unclip the RF cable (item 6).

Step 12. Remove the two TORX T10 screws fastening the angle (item 7).

Step 13. Remove the angle (item 8).

Step 14. Remove the RF cable (item 9).

Step 15. Remove the two TORX T10 screws fastening the front end module from the receiver module (item 10 and item 11).

Step 16. Unfasten the two semi-rigid cables (item 12).

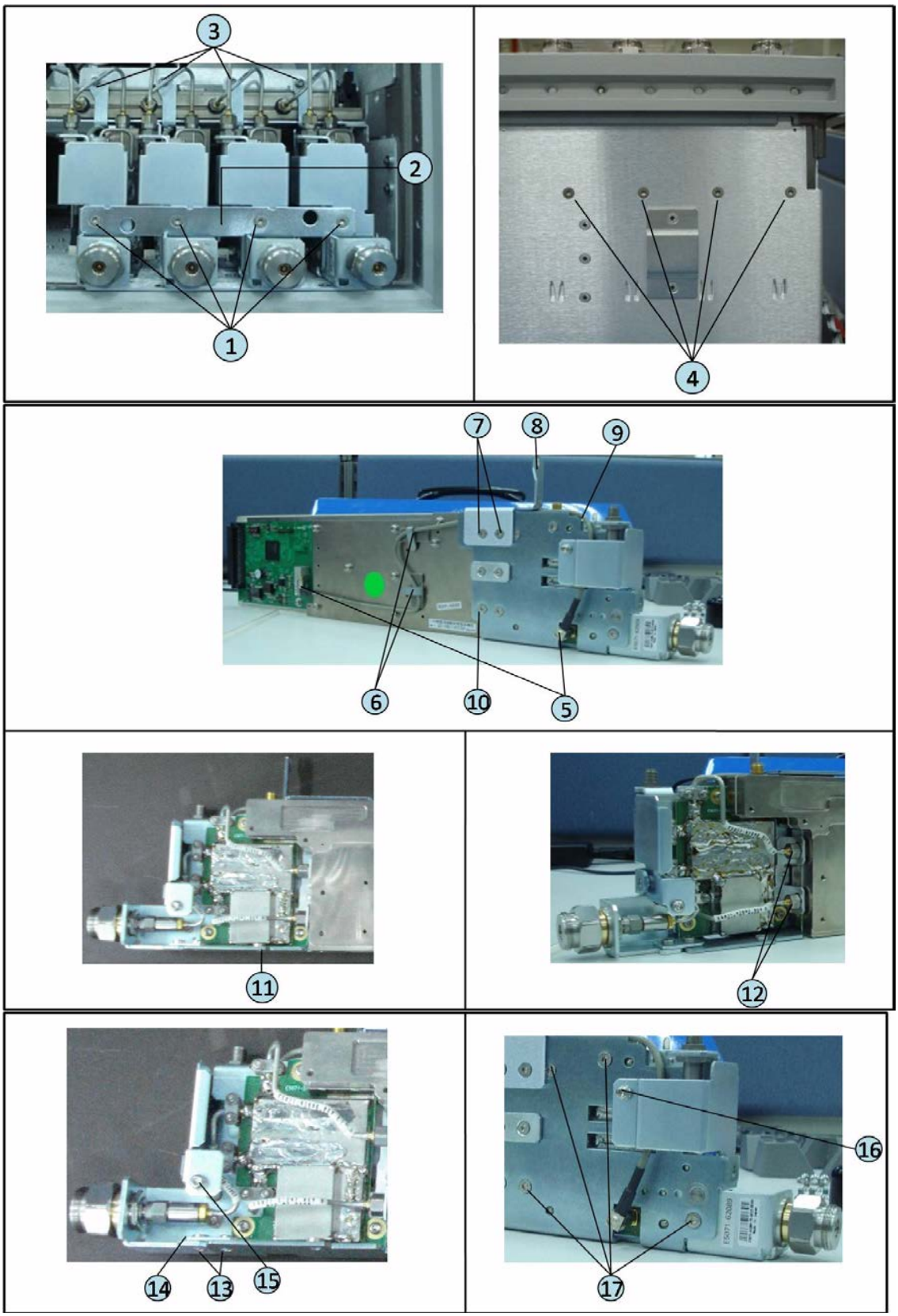
Step 17. Separate the front end module from the receiver module.

Step 18. Remove the two TORX T10 screws (item 13) and remove the plate (item 14).

Step 19. Remove the six TORX T10 screws (item 15, item 16 and item 17).

Step 20. Separate the plate from the front end module.

Figure 6-29 Receiver Module Removal for 4-port model



Replacement Procedure

Step 1. Replace the receiver module by inverse procedure of removal.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

RF Switch and Distributor Module Replacement for 2-Port model (A4)

Up to 8.5 GHz Options

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)

Removal Procedure

Refer to Figure 6-30 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the following assemblies.

- Front Panel Assembly (refer to "Front Panel Removal" on page 200.)
- Removable Hard Disk Assembly (refer to "Removable Hard Disk Assembly Removal (Obsolete)" on page 201.)
- Disconnect all semi-rigid cables.

Step 3. Disconnect the flat cable (item 1) from the distributor module.

Step 4. Remove a TORX T10 screws (item 2) fastening the guard.

Step 5. Remove a TORX T10 screws (item 3) fastening the guard.

Step 6. Lift the guard from the distributor module (item 4).

Step 7. Remove the three TORX T10 screws (item 5) fastening the plate.

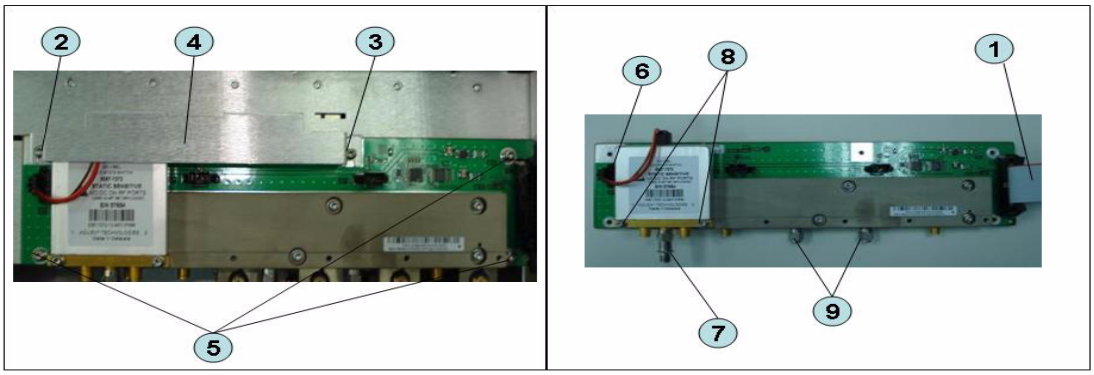
Step 8. Disconnect the switch cable (item 6) from the switch.

Step 9. Remove the attenuator (item 7) fastening the switch.

Step 10. Remove the two TORX T10 screws (item 8) fastening the switch.

Step 11. Remove the two terminations (item 9) fastening the distributor module when replaced the distributor module.

Figure 6-30 **RF Switch and Distributor Module Replacement for 2-port model**



Replacement Procedure

Step 1. Replace the switch and distributor module by inverse procedure of removal.

NOTE Be careful screw (item 2) and screw (item 3) are different.

NOTE Fasten the semi rigid cables, attenuator and terminations using a torque wrench or torque driver set for replacement.

RF Switch and Distributor Module Replacement for 4-Port model (T2-SW and A4)

Up to 8.5 GHz Options

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)

Removal Procedure

Refer to Figure 6-31 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the following assemblies.

- Front Panel Assembly (refer to "Front Panel Removal" on page 200.)
- Removable Hard Disk Assembly (refer to "Removable Hard Disk Assembly Removal (Obsolete)" on page 201.)
- Disconnect all semi-rigid cables.

Step 3. Disconnect the semi-rigid cable (item 1).

Step 4. Disconnect the semi-rigid cable (item 2).

Step 5. Disconnect the flat cable (item 3) from the distributor module.

Step 6. Remove a TORX T10 screws (item 4) fastening the guard.

Step 7. Remove a TORX T10 screws (item 5) fastening the guard.

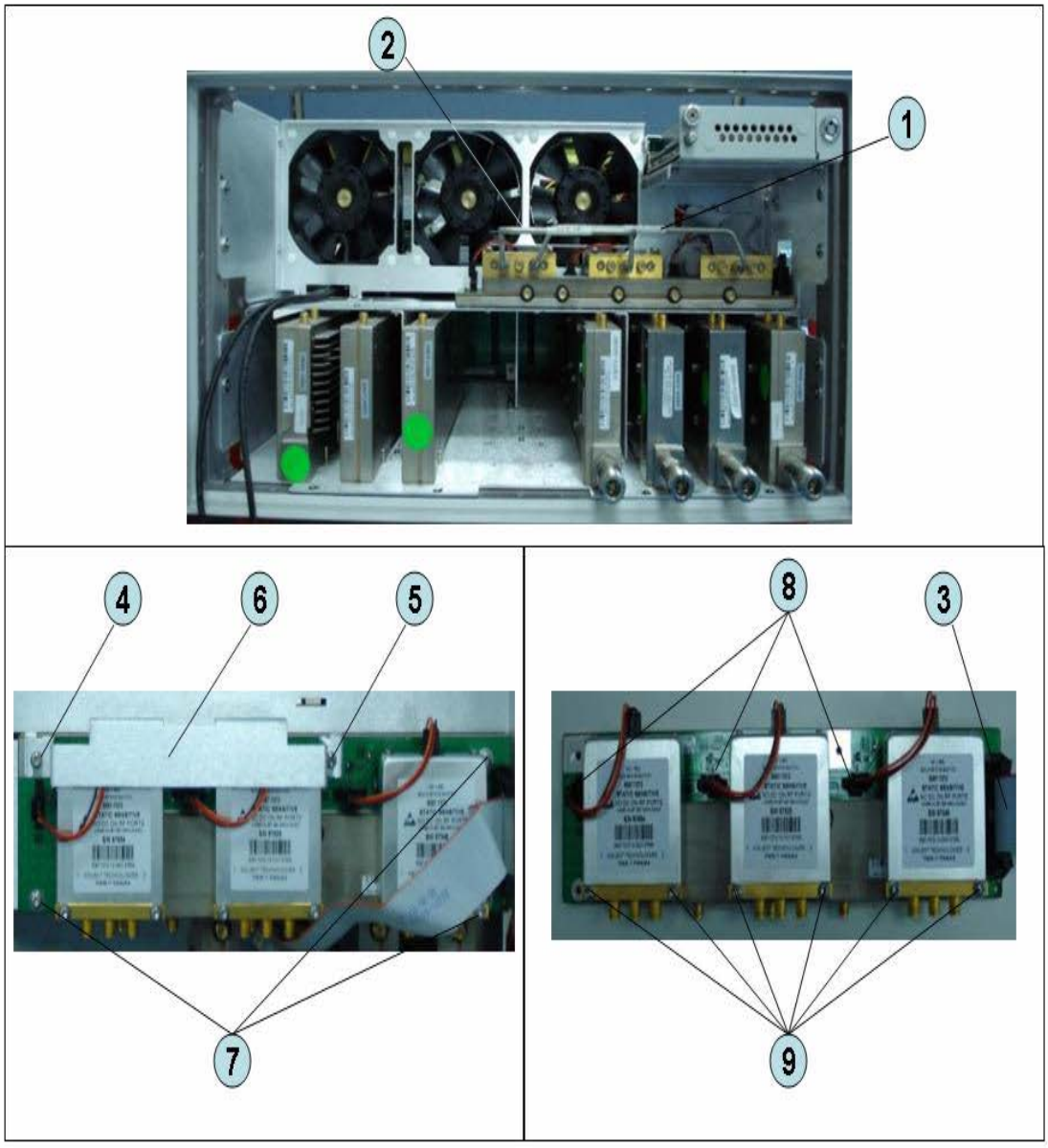
Step 8. Lift the guard from the distributor module (item 6).

Step 9. Remove the three TORX T10 screws (item 7) fastening the plate.

Step 10. Disconnect the three switch cables (item 8) from the switch.

Step 11. Remove the six TORX T10 screws (item 9) fastening the switch.

Figure 6-31 **RF Switch and Distributor Module Replacement for 4-port model**



Replacement Procedure

Step 1. Replace the switch by inverse procedure of removal.

NOTE Be careful screw (item 4) and screw (item 5) are different.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

Imix, Attenuator and Distributor Module Replacement (IMX, ATT and A4)

1) 2-Ports Options

Tools Required

- TORX screwdriver, T10
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (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 199.

Step 2. Remove the following assemblies.

- Front Panel Assembly (refer to "Front Panel Removal" on page 200.)
- Removable Hard Disk Assembly (refer to "Removable Hard Disk Assembly Removal (Obsolete)" on page 201.)
- Disconnect all semi-rigid cables.

Step 3. Disconnect the two semi-rigid cables (item 1).

Step 4. Disconnect the four semi-rigid cables (item 2).

Step 5. Remove three TORX T10 screws (item 3) fastening the Imix module.

Step 6. Lift the Imix module.

Step 7. Remove two TORX T10 screws (item 4) fastening the distributor module to the plate.

Step 8. Lift the attenuator module.

Step 9. Remove four TORX T10 screws (item 5) fastening the guard.

Step 10. Lift the guard from the attenuator module (item 6).

Step 11. Disconnect the three semi-rigid cables (item 7).

Step 12. Remove the four TORX T10 screws (item 8) fastening the plate.

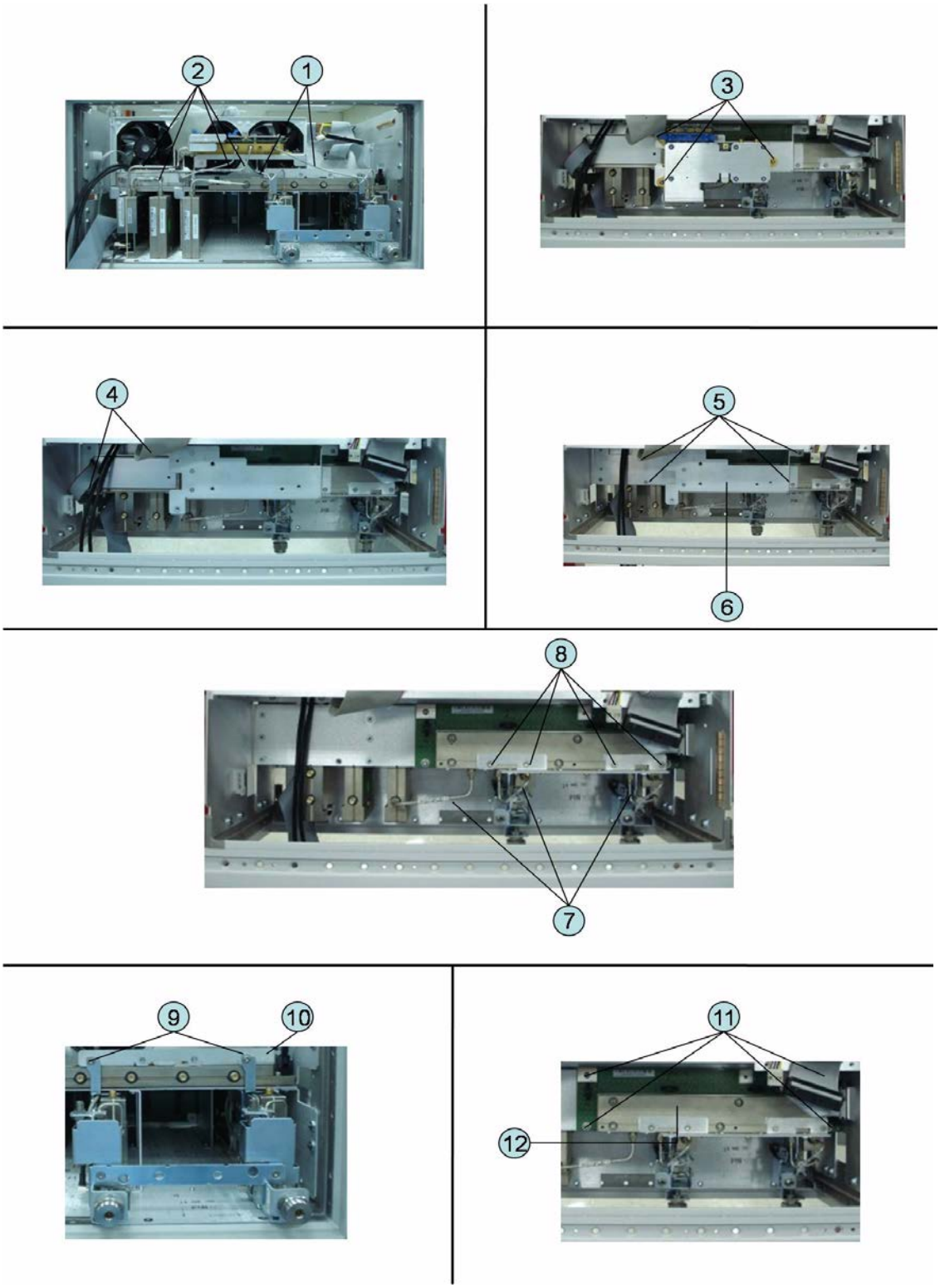
Step 13. Remove the two TORX T10 screws (item 9) fastening the plate.

Step 14. Lift the plate (item 10).

Step 15. Remove the four TORX T10 screws (item 11) fastening the attenuator module.

Step 16. Lift the distributor module (item 12).

Figure 6-32 **Imix, Attenuator and Distributor Module Replacement (2-Ports Options)**



Replacement Procedure

Step 1. Replace the switch by inverse procedure of removal.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

2) 4-Ports Options

Tools Required

- TORX screwdriver, T10
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (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 199.

Step 2. Remove the following assemblies.

- Front Panel Assembly (refer to "Front Panel Removal" on page 200.)
- Removable Hard Disk Assembly (refer to "Removable Hard Disk Assembly Removal (Obsolete)" on page 201.)
- Disconnect all semi-rigid cables.

Step 3. Disconnect the four semi-rigid cables (item 1).

Step 4. Disconnect the four semi-rigid cables (item 2).

Step 5. Remove three TORX T10 screws (item 3) fastening the plate.

Step 6. Lift the Imix module.

Step 7. Remove two TORX T10 screws (item 4) fastening the distributor module to the plate.

Step 8. Lift the distributor module.

Step 9. Remove four TORX T10 screws (item 5) fastening the guard.

Step 10. Lift the guard from the distributor module (item 6).

Step 11. Disconnect the five semi-rigid cables (item 7).

Step 12. Remove the four TORX T10 screws (item 8) fastening the plate.

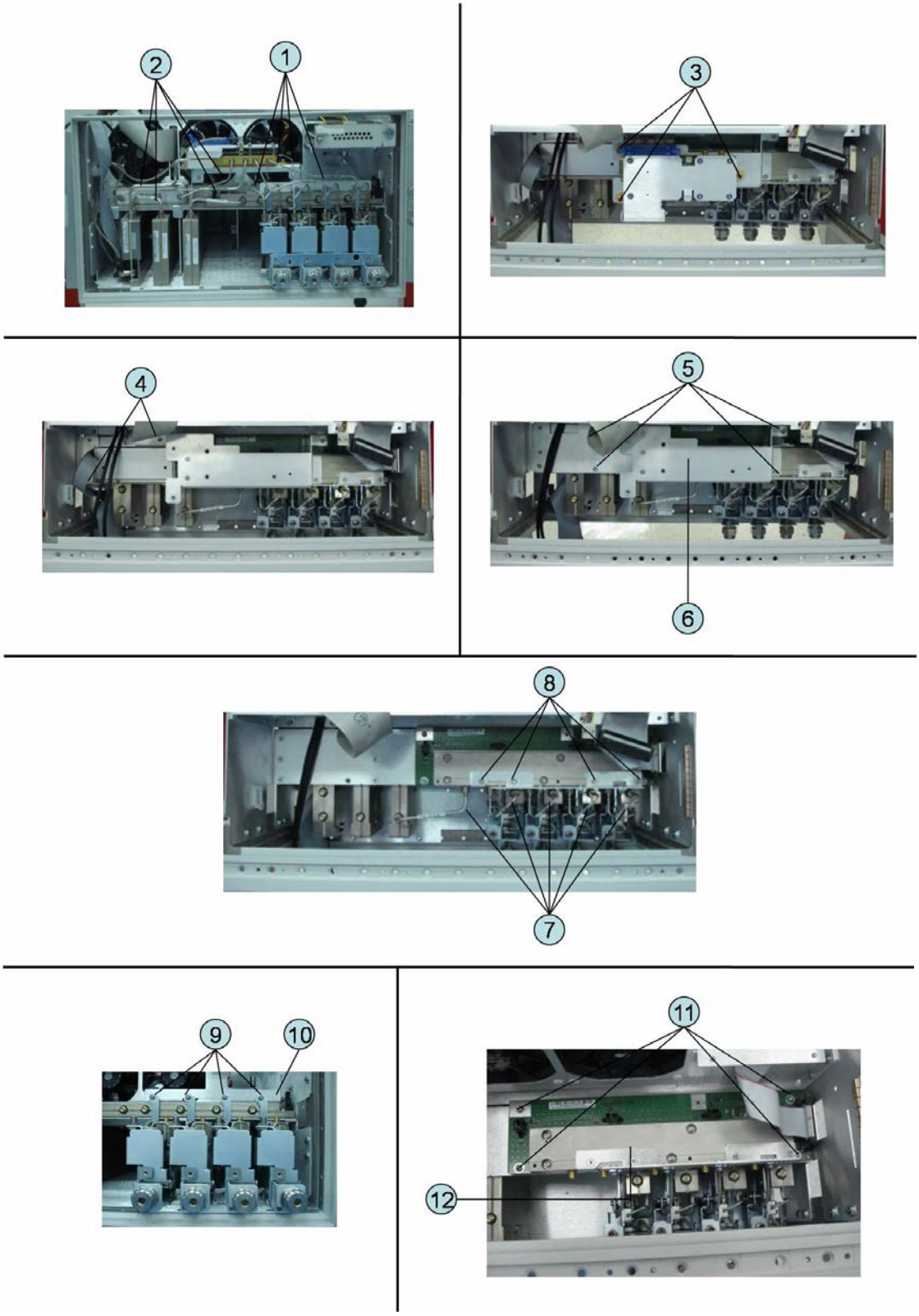
Step 13. Remove the four TORX T10 screws (item 9) fastening the plate.

Step 14. Lift the plate (item 10).

Step 15. Remove the four TORX T10 screws (item 11) fastening the attenuator module.

Step 16. Lift the attenuator module (item 12).

Figure 6-33 **Imix, Attenuator and Distributor Module Replacement (4-Ports Options)**



Replacement Procedure

Step 1. Replace the switch by inverse procedure of removal.

NOTE Fasten the semi rigid cables using a torque wrench or torque driver set for replacement.

Fan Replacement

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- A fine stick such as Hex key, 1.5 mm
- Cutting plier or scissors

Removal Procedure

Refer to Figure 6-34 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the removal hard disk assembly as described in "Removable Hard Disk Assembly Removal (Obsolete)" on page 201.

Step 3. Disconnect the fan cables (item 1) from the analog base module.

Step 4. Disconnect the flat cable (item 2) from the analog base module.

Step 5. Disconnect the flat cable (item 3) from the digital bridge board.

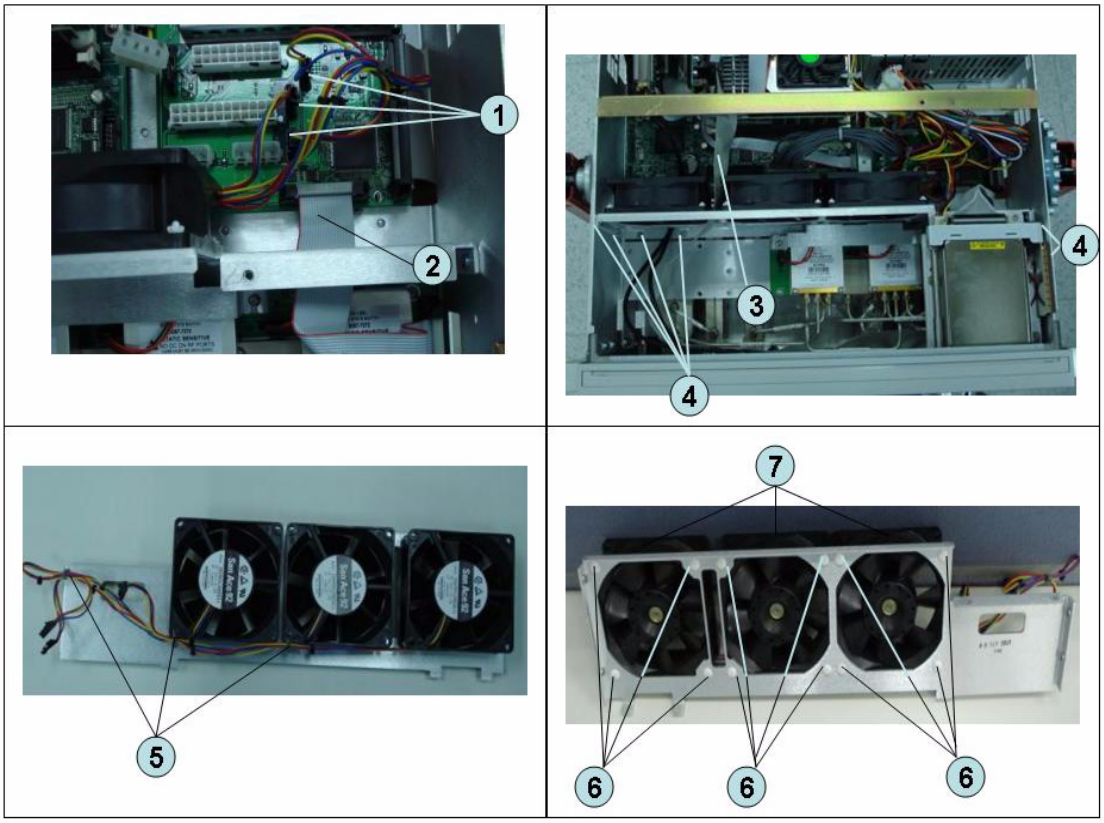
Step 6. Remove the six TORX T10 screws (item 4) fastening the fan plate.

Step 7. Cut the cable tie (item 5).

Step 8. Remove the twelve rivet (plastic)(item 6) fastening the fan.

Step 9. Remove the fan (item 7) from fan plate.

Figure 6-34 Fan Removal



Replacement Procedure

Step 1. Replace the fan by inverse procedure of removal.

NOTE Connecting the cables (item 1) as described below.

- Connect the short cable to “J5” connector.
- Connect the middle cable to “J6” connector.
- Connect the long cable to “J7” connector.

PCA DC Bias Board (Opt.xx5) Replacement (A57/A58)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Open-end torque wrench, 9/16 inch (set to 3.46 N-m / 30.5 lb-in)

Removal Procedure

Refer to Figure 6-34 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

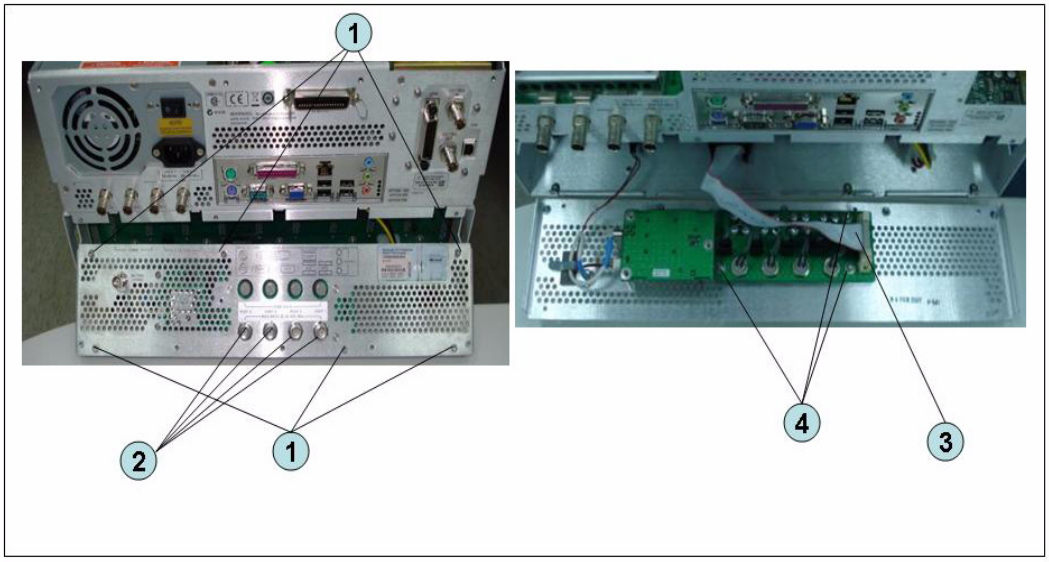
Step 2. Remove the 9/16 inch nut (item 2) fastening the rear cover.

Step 3. Remove the six TORX T10 screws (item 1) fastening the rear cover.

Step 4. Disconnect the cable (item 3) from the analog motherboard.

Step 5. Remove the three TORX T10 screw (item 4) fastening the DC Bias board.

Figure 6-35 PCA DC Bias Board Removal



Replacement Procedure

Step 1. Replace the PCA DC bias board by inverse procedure of removal.

NOTE Fasten the 9/16 inch nuts (item 2) using a open-end torque wrench.

10 MHz Oven Board (Opt. 1E5) Replacement (A5)

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 199.

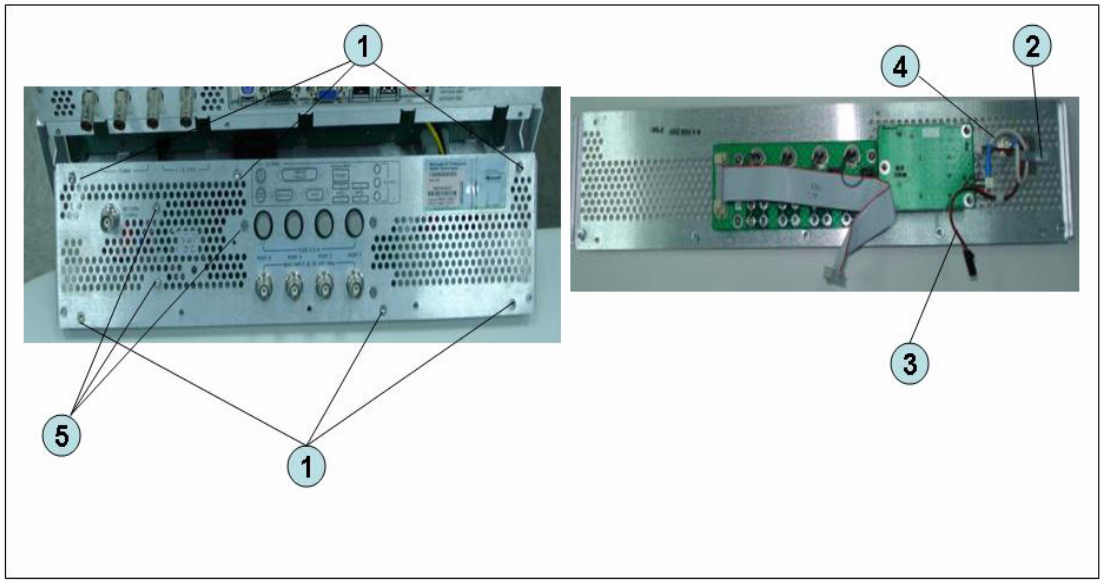
Step 2. Remove the six TORX T10 screws (item 1) fastening the rear cover.

Step 3. Release the clamped cables from the clamps (item 2) on the rear cover.

Step 4. Disconnect the cables (item 3, 4) from the oven.

Step 5. Remove the three TORX T10 screws (item 5) fastening the oven.

Figure 6-36 **10 MHz Oven Board Removal**



Replacement Procedure

Step 1. Replace the 10 MHz oven board by inverse procedure of removal.

Analog Motherboard Replacement (A50)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Open-end wrench, 5/8 inch
- Open-end torque wrench, 5/16 inch or 8mm (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)
- Torque driver set, 5/16 inch (set to 1.08 N-m / 9.5 lb-in) (for reconnecting SMA connector)

Removal Procedure

Refer to Figure 6-37 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the following assemblies.

- Front Panel Assembly (refer to "Front Panel Removal" on page 200.)
- Removable Hard Disk Assembly (refer to "Removable Hard Disk Assembly Removal (Obsolete)" on page 201.)
- Level Vernier Module (refer to "Level Vernier Module Replacement (A3)" on page 235.)
- Synthesizer Module (refer to "Synthesizer Module Replacement (A1)" on page 239.)
- Receiver Module (refer to "Receiver Module Replacement for 2-Port model (A2/A7+A9)" on page 241 or "Receiver Module Replacement for 4-Port model (A82/A87)" on page 246.)

Step 3. Remove the two TORX T10 screws (item 3) fastening the plate and remove it.

Step 4. Disconnect the flat cables connected to the analog motherboard (item 1, 2).

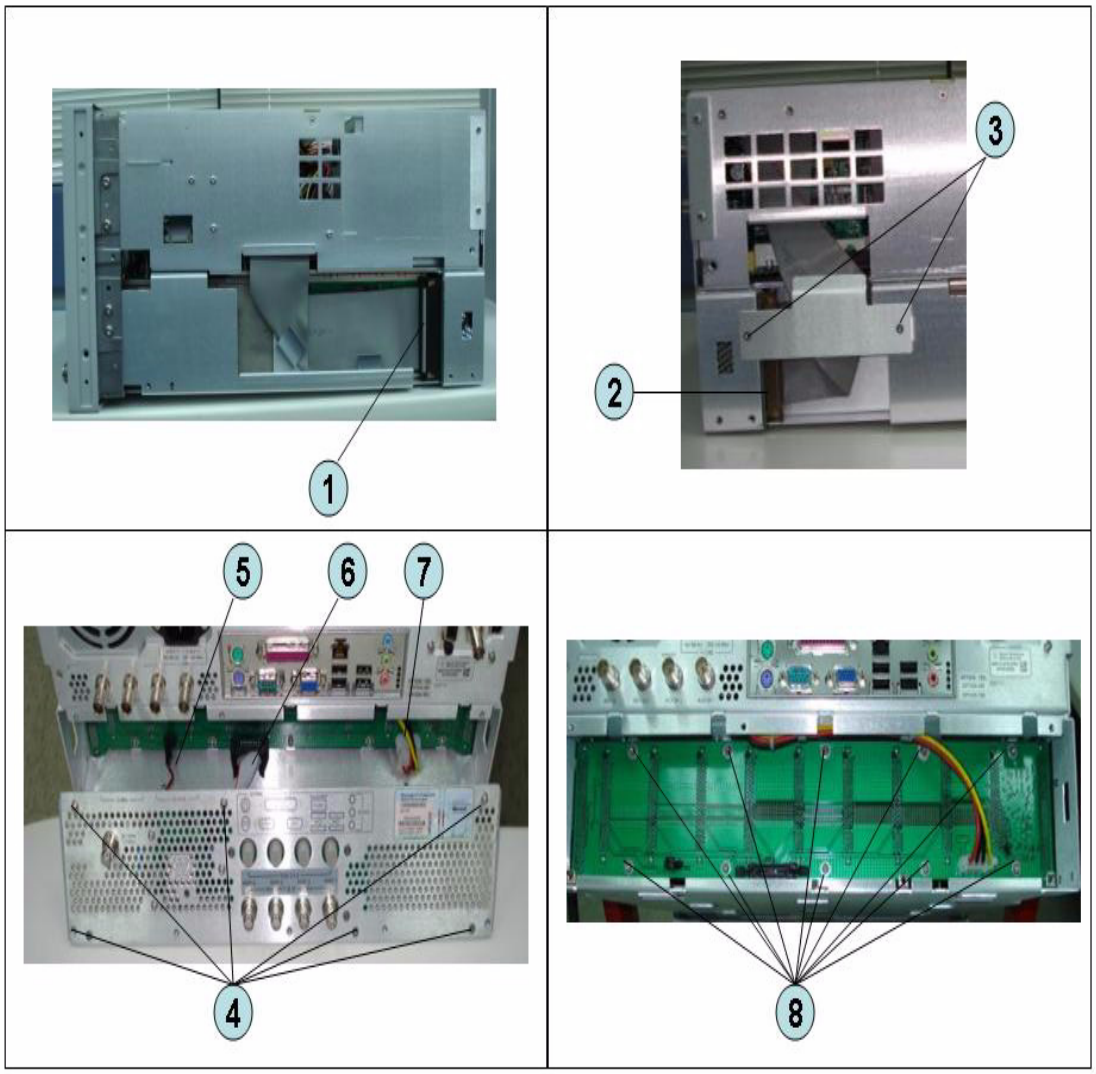
Step 5. Remove the six TORX T10 screws (item 4) fastening the rear cover.

Step 6. Disconnect the cable (item 5) connected to the analog motherboard when with option 1E5.

Step 7. Disconnect the cables (item 6, 7) connected to the analog motherboard.

Step 8. Remove the ten TORX T10 screws (item 8) fastening the analog mother board.

Figure 6-37 Analog Motherboard Removal



Replacement Procedure

Step 1. Replace the analog motherboard by inverse procedure of removal.

Front Panel Cover Removal

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver

Removal Procedure

Refer to Figure 6-38 for this procedure.

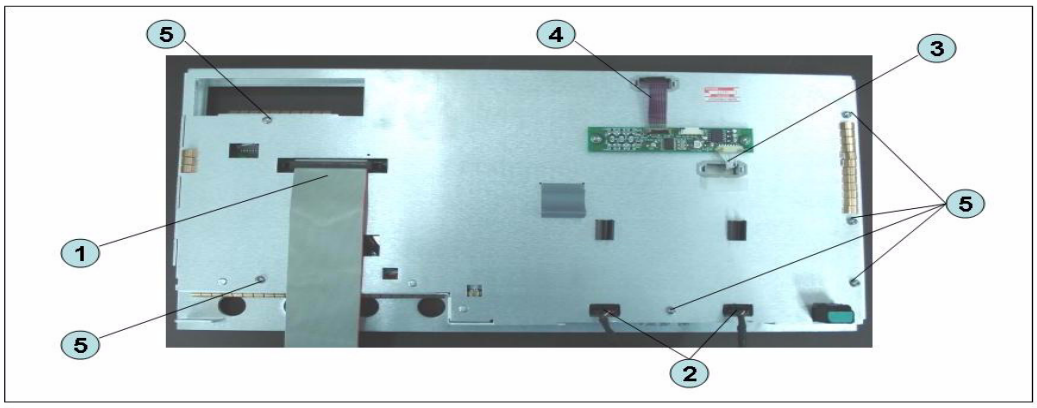
Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Disconnect the cables (item 1, 2, 3, 4) connected through the cover.

Step 4. Remove the six TORX T10 screws (item 5) fastening the cover.

Figure 6-38 Front Panel Cover Removal



Control Touch Panel Replacement

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver

Removal Procedure

Refer to Figure 6-39 for this procedure.

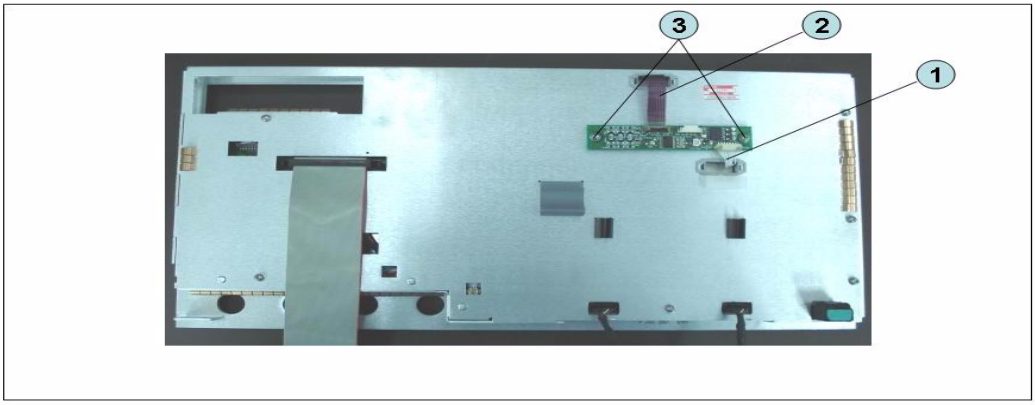
Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Disconnect the cables (item 1, 2) connected through the cover.

Step 4. Remove the two TORX T10 screws (item 3) fastening the control touch panel.

Figure 6-39 Control Touch Panel Replacement



Replacement Procedure

Step 1. Replace the control touch panel by inverse procedure of removal.

Inverter Board Replacement

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 outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Remove the front panel cover as described in "Front Panel Cover Removal" on page 266.

Step 4. Disconnect the three cables (item 1) connected front panel keyboard.

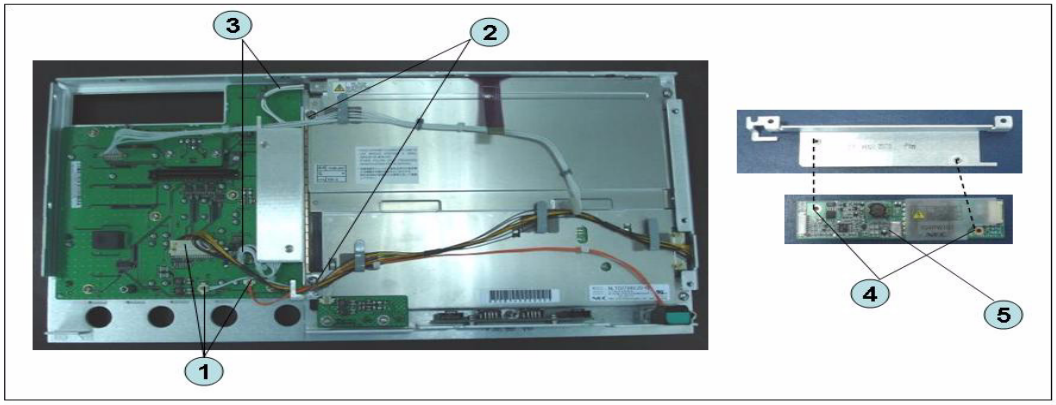
NOTE Be careful to remove the cables (item 1), and not apply any scratches on the cables.

Step 5. Remove the two TORX T15 screws (item 2) fastening the inverter assembly.

Step 6. Disconnect the two cables (item 3) connected inverter assembly.

Step 7. Remove the two TORX T8 screws (item 4) fastening the inverter to the bracket and lift it (item 5).

Figure 6-40 Inverter Board Removal



Replacement Procedure

Step 1. Replace the inverter assembly by inverse procedure of removal.

NOTE Fasten the TORX T15 screws (item 2) using a torque screwdriver (set to 1.02 N-m / 9.0 lb-in).

LCD Replacement

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver

Removal Procedure

Refer to Figure 6-41 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Remove the front panel cover as described in "Front Panel Cover Removal" on page 266.

Step 4. Remove the inverter board as described in "Inverter Board Replacement" on page 268.

Step 5. Release the clamped cables from the clamps (item 1) on the LCD.

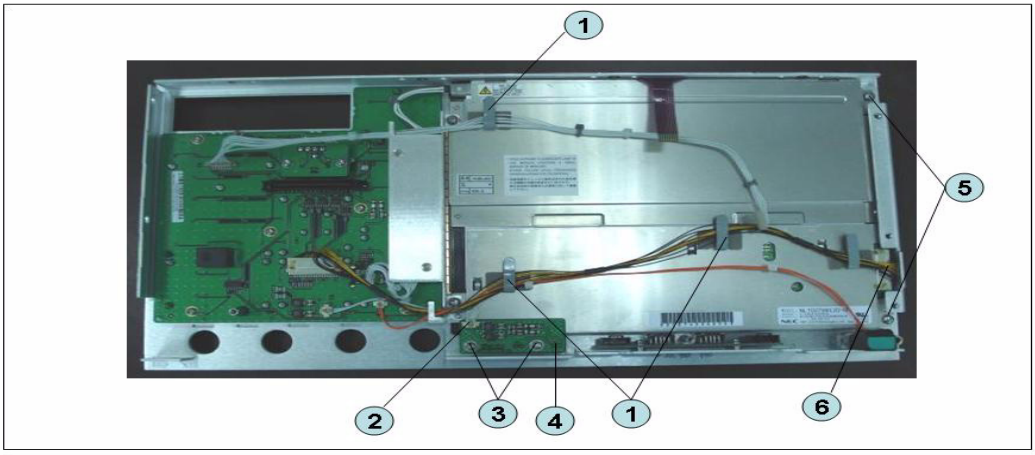
Step 6. Disconnect the cable (item 2) from the probe power.

Step 7. Remove the two TORX T10 screws (item 3) fastening the probe power and lift it (item 4).

Step 8. Remove the two TORX T15 screws (item 5) fastening the LCD to the front panel.

Step 9. Disconnect the cable (item 6) from the front panel keyboard.

Figure 6-41 LCD Removal



Replacement Procedure

Step 1. Replace the LCD by inverse procedure of removal.

NOTE Fasten the TORX T15 screws (item 5) using a torque screwdriver (set to 1.02 N-m / 9.0 lb-in).

Step 2. You have to calibrate the touch screen. Follow the procedure described on “Calibration of the Touch Screen” on page 205.

Front Panel Keyboard Replacement

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Hex key, 1.5 mm

Removal Procedure

Refer to Figure 6-42 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Remove the front panel cover as described in "Front Panel Cover Removal" on page 266.

Step 4. Remove the inverter board as described in "Inverter Board Replacement" on page 268.

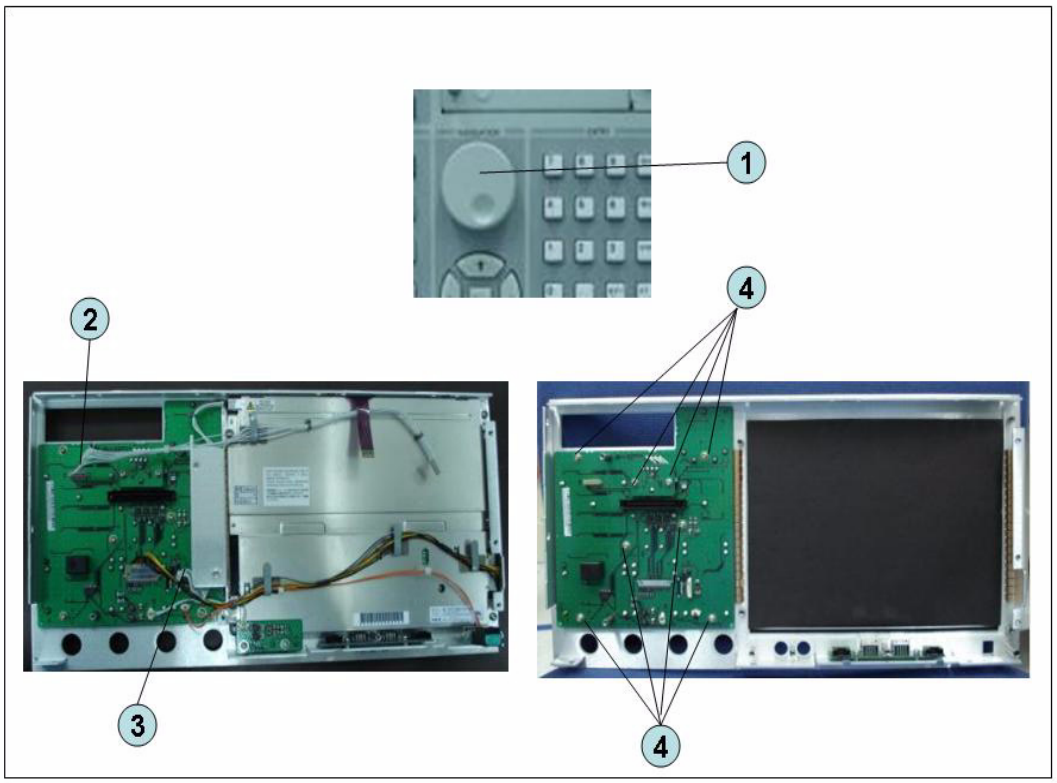
Step 5. Remove the knob (item 1) from switch rotary using the hex key.

Step 6. Disconnect the cables (item 2 and 3) from the LCD.

Step 7. Remove the eight TORX T10 screws (item 4) fastening the front panel.

Step 8. Remove the keyboard rubber from front panel keyboard.

Figure 6-42 Front Panel Keyboard Removal



Replacement Procedure

Step 1. Insert the whole jut of the rubber key into the hole on the new front panel keyboard.

Step 2. Replace the front panel keyboard by inverse procedure of removal.

NOTE Replace the keyboard rubber to new one, if it's pulled the keyboard rubber from the front panel keyboard.

Front USB Board Replacement (A55)

Tools Required

- TORX screwdriver, T10, T15, and T20
- Flat edge screwdriver
- Hex key, 1.5 mm

Removal Procedure

Refer to Figure 6-43 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

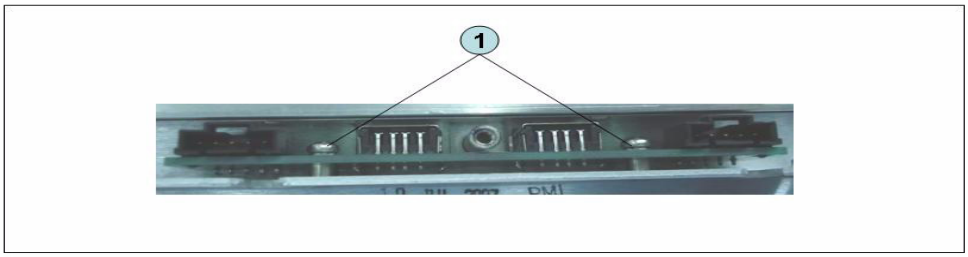
Step 3. Remove the front panel cover as described in "Front Panel Cover Removal" on page 266.

Step 4. Remove the inverter board as described in "Inverter Board Replacement" on page 268.

Step 5. Remove the LCD as described in "LCD Replacement" on page 270.

Step 6. Remove the two TORX T10 screws (item 1) fastening the front panel.

Figure 6-43 Front USB Board Replacement



Replacement Procedure

Step 1. Replace the USB board by inverse procedure of removal.

Probe Power and Power Switch Board Replacement (A56)

Tools Required

- TORX screwdriver, T8, T10, T15, and T20
- Flat edge screwdriver
- Cutting plier or scissors

Removal Procedure

Refer to Figure 6-44 for this procedure.

Step 1. Remove the outer cover as described in "Outer Cover Removal" on page 199.

Step 2. Remove the front panel as described in "Front Panel Removal" on page 200.

Step 3. Remove the front panel cover as described in "Front Panel Cover Removal" on page 266.

Step 4. Remove the Prove Power Board or Switch Board.

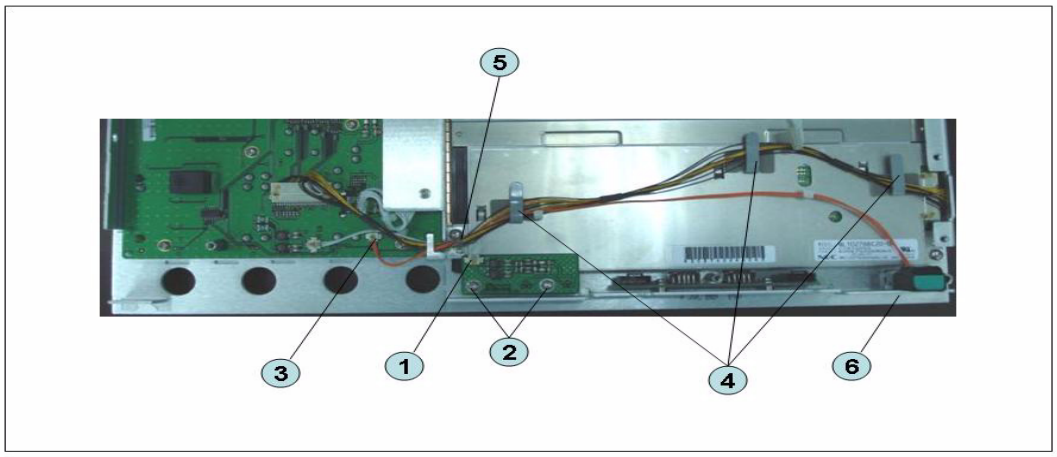
For removing the Prove Power Board.

- Disconnect the cable (item 1) from the front panel keyboard.
- Remove the two TORX T10 screws (item 2) fastening the front panel.

For removing the Switch Board.

- Disconnect the cable (item 3) connected the front panel keyboard.
- Release the clamped cables from the clamps (item 4) on the LCD.
- Cut the cable tie (item 5).
- Remove the two TORX T8 screws (item 6) fastening the angle.

Figure 6-44 Probe Power and Power Switch Board Removal



Replacement Procedure

Step 1. Replace the prove power board or switch board by inverse procedure of removal.

7 Post-Repair Procedures

This chapter lists the procedures required to verify the E5071C 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 or CPU. These are the recommended minimum procedures to ensure that the replacement is successfully completed.

It is recommended to confirm the performance executing with all of adjustment and performance tests as final step.

Table 7-1 Post-Repair Procedures for Analog Assemblies for Up to 8.5 GHz Options

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
PCI-DSP Card (A51)	Perform the following required adjustment. - Write ID - Save to Flash memory	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - AUX Input Test - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy Test - Uncorrected System Performance Test Perform "To Check the External Trigger Input" on page 94
Reference Oven Board (A5)	Perform the following required adjustment. - OCXO	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test

Table 7-1 Post-Repair Procedures for Analog Assemblies for Up to 8.5 GHz Options

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
Analog Base Module (A6)	Perform the following required adjustment. - AUX Input - Frequency Reference	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - AUX Input Test - Frequency Accuracy Test
Synthesizer Module (A1)	Perform the following required adjustment. - Synthesizer Gain - Source Output Power - Receiver Port Characteristics - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy test - Uncorrected System Performance Test
Receiver Module (A2)	Perform the following required adjustments. - Source Output Power - Receiver IF Range - Receiver Port Characteristics - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic accuracy test - Uncorrected system performance

Table 7-1 Post-Repair Procedures for Analog Assemblies for Up to 8.5 GHz Options

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
Level Vernier Module (A3)	Perform the following required adjustments. - Source Output Power - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy test - Uncorrected System Performance Test
Distributer Module (A4)	Perform the following required adjustments. - Source Output Power - Receiver Port Characteristics - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy test - Uncorrected System Performance Test

Table 7-1 Post-Repair Procedures for Analog Assemblies for Up to 8.5 GHz Options

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
T2 Switch	Perform the following required adjustments - Source Output Power - Receiver Port Characteristics - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy test - Uncorrected System Performance Test

Table 7-2 Post-Repair Procedures for Analog Assemblies for Over 8.5 GHz Options

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
PCI-DSP Card (A51)	Perform the following required adjustment. - Write ID - Save to Flash memory	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - AUX Input Test - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy Test - Uncorrected System Performance Test Perform "To Check the External Trigger Input" on page 94

Table 7-2 Post-Repair Procedures for Analog Assemblies for Over 8.5 GHz Options

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
Reference Oven Board (A5)	Perform the following required adjustment. - OCXO	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test
Analog Base Module (A6)	Perform the following required adjustment. - AUX Input - Frequency Reference	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - AUX Input Test - Frequency Accuracy Test
Synthesizer Module (A1)	Perform the following required adjustment. - Synthesizer Gain - Source Output Power - Receiver Port Characteristics - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy test - Uncorrected System Performance Test

Table 7-2 Post-Repair Procedures for Analog Assemblies for Over 8.5 GHz Options

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
Receiver Module (A7)	Perform the following required adjustments. - Source Output Power - Receiver IF Range - Receiver Port Characteristics - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic accuracy test - Uncorrected system performance
Front End Module (A9)	Perform the following required adjustments - Source Output Power - Receiver Port Characteristics - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Uncorrected System Performance Test
Doubler Module (A86)	Perform the following required adjustments. - Source Output Power - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy Test

Table 7-2 Post-Repair Procedures for Analog Assemblies for Over 8.5 GHz Options

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
Distributer Module (A4)	Perform the following required adjustments. - Receiver IF Range - Receiver Port Characteristics - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy test - Uncorrected System Performance Test
Imix	Perform the following required adjustments - Source Output Power - Receiver Port Characteristics - Receiver Absolute Gain	Perform "To Execute the diagnostics Test" on page 79 Perform the following performance test. - Frequency Accuracy Test - RF Output Level Accuracy and Flatness Test - RF Output Level Linearity Test - Trace Noise Test - Crosstalk Test - System Dynamic Range Test - Noise Floor Test - Dynamic Accuracy test - Uncorrected System Performance Test

Table 7-3 Post-Repair Procedures for Digital Assemblies

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
CPU Mother board Assembly (A01)	Perform "To configure the CPU Mother Board Assembly and BIOS" on page 109.	Inspect the Booting Process

Table 7-3 Post-Repair Procedures for Digital Assemblies

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
PCA Front Key (A52)	No adjustment needed	Perform "To Execute the diagnostics Test" on page 79 Perform "To Check the Front Panel" on page 92
Handler I/O Board (A23)	No adjustment needed	Perform "To Execute the diagnostics Test" on page 79
GPIB Board	No adjustment needed	Perform "To Check the GPIB" on page 94
USB Interface Card	No adjustment needed	Perform "To Check the USB Interface Card" on page 94
PCA Digital Board (A53)	No adjustment needed	Inspect the Booting Process Perform "To Execute the diagnostics Test" on page 79 Perform "To Check the Video Output" on page 94
Removable Hard Disk Drive	Calibration of the Touch Screen.	Inspect the Booting Process
Power Supply Assembly	No adjustment needed	Inspect the Booting Process
LCD TPANEL Assembly	Calibration of the Touch Screen	Inspect the Booting Process Perform "To Execute the diagnostics Test" on page 79 Perform "To Check the LCD" on page 93

Post-Repair Procedures

A Manual Changes

This appendix contains the information required to adapt this manual to versions or configurations of the E5071C manufactured earlier than the current printing date of this manual. The information in this manual applies directly to E5071C units with the serial number that is printed on the title page of this manual.

Manual Changes

To adapt this manual to your E5071C, 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

B System Recovery

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

System Recovery

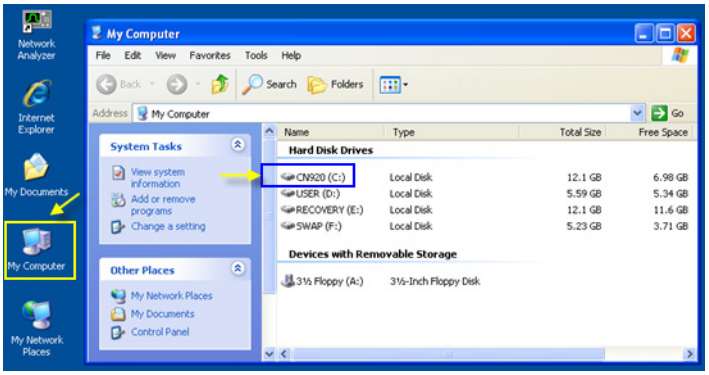
By executing system recovery, you can return the system of the E5071C (the Windows operating system) to the factory state (at the time of purchase[*1]).

NOTE System recovery is a function of Windows and not a function of the E5071C Firmware.

The system recovery procedure is different in accordance with the HDD revision. The HDD revision can be checked using the following procedure:

Step 1. In E5071C, from Windows Start Menu, click on My Computer.

Step 2. The volume label for C: drive is displayed in Hard Disc Drive area.



CAUTION Strictly follow the steps described below. If you do any operation other than the following steps, the system may not be recovered.

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 (available only when HDD revision is CN924 or below)

  Returns the contents of the C and D drives to a user-specified state. To use this function, you must prepare for recovery in advance. For information on the preparation, see "Procedure to execute the factory recovery (HDD Revision: CN924 or below)" on page 299 for information on the execution, see "Procedure to execute the factory recovery (HDD Revision: CN924 or below)" on page 299.

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

Notes on executing the factory recovery function

Executing the factory recovery function causes the following conditions:

- In addition to the Windows operating system, the following settings of the E5071C are returned to the factory 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.
- The firmware revision you installed remains even if you perform factory recovery.

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 “Backing Up the Data” as described in E5071C Online Help.

Procedure to execute the factory recovery (HDD Revision: CFxxx or CHxxx)

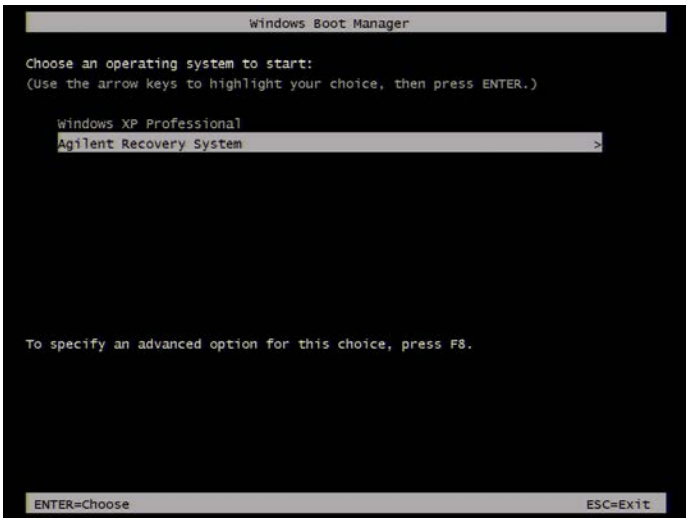
NOTE The recovery function for Factory image is only loaded.

The User back up function is not available.

Step 1. Turn ON the E5071C.

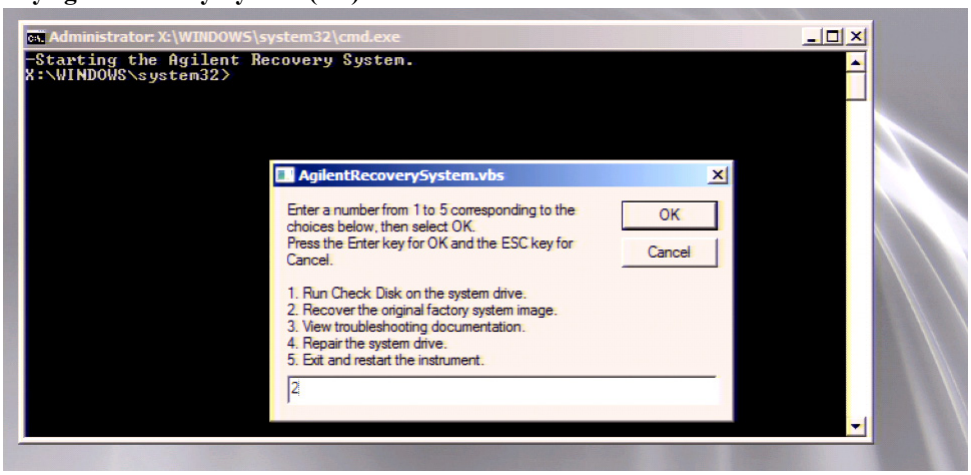
Step 2. The Windows Boot Manager is displayed. Use the downward arrow key to select "Keysight Recovery System" and press Enter.

Figure B-1 **Windows Boot Manager**



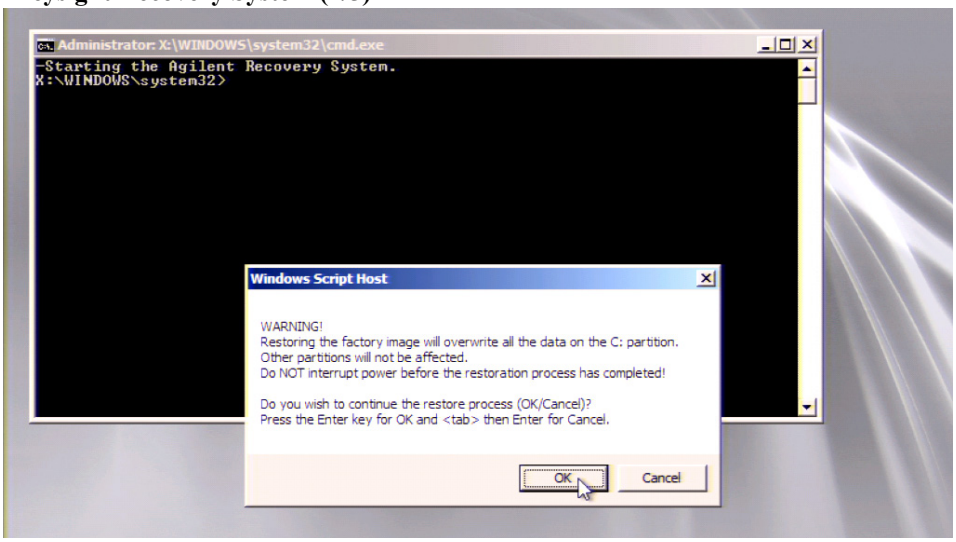
Step 3. Windows XP starts up and "Keysight Recovery System" window is displayed. Type 2 to select **Recover the original factory system image** and press Enter.

Figure B-2 **Keysight Recovery System (1/5)**



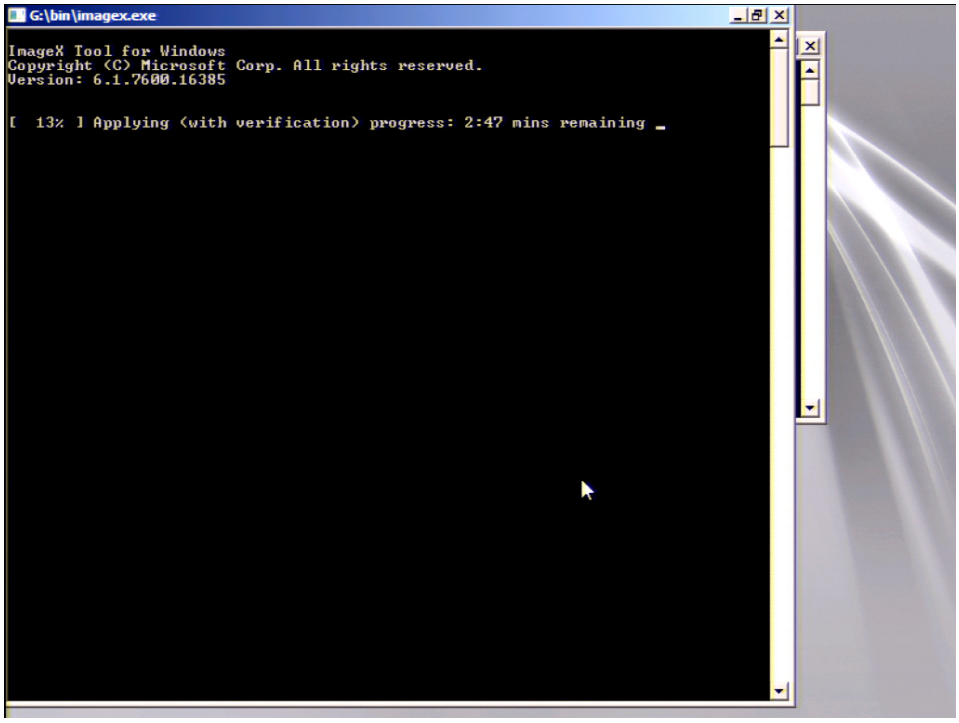
Step 4. A confirmation message appears. Click OK to continue.

Figure B-3 **Keysight Recovery System (2/5)**



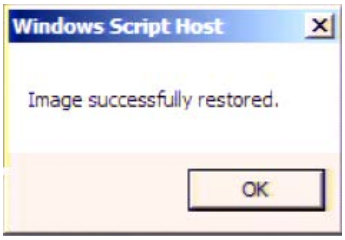
Step 5. The progress of the system configuration is displayed on the screen. The recovery takes a few minutes depending on the amount of data.

Figure B-4 **Keysight Recovery System (3/5)**



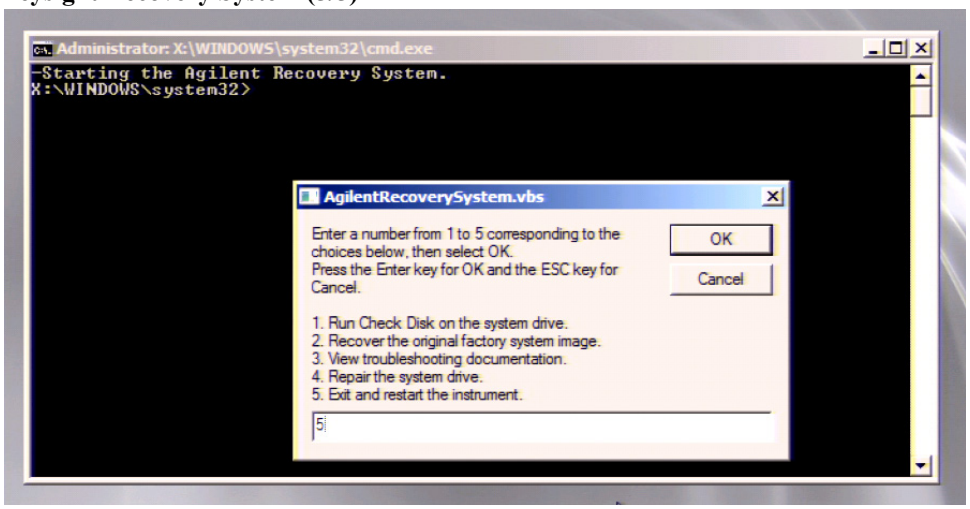
Step 6. A message box appears at the completion of the recovery process. Click OK. The E5071C restarts automatically.

Figure B-5 **Keysight Recovery System (4/5)**



Step 7. Type 5 to select Exit and restart the instrument and press Enter..

Figure B-6 **Keysight Recovery System (5/5)**



Step 8. After restart, execute initial registration. For information on the execution procedure, refer to “Initial Registration Procedure (HDD Revision: CFxxx or CHxxx)” on page 318.

NOTE If the touch screen does not work after System Recovery, refer to “Reconfiguring Touch Panel Settings” on page 324.

Procedure to execute the factory recovery (HDD Revision: CN925 or above)

NOTE The recovery function for Factory image is only loaded.

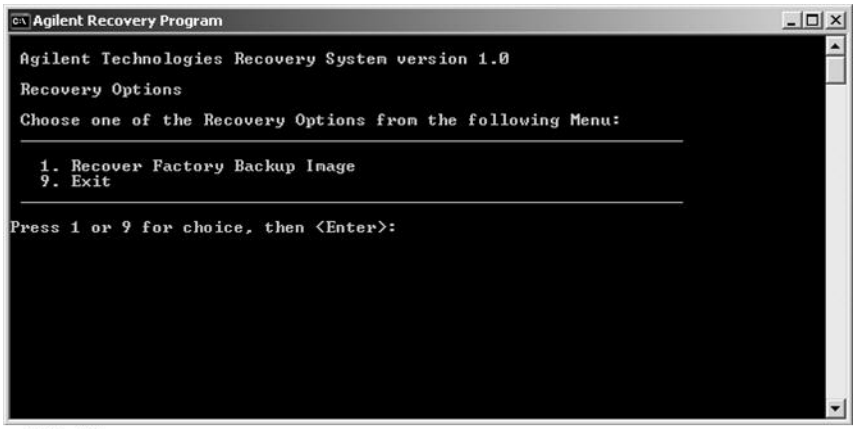
The User back up function is not available.

Step 1. Turn ON the E5071C.

Step 2. The boot option is displayed. Use the downward arrow key to select the “Keysight Recovery Solution” and press Enter

Step 3. Windows PE starts up and “Keysight Recovery Program” window is displayed. Press 1, and then press Enter.

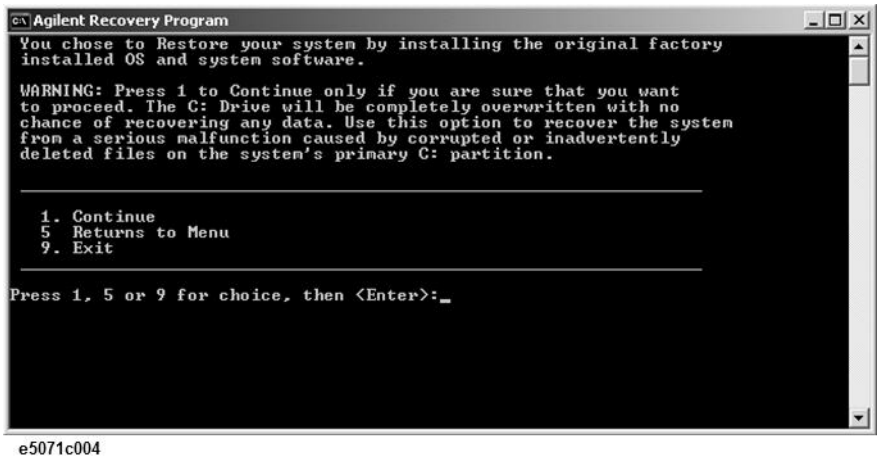
Figure B-7 Keysight Recovery Program(1/4)



e5071cs003

Step 4. A warning message is displayed. Press 1, and then press Enter.

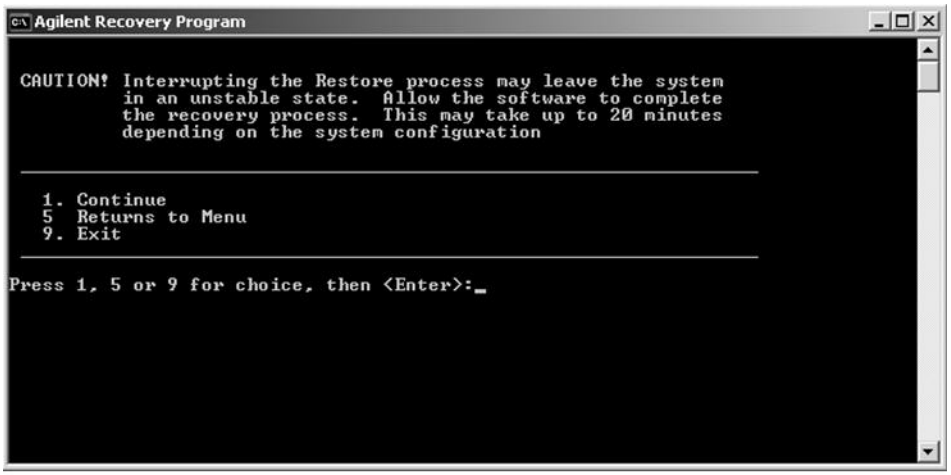
Figure B-8 Keysight Recovery Program(2/4)



e5071c004

Step 5. Caution is displayed. Press 1, and then press Enter.

Figure B-9 **Keysight Recovery Program(3/4)**

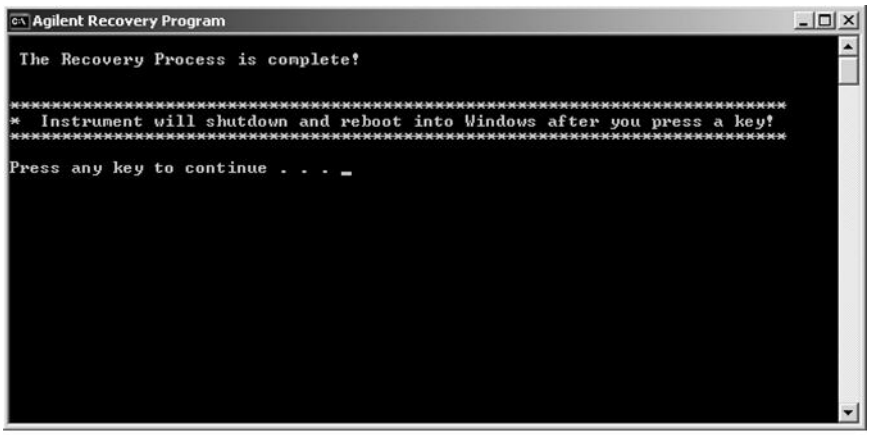


e5071c005

Step 6. Recovery function is performed.

Step 7. A message box appears after the completion of recovery process. Press any key to continue.

Figure B-10 **Keysight Recovery Program(4/4)**



e5071cs006

Step 8. When the recovery is finished, E5071C restarts.

Step 9. After restart, the screen for initial registration appears. Execute initial registration. For information on the execution procedure, refer to "Initial Registration Procedure (HDD Revision: CN925 or above)" on page 321.

NOTE If the touch screen does not work after System Recovery, refer to "Reconfiguring Touch Panel Settings" on page 324.

Procedure to execute the factory recovery (HDD Revision: CN924 or below)

This section describes how to return the contents of the C drive to the factory state.

NOTE You need a keyboard for this operation.

Step 1. Shut down the E5071C.

Step 2. Disconnect all of the USB device from the USB ports.

Step 3. Connect the keyboard to the E5071C.

Step 4. Press the standby switch of the E5071C to turn it on.

Step 5. When the screen as shown in the figure below appears, press F11 of the keyboard.

e5071cse1055

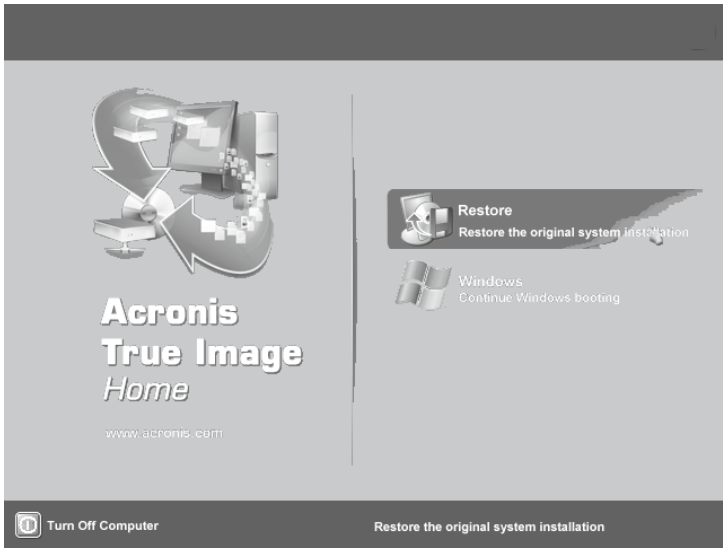
CAUTION Press F11 only once. If you press F11 twice or more and a screen which is not mentioned in this manual appears, reboot the instrument and restart the process from the first.

NOTE After several seconds, the next screen appears automatically even if you do not press any key, so do not miss it.

NOTE After Step 5, if the E5071C freezes with the cursor does not blink, turn the off and remove unnecessary USB devices. Then, replace the keyboard with a PS/2 keyboard to execute the process again.

Step 6. Select **Restore**.

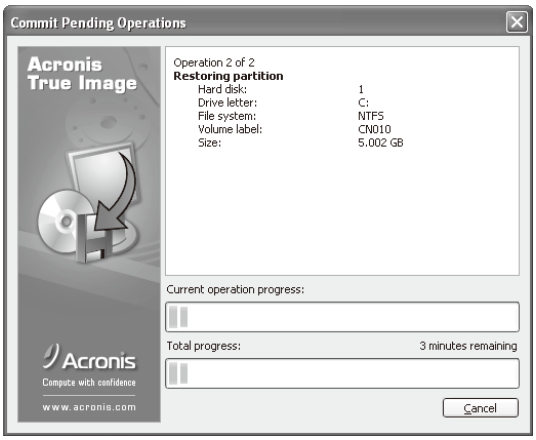
Figure 0-1 **Activate Acronis Startup Recovery Manager**



e5071cse1079

Step 7. A confirmation dialog box is displayed. Push the enter to select **Yes** to start the recovery of the factory backup. The recovery takes a few minutes depending on the amount of data.

Figure 0-2 **Recover Factory Backup**



e5071cse1034

Step 8. When the recovery is finished, push the enter select OK. The E5071C restarts automatically.

Step 9. After restart, the screen for initial registration appears. Execute initial registration. For information on the execution procedure, refer to "Initial Registration Procedure (HDD Revision: CN924 or below)" on page 326.

Step 10. Execute the calibration of the touch screen. For information on the execution procedure, refer to "Calibration of the Touch Screen" on page 328.

CAUTION **Never turn off the power during the system recovery because doing so may cause serious damage to the E5071C.**

Procedure to create the user backup image (HDD Revision: CN924 or below)

This section describes how to create the user backup image. The C and D drives' contents saved in this procedure are recalled when the user recovery function is executed.

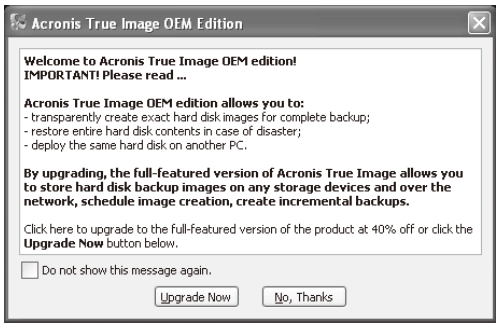
Step 1. Close the E5071C application by pressing **System** > Service Menu > Exit.

Step 2. Close all other applications you currently open.

Step 3. From the Windows start menu, select All Programs > Acronis > Acronis True Image.

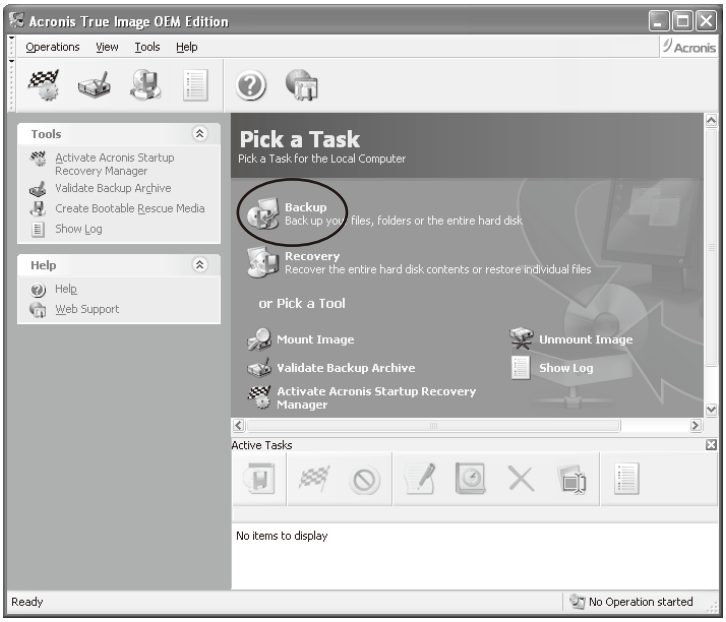
Step 4. Click "No, Thanks" button.

Figure 0-3 **Recover User Backup**



e5071cse1080

Step 5. Click **Backup**

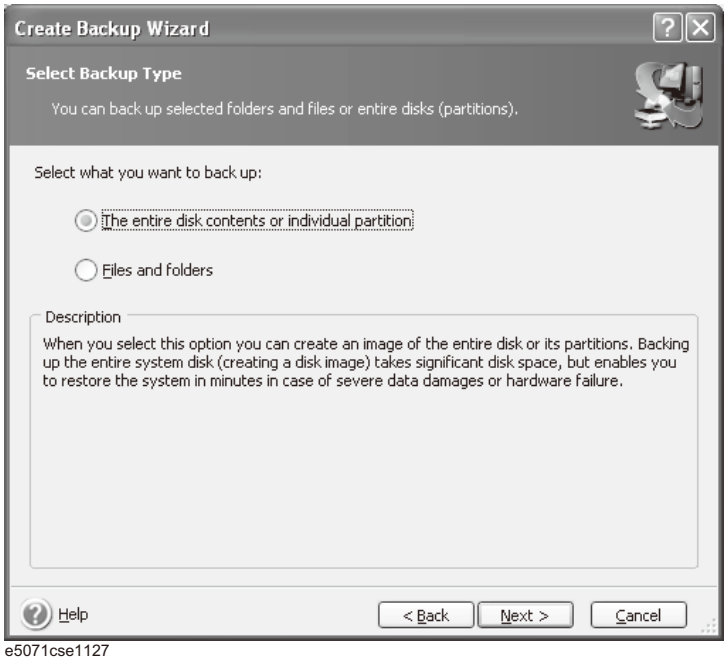


e5071cse1125

Step 6. Click **Next** button.

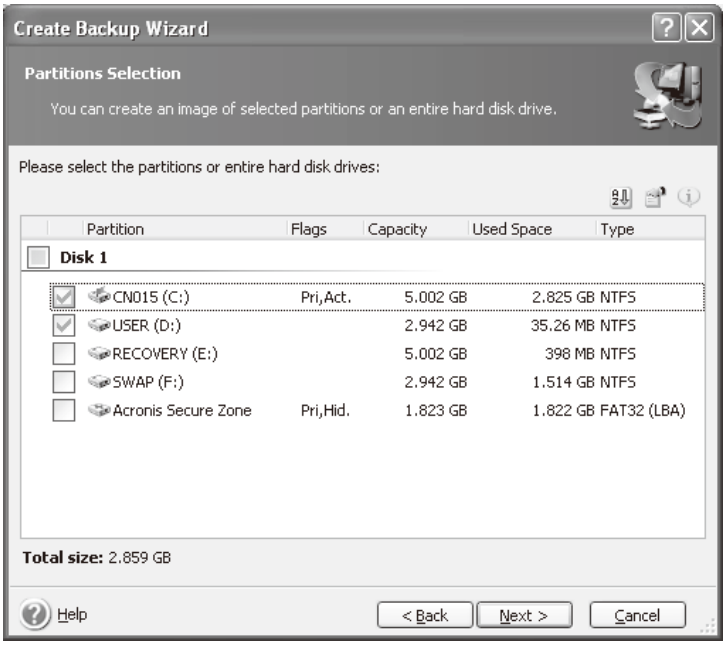
e5071cse1126

Step 7. Select "The entire disk contents or individual partition," then click **Next** button.



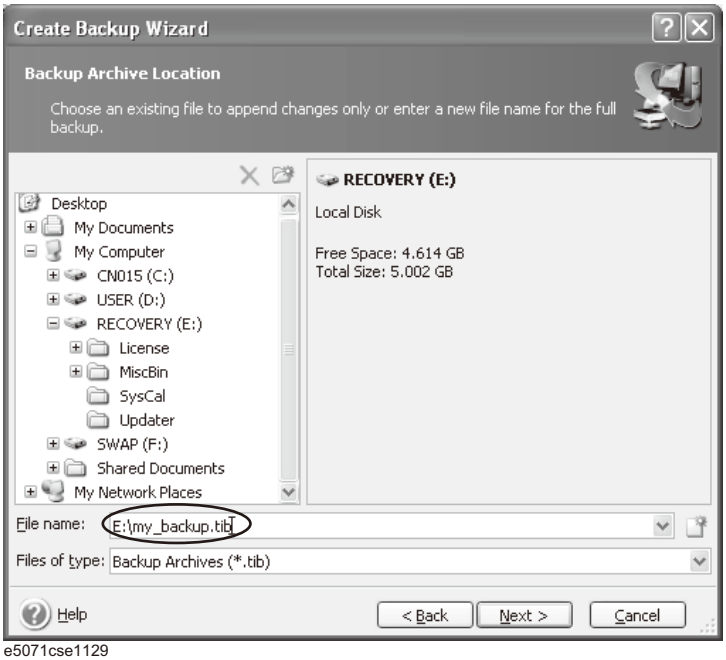
e5071cse1127

Step 8. Select the C drive and D drive.



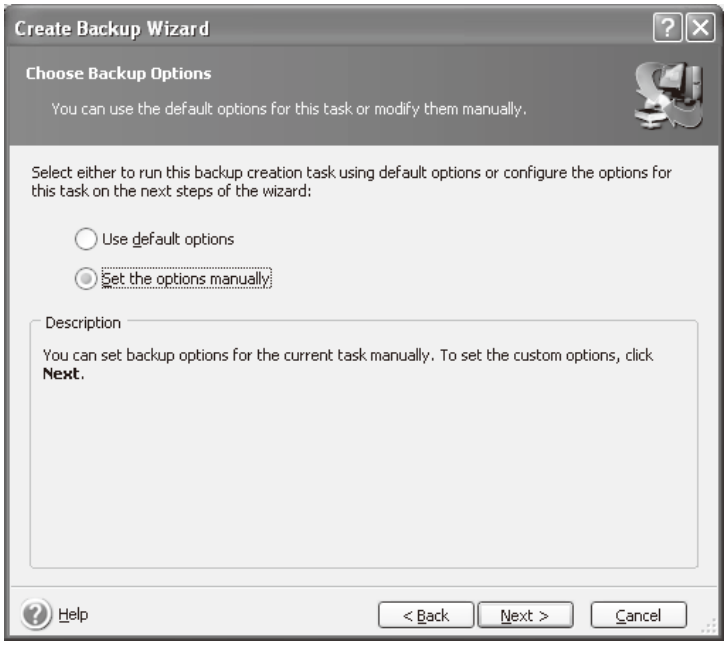
e5071cse1128

Step 9. Select the destination folder and input a file name, then click **Next** button. It is recommended to save the file to a directory which has enough space like the E drive. Also, never save the contents of the drive to the C, D or F drive.



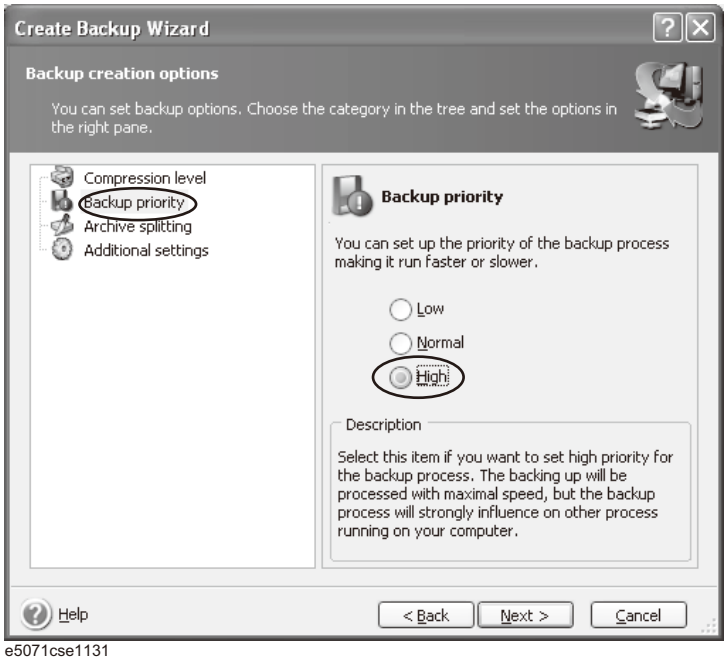
e5071cse1129

Step 10. Select “Set the options manually” and click **Next** button.



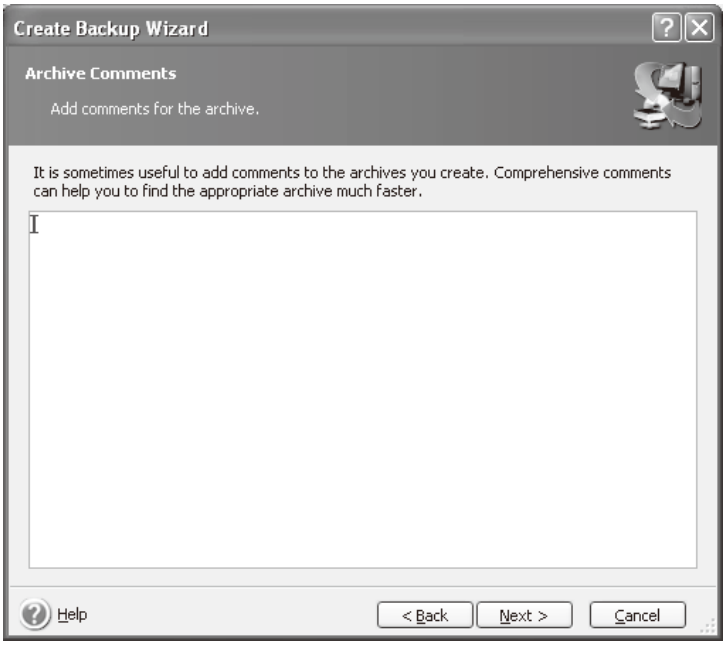
e5071cse1130

Step 11. Select “Backup priority” in the left field and “High” in the right field, then click **Next** button.



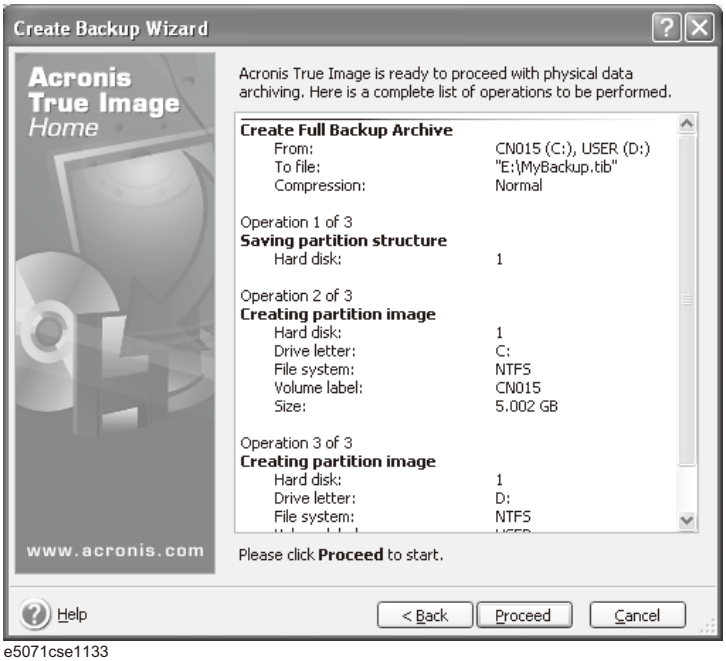
e5071cse1131

Step 12. If necessary, input comments and click **Next** button. The comments can be omitted.



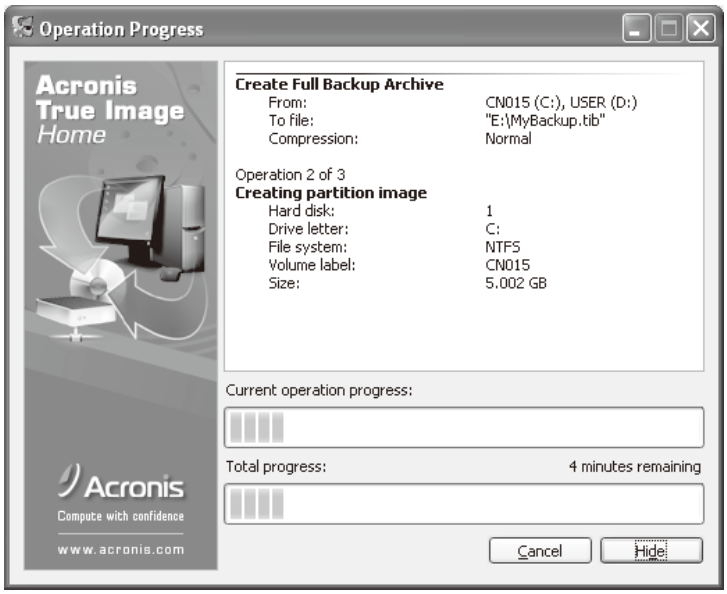
e5071cse1132

Step 13. Click **Proceed** button.



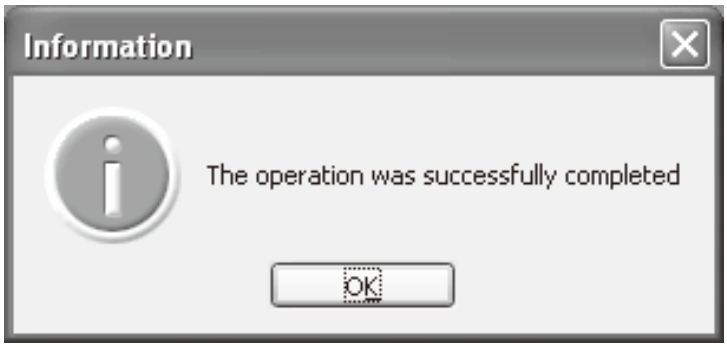
e5071cse1133

Step 14. The following screen appears during backup.



e5071cse1134

Step 15. The following screen appears when the user backup image was created. Click **OK**.



e5071cse1135

CAUTION **Never turn off the power during creating the user backup image because doing so may cause serious damage to the E5071C.**

Procedure to execute the user recovery function (HDD Revision: CN924 or below)

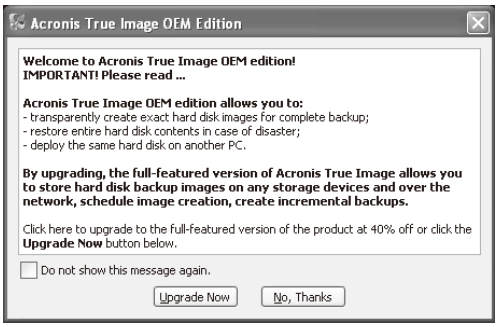
Returns the contents of the C and D drives to a user-specified state. To use this function, you must create the user backup image in advance. For more information, see the description "Procedure to create the user backup image (HDD Revision: CN924 or below)" on page 301.

Step 1. Close the E5071C application by pressing **System** > Service Menu > Exit.

Step 2. Close all other applications you currently open.

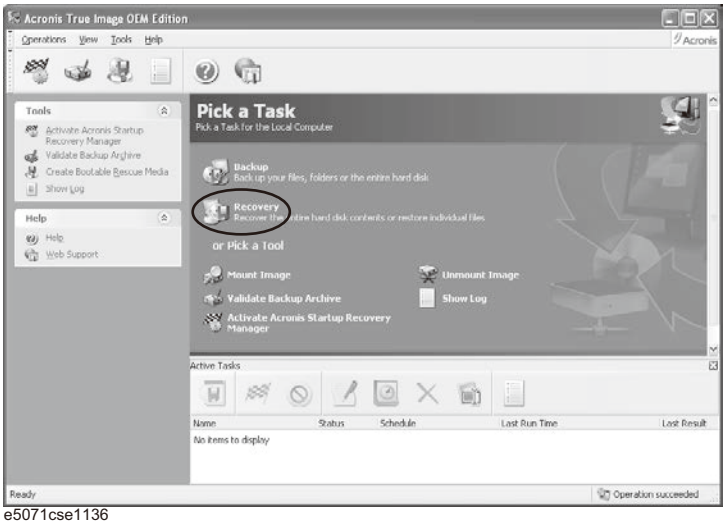
Step 3. From the Windows start menu, select All Programs > Acronis > Acronis True Image.

Step 4. Click "No, Thanks" button.



e5071cse1080

Step 5. Click **Recovery**.

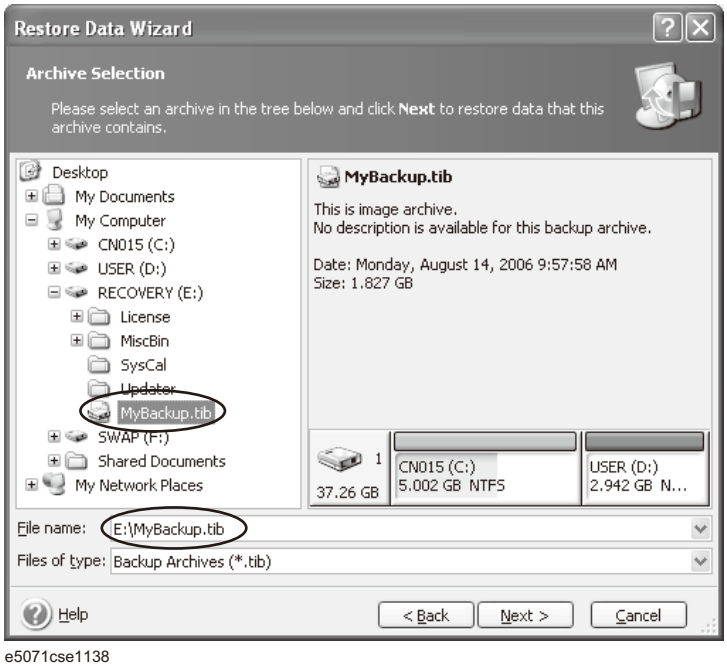


e5071cse1136

Step 6. Click **Next** button.

e5071cse1137

Step 7. Select the saved backup image file, then click **Next** button.

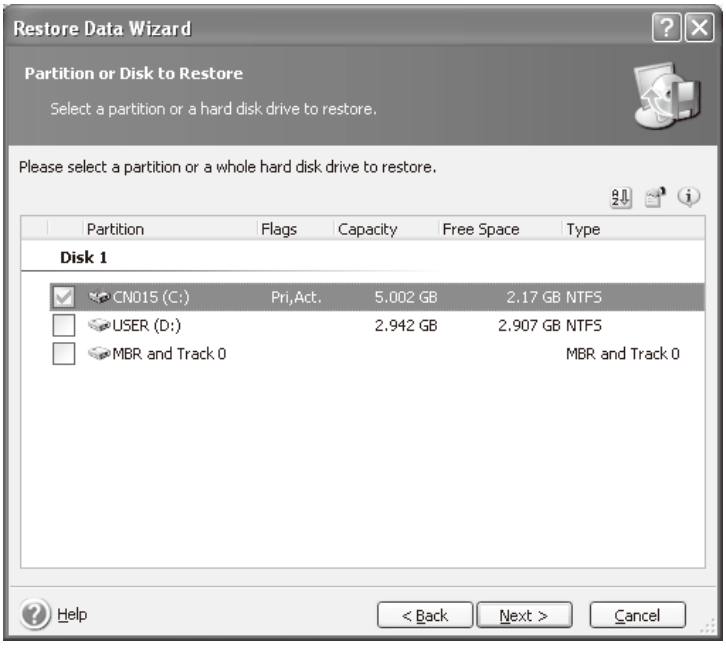


e5071cse1138

Step 8. Select “Restore disks or partitions,” then click **Next** button.

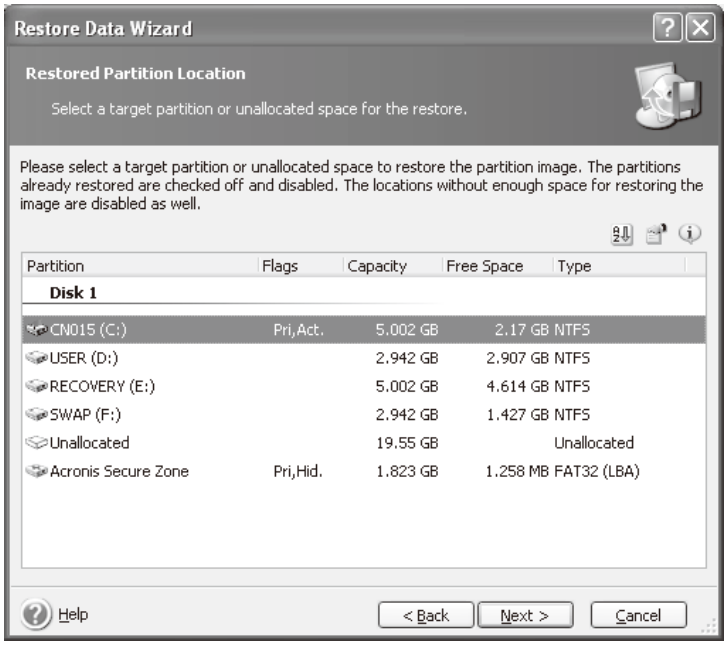
e5071cse1139

Step 9. Select the C drive, then click **Next** button.



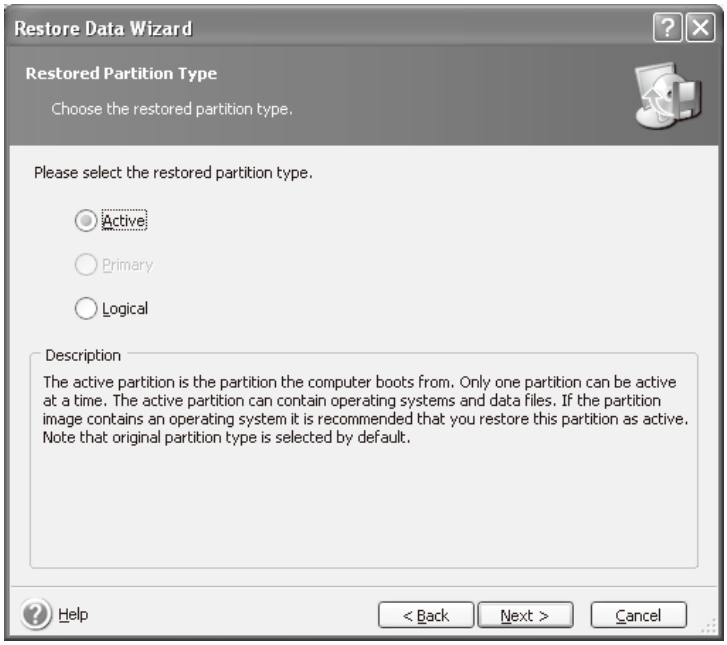
e5071cse1143

Step 10. Select the C drive to restore, then click **Next** button.



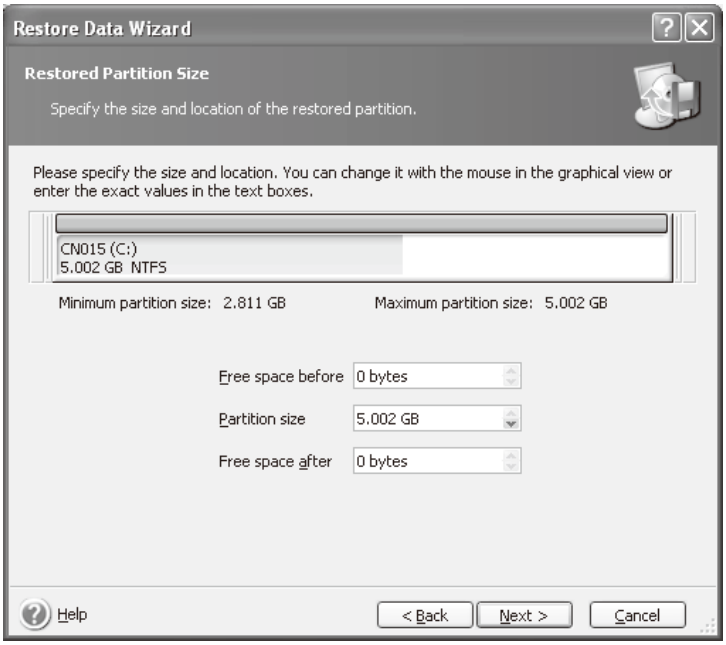
e5071cse1144

Step 11. Select "Active" and click **Next** button.



e5071cse1145

Step 12. Click **Next** button.

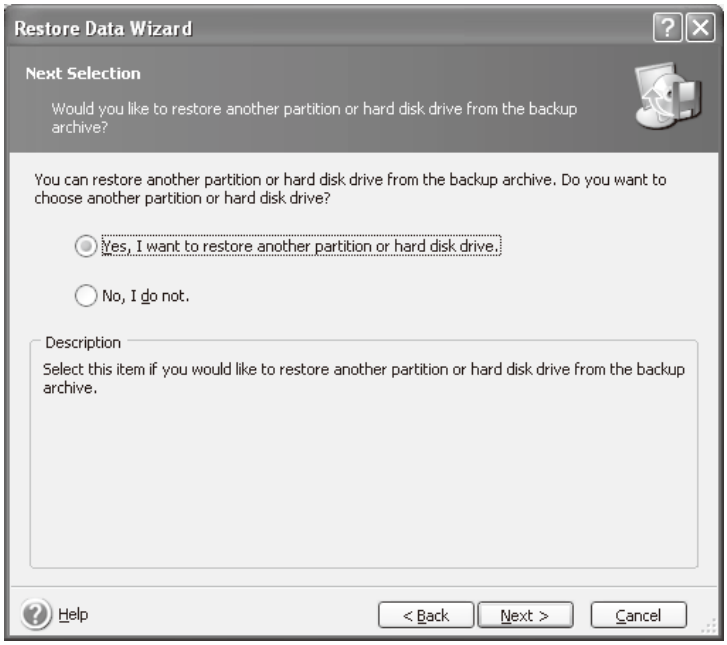


e5071cse1146

Step 13. Select "Yes, I want to assign a logical drive letter to the restored partition" and click **Next** button.

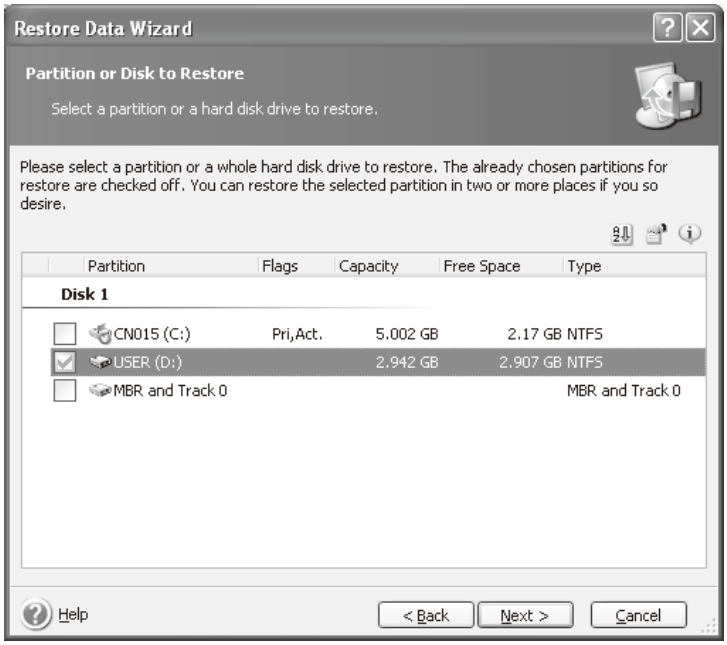
e5071cse1147

Step 14. Select "Yes, I want to restore another partition or hard disk drive," then click **Next** button.



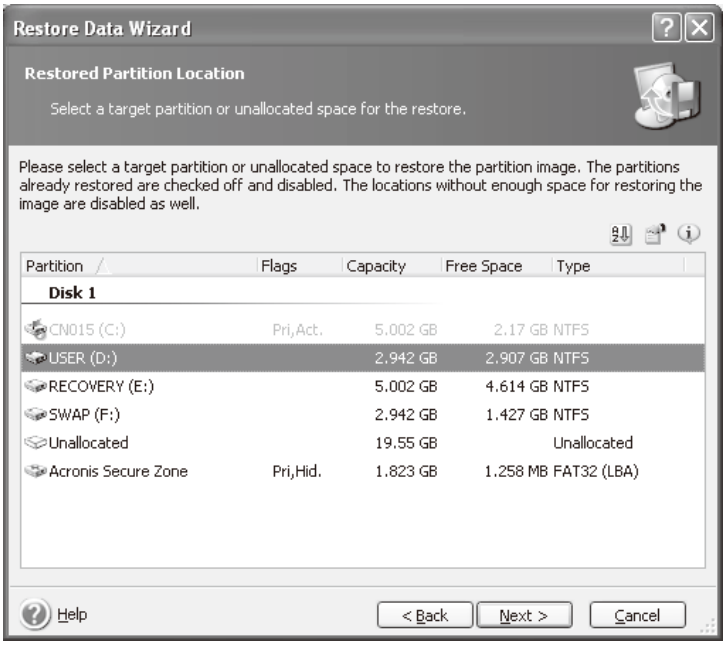
e5071cse1148

Step 15. Select the D drive to restore, then click **Next** button.



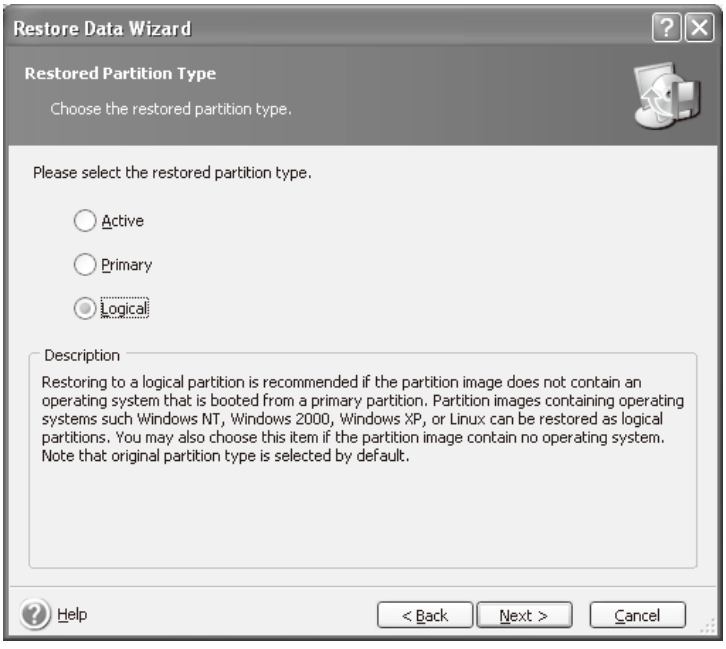
e5071cse1149

Step 16. Select the D drive to restore, then click **Nex**t button.



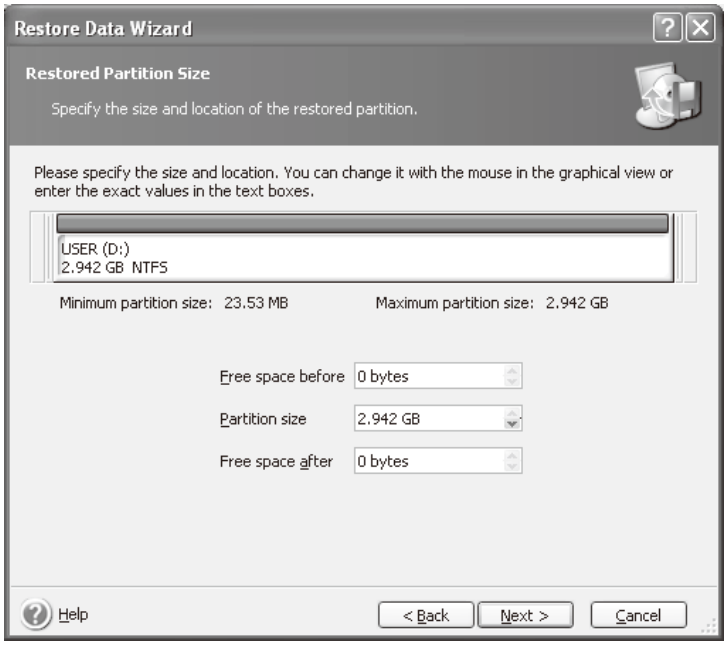
e5071cse1150

Step 17. Select "Logical" and click **Next** button.



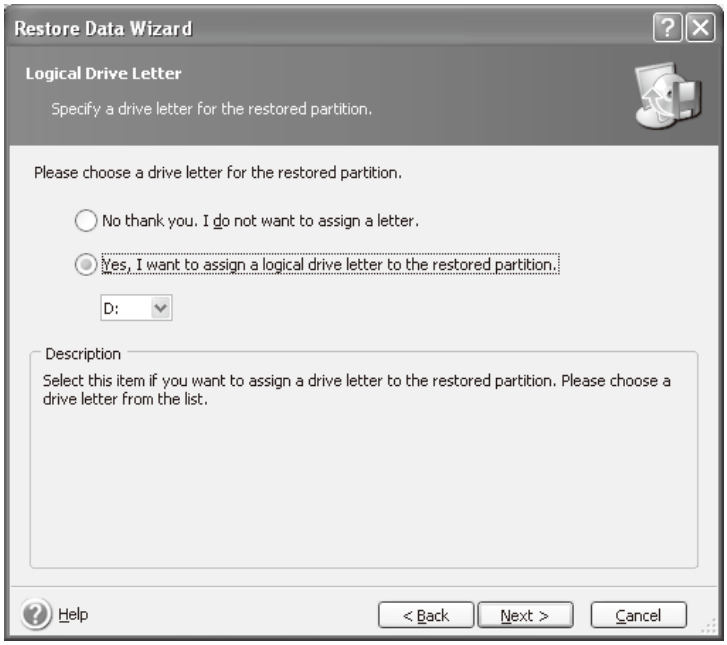
e5071cse1151

Step 18. Click **Next** button.



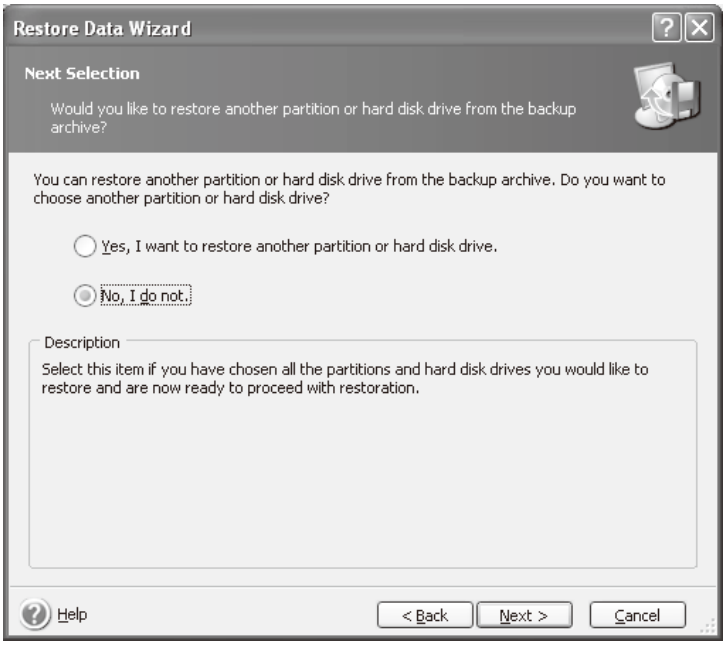
e5071cse1152

Step 19. Select "Yes, I want to assign a logical drive letter to the restored partition," then click **Next** button.



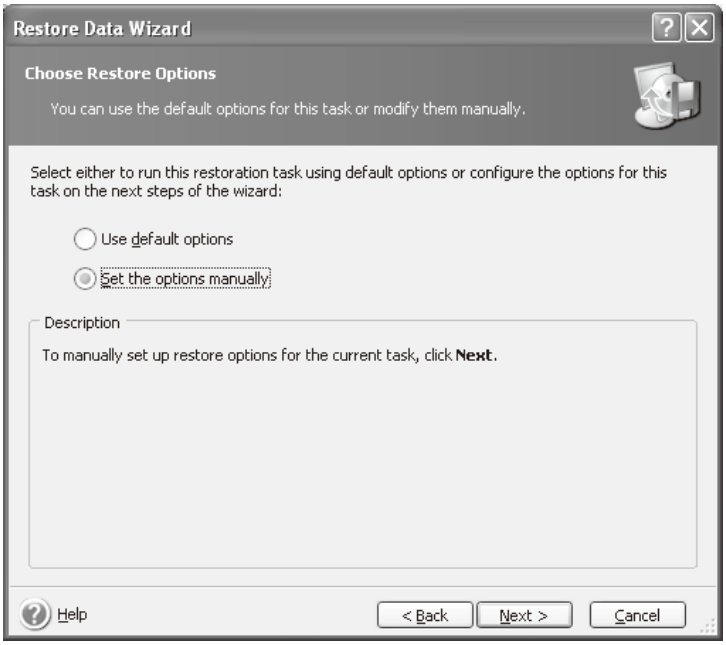
e5071cse1153

Step 20. Select “No, I do not.” and click **Next** button.



e5071cse1154

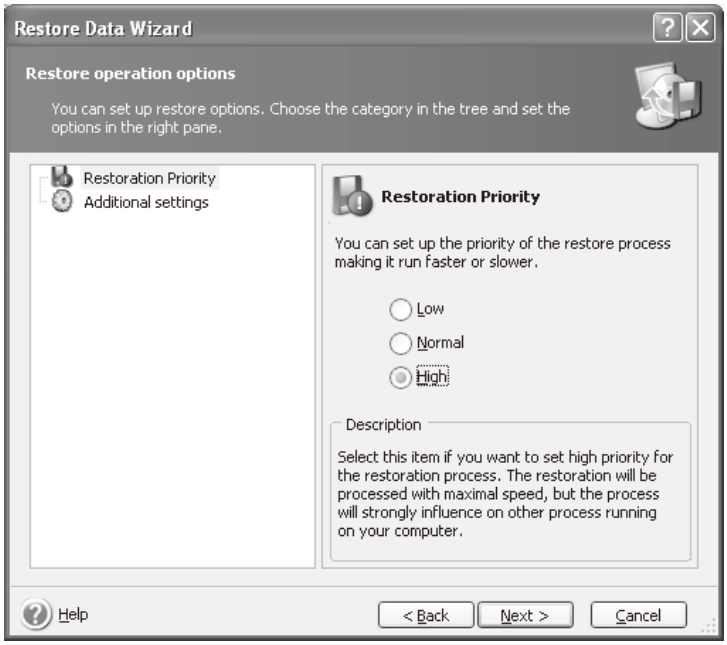
Step 21. Select “Set the options manually” and click **Next** button.



e5071cse1155

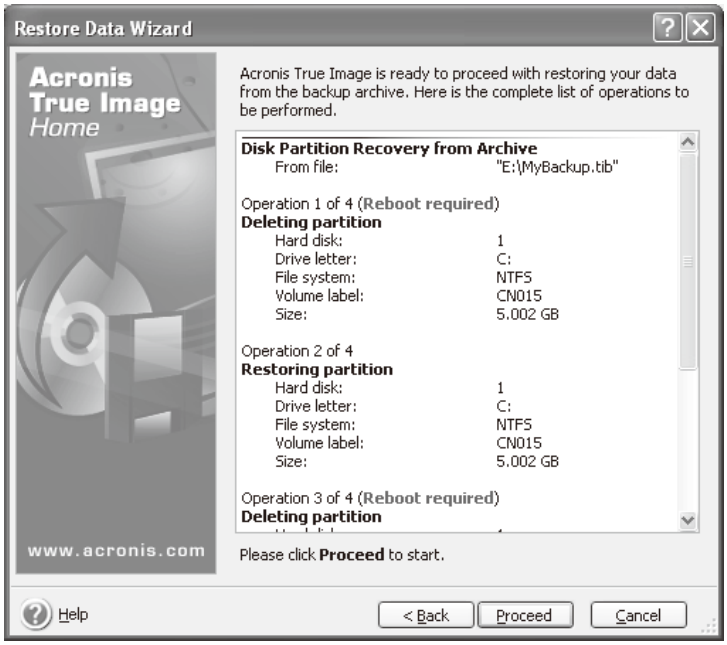
Step 22. Select “Restoration Priority” in the left field and “High” in the right field, then click **Next**

button.



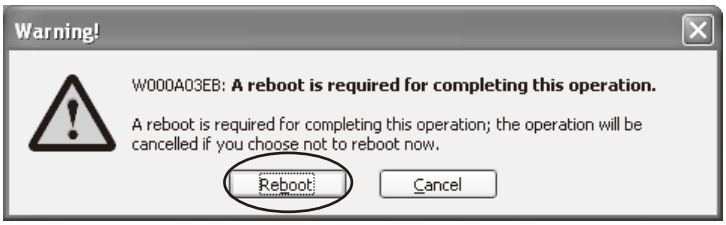
e5071cse1156

Step 23. Click **Proceed** button.



e5071cse1157

Step 24. Click **Reboot** button.



e5071cse1158

CAUTION **Never turn off the power during the recovery of the user backup image because doing so may cause serious damage to the E5071C.**

Step 25. After boot up, perform "Initial Registration of E5071C" on page 318 and "Calibration of the Touch Screen" on page 328.

Initial Registration of E5071C

When you start up the E5071C at the first time, you need to perform the initial registration of the Windows XP operating system of the E5071C. There are two procedures in accordance with the HDD revision.

NOTE It is not possible to check the HDD revision installed on your E5071C before Windows is booted. Therefore you should follow the procedure which you see on the E5071C.

NOTE You cannot use the front panel keys during the initial registration of the E5071C therefore connect the mouse and the keyboard before turning on the power.

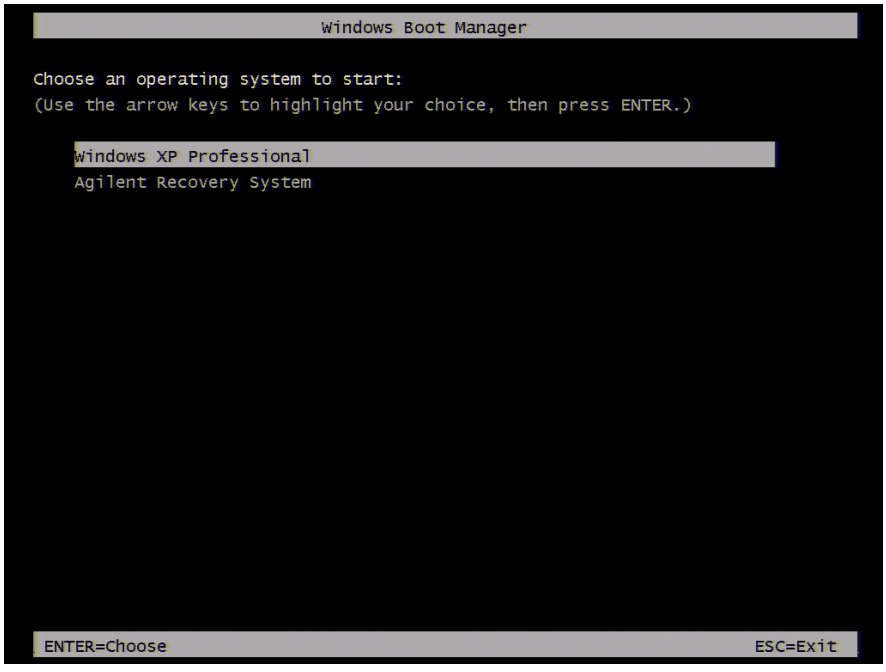
NOTE If you perform the following procedure incorrectly, a message asking you whether to return to the previous registration screen and perform the registration appears. In this case, follow the instruction to return to the previous registration screen.

Initial Registration Procedure (HDD Revision: CFxxx or CHxxx)

Step 1. Turn on the E5071C. Do not touch any key on the front panel during boot up.

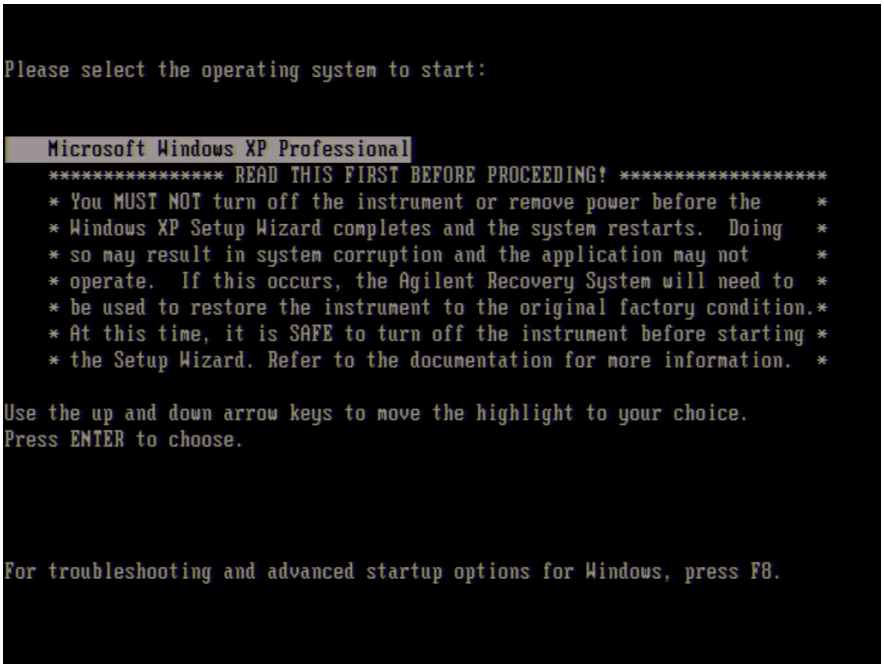
Step 2. The screen as shown in Figure B-11 appears. Select **Windows XP Professional** and press Enter.

Figure B-11 System start up screen (1/3)



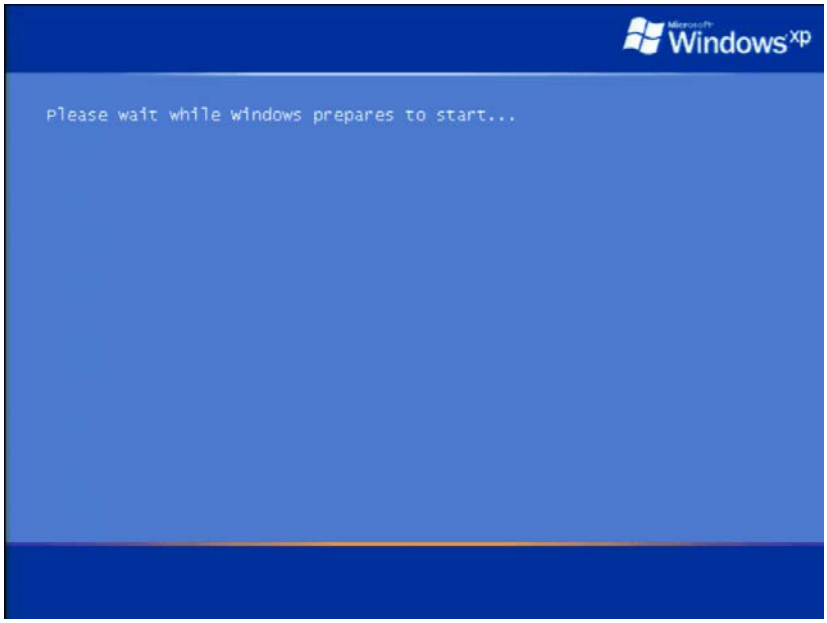
Step 3. The screen as shown in Figure B-12 appears. Press Enter.

Figure B-12 **System start up screen (2/3)**



Step 4. The windows start up screen as shown in Figure B-13 appears.

Figure B-13 **System start up screen (3/3)**

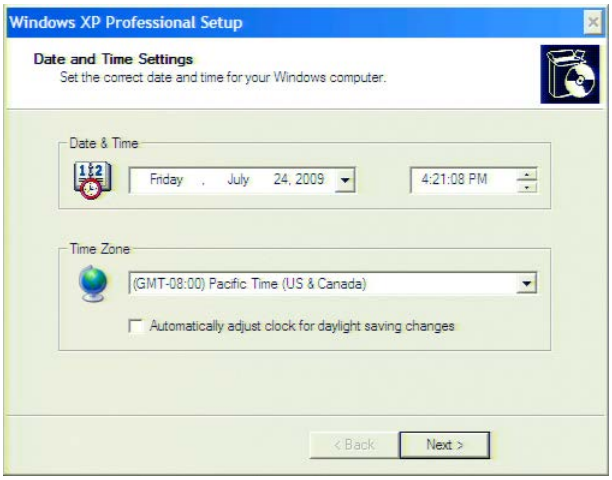


Step 5. In the License agreement dialog box, select the **I accept this agreement box** and click the **Next >** button.

Step 6. In the next dialog box, set the date and time for your Windows. Then, click the Next>

button.

Figure B-14 **Date and Time Setting dialog box**



Step 7. After awhile, the E5071C restarts automatically.

Step 8. E5071C firmware is executed, then the measurement display appears.

NOTE If the touch screen does not work after Initial Registration, refer to "Reconfiguring Touch Panel Settings" on page 324.

Reconfiguring Touch Panel Settings

Step 1. In E5071C, right click My Computer.

Step 2. Select Properties. The System Properties dialog box appears.

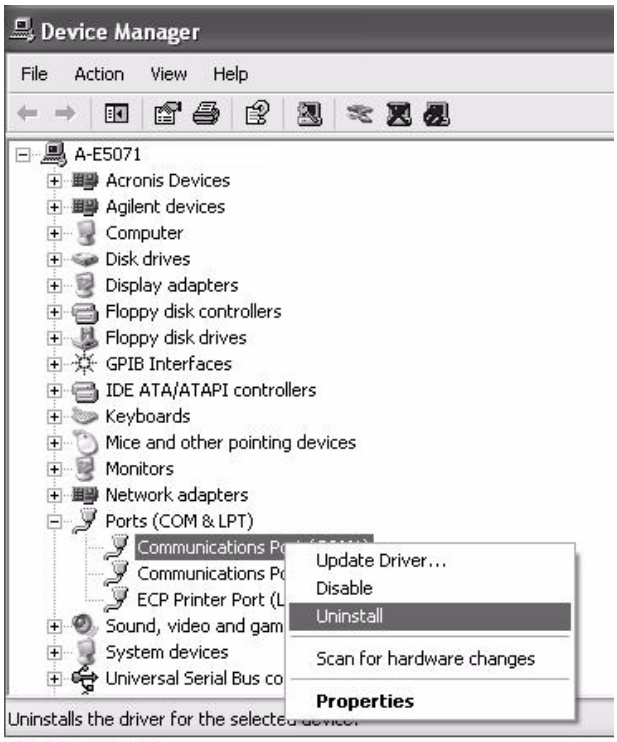
Step 3. Select Hardware tab.

Step 4. Click **Device Manager**. The Device Manager dialog box appears.

Step 5. Select Ports (COM & LPT).

Step 6. Check if two Communication Port (COM1) are displayed.

Step 7. Right click and select Unistall for both the COM1 ports.



e5071cse007

Step 8. The Confirm Device Removal message box appears. Click **OK**.

Step 9. Reboot the instrument.

Initial Registration Procedure (HDD Revision: CN925 or above)

Step 1. Turn on the E5071C.

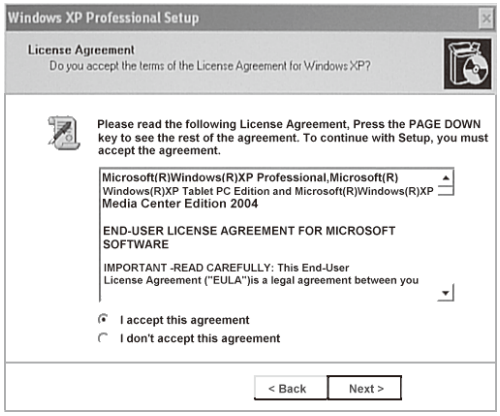
Step 2. The Windows XP Professional Setup wizard appears. Click the **Next >** button (Figure B-15).

Figure B-15 Windows XP Professional Setup wizard

e5071cse1073

Step 3. In the Windows XP Professional Setup dialog box, read the license agreement, then select the **I accept this agreement** box and click the **Next >** button (Figure B-16).

Figure B-16 **Windows XP Professional Setup dialog box (1/2)**



e5071cse1074

Step 4. In the next dialog box, input **agena** in the **Name** box. Then, click the **Next>** button (Figure B-17).

Figure B-17 **Windows XP Professional Setup dialog box (2/2)**

e5071cse1075

Step 5. The E5071C restart automatically.

Step 6. The Keysight Recovery Image Setup screen (Figure B-18) appears. Click OK to proceed.

Figure B-18 **Keysight Recovery Image Setup Screen(1/2)**

e5071cs001

Step 7. A progress bar appears (Figure B-19) indicating the progress of the Recovery Image setup. The complete process takes less than 5 minutes to finish.

Figure B-19 **Keysight Recovery Image Setup Screen(2/2)**

e5071cs002

Step 8. A message dialog box appears after the completion of the Recovery Image Setup procedure. The dialog box disappears automatically after a few seconds.

Step 9. E5071C firmware is executed, then the measurement display appears.

NOTE If the touch screen does not work after Initial Registration, refer to "Reconfiguring Touch Panel Settings" on page 324.

Reconfiguring Touch Panel Settings

Step 1. In E5071C, right click My Computer.

Step 2. Select Properties. The System Properties dialog box appears.

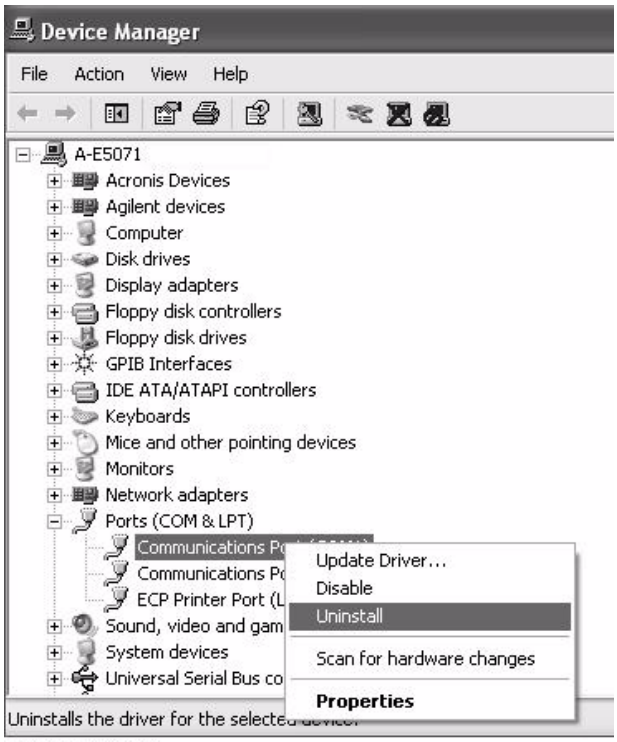
Step 3. Select Hardware tab.

Step 4. Click **Device Manager**. The Device Manager dialog box appears.

Step 5. Select Ports (COM & LPT).

Step 6. Check if two Communication Port (COM1) are displayed.

Step 7. Right click and select Unistall for both the COM1 ports.



e5071cse007

Step 8. The Confirm Device Removal message box appears. Click **OK**.

Step 9. Reboot the instrument.

Initial Registration Procedure (HDD Revision: CN924 or below)

Step 1. Turns on the E5071C.

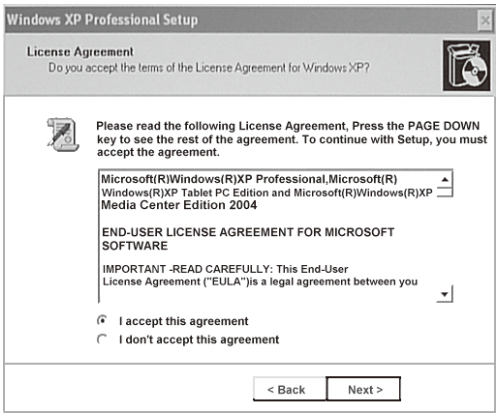
Step 2. The Windows XP Professional Setup wizard appears. Click the **Next >** button (Figure B-20).

Figure B-20 Windows XP Professional Setup wizard

e5071cse1073

Step 3. In the Windows XP Professional Setup dialog box, select the **I accept this agreement** box and click the **Next >** button (Figure B-21).

Figure B-21 Windows XP Professional Setup dialog box (1/2)



e5071cse1074

Step 4. In the next dialog box, input **agena** in the **Name** box. Then, click the **Next>** button (Figure B-22).

Figure B-22 Windows XP Professional Setup dialog box (2/2)

e5071cse1075

Step 5. After a while, the E5071C restart automatically.

Calibration of the Touch Screen

After E5071C measurement screen appears, you have to calibrate the touch screen. Follow the procedure described below to calibrate the touch screen.

Step 1. Press System.

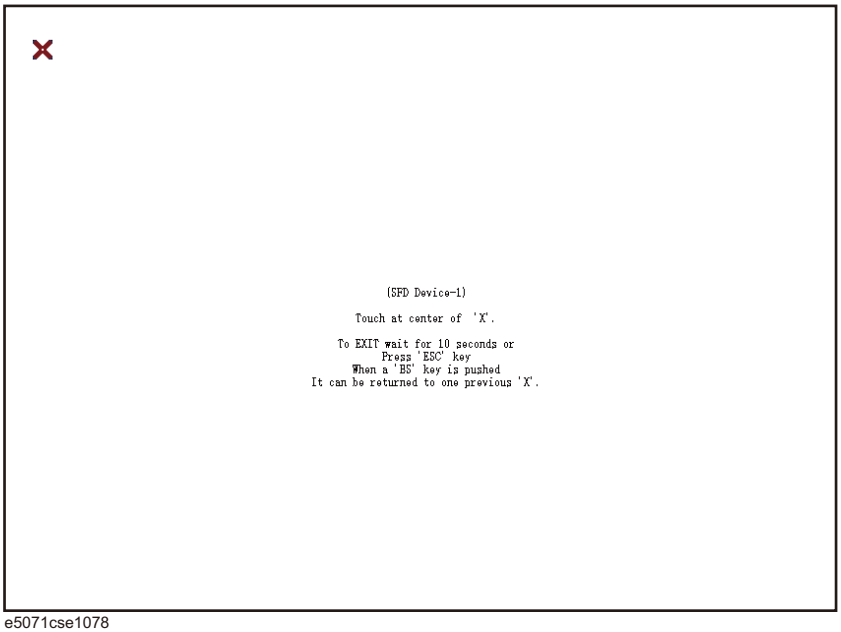
Step 2. Press **Service Menu**.

Step 3. Press **Test Menu**.

Step 4. Press **Adjust Touch Screen**.

The touch screen calibration screen (Figure B-23) appears.

Figure B-23 Touch Panel Calibration Screen



e5071cse1078

Step 5. Touch the x mark on the upper left with your finger. The mark x appears also on the upper right, lower left, 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 E5071C firmware. When you want to update the E5071C firmware, refer to this appendix.

KEYSIGHT TECHNOLOGIES

Firmware Update

Required Equipment

- E5071C (with keyboard and mouse).
- USB memory.

NOTE The free space of 30 MB or more is necessary for the USB mass storage device.

Location of the latest E5071C Firmware

Step 1. The latest firmware can be downloaded from the following site.

- http://www.keysight.com/find/ena/e5071c/

How to update the E5071C firmware

It is possible to update the E5071C 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 E5071C 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 download site. It is prepared as execution file (E5071C_xx.xx.exe).

Step 2. Run the “E5071C_xx.xx.exe” to extract the E5071C.msi. Then, save this file to a USB mass storage device.

Step 3. Connect the mouse and the keyboard to the E5071C rear panel. Then turn the E5071C on.

Step 4. Connect the USB mass storage device into the front USB port of the E5071C.

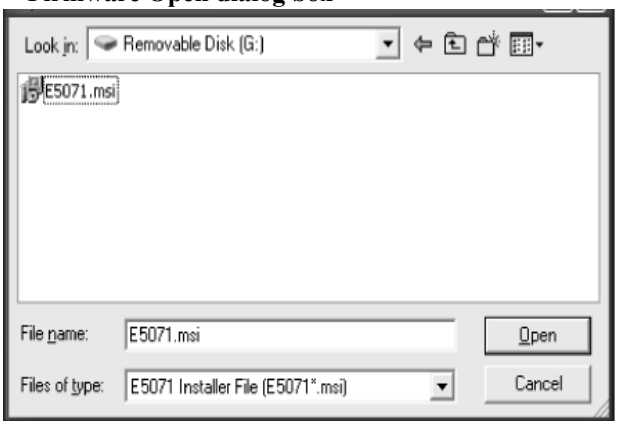
Step 5. Update the E5071C firmware.

1. Press System key.
2. Press **Service Menu** - **Update Firmware** on the menu bar, and the Password dialog box will appear.
3. Enter the password **e507xa** into the Password box, then click **OK**.

Figure C-1 Password box

4. Open dialog box apperas. Confirm that **E5071.msi** is displayed at the File name column. Select it, then press the **Open** button, and the Windows instoller will appear.

Figure C-2 Firmware Open dialog box



Step 6. After the installation is finished, the instrument will be restarted and the measurement view will appear.

Step 7. Press System -**Firmware Revision**. Confirm the firmware revision you have just installed.

Firmware Update

D Power Requirement

KEYSIGHT TECHNOLOGIES

Preparation for Power Supply

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

Power Requirements

The E5071C requires the following power source:

	Requirements
Voltage	100 - 240 VAC ± 10% (Vpeak >= 120 V)
Frequency	47 to 63 Hz
Maximum power consumption	350 VA

Verification and Connection of Power Cable

The three-wire power cable attached to the E5071C has one wire serving as a ground. Using this power cable allows the E5071C to be grounded, thereby protecting you against electrical shock from the power outlet.

Step 1. Confirm that the power cable is not damanged.

WARNING **NEVER use a power cable showing any sign of damage. Faulty cables can cause electrical shock.**

Step 2. Use the supplied cable to connect between the power cable receptacle on the rear panel of the E5071C and a three-wire power outlet with the grounding prong firmly connected in the ground slot.

WARNING **Use the supplied power cable with grounding wire to securely ground the E5071C.**

Power cord list, 16000-99101 shows the power cable options.

Blown Fuses

If the fuse appears to have blown during operation, this instrument may be subject to failure and must be repaired. For any assistance, contact Keysight Technologies Customer contact centre listed at the end of this guide.

This product uses the following fuse type:

Up to 8.5 GHz Options: UL/CSA Type, Slow-Blo, 6.3 A-250 Vac.

Over 8.5 GHz Options: UL/CSA Type, Slow-Blo, 10A-250 Vac.

WARNING **DO NOT replace the fuse yourself; doing this may expose you to electrical shock.**

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 E5071C 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 E5071C.

- 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 E5071C 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 E5071C 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 E5071C.

E Messages

The E5071C 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 E5071C are displayed in the lower-left area of the E5071C LCD screen. These messages include error messages that occur during 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 a Keysight 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 power ranges are selected in multiple channel measurement settings to avoid source attenuator damage.

NOTE This error occurs in the case of E5071C Over 8.5 GHz Options

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. When the auto-detect function is turned OFF, (SENS:CORR:COLL :ECAL:ORI OFF), however, this error does not occur even when the port on the ECal module is 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.

502 **Equation run time error**

This error occurs under the following conditions:

- The trace number in data(tr)/mem(tr)/xAxis(tr) is out of range
  # of trace available depends on the maximum number of channel/traces
- The port number in Advanced math function is out of range
  # of port available depends on the model option

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:FDATcommand) 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**

The equation expression used in Equation Editor is not valid.

501 **Invalid equation label**

The equation label used in Equation Editor is not valid.

-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 E5071C.

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 caqlculation 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.

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 a Keysight 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 a Keysight 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.

NOTE When FOM function or an external signal source is used over 8.5 GHz frequency measurements with E5071C-Over 8.5 GHz Options, there is a possibility that overload detection and power trip occurs even if you measure the devices under the maximum input level. In that case, turn OFF the overload & power trip detect function after ensuring the value of input power level.

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 a Keysight 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.

NOTE When FOM function or an external signal source is used over 8.5 GHz frequency measurements, there is a possibility that overload detection and power trip occurs even if you measure the devices under the maximum input level. In that case, turn OFF the overload & power trip detect function after ensuring the value of input power level.

223 **Port 3 receiver overload (for 4 Port Option 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 a Keysight 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.

NOTE When FOM function or an external signal source is used over 8.5 GHz frequency measurements, there is a possibility that overload detection and power trip occurs even if you measure the devices under the maximum input level. In that case, turn OFF the overload & power trip detect function after ensuring the value of input power level.

224 **Port 4 receiver overload (for 4 Port Option 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 a Keysight 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.

NOTE When FOM function or an external signal source is used over 8.5 GHz frequency measurements, there is a possibility that overload detection and power trip occurs even if you measure the devices under the maximum input level. In that case, turn OFF the overload & power trip detect function after ensuring the value of input power level.

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 a Keysight Technology sales office or the company from which you bought the instrument.

61 **Power unleveled**

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.

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 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:Z0: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.

This error occurs when the E5071C and the power meter is not connected with USB/GPIB interface, the GPIB addresses do not match between the power meter and the E5071C'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 seep.

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.

User Preset File not found

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