

# **Agilent E4980A Precision LCR Meter**

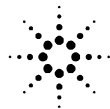
## **Service Guide**

**Second Edition**

### **FIRMWARE REVISIONS**

This manual applies directly to instruments that have the firmware revision A.01.00 or higher.

For additional information about firmware revisions, see Appendix A.



**Agilent Technologies**

**Agilent Part No. E4980-90100**

**April 2006**

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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.

March 2006      First Edition (part number: E4980-90100)

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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. Such noncompliance would also violate safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these precautions.

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<b>NOTE</b>	The E4980A complies with INSTALLATION CATEGORY II as well as POLLUTION DEGREE 2 in IEC61010-1. The E4980A is an INDOOR USE product.
<b>NOTE</b>	The LEDs in the E4980A are Class 1 in accordance with IEC60825-1, CLASS 1 LED PRODUCT
<b>NOTE</b>	This equipment is MEASUREMENT CATEGORY I (CAT I). Do not use for CAT II, III, or IV.
<b>NOTE</b>	This equipment is tested with stand-alone condition or with the combination with the accessories supplied by Agilent Technologies against the requirement of the standards described in the Declaration of Conformity. If it is used as a system component, compliance of related regulations and safety requirements are to be confirmed by the builder of the system.

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- **Ground the Instrument**

To avoid electric shock, the instrument chassis and cabinet must be grounded with the supplied power cable's grounding prong.
- **DO NOT Operate in an Explosive Atmosphere**

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

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

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
- **DO NOT Substitute Parts or Modify the Instrument**

To avoid the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to an Agilent Technologies Sales and Service Office for service and repair to ensure that

safety features are maintained in operational condition.

- Dangerous Procedure Warnings

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

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**WARNING**

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

- Do not connect the measuring terminals to mains.

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## Safety Symbols

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



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



Alternating current.



Direct current.



On (Supply).



Off (Supply).



In position of push-button switch.



Out position of push-button switch.



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



Stand-by.

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**WARNING**

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

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**CAUTION**

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

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**NOTE**

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



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## **Certification**

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

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

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## Typeface Conventions

**Sample (bold)**

Boldface type is used for emphasis.

*Sample (Italic)*

Italic type is used for emphasis and manual title.

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

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

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# 1 General Information

This Service Guide is a guide to servicing the E4980A 20 Hz to 2 MHz Precision LCR Meter. The Service Guide provides information about performance test, adjustment, troubleshooting, and repairing the E4980A.

## Organization of Service Guide

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

- Chapter 1, “General Information.”

This Service Guide is a guide to servicing the E4980A 20 Hz to 2 MHz Precision LCR Meter. The Service Guide provides information about performance test, adjustment, troubleshooting, and repairing the E4980A.
- Chapter 2, “Performance Test.”

This chapter provides the outline of the E4980A performance tests.
- Chapter 3, “Adjustment.”

This chapter provides the adjustment information for the E4980A to ensure that it is within its specifications. The adjustment must be performed Agilent’s qualified service personnel. If you need the adjustment for your E4980A, it should be sent to the nearest Agilent Technologies service office.
- Chapter 4, “Troubleshooting.”

This chapter provides the procedure to isolate a faulty assembly in the E4980A.
- Chapter 5, “Replaceable Parts.”

This chapter contains information for ordering replacement parts for the E4980A.
- Chapter 6, “Replacement Procedure.”

This chapter provides procedure for removing and replacing the major assemblies in the E4980A.
- Chapter 7, “Post-Repair Procedures.”

This chapter lists the procedures required to verify the E4980A 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 E4980A manufactured earlier than the current printing date of this manual. The information in this manual applies directly to E4980A units with the serial number that is printed on the title page of this manual.
- Appendix B, “Firmware Update.”

This appendix describes how to update the E4980A firmware. When you want to update the E4980A firmware, refer to this appendix.
- Appendix C, “Power Requirement.”
- Appendix D, “Error Messages.”

The Agilent E4980A provides error messages to indicate its operating status. This appendix describes the error messages of the E4980A in alphabetical order.

---

## Instruments Covered by This Manual

The ten-character serial number is stamped on the serial number plate (Figure 1-1) on the rear panel.

Figure 1-1

### Serial Number Label



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

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

## Required Equipment

Table 1-1 lists the recommended equipment for performance test, adjustment and troubleshooting for E4980A.

**Table 1-1 Recommended Test Equipment**

Equipment	Critical Specifications	Recommended Model	Qty.	Use <sup>*1</sup>
Frequency Counter	Frequency Range: 1 MHz Time Base Error < 50 ppm/year	Agilent 53181A	1	P
Digital Multimeter	No Substitute	Agilent 3458A	1	P,A
Standard Capacitors Set	No Substitute	16380A	1	P,A
Standard Capacitors Set	No Substitute	16380C with option 001	1	P
Four Terminal Pair Standard Resistor Set	No Substitute	Agilent 42030A	1	P,A
4TP Open Termination	No Substitute	Agilent 42090A	1	P,A
4TP Short Termination	No Substitute	Agilent 42091A	1	P,A
Test Leads (BNC), 1 m	No Substitute	Agilent 16048A	1	P,A
Test Leads (BNC), 2 m	No Substitute	Agilent 16048D	1	P,A
Test Leads (BNC), 4 m	No Substitute	Agilent 16048E	1	P,A
DC Power Supply	+ 5V, 0.1A	Agilent E3610A	1	T
Handler Simulator	No Substitute	p/n 04278-65001	1	T
Scanner Simulator	No Substitute	p/n 04278-65301	1	T
Bias Interface Simulator	No Substitute	p/n 42841-65001	1	T
Bias Interface Cable	GP-IO Cable	p/n 42841-61640	1	T
Interface Box	No Substitute	p/n 04294-61002	1	P,A
Cables	BNC(m)-BNC(m) Cable, 122 cm	p/n 8120-1840	1	P,A
Adapter	BNC(f)-BNC(f) Adapter	p/n 1250-1830	4	P,A
	Dual Banana-BNC(f) Adapter	p/n 1251-2277	1	P,A

\*1.P:Performance Test A:Adjustment T:Troubleshooting

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## **2 Performance Test**

This chapter provides the outline of the E4980A performance tests.

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## Introduction

This chapter provides the performance tests outline for Agilent E4980A. The performance test names are listed in Table 2-1. The test descriptions are described sequentially in the following pages.

---

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

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

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

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

---

**Table 2-1** List of the E4980A performance tests

Para.	Title
1	Frequency Accuracy Test
2	DC Source Level Accuracy Test
3	DC Bias Level Accuracy Test
4	DC bias V Level Monitor Accuracy Test
5	DC bias I Level Monitor Accuracy Test
6	AC Signal Level Monitor Accuracy Test
7	AC Signal Level Accuracy Test
8	Impedance Measurement Accuracy Test
9	DCR Measurement Accuracy Test

### Test Equipment Required

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

## Individual Test Description

### 1. Frequency Accuracy Test

#### Description

This test checks the frequency accuracy of the E4980A test signal. The frequency accuracy is checked at 1MHz with a frequency counter. Since the E4980A employs a Direct Digital Synthesizer for the signal source, the frequency accuracy test at this frequency point can verify the accuracy for the entire frequency range.

#### Specification

@23 ± 5 °C

Frequency [Hz]	Spec.
20 to 2M	± 0.01%

#### Test equipment

Frequency Counter	Agilent 53181A
Interface Box	Agilent 04294-61002
BNC(m)-BNC(m) Cable (122cm)	Agilent 8120-1840

#### Test point and limits

Cable Length : 0 m

Frequency	Test Limit	Measurement Uncertainty
1 MHz	±100 Hz	±0.5 Hz

## 2. DC Source Level Accuracy Test

### Description

This test checks the DC source level accuracy of the E4980A DC source port output signal.

### Specification

@23 ± 5 °C

DC Source level [V]	Spec.
0 to ± 10	± (0.1% + 3 mV)

### Test equipment

Digital Multimeter	Agilent 3458A
BNC(m)-BNC(m) Cable (122cm)	Agilent 8120-1840
Dual Banana-BNC(f) Adapter	Agilent 1251-2277

### Test point and limits

Option : 001, Cable Length : 0 m

DC Source Level	Test Limit	Measurement Uncertainty
-10 V	±13 mV	±0.242 mV
0V	±3 mV	±0.008 mV
10 V	±13 mV	±0.242 mV



### 3. DC Bias Level Accuracy Test

#### Description

This test checks the DC bias level accuracy of the E4980A DC bias signal.

#### Specification

@23 ± 5 °C

DCSource level[V]	AC level [Vrms]	Spec.
0 to ±40	2 <	0.1% + 4 mV
	≤ 2	0.1% + 2 mV

#### Test equipment

Digital Multimeter	Agilent 3458A
4TP Open Termination	Agilent 42090A
BNC(m)-BNC(m) Cable (122cm)	Agilent 8120-1840
Dual Banana-BNC(f) Adapter	Agilent 1251-2277

#### Test point and limits

Option : STD, Cable Length : 0 m, AC Level : 0 Vrms, Amp mode : x1

DC Bias Level	Test Limit	Measurement Uncertainty
0 V	±2 mV	±0.009 mV
1.5 V	±3.5 mV	±0.052 mV
2 V	±4 mV	±0.071 mV

Option : 001, Cable Length : 0 m, AC Level : 0 Vrms, Amp mode : x1

DC Bias Level	Test Limit	Measurement Uncertainty
-5 V	±7 mV	±0.205 mV
5 V	±7 mV	±0.185 mV

Performance Test  
Individual Test Description

Option : 001, Cable Length : 0 m, AC Level : 0 Vrms, Amp mode : DC

DC Bias Level	Test Limit	Measurement Uncertainty
-40 V	±42 mV	±1.580 mV
-20 V	±22 mV	±0.860 mV
-10 V	±12 mV	±0.446 mV
10 V	±12 mV	±0.359 mV
20 V	±22 mV	±0.768 mV
40 V	±42 mV	±1.567 mV

Option : 001, Cable Length : 0 m, AC Level : 2.1 Vrms (at 1 MHz), Amp mode : x8

DC Bias Level	Test Limit	Measurement Uncertainty
-5 V	±9 mV	±0.171 mV
0 V	±4 mV	±0.173 mV
5 V	±9 mV	±0.360 mV

#### 4. DC Bias V Level Monitor Accuracy Test

##### Description

This test checks the DC bias V level monitor accuracy of the E4980A. (Option : 001 only)

##### Specification

@23 ± 5 °C

DC bias level[V]	Spec.
0 to ± 40	± (0.5% + 60 mV)

##### Test equipment

Digital Multimeter	Agilent 3458A
Interface Box	Agilent 04294-61002
BNC(m)-BNC(m) Cable (122cm)	Agilent 8120-1840
Dual Banana-BNC(f) Adapter	Agilent 1251-2277

##### Test point and limits

Option : 001, Cable Length : 0 m

DC Bias V Level	Test Limit	Measurement Uncertainty
-40 V	±260 mV	±1.221 mV
0 V	±60 mV	±0.210 mV
40 V	±260 mV	±1.322 mV

## 5. DC Bias I Level Monitor Accuracy Test

### Description

This test checks the DC bias I level monitor accuracy of the E4980A. (Option : 001 only)

### Specification

@23 ± 5 °C

<b>Spec.</b>
± (1% of reading + Offset <sup>*1</sup> )

\*1. Offset = 45 nA to 150 µA. Refer to the Specification Chapter in the User's Guide for details.

### Test equipment

Digital Multimeter	Agilent 3458A
Interface Box	Agilent 04294-61002
BNC(m)-BNC(m) Cable (122cm)	Agilent 8120-1840
Dual Banana-BNC(f) Adapter	Agilent 1251-2277

### Test point and limits

Option : 001, Cable Length : 0 m

DC Bias (DCI nominal)	Impedance Range	Test Limit	Measurement Uncertainty
16 mV (19.3 µA)	100 kΩ	±0.238 µA	±0.007 µA
40 mV (200 µA)	10 kΩ	±2.3 µA	±0.031 µA
220 mV (2 mA)	1 kΩ	±23 µA	±0.27 µA
2.02 V (20 mA)	100 Ω	±0.23 mA	±0.004 mA
10.1 V (100 mA)	10 Ω	±1.15 mA	±0.025 mA

## 6. AC Signal Level Monitor Accuracy Test

### Description

This test checks the AC signal level monitor accuracy of the E4980A.

### Specification

@23 ± 5 °C

AC signal level [Vrms] *1	AC signal freq [Hz]	Spec.
5m ≤ level ≤ 2	≤ 1 M	± (3% of reading + 0.5 mVrms)
	> 1 M	± (6% of reading + 1 mVrms)
2 < level	≤ 300 k	± (3% of reading + 5 mVrms)
	> 300 k	± (6% of reading + 10 mVrms) *2

\*1. This is not an output value but a displayed test signal level.

\*2. Typ. when test frequency > 1 MHz and test signal voltage > 10 Vrms.

### Test equipment

Digital Multimeter	Agilent 3458A
Interface Box	Agilent 04294-61002
BNC(m)-BNC(m) Cable (122cm)	Agilent 8120-1840
Dual Banana-BNC(f) Adapter	Agilent 1251-2277

### Test point and limits

Cable Length : 0 m

Level	Frequency	Test Limit	Measurement Uncertainty
20 mV	1 MHz	±1.1 mV	±0.24 mV
0.2 V	1 MHz	±6.5 mV	±2.43 mV
	2 MHz	±13.0 mV	±3.59 mV
0.5 V	1 MHz	±15.5 mV	±5.90 mV
	2 MHz	±31.0 mV	±8.79 mV

Performance Test  
**Individual Test Description**

Level	Frequency	Test Limit	Measurement Uncertainty
1 V	20 Hz	±30.5 mV	±0.24 mV
	125 Hz	±30.5 mV	±0.19 mV
	1 kHz	±30.5 mV	±0.18 mV
	1 MHz	±30.5 mV	±11.7 mV
	2 MHz	±61.0 mV	±17.5 mV
2 V	1 MHz	±60.5 mV	±24.3 mV
	2 MHz	±121 mV	±35.8 mV
10 V* <sup>1</sup>	2 MHz	±610 mV	±174.6 mV
20 V* <sup>1</sup>	1 MHz	±1.21 V	±358.5 mV

\*1. Option 001 only

## 7. AC Signal Level Accuracy Test

### Description

This test checks the AC signal level accuracy of the E4980A output signal.

### Specification

@23 ± 5 °C

AC signal level[Vrms]	Frequency[Hz]	Spec.
≤ 2	≤ 1 M	10% + 1 mVrms
	> 1 M	10% + 1 mVrms (typ.)
> 2	≤ 300 k	10% + 10 mVrms
	300 k < Frequency ≤ 1M	15% + 20 mVrms
	> 1M	15% + 20 mVrms (typ.)

### Test equipment

4TP Open Termination	Agilent 42090A
----------------------	----------------

### Test point and limits

Option : STD, Cable Length : 0 m, Amp Mode : x1, DC Bias : 0 V

Level	Frequency	Test Limit	Measurement Uncertainty
20 mV	1 MHz	±3 mV	±1.3 mV
0.2 V	1 MHz	±21 mV	±7.5 mV
0.5 V	1 MHz	±51 mV	±17.9 mV
1 V	20 Hz	±101 mV	±35.3 mV
	125 Hz	±101 mV	±35.3 mV
	1 kHz	±101 mV	±35.3 mV
	1 MHz	±101 mV	±35.3 mV
2 V	1 MHz	±201 mV	±69.9 mV

Performance Test  
**Individual Test Description**

Option : 001, Cable Length : 0 m, Amp Mode : DC, DC Bias : 5.1 V

Level	Frequency	Test Limit	Measurement Uncertainty
1 V	20 Hz	$\pm 101$ mV	$\pm 35.3$ mV
	125 Hz	$\pm 101$ mV	$\pm 35.3$ mV
	1 kHz	$\pm 101$ mV	$\pm 35.3$ mV
	1 MHz	$\pm 101$ mV	$\pm 35.3$ mV

Option : 001, Cable Length : 0 m, Amp Mode : x8, DC Bias : 0 V

Level	Frequency	Test Limit	Measurement Uncertainty
20 V	20 Hz	$\pm 2.01$ V	$\pm 0.699$ V
	125 Hz	$\pm 2.01$ V	$\pm 0.699$ V
	1 kHz	$\pm 2.01$ V	$\pm 0.699$ V
	1 MHz	$\pm 3.02$ V	$\pm 1.399$ V



## 8. Impedance Measurement Accuracy Test

### Description

This test checks the impedance measurement accuracy of the E4980A.

### Specification

@23 ± 5 °C

Impedance Accuracy *1	< ± (Relative Accuracy + Cal Accuracy)
-----------------------	--

\*1. Refer to the Specification Chapter in the User's Guide for details.

### Test equipment

Standard Capacitors Set	Agilent 16380A
Standard Capacitors Set	Agilent 16380C with option 001
Four Terminal Pair Standard Resistor Set	Agilent 42030A
4TP Open Termination	Agilent 42090A
4TP Short Termination	Agilent 42091A
Test Leads (BNC), 1 m	Agilent 16048A
Test Leads (BNC), 2 m	Agilent 16048D
Test Leads (BNC), 4 m	Agilent 16048E
BNC(f)-BNC(f) Adapter, 4ea	Agilent 1250-1830

Performance Test  
Individual Test Description

**Test point and limits**

Cable Length : 0 m, DUT: 10 pF, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.02 V	1 MHz	Cp	±0.0478 pF	±0.0009 pF
		D	±0.00608	±0.00009
0.3 V	100 kHz	Cp	±0.0241 pF	±0.0009 pF
		D	±0.00321	±0.00009
	1 MHz	Cp	±0.0241 pF	±0.0009 pF
		D	±0.00371	±0.00010
	2 MHz	Cp	±0.0571 pF	±0.0009 pF
		D	±0.01131	±0.00011
2.1 V <sup>*1</sup>	1 MHz	Cp	±0.0296 pF	±0.0011 pF
		D	±0.00426	±0.00009

\*1. Option 001 only

Cable Length : 0 m, DUT: 10 pF, MEAS TIME : SHORT

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.02 V	1 MHz	Cp	±0.0871 pF	±0.0021 pF
		D	±0.01001	±0.00021

Cable Length : 0 m, DUT: 1000 pF, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.02 V	1 kHz	Cp	±3.44 pF	±0.17 pF
		D	±0.00325	±0.00009
	1 MHz	Cp	±3.59 pF	±0.18 pF
		D	±0.00289	±0.00008
0.3 V	20 Hz	Cp	±18.47 pF	±1.82 pF
		D	±0.01827	±0.00128
	1 kHz	Cp	±0.95 pF	±0.15 pF
		D	±0.00076	±0.00006
	1 MHz	Cp	±1.51 pF	±0.18 pF
		D	±0.00081	±0.00008
	2 MHz	Cp	±4.02 pF	±0.18 pF
		D	±0.00162	±0.00008
2 V	1 kHz	Cp	±1.42 pF	±0.15 pF
		D	±0.00123	±0.00006
	1 MHz	Cp	±2.01 pF	±0.18 pF
		D	±0.00131	±0.00008
2.1 V* <sup>1</sup>	1 kHz	Cp	±1.51 pF	±0.15 pF
		D	±0.00132	±0.00006
	1 MHz	Cp	±2.01 pF	±0.18 pF
		D	±0.00131	±0.00008
18 V* <sup>1</sup>	1 MHz	Cp	±2.50 pF	±0.18 pF
		D	±0.00180	±0.00008
20 V* <sup>1</sup>	1 kHz	Cp	±1.93 pF	±0.15 pF
		D	±0.00174	±0.00006

\*1. Option 001 only

Performance Test  
Individual Test Description

Cable Length : 0 m, DUT: 1000 pF, MEAS TIME : MED

DC Bias : ON (39 V) (Option 001 only)

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.3 V	1 kHz	Cp	±0.95 pF	±0.16 pF
		D	±0.00076	±0.00007
	1 MHz	Cp	±1.51 pF	±0.18 pF
		D	±0.00081	±0.00008
	2 MHz	Cp	±4.02 pF	±0.18 pF
		D	±0.00162	±0.00008

Cable Length : 0 m, DUT : 0.1 μF, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.3 V	120 Hz	Cp	±0.082 nF	±0.005 nF
		D	±0.00062	±0.00003
	100 kHz	Cp	±0.160 nF	±0.005 nF
		D	±0.00140	±0.00004

Cable Length : 0 m, DUT : 10 μF, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.3 V	20 Hz	Cp	±0.0132 μF	±0.0013 μF
		D	±0.00112	±0.00012
	120 Hz	Cp	±0.0084 μF	±0.0012 μF
		D	±0.00064	±0.00013
	1 kHz	Cp	±0.0168 μF	±0.0012 μF
		D	±0.00138	±0.00011
	10 kHz	Cp	±0.0266 μF	±0.0020 μF
		D	±0.00236	±0.00030
	100 kHz	Cp	±0.0799 μF	±0.0073 μF
		D	±0.00779	±0.00072

Cable Length : 0 m, DUT : 10  $\mu$ F, MEAS TIME : SHORT

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.3 V	20 Hz	Cp	$\pm 0.0337 \mu\text{F}$	$\pm 0.0014 \mu\text{F}$
		D	$\pm 0.00317$	$\pm 0.00012$
	120 Hz	Cp	$\pm 0.0347 \mu\text{F}$	$\pm 0.0019 \mu\text{F}$
		D	$\pm 0.00327$	$\pm 0.00014$

Cable Length : 0 m, DUT : 0.1  $\Omega$ , MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
2.1 V*1	1 kHz	Rx	$\pm 0.840 \text{ m}\Omega$	$\pm 0.033 \text{ m}\Omega$

\*1. Option 001 only

Cable Length : 0 m, DUT : 1  $\Omega$ , MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.3 V	1 kHz	Rx	$\pm 0.00373 \Omega$	$\pm 0.00021 \Omega$

Performance Test  
Individual Test Description

Cable Length : 1 m, DUT : 1000 pF, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.02 V	1 kHz	Cp	±3.44 pF	±1.13 pF
		D	±0.00325	±0.00011
	1 MHz	Cp	±3.74 pF	±0.19 pF
		D	±0.00304	±0.00008
0.3 V	1 kHz	Cp	±0.95 pF	±0.15 pF
		D	±0.00076	±0.00006
	1 MHz	Cp	±1.66 pF	±0.18 pF
		D	±0.00096	±0.00008
	2 MHz	Cp	±4.63 pF	±0.18 pF
		D	±0.00223	±0.00008
2 V	1 kHz	Cp	±1.42 pF	±0.15 pF
		D	±0.00123	±0.00006
	1 MHz	Cp	±2.16 pF	±0.18 pF
		D	±0.00146	±0.00008
2.1 V <sup>*1</sup>	1 kHz	Cp	±1.52 pF	±0.15 pF
		D	±0.00133	±0.00006
	1 MHz	Cp	±2.16 pF	±0.18 pF
		D	±0.00146	±0.00008
17 V <sup>*1</sup>	1 MHz	Cp	±2.66 pF	±0.18 pF
		D	±0.00196	±0.00008
20 V <sup>*1</sup>	1 kHz	Cp	±1.93 pF	±0.15 pF
		D	±0.00174	±0.00006

\*1. Option 001 only

Cable Length : 2 m, DUT : 1000 pF, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.02 V	1 kHz	Cp	±3.44 pF	±0.17 pF
		D	±0.00325	±0.00010
	1 MHz	Cp	±4.19 pF	±0.18 pF
		D	±0.00349	±0.00009
0.3 V	1 kHz	Cp	±0.95 pF	±0.16 pF
		D	±0.00076	±0.00006
	1 MHz	Cp	±2.11 pF	±0.18 pF
		D	±0.00141	±0.00008
	2 MHz	Cp	±6.45 pF	±0.18 pF
		D	±0.00405	±0.00009
2 V	1 kHz	Cp	±1.42 pF	±0.18 pF
		D	±0.00123	±0.00006
	1 MHz	Cp	±2.61 pF	±0.18 pF
		D	±0.00191	±0.00008
2.1 V* <sup>1</sup>	1 kHz	Cp	±1.52 pF	±0.16 pF
		D	±0.00133	±0.00006
	1 MHz	Cp	±2.61 pF	±0.18 pF
		D	±0.00191	±0.00008
15 V* <sup>1</sup>	1 MHz	Cp	±3.11 pF	±0.18 pF
		D	±0.00241	±0.00008
20 V* <sup>1</sup>	1 kHz	Cp	±1.93 pF	±0.16 pF
		D	±0.00174	±0.00006

\*1. Option 001 only

Performance Test  
Individual Test Description

Cable Length : 4 m, DUT : 1000 pF, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.02 V	1 kHz	Cp	±3.45 pF	±0.17 pF
		D	±0.00326	±0.00016
	1 MHz	Cp	±6.00 pF	±0.18 pF
		D	±0.00530	±0.00008
0.3 V	1 kHz	Cp	±0.95 pF	±0.15 pF
		D	±0.00076	±0.00006
	1 MHz	Cp	±3.92 pF	±0.18 pF
		D	±0.00322	±0.00008
	2 MHz	Cp	±13.68 pF	±0.20 pF
		D	±0.01128	±0.00009
2 V	1 kHz	Cp	±1.42 pF	±0.15 pF
		D	±0.00123	±0.00006
	1 MHz	Cp	±4.41 pF	±0.18 pF
		D	±0.00371	±0.00008
2.1 V <sup>*1</sup>	1 kHz	Cp	±1.52 pF	±0.15 pF
		D	±0.00133	±0.00006
	1 MHz	Cp	±4.42 pF	±0.18 pF
		D	±0.00372	±0.00009
13 V <sup>*1</sup>	1 MHz	Cp	±4.91 pF	±0.18 pF
		D	±0.00421	±0.00009
20 V <sup>*1</sup>	1 kHz	Cp	±1.93 pF	±0.15 pF
		D	±0.00174	±0.00006

\*1. Option 001 only



## 9. DCR Measurement Accuracy Test

### Description

This test checks the DCR measurement accuracy of the E4980A. (Option : 001 only)

### Specification

@23 ± 5 °C

DCR Measurement Accuracy*1	< ± (Relative Accuracy + Cal Accuracy)
----------------------------	--

\*1. Refer to the Specification Chapter in the User's Guide for details.

### Test equipment

Four Terminal Pair Standard Resistor Set	Agilent 42030A
4TP Open Termination	Agilent 42090A
4TP Short Termination	Agilent 42091A

### Test point and limits

Option : 001, Cable Length : 0 m, DUT : 1 Ω, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.1 V	DC	R	±0.0083 Ω	±0.0008 Ω

Option : 001, Cable Length : 0 m, DUT : 1 kΩ, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.1 V	DC	R	±0.0033 kΩ	±0.0002 kΩ

Option : 001, Cable Length : 0 m, DUT : 100 kΩ, MEAS TIME : MED

Signal Level	Frequency	Parameter	Test Limit	Measurement Uncertainty
0.1 V	DC	R	±0.43 kΩ	±0.02 kΩ

Performance Test  
**Individual Test Description**

---

## 3 Adjustment

This chapter provides the adjustment information for the E4980A to ensure that it is within its specifications. The adjustment must be performed Agilent's qualified service personnel. If you need the adjustment for your E4980A, it should be sent to the nearest Agilent Technologies service office.

## Safety Considerations

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

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### 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.**

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## Warm-up for Adjustment

Warm-up the E4980A for at least 30 minute before performing any of the following Adjustment procedures to ensure proper results and correct instrument operation.

---

## Required Equipment

Table 1-1 on page 16 lists the equipment required to perform the Adjustment procedures described in this chapter. Use only calibrated test equipment when adjusting the E4980A.

## Required Adjustment after Replacing Assembly

After replacing the following assembly, the adjustment items described in Table 3-1 must be required. The adjustment must be performed Agilent's qualified service personnel. If you need the adjustment for your E4980A, it should be sent to the nearest Agilent Technologies service office.

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

Replaced Assembly	Adjustment Item												
	Writing ID	Write Null phase track default data	Null DC offset Adjustment	Null ADC DC offset Adjustment	ADC linearity Adjustment	DC Bias Adjustment	DC Level V monitor Adjustment	DC Level I monitor Adjustment	DC Source Adjustment	DCR Adjustment	Impedance Adjustment	AC Level monitor Adjustment	OSC Level Adjustment
PPMC PCA													
A1 Board	√												
A2 Board		√	√	√	√	√	√	√	√	√	√	√	√
A3 Board						√	√	√	√	√	√	√	√

3. Adjustment

### Writing ID

This item writes the serial number, option information into the A1 board of the E4980A.

#### Required equipment for the writing ID

None

### Write Null Phase Track Default Data

The purpose of this procedure is to write the null phase track default data into A2 board

#### Required equipment for the Write Null PhaseTrack Default Data

None

### Null DC Offset Adjustment

The purpose of this procedure is to adjust the null dc offset of the A2 board.

## Adjustment

### Required Adjustment after Replacing Assembly

#### Required equipment for the Null DC Offset adjustment

Description	Recommended Model
Open Termination	Agilent 42090A

#### Null ADC DC Offset Adjustment

The purpose of this procedure is to adjust the null adc dc offset of the A2 board.

#### Required equipment for the Null ADC DC Offset adjustment

Description	Recommended Model
Open Termination	Agilent 42090A

#### ADC Linearity Adjustment

The purpose of this procedure is to adjust ADC non-linearity of the A2 board.

#### Required equipment for the ADC Linearity adjustment

Description	Recommended Model
Standard Resistor 10 k $\Omega$	Agilent 42030A (10 k $\Omega$ )
Standard Capacitor 10 pF	Agilent 16380A (10 pF)
Standard Capacitor 100 pF	Agilent 16380A (100 pF)

#### DC Bias Adjustment

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

#### Required equipment for the DC Bias adjustment

Description	Recommended Model
Digital Multimeter	Agilent 3458A
Interface Box	Agilent p/n 04294-61002
Dual Banana-BNC(f) Adapter	Agilent p/n 1251-2277
BNC(m)-BNC(m) Cable, 122 cm	Agilent p/n 8120-1840

#### DC Level V Monitor Adjustment

The purpose of this procedure is to adjust the DC Level Monitor.

**Required equipment for the DC Level V Monitor adjustment**

<b>Description</b>	<b>Recommended Model</b>
Digital Multimeter	Agilent 3458A
Interface Box	Agilent p/n 04294-61002
Dual Banana-BNC(f) Adapter	Agilent p/n 1251-2277
BNC(m)-BNC(m) Cable, 122 cm	Agilent p/n 8120-1840

**DC Level I Monitor Adjustment**

The purpose of this procedure is to adjust the DC Level I Monitor.

**Required equipment for the DC Level Monitor adjustment**

<b>Description</b>	<b>Recommended Model</b>
Digital Multimeter	Agilent 3458A
Interface Box	Agilent p/n 04294-61002
Dual Banana-BNC(f) Adapter	Agilent p/n 1251-2277
BNC(m)-BNC(m) Cable, 122 cm	Agilent p/n 8120-1840

**DC Source Adjustment**

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

**Required equipment for the DC Source adjustment**

<b>Description</b>	<b>Recommended Model</b>
Digital Multimeter	Agilent 3458A
Dual Banana-BNC(f) Adapter	Agilent p/n 1251-2277
BNC(m)-BNC(m) Cable, 122 cm	Agilent p/n 8120-1840

**DCR Adjustment**

The purpose of this procedure is to adjust the DCR measurement.

## Adjustment

### Required Adjustment after Replacing Assembly

#### Required equipment for the DCR adjustment

Description	Recommended Model
Open Termination	Agilent 42090A
Short Terminaton	Agilent 42091A
Standard Resistor Set	Agilent 42030A

#### Impedance Adjustment

The purpose of this procedure is to adjust the impedance measurement.

#### Required equipment for the Impedance adjustment

Description	Recommended Model
Open Termination	Agilent 42090A
Short Terminaton	Agilent 42091A
Standard Resistor Set	Agilent 42030A
Test Leads (BNC), 1 m	Agilent 16048A
Test Leads (BNC), 2 m	Agilent 16048D
Test Leads (BNC), 4 m	Agilent 16048E

#### AC Level Monitor Adjustment

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

#### Required equipment for the AC Level Monitor adjustment

Description	Recommended Model
Digital Multimeter	Agilent 3458A
Interface Box	Agilent p/n 04294-61002
Dual Banana-BNC(f) Adapter	Agilent p/n 1251-2277
BNC(m)-BNC(m) Cable, 122 cm	Agilent p/n 8120-1840

#### OSC Level Adjustment

The purpose of this procedure is to adjust the OSC level.

#### Required equipment for the OSC Level adjustment

Description	Recommended Model
Open Termination	Agilent 42090A



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# 4 Troubleshooting

This chapter provides the procedure to isolate a faulty assembly in the E4980A.

## 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.

---

---

## To Troubleshoot the Instrument

This section describes the basic procedural flow of troubleshooting when servicing the E4980A. The primary procedural tool in this section is the flowchart. The flowchart contains the 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 in Figure 4-1 is to help direct you to the correct section for troubleshooting the E4980A.

**Step 1.** Turn the E4980A power on

With the E4980A plugged in and the power turned off, the front panel orange standby LED should be on. When the front panel power switch is turned on, the orange LED should go out and the yellow-green LED should come on. Also, the fan should start rotating. In case of unexpected results, go to “Power On Sequence Troubleshooting” on page 49.

**Step 2.** Check the display

- The power on test is executed once automatically before the measurements start. If the power on test fails, go to “Troubleshooting Using Service Function” on page 52.
- If one of the following error messages **A1 EEPROM write error**, **CPU Bd EEPROM write error**, **CPU Bd FLASH ROM write error**, **Fan failed**, or **Power failed** is displayed during the measurement process, go to “Power On Sequence Troubleshooting” on page 49 (check booting process).

**Step 3.** Check the basic function

If the front-panel, LCD display, data storage, remote interface or another function (except for measurement part) does not work correctly, go to “Function Specific Troubleshooting” on page 60.

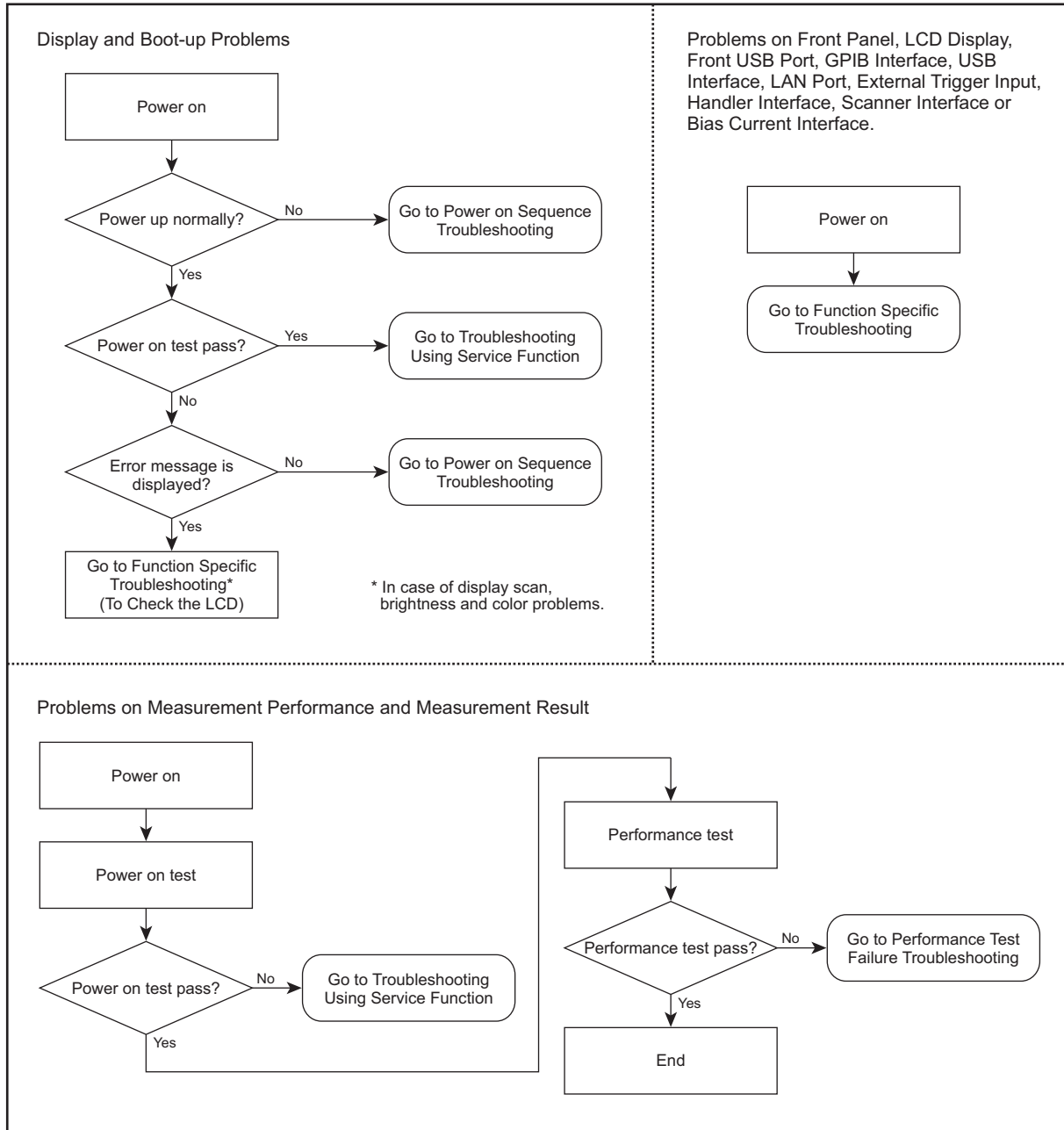
**Step 4.** Check the measurement function

If the E4980A fails any of the performance tests, go to “Performance test failure troubleshooting” on page 77.

A faulty part should be replaced as outlined in Chapter 5 which gives replacement procedures for each part. The procedures required after part replacement are given in Chapter 6.

Troubleshooting  
To Troubleshoot the Instrument

Figure 4-1 Primary trouble isolation flowchart



e4980ase1054

## Power On Sequence Troubleshooting

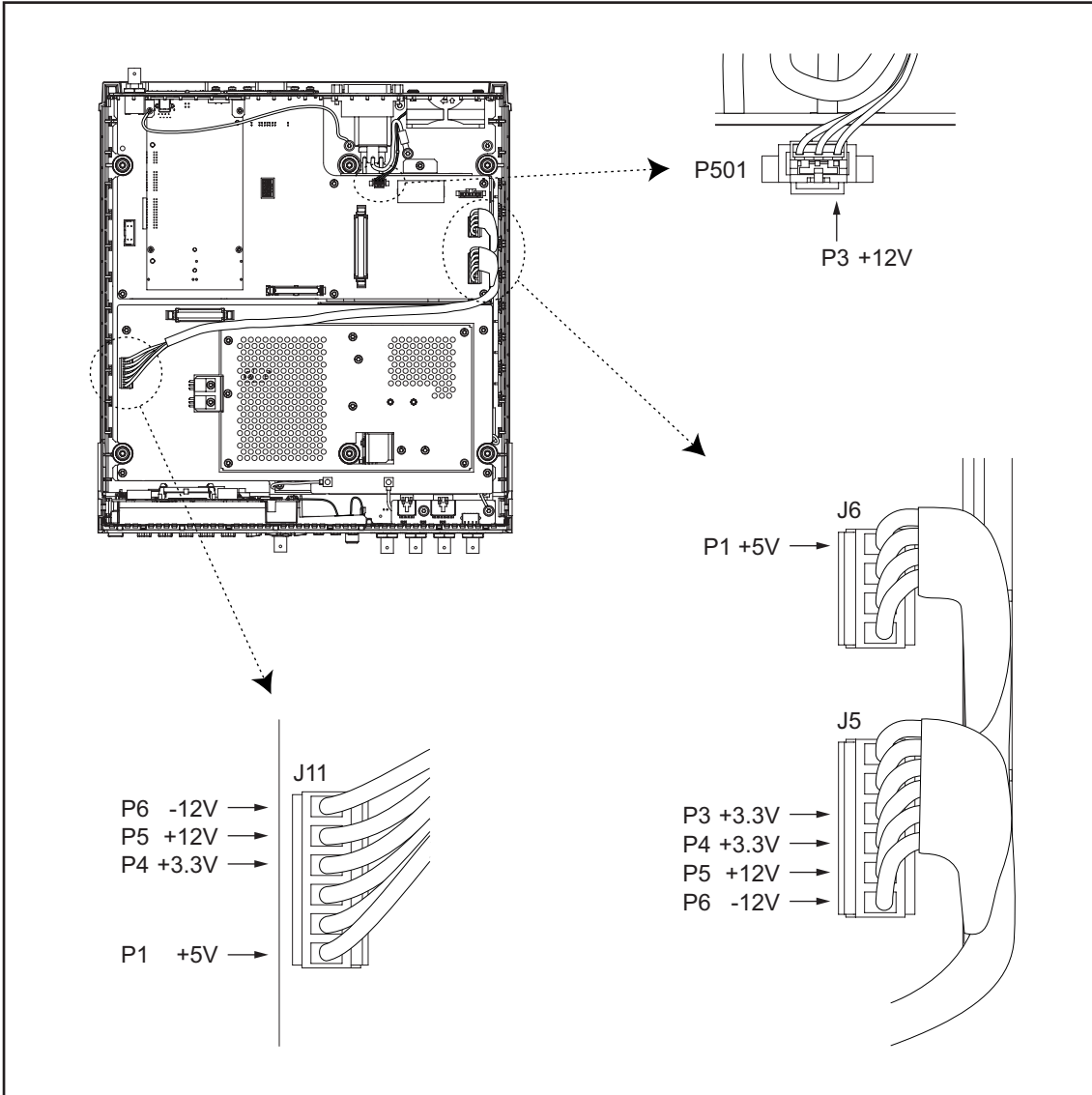
### Check the Line Voltage and Fuse

Check the main power line cord, power fuse, and actual line voltage to see that they are all correct. For more information about the line cord and power fuse, see the Power Requirements in Appendix B.

### Check the Power Supply Unit Output

- Step 1.** Remove the E4980A's outer cover.
- Step 2.** Turn the E4980A power on.
- Step 3.** Measure the output voltage (+3.3, +5, +12, -12 V) of the power supply unit using a voltmeter with a small probe. The location of each voltage connector on the A1 board and A3 board is shown in Figure 4-2.

**Figure 4-2** Output Voltage Location



e4980ase1045

- If the voltmeter reading is not within the following limits, replace the power supply unit.

**Table 4-1** Power Supply Unit Output

supply	Range
+ 3.3 V	+ 3.2 to + 3.4
+ 5 V	+ 4.8 to + 5.2
+ 12 V	+ 11.4 to + 12.6
- 12 V	- 11.4 to -12.6

- If the voltmeter reading is within the limits, the power supply is verified.

### Check booting process

If the power on sequence has a problem despite it being powered from the power supply unit properly, check the following events in this order.

1. With the E4980A plugged in and the power turned off, the orange standby LED should be on. If the orange LED doesn't light, check the key flex circuit, display interface board, A1 board, and relevant cables.
2. When the front panel power switch is turned on, the orange LED should go out and the yellow-green LED should come on. If the yellow-green LED doesn't light, check the key flex circuit, display interface board, A1 board, and relevant cables.
3. Three LEDs (+3.3V, +5V, and PWR\_GD) on the A1 board should be on. If the LEDs don't light, a problem in the A1 board is suspected.
4. The fan should be rotating and audible. If the fan doesn't run, it is probably defective.
5. Three LEDs for DC Source, DS Bias, and USB should be on temporarily. If these LEDs don't light, check the USB board, A1 board and the relevant cable.
6. The LED on the display interface board should blink. If the LED doesn't blink, check the display interface board, the A1 board, and the relevant cable.
7. Three LEDs for DC Source, DC Bias, and USB should go out.
8. The firmware revision and hardware option information along with copyright declaration should be displayed. If nothing is displayed, check the LCD, display interface board, inverter board, and the relevant cables.
9. The power on test should be executed once automatically before the measurement starts. If the power on test fails, an error code or an error message is displayed. For more details, refer to "Troubleshooting using service function".
10. The measurement view should be displayed.
11. If the following error message **A1 EEPROM write error** is displayed during the measurement process, a problem in the A1 board is suspected.
12. If the following error message **CPU Bd EEPROM write error**, or **CPU Bd FLASH ROM write error** is displayed during the measurement process, a problem in the PPMC PCA is suspected.
13. If the following error message **Fan failed** is displayed during the measurement process, a problem in the fan is suspected.
14. If the following error message **Power failed** is displayed during the measurement process, a problem in the power supply is suspected.

## Troubleshooting Using Service Function

The Agilent E4980A has a service function to diagnose the analog measurement section, digital section, and internal dc power supply voltages. The Power On Test or Self Test of the service function makes it possible to isolate a faulty board assembly.

### Power On Test

The Power On Test always takes place once the E4980A is turned on. When a failure is detected, a message "Power on test failed" is displayed in the system message area and the normal measurement screen does not appear (Service Mode). The Service Mode is a state that occurs when the power-on test fails. Here, the characters on the display turn yellow and all of the front panel keys are unavailable.

---

#### NOTE

When you want to use the front panel keys in the Service Mode while carrying out any repairs to the unit, Power Switch + Preset keys can be pressed. The characters on the display turn yellow too, but you can use all keys.

---

### Contents of the power on test results

The Power On Test contains tests as shown in Table 4-4. If the power on test is failed, an error code or an error message is also displayed. You can identify a failure section with the error code or the error message. The error code or error message is related to each test group as shown in Table 4-4. For example, the first item of the error code is for CPU test group, second item is for System test group, and seventh item is for A3 test group. The value for each test group is given in hexadecimal.

**Example of error code:** Power on test failed: 0,0,0,0,0,3f,1f

---

#### NOTE

When the test no.1 or 2 of System test group fails, tests of A1, A2, A3 test groups are not performed. In case of this failure, the value for the fifth, sixth, and seventh item is indicated as ffff.

---

### Self Test

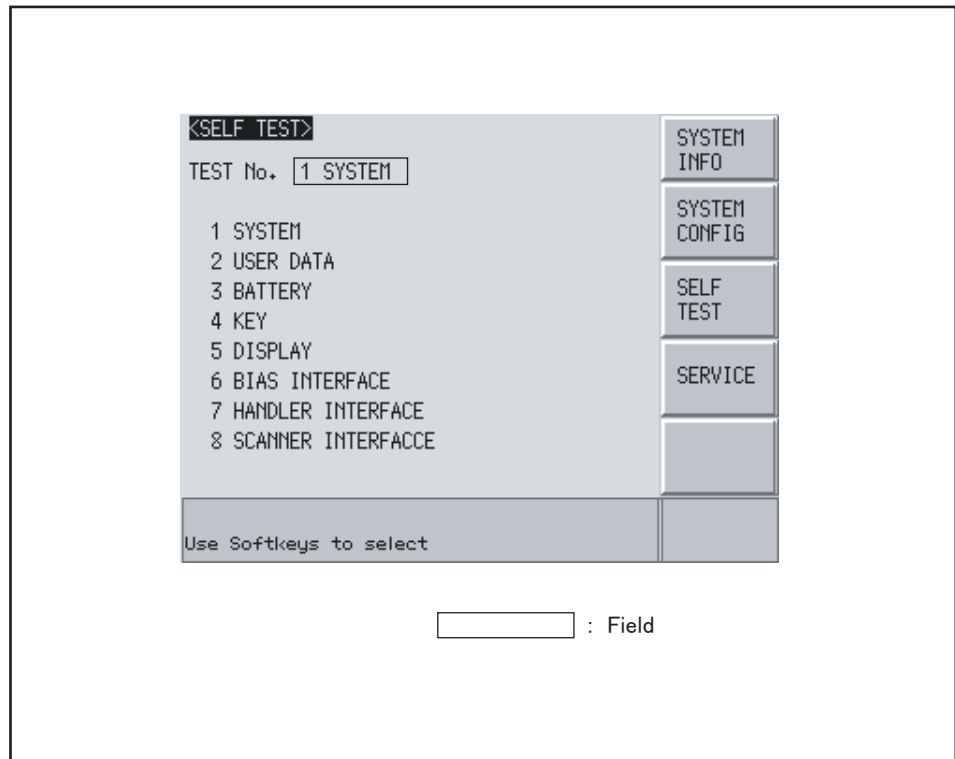
The Self Test can perform some test items of the power on test. Pressing the [System] key followed by the **SELF TEST** softkey opens the SELF TEST page. The SELF TEST page, intended for maintenance and repair, allows you to check the digital and analog behavior of E4980A. You can choose one of the available test items with the cursor placed in the corresponding field (parenthesized field).

- Choosing a Test Item (TEST No. field)

Figure 4-3 shows the fields available on this page along with the softkeys corresponding to them.



**Figure 4-3** SELF TEST Page



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**Choosing a Test Item**

**Functional Description** E4980A can run the following self tests:

The tests of SYSTEM, USER DATA, and BATTERY are also performed by the power on test.

**Table 4-2**

Test item	Description
SYSTEM	Checks the entire system, A1/A2/A3 boards, system calibration data, and so on.
USER DATA	Checks the GPIB/LAN configurations, instrument configuration information, instrument calibration data, and scanner calibration data.
BATTERY	Checks the internal batteries.
KEY	Checks the front panel keys. (Visual checks only; no result shown on screen.)
DISPLAY	Checks the front panel LEDs and LCD. (Visual checks only; no result shown on screen.)
BIAS INTERFACE	Checks the bias interface. (Visual checks only; no result shown on screen.)

4. Troubleshooting

**Table 4-2**

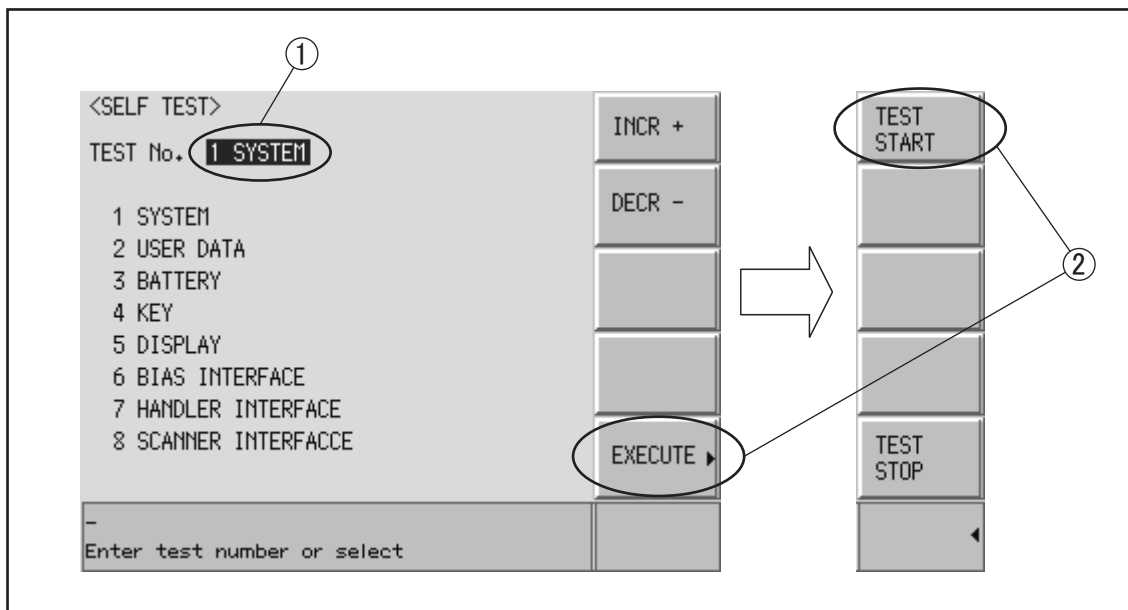
Test item	Description
HANDLER INTERFACE	Checks the handler interface. (Visual checks only; no result shown on screen.)
SCANNER INTERFACE	Checks the scanner interface. (Visual checks only; no result shown on screen.)

**Executing the self-test from the front panel** The self-test of the E4980A can be executed from the front panel. The steps are given below.

**Self-test procedure**

- Step 4.** Press [System] - **SELF TEST**
- Step 5.** Use the cursor key to highlight the selection item to the right of “TEST No.” (1 in Figure 4-4)
- Step 6.** Select the number corresponding to the test that you want to perform by using the **INCR+** and **DECR-** softkeys.
- Step 7.** Press **EXECUTE - TEST START** (2 in Figure 4-4) to execute the selected test item.

**Figure 4-4** Self-test screen and procedure



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**SERVICE Page**

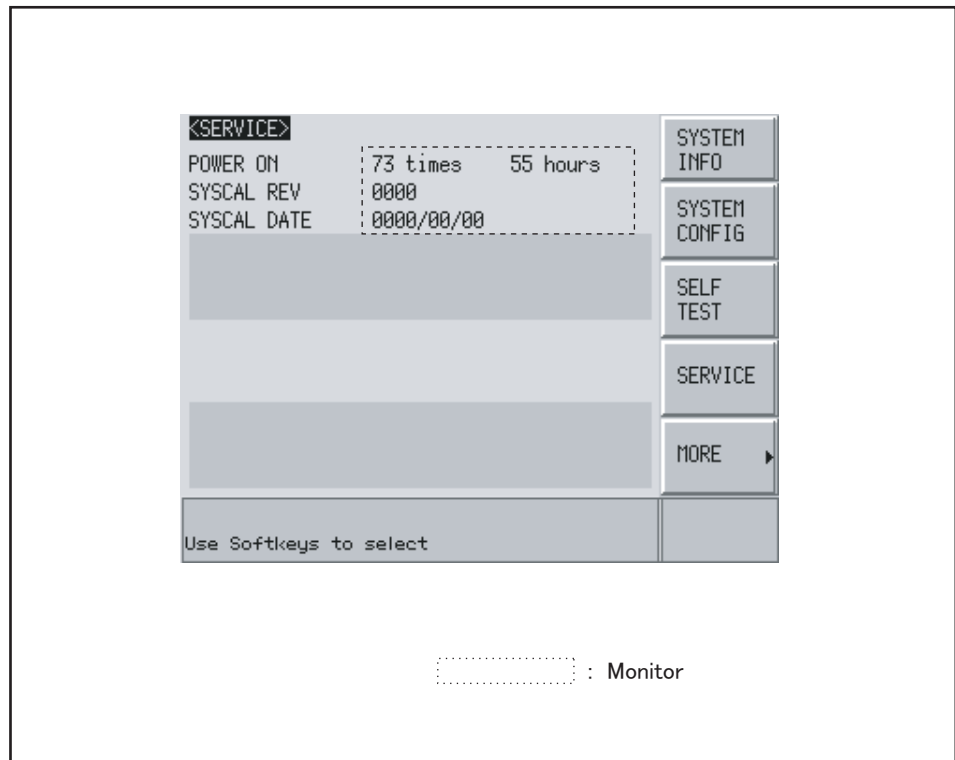
The results of the power on test or the self test (SYSTEM, USER DATA, and BATTERY) can be saved into a USB memory. Pressing the [System] key followed by the **SERVICE** softkey opens the SERVICE page.

This page is read-only.

This page displays the system information of E4980A and allows you to save the displayed information into the USB memory, but does NOT allow you to modify or delete the information.

**NOTE** The system information of E4980A may be used for the purposes of support and repair by Agilent Technologies, but will never be used for any other purposes.

**Figure 4-5** SERVICE Page



e4980aue1147

**Monitor Information**

The SERVICE page displays the following monitor information, which cannot be edited on the SERVICE page.

**Table 4-3**

<b>Monitor Information</b>	<b>Description</b>
POWER ON	Displays how many times E4980A have been started up and its cumulative power-on time.
SYSCAL REV	Displays the program revision of the adjustment for the E4980A.
SYSCAL DATE	Displays the date of the last adjustment for the E4980A.

## Troubleshooting

### Troubleshooting Using Service Function

#### Saving the System Information into External Memory

The system information of E4980A can be saved into external memory.

The system information may be used for the purposes of support and repair by Agilent Technologies.

The file location on the USB memory is as follows:

```
\e4980a\system\sysinfo.txt
```

---

**NOTE**

---

The system information of E4980A may be used for the purposes of support and repair by Agilent Technologies, but will never be used for any other purposes.

#### To save the system information into external memory:

- Step 1.** Plug a USB memory stick into the front USB port.
- Step 2.** Press [System].
- Step 3.** Press the **SERVICE** softkey.
- Step 4.** Press the **MORE** softkey.
- Step 5.** Press the **SAVE SYS INFO** softkey.
- Step 6.** While the data is being saved, a "PROCESSING..." message is shown on the display. When the data has been saved into the USB memory, a "Storing data completed." message appears in the system message area.

#### Example of the System Information

The sysinfo.txt can be read by using an external computer (PC). The example of the system information is as follows:

**Example 4-1****System information**

```
ID: Agilent Technologies,E4980A,MY12345678,A.01.00
OPT: 001,710,710
POWER CYCLE: 42
POWER ON HOURS: 22
SYSCAL REV: 1.00
SYSCAL DATE: 2006/3/9
R: Rev.1.00
CPU[1]: 0
CPU[2]: 0
SYST[1]: 0
SYST[2]: 0
SYST[3]: 0
SYST[4]: 0
SYST[5]: 0
DATA[1]: 0
DATA[2]: 0
DATA[3]: 0
```

DATA[4]: 0  
OPT[1]: 0  
OPT[2]: 0  
OPT[3]: 0  
OPT[4]: 0  
OPT[5]: 0  
OPT[6]: 0  
OPT[7]: 0  
A1[1]: -1.187504864E+01  
A1[2]: +1.184382915E+01  
A1[3]: +5.098754883E+00  
A1[4]: +3.359375000E+00  
A1[5]: +2.504882813E+00  
A1[6]: +5.090893269E+00  
A2[1]: -2.337981556E-04  
A2[2]: -4.294419530E-01  
A2[3]: +4.937164751E-01  
A2[4]: +4.625371247E-01  
A2[5]: -4.599838385E-01  
A2[6]: +3.438261555E-01  
A3[1]: -4.189105189E-05  
A3[2]: -8.715481204E-01  
A3[3]: +8.746015586E-01  
A3[4]: -7.700712127E-01  
A3[5]: +2.887844449E-01  
USER[1]: 0  
USER[2]: 0  
USER[3]: 0  
USER[4]: 0  
BATT[1]: +3.247070313E+00  
+3.750000000E+01  
+4.474563461E-01  
+4.404803338E-01

### Power On Test / Self Test Failure Troubleshooting

Table 4-4 represents the contents of the power on tests or self test and the relationships of failed tests to probable faulty board assemblies. If power on test failed is displayed or self test fail is displayed, replace the faulty board assembly as shown in Table 4-4.

**Table 4-4 Power on test / self test failure troubleshooting information**

Test group	Test No.	Test Name	Error Code / Message	Probable faulty board assembly						
				A1	A2	A3	Bias IF	Handler	Scanner	PPMC
CPU	1	CPU Test	1 ~ ffff							###
	2	CPU Test	1 ~ ff							###
System	1	A1 FPGA check	0x01	###						#
	2	A2 FPGA check	0x02	##	###					#
	3	A1 Revision check	0x04	###						#
	4	A2 Revision check	0x08	##	###					
	5	A3 Revision check	0x10	##		###				
Data	1	System Data	0x01	###						#
	2	SysCal Data	0x02	##	###					#
	3	Flash File system check	0x04							###
	4	Test Limit Data	0x08							###
Option	1	Option 002 Off check	0x01	##			###			#
	2	Option 002 On check	0x02	##			###			#
	3	Option 201 Off check	0x04	##				###		#
	4	Option 201 On check	0x08	##				###		#
	5	Option 301 Off check	0x10	##					###	#
	6	Option 301 On check	0x20	##					###	#
	7	Option consistency check	0x40	##						#

**Table 4-4 Power on test / self test failure troubleshooting information**

Test group	Test No.	Test Name	Error Code / Message	Probable faulty board assembly						
				A1	A2	A3	Bias IF	Handler	Scanner	PPMC
A1	1	A1_DCBUS_M12V	0x01	###						
	2	A1_DCBUS_P12V	0x02	###						
	3	A1_DCBUS_P5V	0x04	###						
	4	A1_DCBUS_P3.3V	0x08	###						
	5	A1_DCBUS_P2.5V	0x10	###						
	6	A1_DCBUS_STANBY	0x20	###						
A2	1	A2_DCBUS_GND	0x01		###	#				
	2	A2_DCBUS_PM5V	0x02		###	#				
	3	A2_DCBUS_P3V	0x04		###	#				
	4	A2_DCBUS_P10V	0x08		###	#				
	5	A2_DCBUS_M10V	0x10		###	#				
	6	A2_DCBUS_TEMP	0x20		###	#				
A3	1	A3_DCBUS_GND	0x01		#	###				
	2	A3_DCBUS_N50V	0x02		#	###				
	3	A3_DCBUS_P50V	0x04		#	###				
	4	A3_DCBUS_N12V	0x08		#	###				
	5	A3_DCBUS_TEMP	0x10		#	###				
User	1	User Data	User Data Lost							###
	2	State Data	State Data Lost							###
	3	Correction Data	Corr Data Lost							###
	4	Scanner Correction Data	Scanner Data Lost							###
Battery	1	A1_DCBUS_BATTERY	Battery Low	###						

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

4. Troubleshooting

## Function Specific Troubleshooting

If the E4980A 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, isolate the trouble using the Function Specific Troubleshooting procedures described below. The major functions of the E4980A and the troubleshooting procedure for each function are shown in Table 4-5.

**Table 4-5 Major functions and troubleshooting procedures**

Function	Description	Troubleshooting
Front panel keys	All the E4980A functions can be set and controlled via the front panel keys.	Refer to “To Check the Front Panel” on page 61.
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 LCD display.	Refer to “To Check the LCD” on page 61.
Front USB port	The USB port is used to save data in a USB memory. The LED for USB lights up while accessing the USB memory.	Refer to “To Check the Front USB port” on page 61.
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 62.
LAN port	The LAN interface port on the rear panel allows the E4980A to be connected to 10/100 Base-T Ethernet.	Refer to “To Check the LAN” on page 62.
GPIB Interface	The GPIB compatibility allows the E4980A to be operated as a talker/listener on IEEE 488 interface bus.	Refer to “To Check the GPIB” on page 64.
USB (USBTMC) Interface	Through this port, you can control the E4980A via external controllers. It is equivalent to control via GPIB.	Refer to in “To Check the USB (USBTMC) Interface Card” on page 65.
Handler interface (Option E4980A-201)	The interface is for data exchange with an automatic machine (handler) used on production line.	Refer to in “To Check the Handler Interface Function (Option 201 only)” on page 65.
Scanner interface (Option E4980A-301)	The interface to connect a scanner to perform up to 128 sets of multi-channel correction and measurements.	Refer to in “To Check the Scanner Interface Function (Option 301 only)” on page 69.
Bias current interface (Option E4980A-002)	The interface to connect the 42841A (Bias Current Source).	Refer to in “To Check the Bias Current Interface Function (Option 002 only)” on page 73.



## To Check the Front Panel

### Procedure

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

- Step 1.** Press [System] - **SELF TEST**
- Step 2.** Use the cursor key to highlight the selection item to the right of “TEST No.”.
- Step 3.** Select **4 KEY** using the **INCR+** or **DECR-** softkey.
- Step 4.** Press **EXECUTE - TEST START**.
- Step 5.** Randomly press the front panel keys. The key name of the pressed key is displayed.
- Step 6.** To exit the front panel test, press **TEST STOP** three times consecutively, and then press [Return].
  - If multiple keys fail to work, a problem in key function (keypad, key flex circuit) or display interface board.
  - If only a specific key doesn't work, check first if the key is subsided in the panel.

## To Check the LCD

### Procedure

- Step 1.** Press [System] - **SELF TEST**
- Step 2.** Use the cursor key to highlight the selection item to the right of “TEST No.”.
- Step 3.** Select **5 DISPLAY** using the **INCR+** or **DECR-** softkey.
- Step 4.** Press **EXECUTE - TEST START**. The whole of the LCD screen turns Red, Green, Blue, Black, and White every 2 seconds.
- Step 5.** To exit the DISPLAY test, press **TEST STOP**, and then press [Return].
  - If the LCD display has a problem, check the LCD and the display interface board.
  - If the LCD is not illuminated with backlight, check the inverter board.

## To Check the Front USB port

### Procedure

- Step 1.** Plug a USB memory, formatted with FAT16 or FAT32.

---

### NOTE

The following USB memory can be used.

Complies with USB 1.1; mass storage class, FAT16/FAT32 format; maximum consumption current is below 500 mA.

Recommended USB memory: Agilent 64MB USB Flash memory (Agilent PN 1818-8989).

Use the prepared USB memory device exclusively for the E4980A; otherwise, other

## Troubleshooting

### Function Specific Troubleshooting

previously saved data may be cleared. If you use a USB memory other than the recommended device, data may not be saved or recalled normally.

---

- Step 2.** Press [Save/Recall].
- Step 3.** Use the cursor keys to select the MEDIA field.
- Step 4.** Press the **EXT** softkey.
- Step 5.** Use the cursor keys to select the No. 11.
- Step 6.** Press the **SAVE** softkey to save configuration states into the USB memory.
- Step 7.** Press [Save/Recall].
- Step 8.** Use the cursor keys to select the MEDIA field.
- Step 9.** Press the **EXT** softkey.
- Step 10.** Use the cursor keys to select the No. 11.
- Step 11.** Press the **RECALL** softkey to recall configurations from the USB memory.

If the file save or recall operation fails, a failure in the USB port or A1 board is suspected. Also check the cable between the USB port and A1 board.

### To Check the External Trigger Input

#### Procedure

- Step 1.** Press [Preset] - **CLEAR SETTING - OK** to initialize the E4980A.
- Step 2.** Press [Meas Setup].
- Step 3.** Using the cursor keys, select the TRIG field, and then select **EXT** softkey.
- Step 4.** Press [Display Format].
- Step 5.** Connect a BNC Short or 50  $\Omega$  termination to the Ext Trig connector on the rear panel and disconnect it. Thereby a measurement trigger should be generated and a measurement result should be refreshed.
- Step 6.** If no trigger occurs, a failure in the A1 board is suspected.

### To Check the LAN

#### Procedure

- Step 1.** Connect a LAN cable between the LAN port on the rear panel and an external computer (PC).

---

#### NOTE

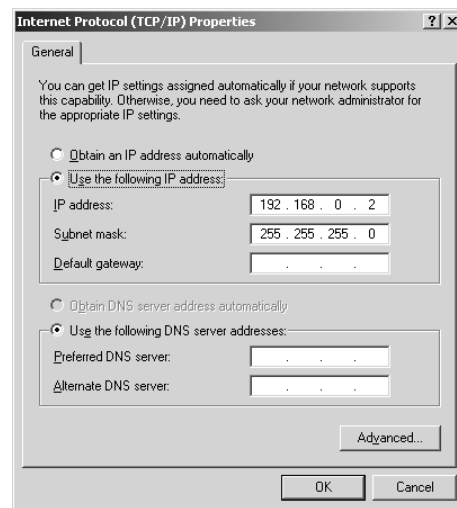
Use a crossed LAN cable to enable the peer-to-peer communication between the E4980A and the PC. If the E4980A needs to be connected to the PC via a multi port Hub, use a straight LAN cable.

---

- Step 2.** Press [System].

- Step 3.** Press the **SYSTEM CONFIG** softkey.
- Step 4.** Select the DHCP ENABLED field using the cursor keys and then press the **OFF** softkey.
- Step 5.** Select the AUTO-IP ENABLED field using the cursor keys and then press the **OFF** softkey.
- Step 6.** Enter the following IP address and subnet mask using the enter keys. For selecting the MANUAL IP ADDR or MANUAL SUBNET MASK field, use the cursor keys.
- IP Address: 192.168.0.1
- Subnet Mask: 255.255.255.0
- Step 7.** Set up the IP address/subnet mask for the external PC.
- a. Double-click “**My Computer**” icon on Windows desktop of the external PC. And double-click **Control Panel**. The Control Panel window will appear.
  - b. In the Control Panel window, double-click **Network**. The Network dialog box will appear. In the **Configuration** tab, select **TCP/IP** (display it in revers video) and press the **Properties** button.
  - c. The dialog box appears. If **Specify an IP address** has been selected, record the IP address and subnet mask.
  - d. If the **Obtain an IP address automatically** has been selected, select the **Specify an IP address**. Enter the IP address xxx.xxx.xxx.y and subnet mask xxx.xxx.xxx.xxx as shown in Figure 4-6. The letters x represent the IP address and subnet mask of the E4980A. The letter y is different from the IP address of the E4980A. Press the **OK** button. Then, restart the external PC.

**Figure 4-6** Network Dialog Box (“IP Address” Tab)



e4980ase1055

- Step 8.** By clicking “OK” button, the network settings take effect. Verify the E4980A LAN settings and response to a command from the external computer as follows:
- a. On the external computer, click "Start" button in the Windows Start menu bar using a mouse.

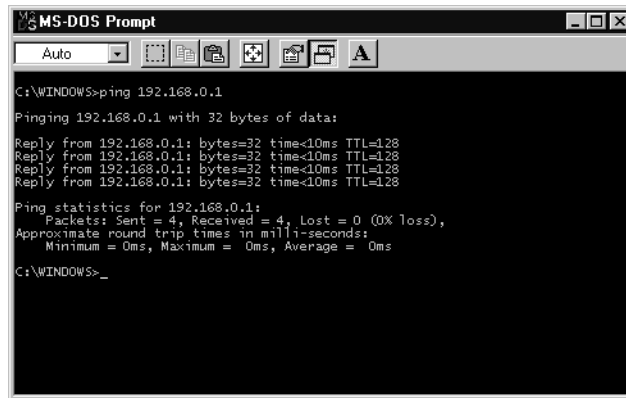
## Troubleshooting

### Function Specific Troubleshooting

- b. Click "Programs" and "MS-DOS Prompt" (or "Command Prompt") to open the DOS (Command) Prompt window.
- c. Type a ping command followed by the E4980A IP address as "ping xxx.xxx.xxx.xxx" (where, xxx.xxx.xxx.xxx is the IP address such as 192.168.0.1 assigned in step 3-d.) Press [Enter] key on the keyboard.
- d. The external computer displays a message of ping command response from the E4980A. Figure 4-7 shows an example of normal result that indicates the IP address, packet size, and a response time counted by the computer. The ping command is repeated 4 times.

Figure 4-7

#### Example of normal ping command test result

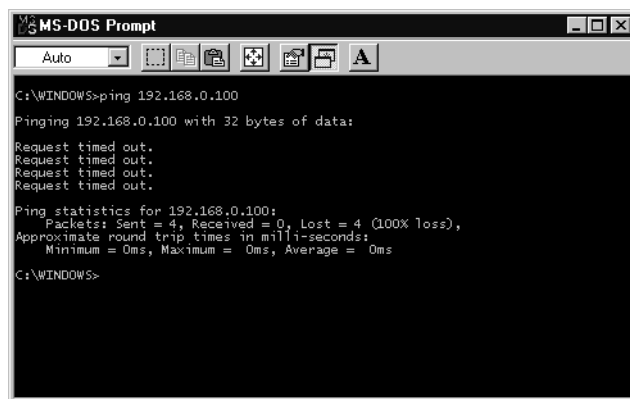


```
MS-DOS Prompt
Auto
C:\WINDOWS>ping 192.168.0.1
Pinging 192.168.0.1 with 32 bytes of data:
Reply from 192.168.0.1: bytes=32 time<10ms TTL=128
Reply from 192.168.0.1: bytes=32 time<10ms TTL=128
Reply from 192.168.0.1: bytes=32 time<10ms TTL=128
Reply from 192.168.0.1: bytes=32 time<10ms TTL=128
Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\WINDOWS>_
```

If the E4980A doesn't return the response, the external computer displays a message of "Request timed out" as shown in Figure 4-8. In this case, a failure in the PPMC PCA is suspected.

Figure 4-8

#### Example of no response for ping command



```
MS-DOS Prompt
Auto
C:\WINDOWS>ping 192.168.0.100
Pinging 192.168.0.100 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.168.0.100:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\WINDOWS>
```

## To Check the GPIB

### Procedure

Perform the E4980A performance test program. If the controller cannot detect the E4980A, the problem seems in the PPMC PCA or the connection of the GPIB cable.

## To Check the USB (USBTMC) Interface Card

### Procedure

Connect the USB cable between the controller PC and the E4980A. Turn the controller PC on. If the E4980A cannot detect the controller PC, the problem seems in the USB (USBTMC) Interface of the PPMC PCA is suspected.

## To Check the Handler Interface Function (Option 201 only)

Perform this test only when troubleshooting the Option 201 Handler Interface Board. This test verifies the handler interface functions.

### Equipment

Table 4-6

### Equipment List of the Handler Interface Function Test (Option 201 only)

Handler Simulator	Agilent p/n 04278-65001
-------------------	-------------------------

### Procedure

- Step 1.** Disconnect the power cable from the E4980A and allow 1 minute for the internal capacitors to discharge.

#### NOTE

Dangerous energy/voltage exists when the E4980A is in operation, and for a time after it is powered down. Allow 1 minutes for the internal capacitors to discharge.

- Step 2.** Remove the Handler Interface Board according to the procedure for describing in “Handler Interface” Chapter of the User’s Guide.

#### NOTE

The interface board contains electronic components that can be damaged by static electricity through electrostatic discharge (ESD). To prevent ESD damage, maintain frequent contact with any bare sheet metal surface on the chassis. A grounding wrist strap (or similar device) is useful for this purpose. Handle the board carefully at all times. Avoid touching electronic components or circuit paths.

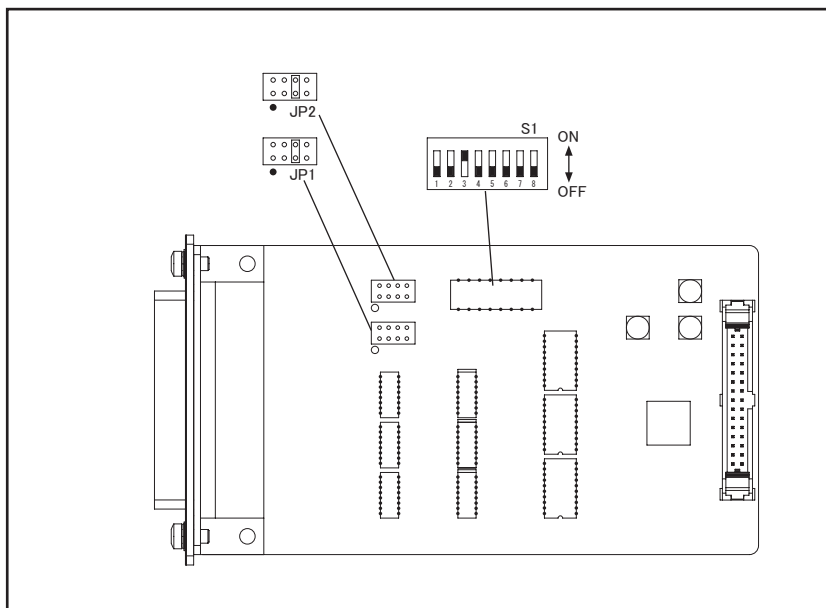
#### NOTE

Before performing Step 3, note the jumper and switch settings on the handler interface board in order to return them to the same settings at the end of this function test.

- Step 3.** Set the jumpers and switch on the handler interface board to the same settings as when the board is shipped from the factory. Refer to Figure 4-9, Table 4-7, and Table 4-8.

Figure 4-9

**Jumper, and Switch Settings**



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**Table 4-7 Internal jumper settings**

Jumper number	Jumper position <sup>*1</sup>
JP1	1
	2
	3(N)
	4
JP2	1
	2
	3(N)
	4

<sup>\*1</sup>. The factory default setting is position (N) shown in the table above.

**Table 4-8 Bit switch (S1) settings**

Bit number <sup>*1</sup>	Factory default settings
1	Off
2	Off

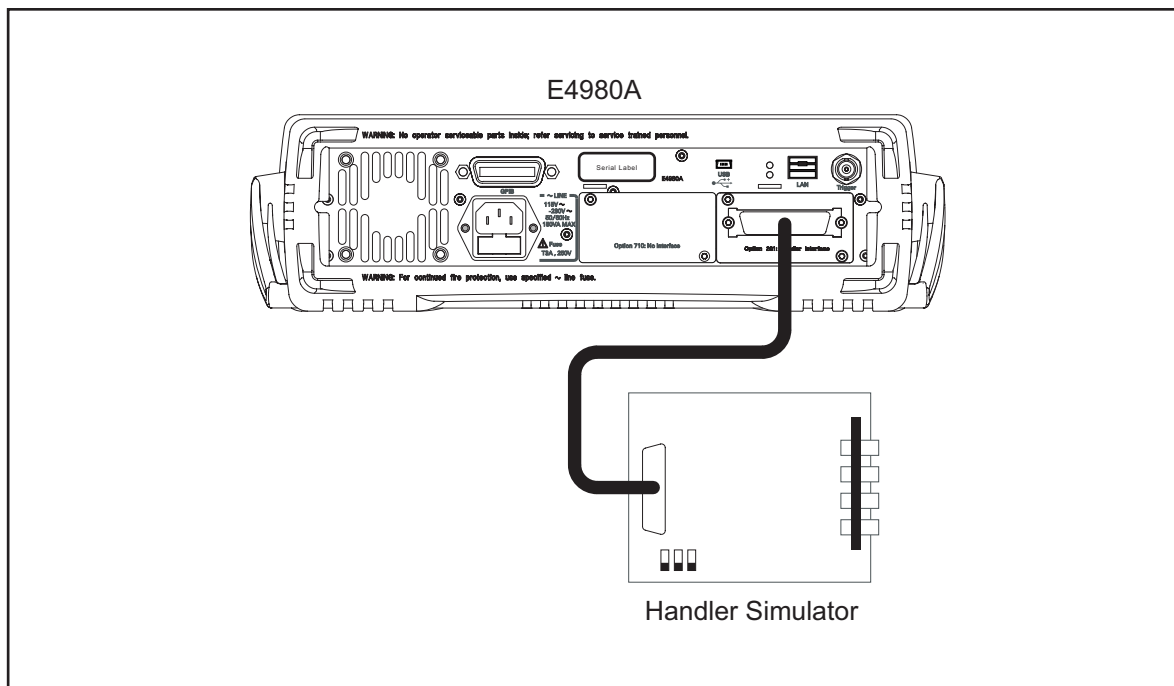
**Table 4-8 Bit switch (S1) settings**

Bit number <sup>*1</sup>	Factory default settings
3	On
4	Off
5	Off
6	Off
7	N.A.
8	N.A.

\*1. The bit numbers referenced in this table are the numbers printed on the bit switch (S1) of the handler interface board.

- Step 4.** Replace the handler interface board.
- Step 5.** Turn the E4980A ON.
- Step 6.** Connect the handler interface connector on the E4980A's rear panel to the handler simulator as shown in Figure 4-10.

**Figure 4-10 Handler Interface Function Test Setup**



e4980ase1050

- Step 7.** Press [System].
- Step 8.** Press the **SELF TEST** softkey to display the **SELF TEST** page.

4. Troubleshooting

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**Step 9.** Use the **CURSOR** arrow keys to move the cursor to the **TEST MENU** field.

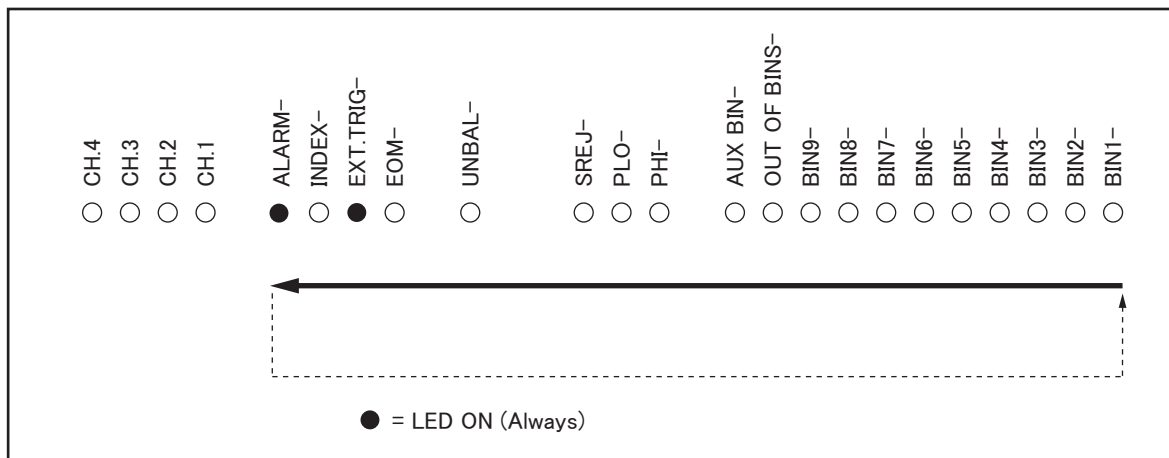
**Step 10.** Use the softkeys to select the **HANDLER INTERFACE** test.

Softkey	Function
<b>INCR +</b>	Increments the test number of the Test Menu.
<b>DECR -</b>	Decrements the test number of the Test Menu.

**Step 11.** Press the **EXECUTE - TEST START** softkeys to execute the **HANDLER INTERFACE** test.

**Step 12.** Confirm that the LEDs on the handler simulator turn ON in accordance with the E4980A's output signals displayed on the LCD. The LEDs turns ON light in the sequence shown in Figure 4-11.

**Figure 4-11** Handler Interface Function Check



e4980ase1051

**Step 13.** Press the **TEST STOP** softkey.

**NOTE** Do not execute any SELF TEST except for the Handler Interface Test or the E4980A will become inoperative.

**Step 14.** Return the jumper and switch settings on the handler interface board to their original settings.



### To Check the Scanner Interface Function (Option 301 only)

Perform this test only when troubleshooting the Option 301 scanner interface board. This test verifies the scanner interface function.

#### Equipment

**Table 4-9**

**Equipment List of the Scanner Interface Function Test (Option 301 only)**

Scanner Simulator	Agilent p/n 04278-65301
DC Power Supply	Agilent E3610A
1 k $\Omega$ Standard	Agilent 42030A (42037A)

#### Procedure

- Step 1.** Disconnect the power cable from the E4980A and allow 1 minute for the internal capacitors to discharge.

---

**NOTE** Dangerous energy/voltage exists when the E4980A is in operation, and for a time after it is powered down. Allow 1 minutes for the internal capacitors to discharge.

---

- Step 2.** Remove the Scanner Interface Board according to the procedure for describing in “Scanner Interface” Chapter of the User’s Guide.

---

**NOTE** The interface board contains electronic components that can be damaged by static electricity through electrostatic discharge (ESD). To prevent ESD damage, maintain frequent contact with any bare sheet metal surface on the chassis. A grounding wrist strap (or similar device) is useful for this purpose. Handle the board carefully at all times. Avoid touching electronic components or circuit paths.

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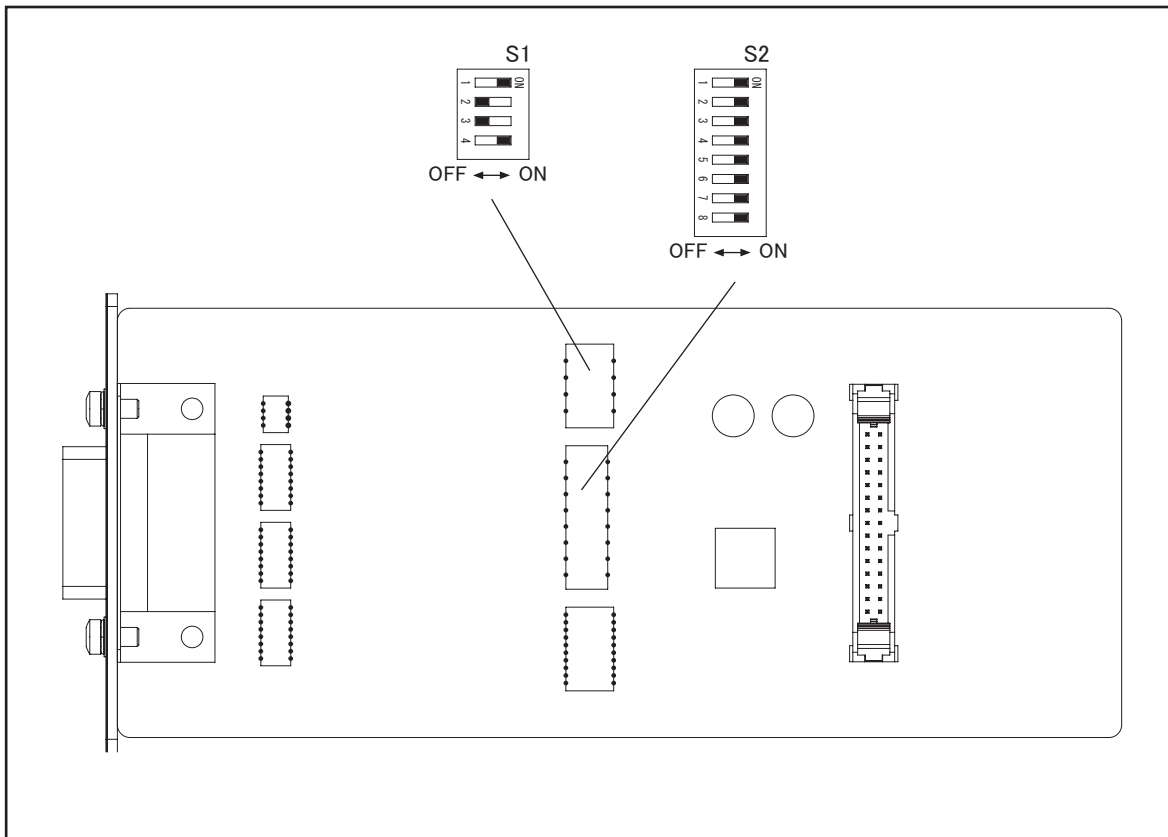
---

**NOTE** Before performing Step 3, note the switch settings on the scanner interface board in order to return them to the same settings at the end of this function test.

---

- Step 3.** Set S1 and S2 on the scanner interface board to the same settings as when the board is shipped from the factory referring to Figure 4-12, Table 4-10, and Table 4-11.

**Figure 4-12** Switches Setting



e4980ase1052

**Table 4-10** Setting Bit Switch (S1)

Bit	Default
1*1	On
2*1	Off
3*1	Off
4	On

\*1. For bits 1 to 3 of bit switch S1, only one bit can be turned on at one time.

**Table 4-11** Setting Bit Switch (S2)

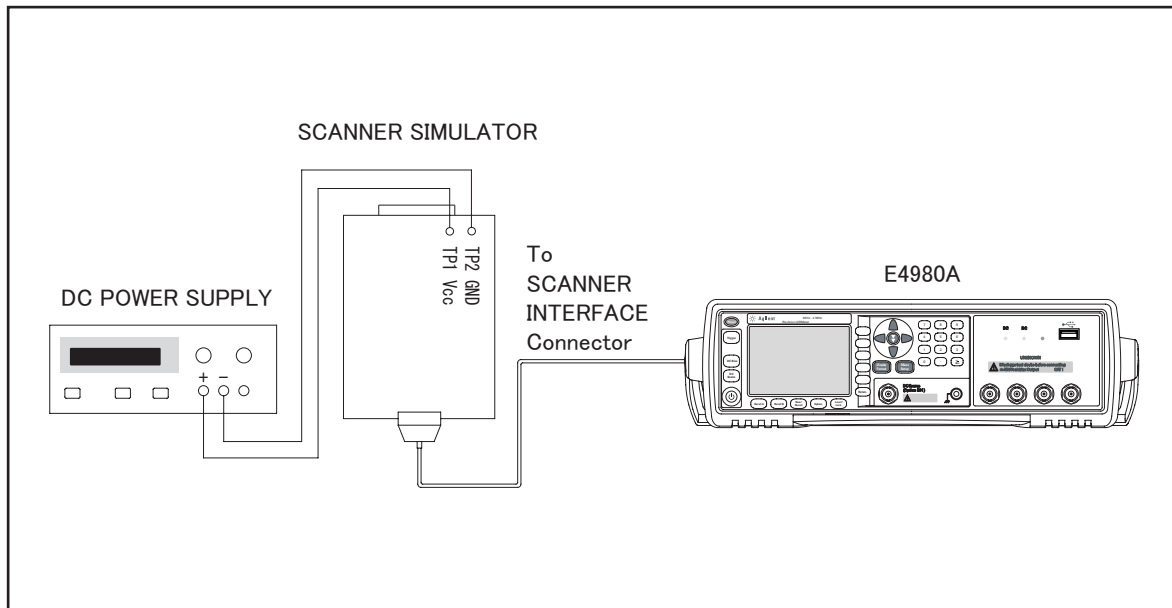
Bit	Default
1-8	On

**NOTE** Bit switches S1 and S2 can be identified by the labels “S1” and “S2” on the scanner

interface board.

- Step 4.** Replace the scanner interface board.
- Step 5.** Set DC power supply output voltage +5 V. Connect TP2 (GND) on the bias interface simulator to '-' terminal of the power supply. Then connect TP1 (Vcc) on the simulator to '+' terminal of the power supply. (Refer to Figure 4-13.)

**Figure 4-13** Scanner Simulator Connections



e4980ase1053

**NOTE** DC power for the bias interface simulator can be supplied from the E4980A instead of an external DC power supply.

- Step 6.** Connect the scanner simulator to the scanner interface connector on the E4980A's rear panel shown in Figure 4-13.
- Step 7.** Connect the 1 k $\Omega$  standard to the UNKNOWN terminal on the E4980A's front panel.
- Step 8.** Turn the E4980A ON.
- Step 9.** Press [System].
- Step 10.** Press the **SELF TEST** softkey to display the **SELF TEST** page.
- Step 11.** Use the **CURSOR** arrow keys to move the cursor to the **TEST MENU** field.
- Step 12.** Use the softkeys to select the **SCANNER INTERFACE** test.

Softkey	Function
<b>INCR +</b>	Increments the test number of the Test Menu.
<b>DECR -</b>	Decrements the test number of the Test Menu.

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**Step 13.** Press the **EXECUTE - TEST START** softkeys to execute the **SCANNER INTERFACE** test.

**Step 14.** Confirm that LEDs on the scanner simulator board turn ON in accordance with the E4980A settings displayed in the LCD.

**Step 15.** Press the **TEST STOP** softkey.

---

**NOTE**

Do not execute any SELF TEST except for the Scanner Interface Test or the E4980A will become inoperative.

---

**Step 16.** Return the switch settings on the scanner interface board to their original settings.

### To Check the Bias Current Interface Function (Option 002 only)

This test verifies the bias current interface functions.

#### Equipment

Table 4-12

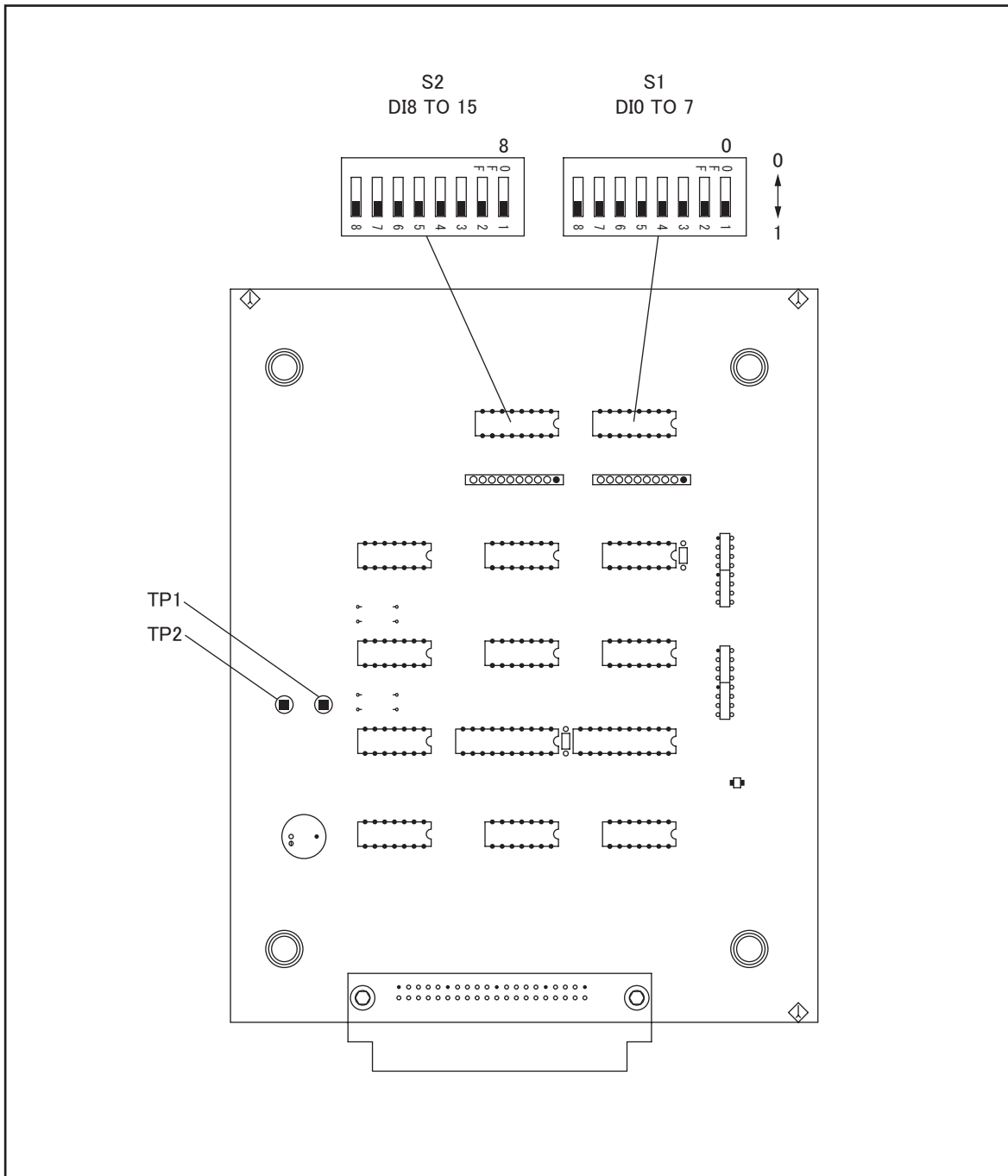
#### Equipment List of the Bias Current Interface Function Test (Option 002 only)

Bias Interface Simulator	Agilent p/n 42841-65001
Bias Interface Cable	Agilent p/n 42841-61640
DC Power Supply	Agilent E3610A
Adapter	Agilent p/n E4980-60102

#### Procedure

- Step 1.** Set all switches of S1 and S2 on the bias interface simulator to '1' as shown in Figure 4-14.

**Figure 4-14** Bias Interface Simulator



e4980ase1046

**Step 2.** Set DC power supply output voltage +5 V. Connect TP2 (GND) on the bias interface simulator to ‘-’ terminal of the power supply. Then connect TP1 (Vcc) on the simulator to ‘+’ terminal of the power supply. (refer to Figure Figure 4-14 and Figure 4-15.)

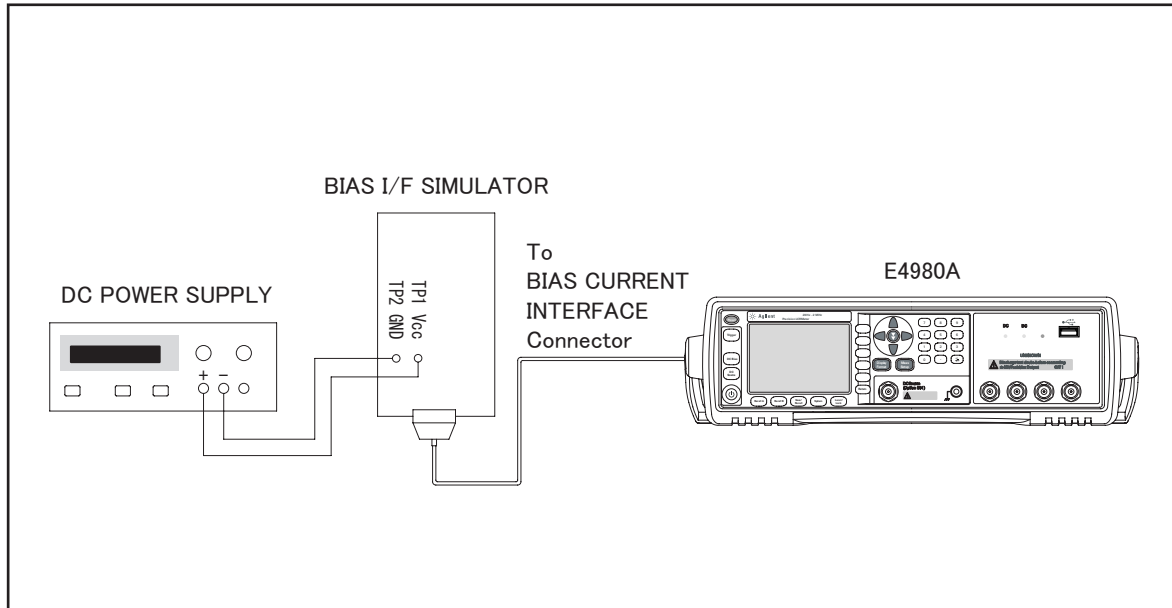
**NOTE**

DC power for the bias interface simulator can be supplied from the E4980A instead of from an external DC power supply.

**Step 3.** Interconnect the bias interface simulator and bias interface connector on the rear panel of the E4980A with the bias interface cable as shown in Figure 4-15.

**NOTE** Connect using the adapter between the bias interface connector on the rear panel of the E4980A and the bias interface cable, when you execute this step.

**Figure 4-15 Bias Current Interface Function Test Setup**



e4980ase1047

**Step 4.** Turn the E4980A ON.

**Step 5.** Press [System].

**Step 6.** Press the **SELF TEST** softkey to display the **SELF TEST** page.

**Step 7.** Use the **CURSOR** arrow keys to move the cursor to the **TEST MENU** field.

**Step 8.** Use the softkeys to select the **BIAS INTERFACE** test.

Softkey	Function
<b>INCR +</b>	Increments the test number of the Test Menu.
<b>DECR -</b>	Decrements the test number of the Test Menu.

**Step 9.** Press the **EXECUTE - TEST START** softkeys to execute the **BIAS INTERFACE** test.

**NOTE** Check the settings of S1 and S2 described in the Step 1, if the E4980A's LCD displays "Illegal Test Setup".

**Step 10.** Confirm the /RESET LED on the bias interface simulator turns ON.

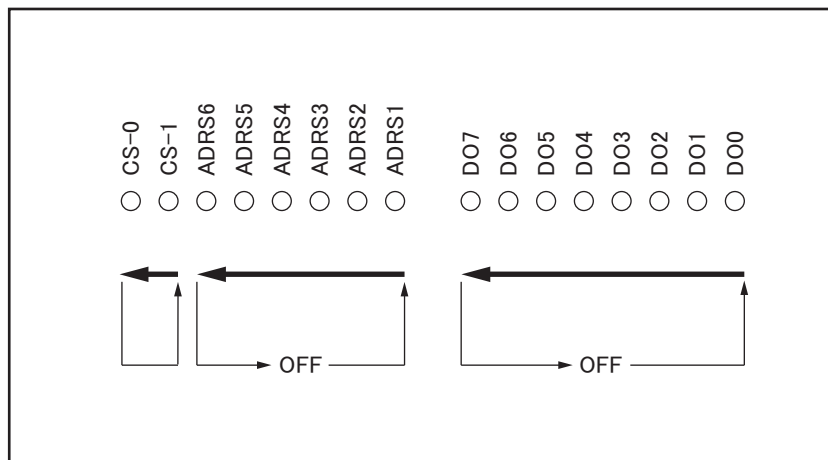
**Step 11.** Confirm CS0 and CS1 LEDs on the simulator turns ON as the E4980A's output signal is

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displayed on the LCD (Refer to Figure 4-16).

- Step 12.** Confirm that ADRS1-ADRS6 LEDs on the simulator turn ON in accordance with the hexadecimal number displayed on the LCD. One of the 6 LEDs turns ON in sequence as shown in Figure 4-16.
- Step 13.** Confirm that DO0-DO7 LEDs on the simulator turn ON in accordance with the hexadecimal number displayed on the LCD. One of the 8 LEDs turns ON in sequence as shown in Figure 4-16.

**Figure 4-16** Bias Current Interface Function Test



e4980ase1048

- Step 14.** Confirm that “DI0 TO 7” and “DI8 TO 15” on the LCD of the E4980A display hexadecimal number “ff”.
- Step 15.** Set switches S1 and S2 on the bias interface simulator to ‘0’. Then confirm that hexadecimal number “0” is displayed by “DI0 TO 7” and “DI8 TO 15”.

---

**NOTE** The states of S1 (DI0 TO 7) and S2 (DI8 TO 15) are displayed as a hexadecimal number on the E4980A’s LCD.

---

- Step 16.** Press the **TEST STOP** softkey.

---

**NOTE** Do not execute any SELF TEST except for the Bias Interface Test or the E4980A will become inoperative.

---



## Performance test failure troubleshooting

This section describes the adjustment and troubleshooting procedures used when the E4980A fails the performance tests. If the performance of the instrument is critical for the test limits and seems to be adjustable, perform first the adjustment(s) related to the failed test. When the test result is far from the tolerance of the test or the performance is not adjustable, isolate the faulty assembly in accordance with the "Performance tests failure troubleshooting procedure".

### Recommended adjustment for performance test failure

Table 4-13 shows the recommended adjustments when the performance test fails. Select the adjustment program corresponding to the recommended adjustment and perform the adjustment.

**Table 4-13 Recommended adjustment for performance test failure**

Test Num.	First failed test	Recommended adjustment			
		A1	A2	A3	PPMC
1	Frequency Accuracy Test			√	
2	DC Source Level Accuracy Test			√	
3	DC Bias Level Accuracy Test			√	
4	DC Bias V Level Monitor Accuracy Test		√		
5	DC Bias I Level Monitor Accuracy Test		√		
6	AC Signal Level Monitor Accuracy Test		√		
7	AC Signal Level Accuracy Test			√	
8	Impedance Measurement Accuracy Test		√		
9	DCR Measurement Accuracy Test		√		

**Adjustment failure troubleshooting**

Table 4-14 represents the relationships between the failed adjustment and probably faulty assembly. Note that this table lists some typical cases. There are possibilities that another assembly may be faulty.

**Table 4-14 Adjustment failure troubleshooting information**

Adj Num.	First failed adjustment	Probable faulty board assembly			
		A1	A2	A3	PPMC
1	Null DC offset adjustment		###		
2	Null ADC offset adjustment		###		
3	ADC Linearity adjustment		###	##	
4	DC Bias adjustment		##	###	
5	DC Level V Monitor adjustment		###		
6	DC Level I Monitor adjustment		###		
7	DC Source adjustment		#	###	
8	DCR adjustment		###	#	
9	Impedance adjustment		###	#	
10	AC level Monitor adjustment		###	#	
11	OSC Level adjustment		#	###	

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

### Performance test failure troubleshooting

Table 4-15 represents the relationships between the failed test and probable faulty assembly. If the performance test failure cannot be removed by a proper adjustment, replace the assembly shown in this table.

Note that this table lists some typical cases. There are possibilities that another assembly may be faulty.

**Table 4-15 Performance test failure troubleshooting information**

Test Num.	First failed test	Probable faulty board assembly			
		A1	A2	A3	PPMC
1	Frequency Accuracy Test		#	###	
2	DC Source Level Accuracy Test		#	###	
3	DC Bias Level Accuracy Test		#	###	
4	DC Bias V Level Monitor Accuracy Test		###		
5	DC Bias I Level Monitor Accuracy Test		###		
6	AC Signal Level Monitor Accuracy Test		###	#	
7	AC Signal Level Accuracy Test		#	###	
8	Impedance Measurement Accuracy Test		###	#	
9	DCR Measurement Accuracy Test		###	#	

###: Most suspicious assembly

##: Suspicious assembly

#: Possible faulty assembly

Troubleshooting

**Performance test failure troubleshooting**

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

This chapter contains information for ordering replacement parts for the E4980A.

## Ordering Information

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

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

## Direct Mail Order System

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

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

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

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

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## Exchange Assemblies

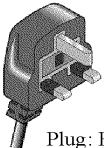
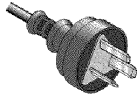
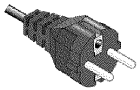
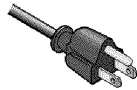

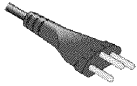
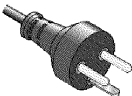
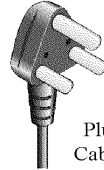
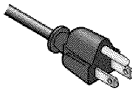

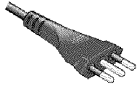

Under the rebuilt-exchange assembly program, certain factory-repaired and tested assemblies are available on a trade-in basis. These assemblies are offered at lower cost than a new assembly, but meet all factory specifications required of a new assembly.

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

### Power Cables and Plug Configurations

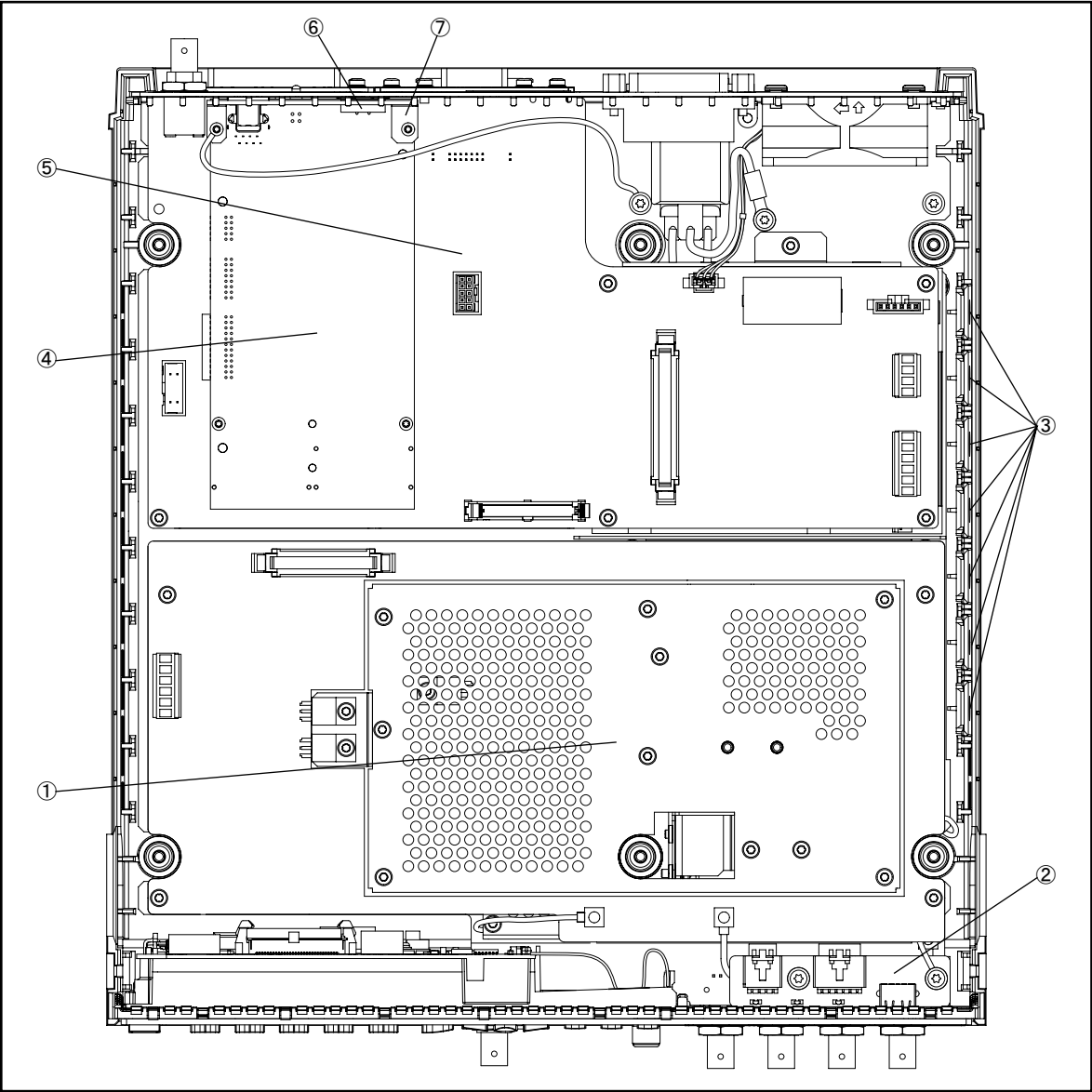
Figure 5-1 Power Cables and Plug Configurations

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

power\_e

Top View (Major Assemblies)

Figure 5-2 Top View (Major Assemblies)



e4980ase1001

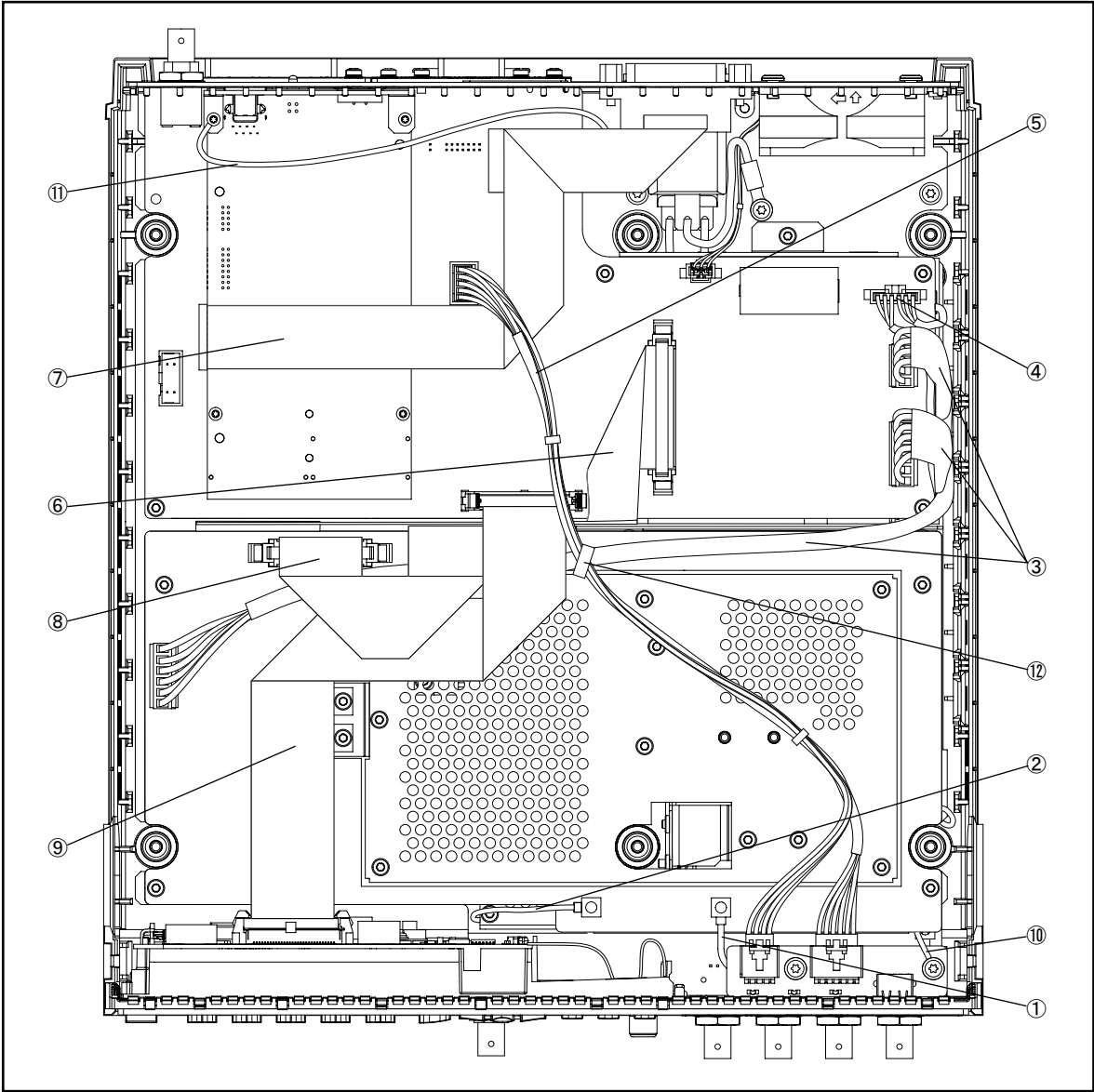


**Table 5-1 Top View (Major Assemblies)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>Qty.</b>	<b>Description</b>
1	E4980-62003	1	TESTED PCA A3 (ANALOG DAUGHTER BOARD)
	E4980-69003	1	RSTRD E4980-62003 ANALOG
	0403-0424	2	BUMPER FOOT-ADH MTG 20.5-MM-WD (not included A3)
2	E4980-66509	1	PCA E4980 USB
3	5041-7724	7	VENT BLOCKS
4	P1000-66501	1	PPMC PCA
5	E4980-66501	1	PCA E4980 MOTHER BOARD (A1)
6	E4980-07004	1	USB GASKET
7	E4980-01207	1	ANGLE CPU

Top View (Cables)

Figure 5-3 Top View (Cables)



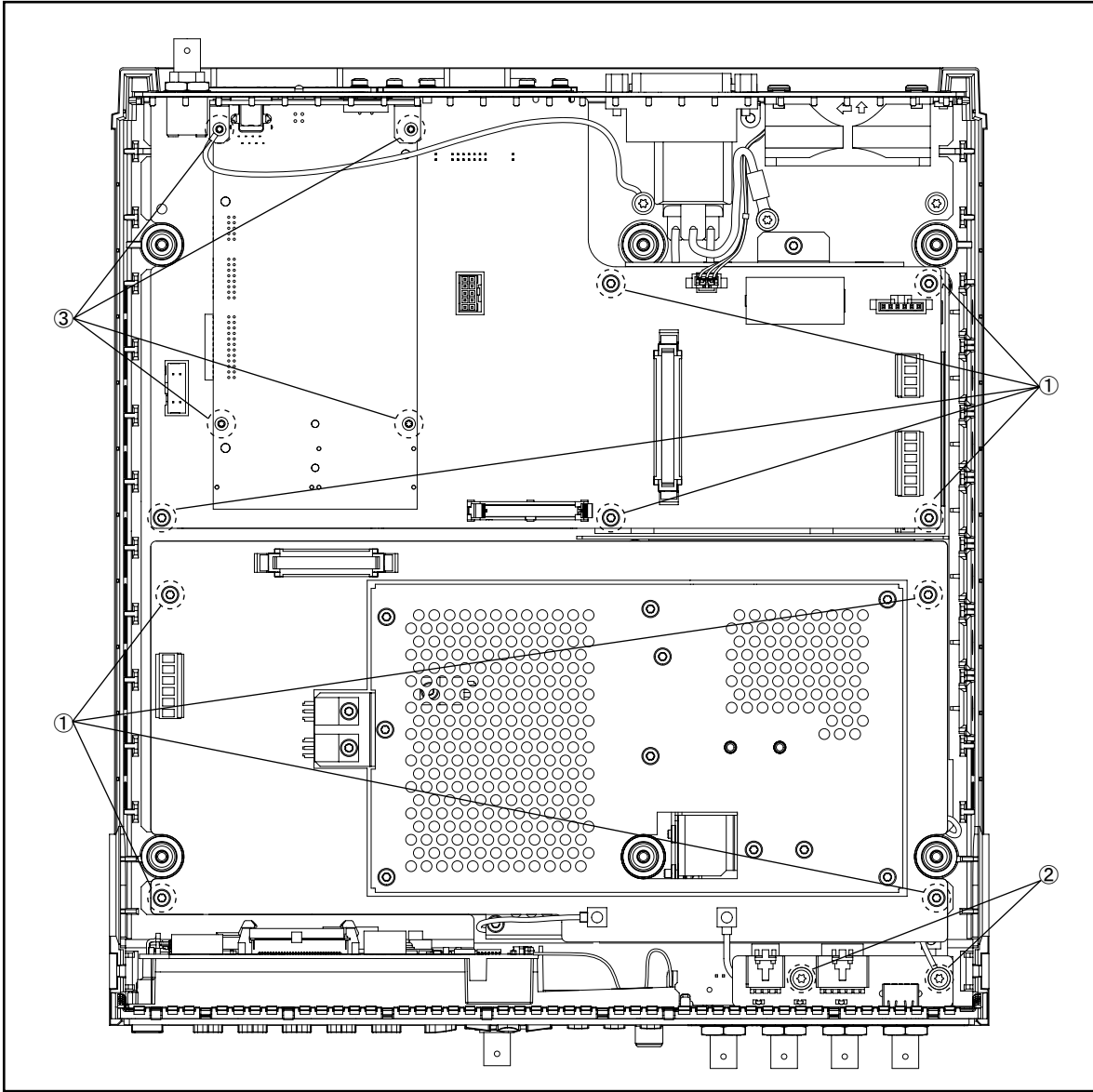
e4980ase1002

**Table 5-2 Top View (Cables)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>Qty.</b>	<b>Description</b>
1	5188-1252	1	RF CABLE ASSY
2	5188-1254	1	RF CABLE ASSY
3	E4980-61601	1	POWER CABLE ASSY
4	E4980-61615	1	CABLE POWER CONTROL
5	E4980-61605	1	FRONT USB CABLE
6	E4980-61609	1	MOTHER-ANALOG CABLE ASSY
7	E4980-61610	1	GPIB CABLE ASSY
8	E4980-61602	1	ANALOG SOURCE CABLE ASSY
9	E4980-61603	1	LCD CABLE ASSY
10	E4980-61617	1	FRONT GND CABLE
11	E4980-61616	1	LAN GND CABLE
12	1400-0249	1	CABLE TIE .062-.625-DIA .091-WD NYL

Top View (Miscellaneous Parts)

Figure 5-4 Top View (Miscellaneous Parts)



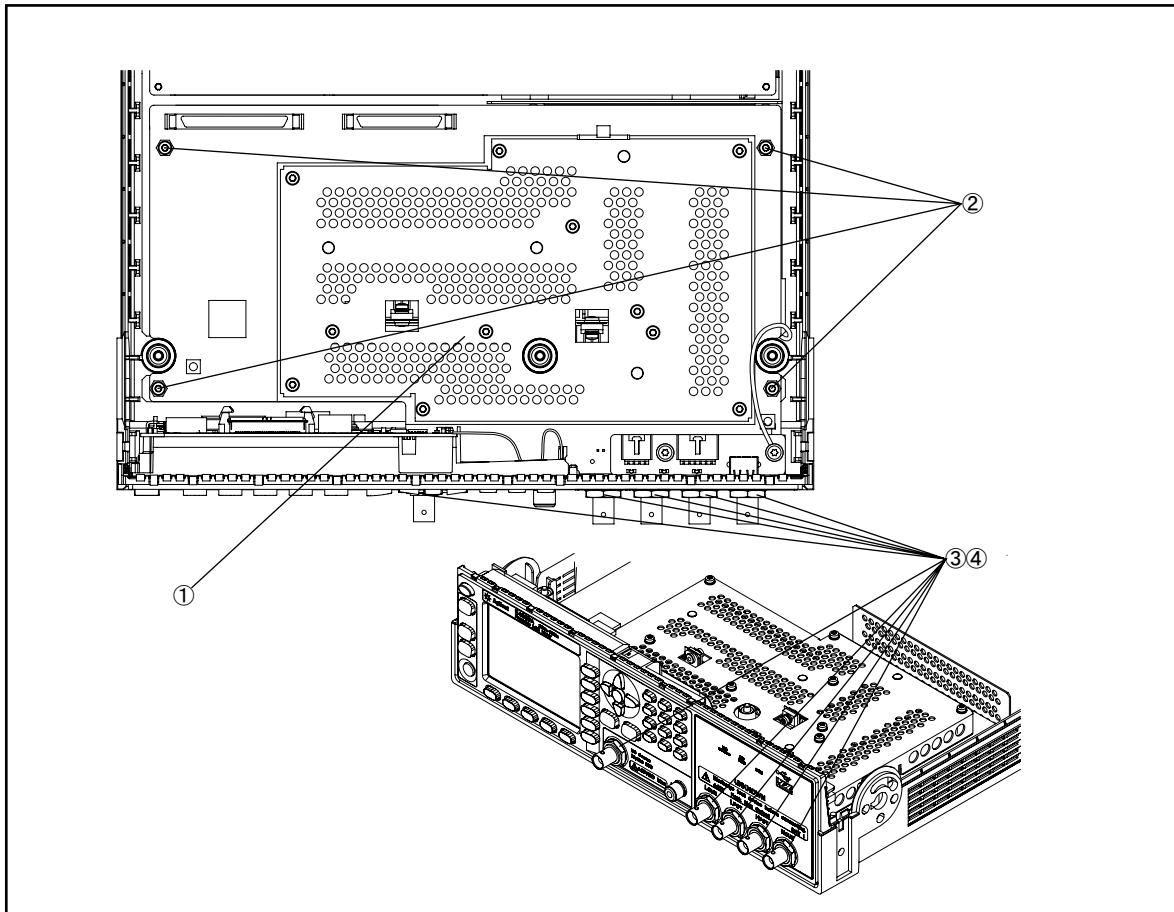
e4980ase1003

Table 5-3 Top View (Miscellaneous Parts)

Ref. Desig.	Agilent Part Number	Qty.	Description
1	0515-0430	9	SCREW-MACH M3 X 0.5
2	0515-4830	2	SCREW-MACH M4 X 0.7
3	0515-1940	4	SCREW-MACH M2.5 X 0.45

**Top View (TESTED PCA A2 (ANALOG BOARD))**

**Figure 5-5** Top View (TESTED PCA A2 (ANALOG BOARD))



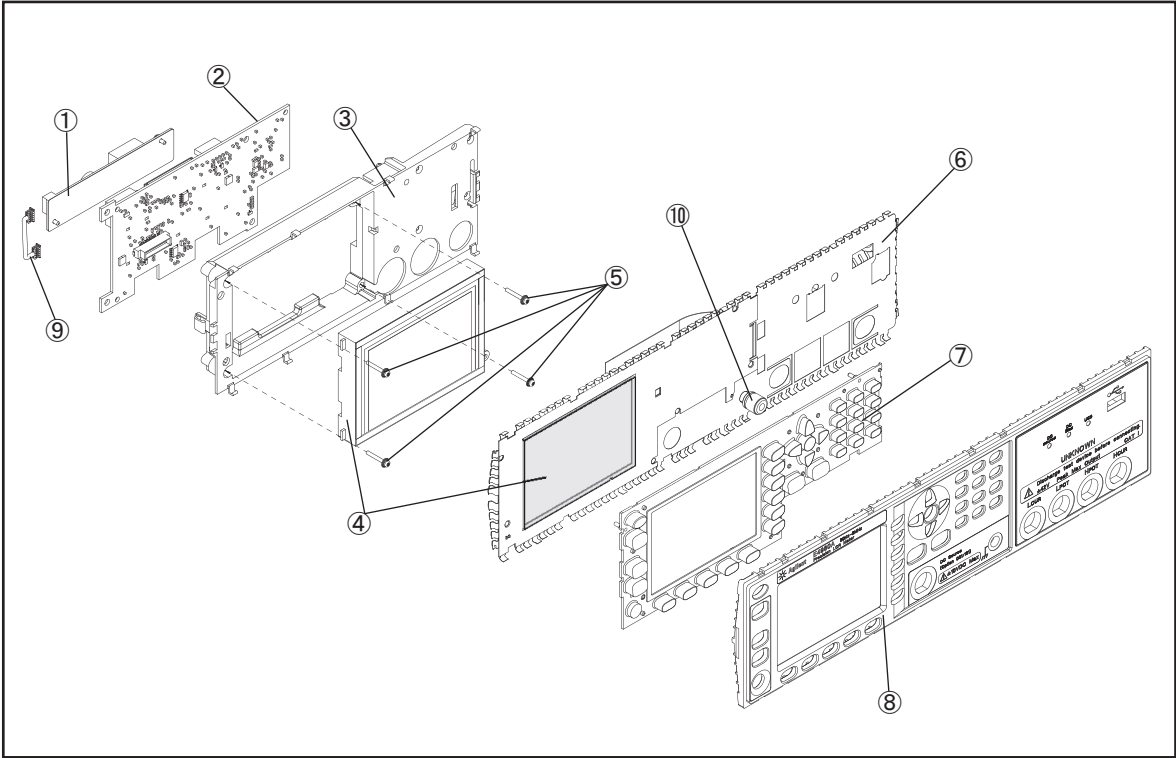
e4980ase1004

**Table 5-4** Top View (TESTED PCA A2 (ANALOG BOARD))

Ref. Desig.	Agilent Part Number	Qty.	Description
1	E4980-62002	1	TESTED PCA A2 (ANALOG BOARD)
	E4980-69002	1	RSTRD E4980-62002 ANALOG
2	0380-4989	4	STANDOFF-HEX M4X0.7
3	2940-0256	5	NUT-HEX-DBL-CHAM 1/2-28-THD .095-IN-THK
4	3050-2230	5	WASHER-SPR-WAVY 13-MM-ID 17-MM-OD

**FRONT PANEL**

**Figure 5-6 FRONT PANEL**



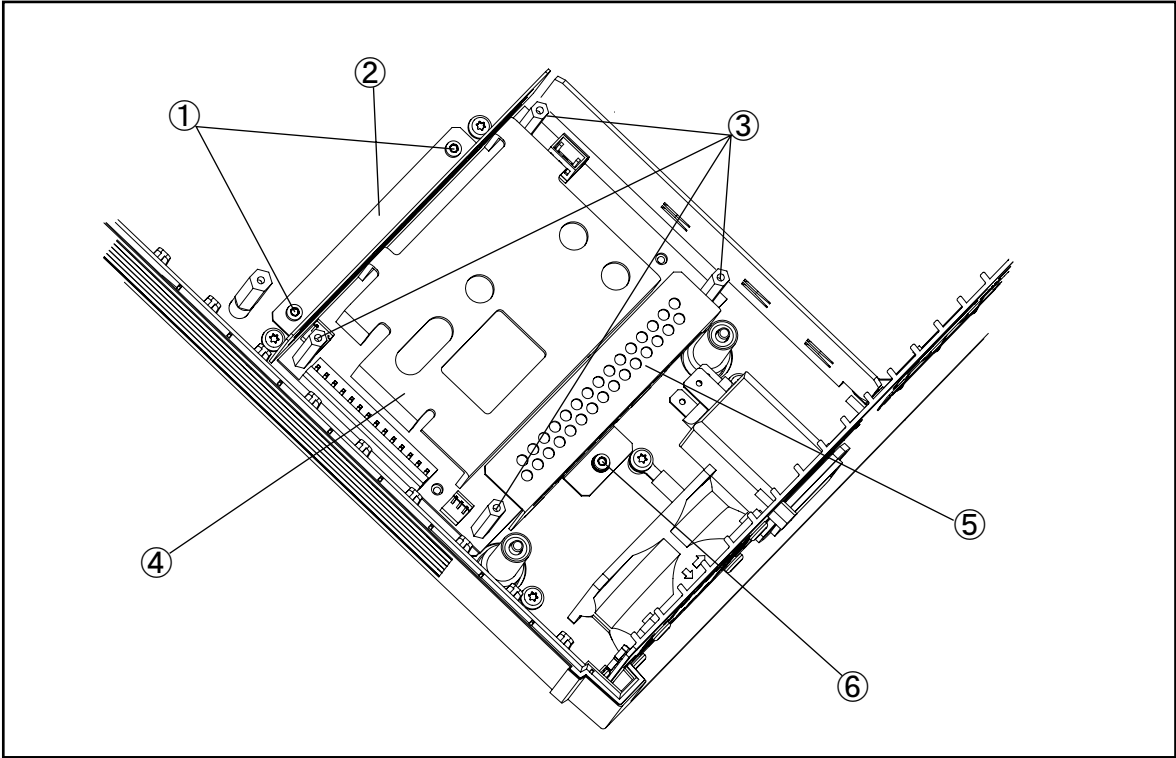
e4980ase1013

**Table 5-5 FRONT PANEL**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>Qty.</b>	<b>Description</b>
1	E4980-25001	1	INSULATOR
	0950-4111	1	INVERTER
	0515-0365	2	SCREW-MACHINE M2 X 0.4
2	N1912-60002	1	DISPLAY INTERFACE
3	N1912-40002	1	DISPLAY SUPPORT
4	2090-0825	1	DISPLAY
	E4980-25003	2	LCD GASKET SHORT
	E4980-25004	2	LCD GASKET LONG
	N1912-20005	1	WINDOW,EMI SHIELD
5	0515-0661	4	SCREW-MACHINE ASSEMBLY M2 X 0.4 14MM-LG
6	E4980-07001	1	EMI SHIELD
	N1912-20001	1	KEY FLEX CIRCUIT
7	E4980-40012	1	KEYPAD
8	E4980-40001	1	FRONT PANEL
9	N1912-61002	1	CABLE ASSY BACKLIGHT
10	1510-0130	1	BINDING POST SGL
	3050-2229	1	WASHER-SPR-WAVY 6.4-MM-ID
	2950-0006	1	NUT-HEX-DBL-CHAM 1/4-32-THD

Top View (Power Supply Assembly)

Figure 5-7 Top View (Power Supply Assembly)



e4980ase1005

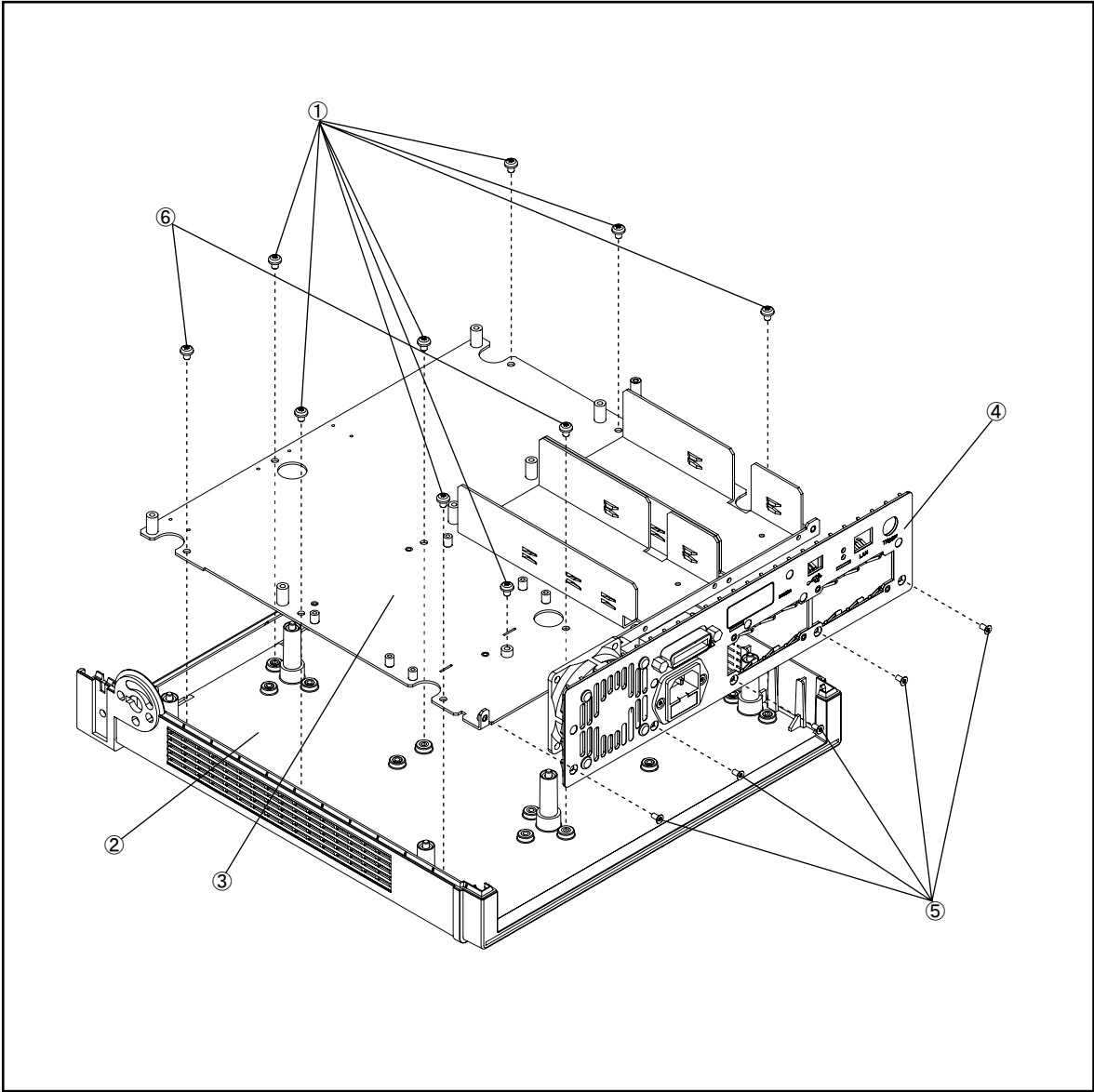


**Table 5-6 Top View (Power Supply Assembly)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>Qty.</b>	<b>Description</b>
1	0515-0430	2	SCREW-MACHINE M3 X 0.5
2	E4980-01205	1	ANGLE SHIELD
3	0380-4972	4	STANDOFF-HEX M3.0 X 0.5
4	E4980-60103	1	Power Supply
5	E4980-04001	1	PSU COVER
6	0515-0430	1	SCREW-MACHINE M3 X 0.5

Top View (BASE PLATE ASSEMBLY)

Figure 5-8 Top View (BASE PLATE ASSEMBLY)



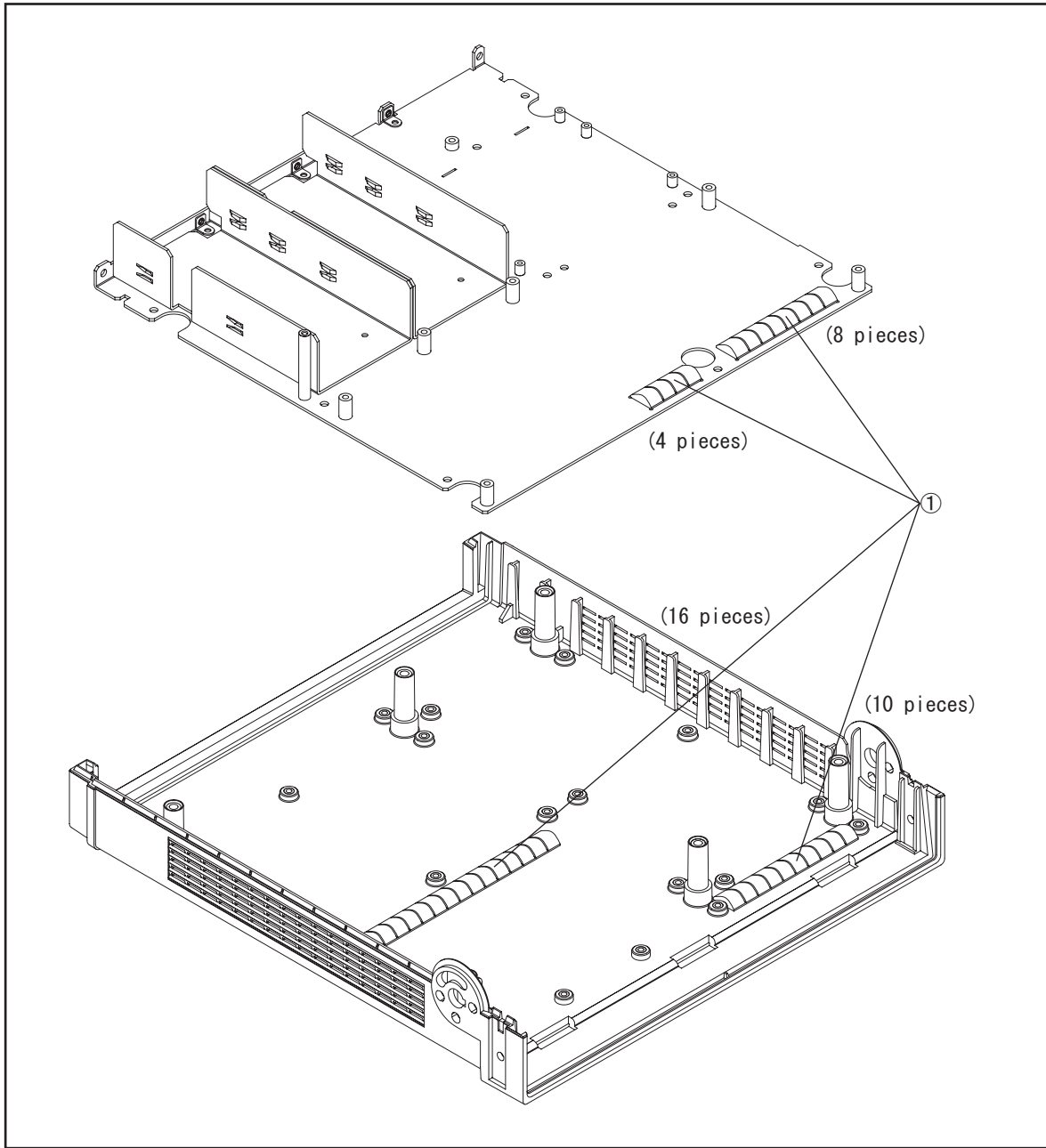
e4980ase1006

**Table 5-7 Top View (BASE PLATE ASSEMBLY)**

<b>Ref. Desig.</b>	<b>Agilent Part Number</b>	<b>Qty.</b>	<b>Description</b>
1	0515-4830	8	SCREW-MACH M4 X 0.7
2	E4980-40003	1	3/4 RACK MODULE BOTTOM CASE
3	E4980-00111	1	BASE PLATE
4	See Table 5-10	1	Rear panel assembly
5	0515-1946	5	SCREW-MACH M3 X 0.5
6	0515-2143	2	SCREW-MACH M4 X 0.7 6MM-LG PAN-HD

**Gasket**

**Figure 5-9** Gasket



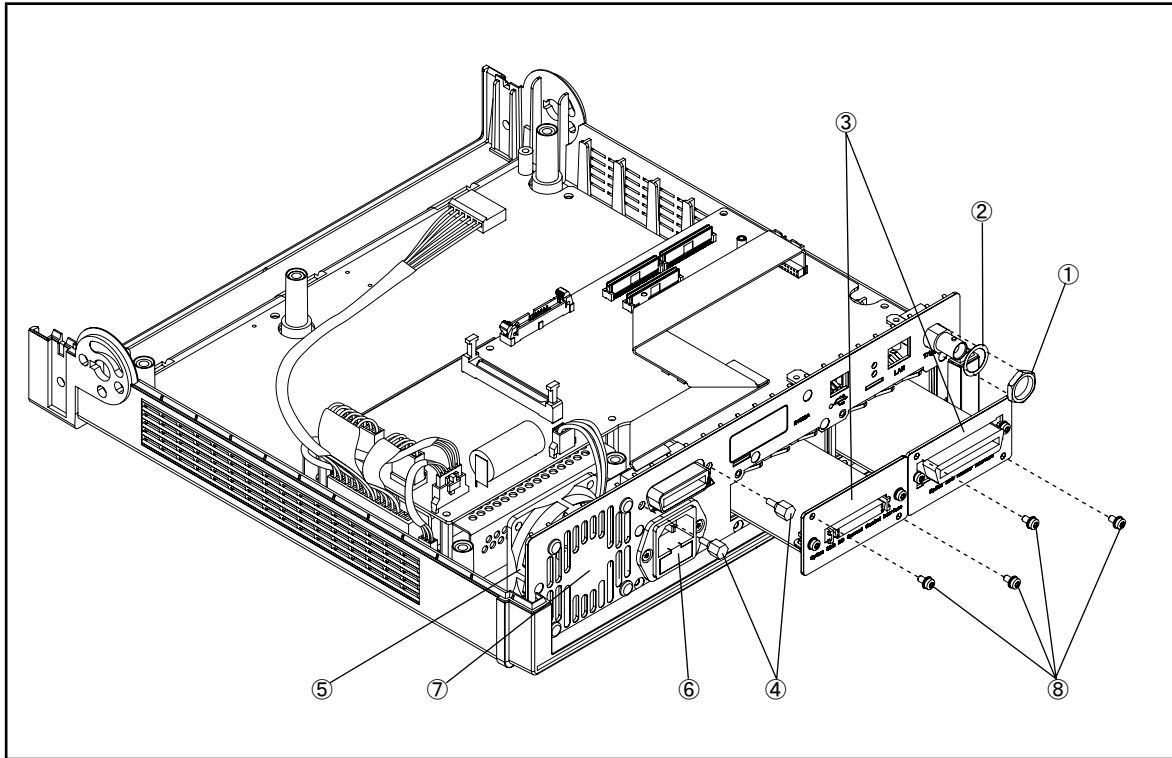
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**Table 5-8** Gasket

Ref. Desig.	Agilent Part Number	Qty.	Description
1	8160-0538	0.85	GASKET

Rear View

Figure 5-10 Rear View



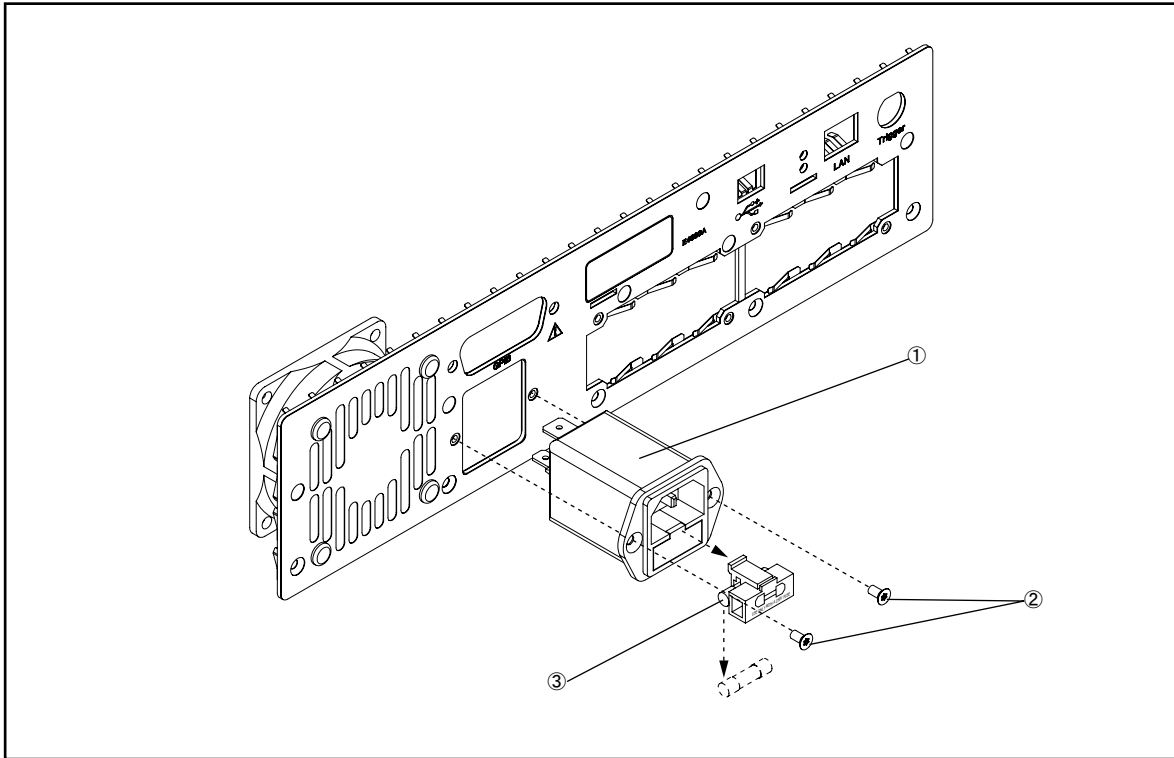
e4980ase1007

Table 5-9 Rear View

Ref. Desig.	Agilent Part Number	Qty.	Description
1	2940-0256	1	NUT-HEX-DBL-CHAM 1/2-28-THD .095-IN-THK
2	3050-2230	1	WASHER-SPR-WAVY 13-MM-ID 17-MM-OD
3	See Table 5-13	2	INTERFACE OPTION ASSEMBLY
4	0380-4870	2	STANDOFF-HEX .591-INCH-LG 4-40-THD
5	See Table 5-12	1	FAN ASSEMBLY
6	See Table 5-11	1	POWER INLET ASSEMBLY
7	E4980-00201	1	REAR PANEL
8	0515-0430	4	SCREW-MACHINE M3 X 0.5

**POWER INLET ASSEMBLY**

**Figure 5-11** POWER INLET ASSEMBLY



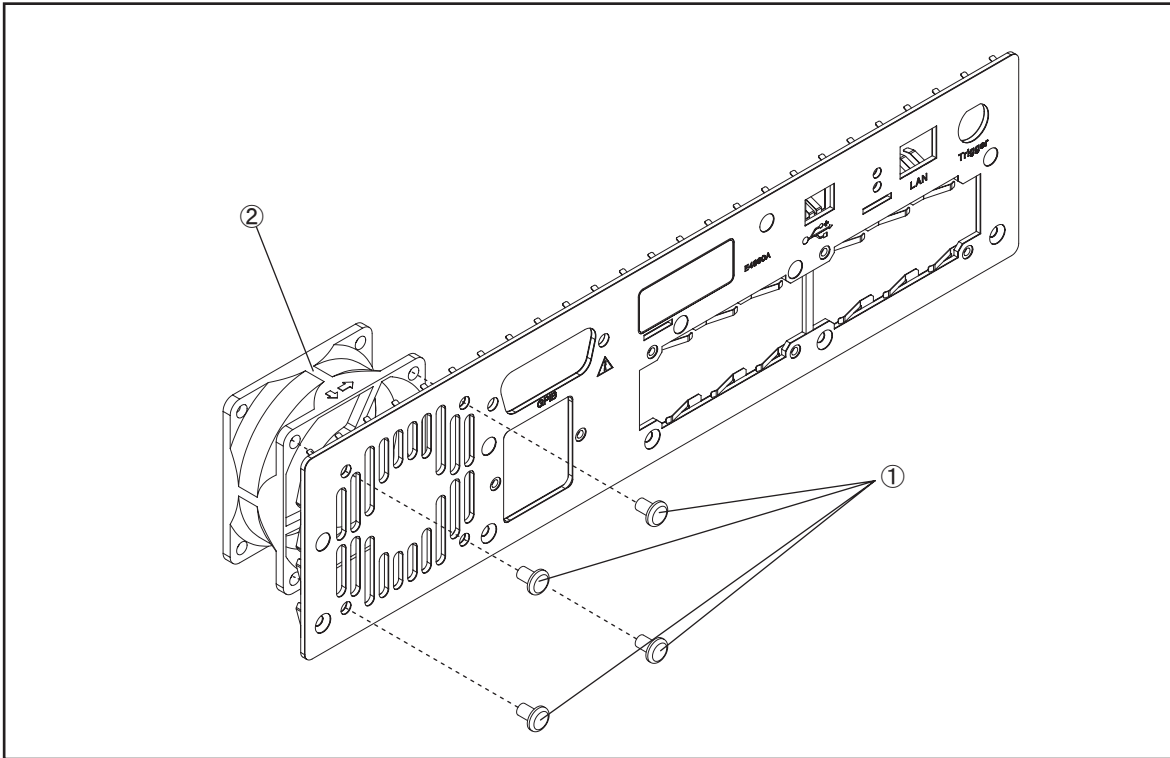
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**Table 5-10** POWER INLET ASSEMBLY

Ref. Desig.	Agilent Part Number	Qty.	Description
1	E4980-61612	1	INLET ASSY
2	0515-1946	2	SCREW-MACH M3 X 0.5
3	2110-1017	1	FUSE 3A 250V

**FAN ASSEMBLY**

**Figure 5-12 FAN ASSEMBLY**



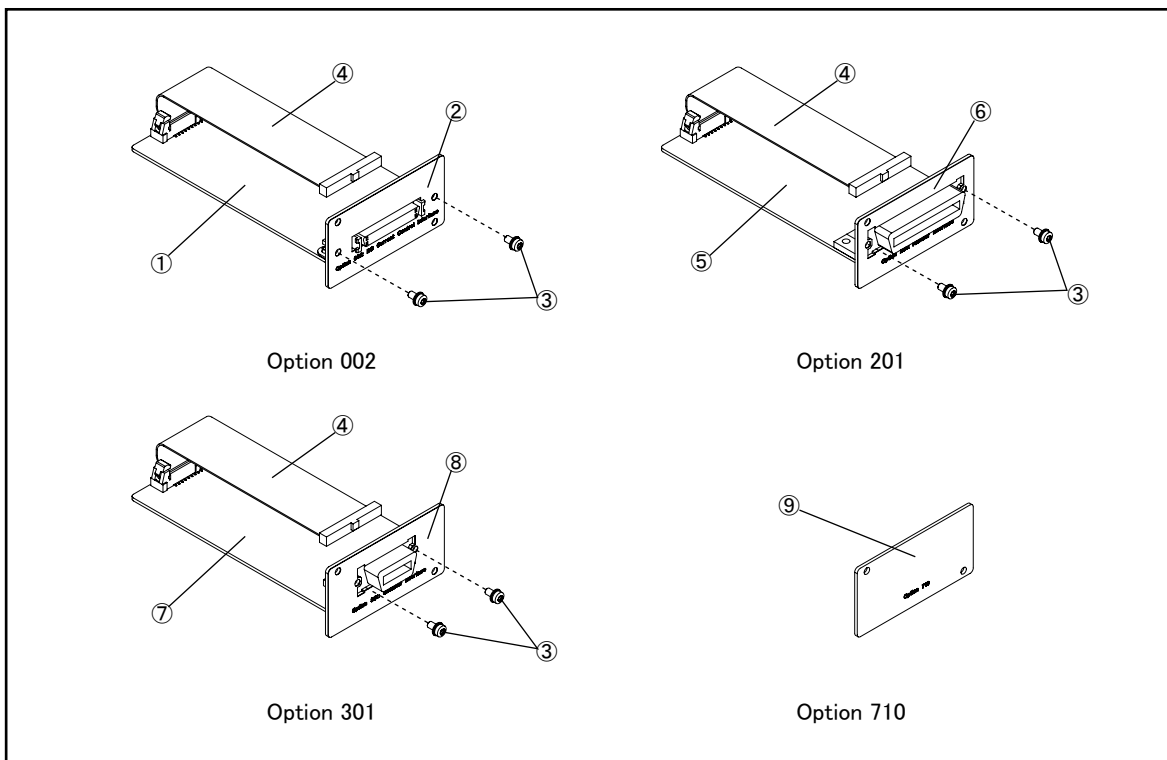
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**Table 5-11 FAN ASSEMBLY**

Ref. Desig.	Agilent Part Number	Qty.	Description
1	0361-1890	4	RIVET-PUSH-IN 8-MM-HEAD DIA 4-MM-BODY DIA
2	E4980-61613	1	FAN ASSY

**INTERFACE OPTION ASSEMBLY**

**Figure 5-13** INTERFACE OPTION ASSEMBLY



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**Table 5-12** INTERFACE OPTION ASSEMBLY

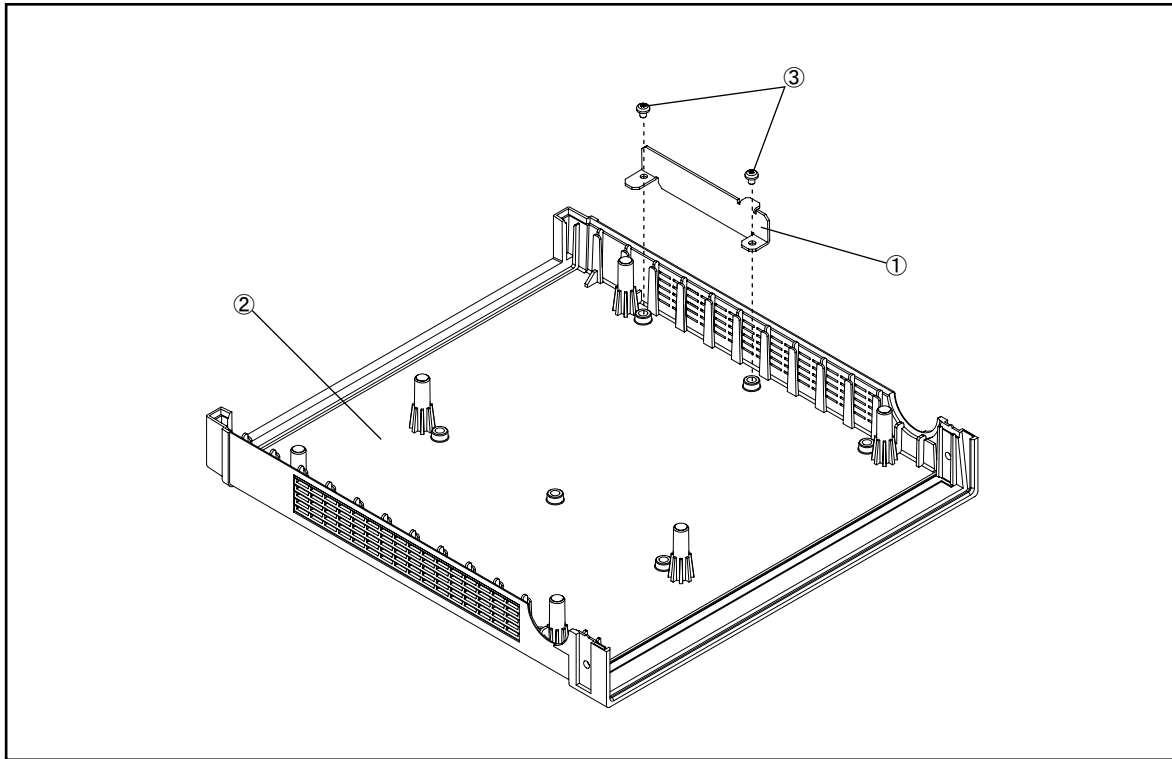
Ref. Desig.	Agilent Part Number	Qty.	Description
1	E4980-66506	1	CURRENT BIAS I/F (Option 002)
2	E4980-00206	1	DC BIAS PANEL (Option 002)
3	0515-0430	2	SCREW-MACHINE M3 X 0.5
4	E4980-61608	1	UTILITY CABLE ASSY
5	E4980-66507	1	HANDLER I/F (Option 201)
6	E4980-00207	1	HANDLER PANEL (Option 201)
7	E4980-66508	1	SCANNER I/F (Option 301)
8	E4980-00208	1	SCANNER PANEL (Option 301)
9	E4980-00202	1	BLANK PANEL (Option 710)



**WIND ANGLE ASSEMBLY**

Figure 5-14

**WIND ANGLE ASSEMBLY**



e4980ase1011

Table 5-13

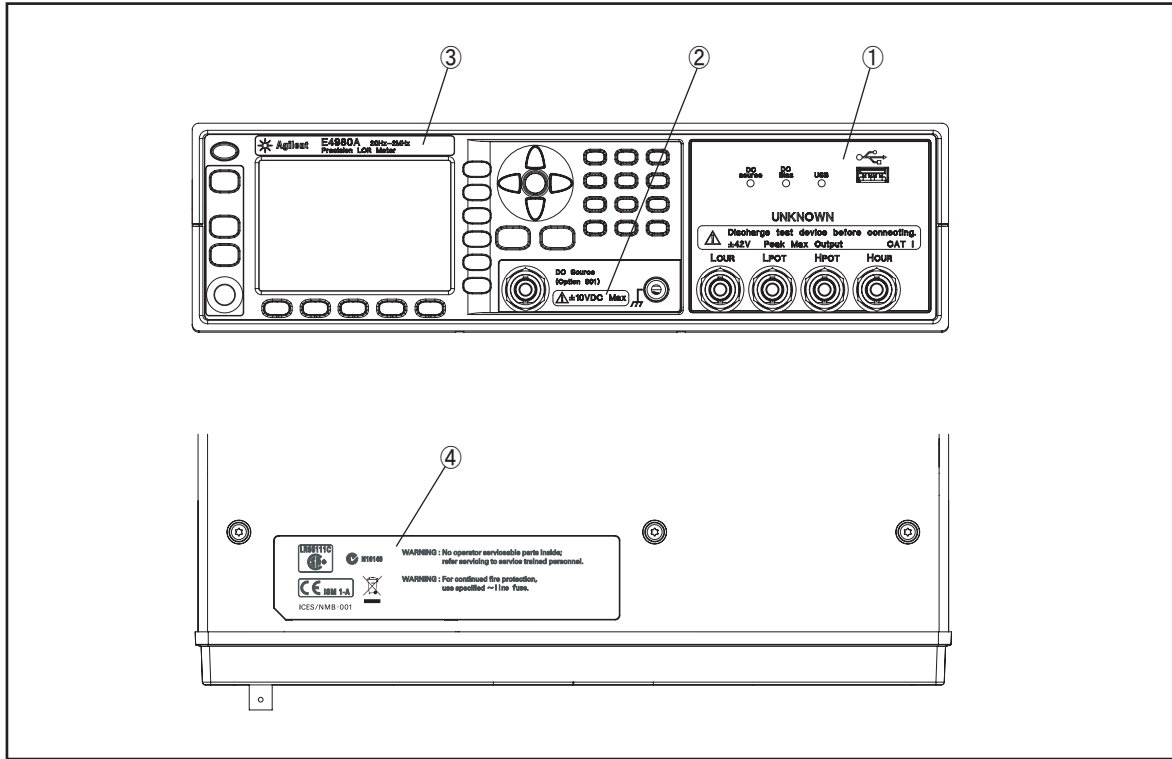
**BUMPER & WIND ANGLE ASSEMBLY**

Ref. Desig.	Agilent Part Number	Qty.	Description
1	E4980-01201	1	ANGLE WIND
2	5041-7719	1	3/4 RACK MODULE TOP
3	0515-4830	2	SCREW-MACH PAN-HD M4 X 0.7

Replaceable Parts  
 Replaceable Parts List

Label Assembly

Figure 5-15 Label Assembly



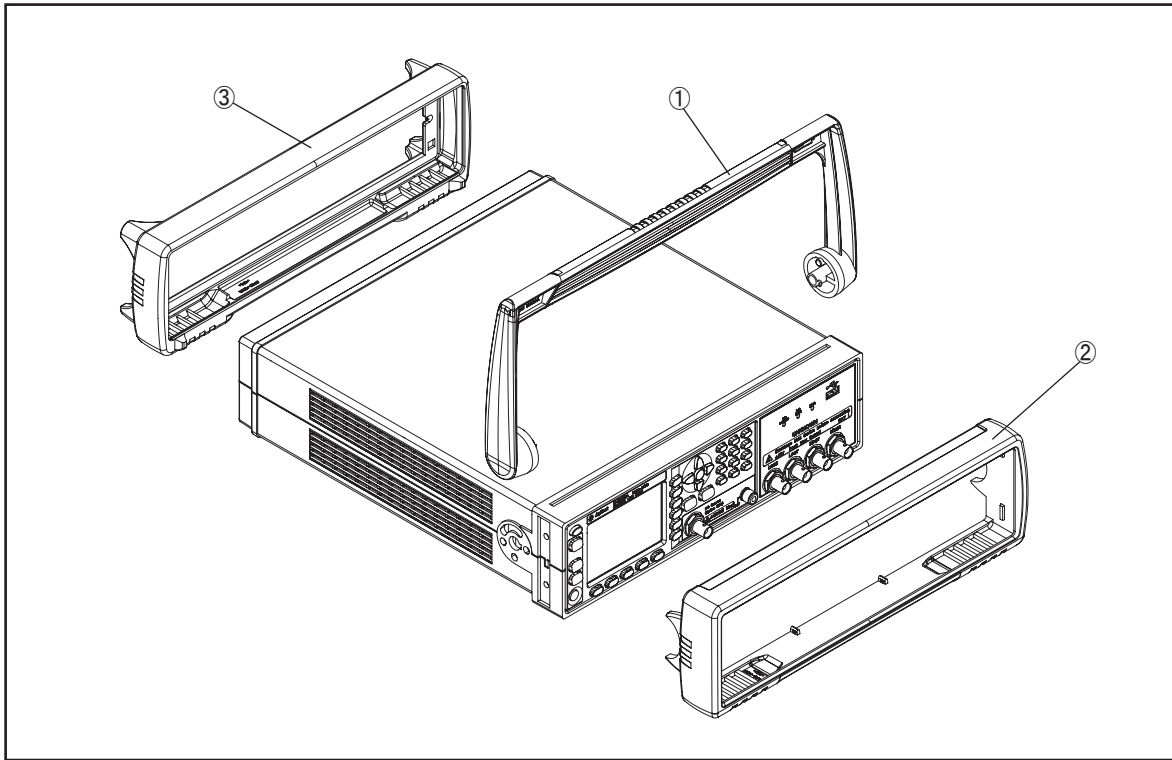
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Table 5-14 Label Assembly

Ref. Desig.	Agilent Part Number	Qty.	Description
1	E4980-87003	1	GND LABEL
2	E4980-87002	1	BNC LABEL
3	E4980-87001	1	NAME LABEL
4	E4980-87005	1	INFORMATION LABEL

**BUMPERS & HANDLE ASSEMBLY**

**Figure 5-16**      **BUMPERS & HANDLE ASSEMBLY**



e4980ase1012

**Table 5-15**      **BUMPERS & HANDLE ASSEMBLY**

Ref. Desig.	Agilent Part Number	Qty.	Description
1	E4980-45001	1	HANDLE
2	34480-46001	1	FRONT BUMPER
3	34480-46002	1	REAR BUMPER

**Other Parts**

**Table 5-16**      **Other Parts**

<b>Agilent Part Number</b>	<b>Qty.</b>	<b>Description</b>
E4980-901x0 <sup>*1</sup>	1	SERVICE GUIDE
82357-61601	1	USB CABLE
E4980-60102	1	Adapter for Option 002

\*1. The number indicated by “x” in the part number of the manual, 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 E4980A.

## Replacing an Assembly

The following steps show the sequence for replacing an assembly in a E4980A Signal Source 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.**

---

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**WARNING**

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

---

---

**CAUTION**

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

---

## Required Tools

The following tools are required for repair of E4980A.

**Table 6-1 Required Tools**

Assembly	Torque screwdriver				Box torque wrench			
	T6	T8	T10	T20	5.5 mm	7 mm	3/8 in.	5/8 in.
3/4 Rack Module Top				√				
A3 Analog Daughter Board			√	√				
A2 Analog Board			√	√		√		√
Front Panel Assembly			√	√		√		√
Option Interface			√					
PPMC PCA		√		√				
A1 Mother Board		√	√	√				√
Power Supply Assembly		√	√	√	√			√
Base Plate		√	√	√	√	√		√
Rear Panel Assembly		√	√	√	√	√		√
FAN Assembly				√				
GPIB Cable				√		√		
Power Inlet Assembly		√	√	√				√
PCA E4980 USB				√				
Binding Post Sgl			√	√		√	√	√
Inverter	√		√	√		√		√
Front Panel, Key Pad, and Key Flex Circuit			√	√		√		√
Display Interface	√		√	√		√		√

## **3/4 Rack Module Top Replacement**

### **Tools Required**

- Torque screwdriver, TORX T20

### **Removal Procedure**

Refer to Figure 6-1, Figure 6-2, Figure 6-3 and for this procedure.

- Step 1.** Disconnect the power cable from the E4980A.
- Step 2.** Remove the handle, front bumper and rear bumper. (item 1, 2, 3 )

---

**NOTE** To remove the handle, rotate the handle to a vertical position and pull the arms outwards.

- Step 3.** Work the six TORX T20 screws (item 4) loose from the bottom.
- Step 4.** Remove the 3/4 Rack Module Top with the Wind Angle. (item 5)
- Step 5.** Remove the seven VENT BLOCKS (item 6) from the 3/4 Rack Module Bottom.
- Step 6.** Remove the two TORX T20 screws (item 7) fastening the Wind Angle.
- Step 7.** Remove the Wind Angle (item 8) from the 3/4 Rack Module Top.

### **Replacement Procedure**

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

---

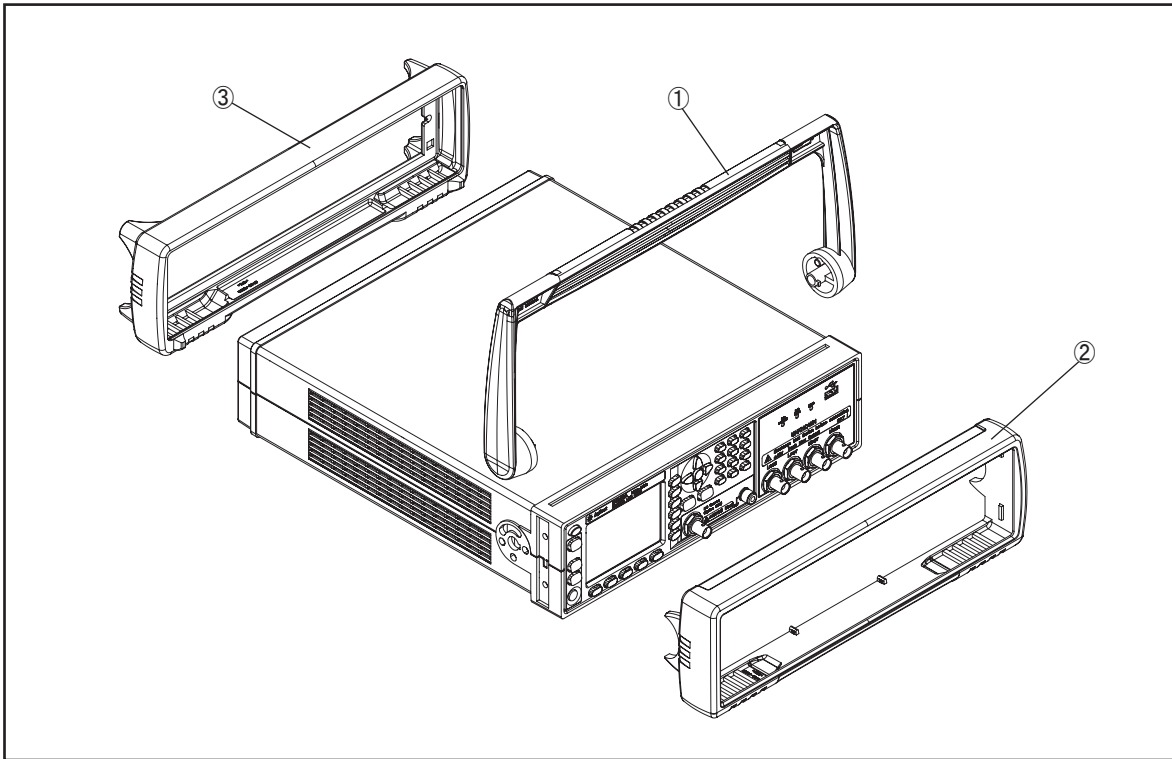
**NOTE** When you fasten the Wind Angle with the two TORX T20 screws, set screwdriver's torque to 21.1 in-lb.

When you fasten the 3/4 Rack Module Top with the six TORX T20 screws, set screwdriver's torque to 21.1 in-lb.

---



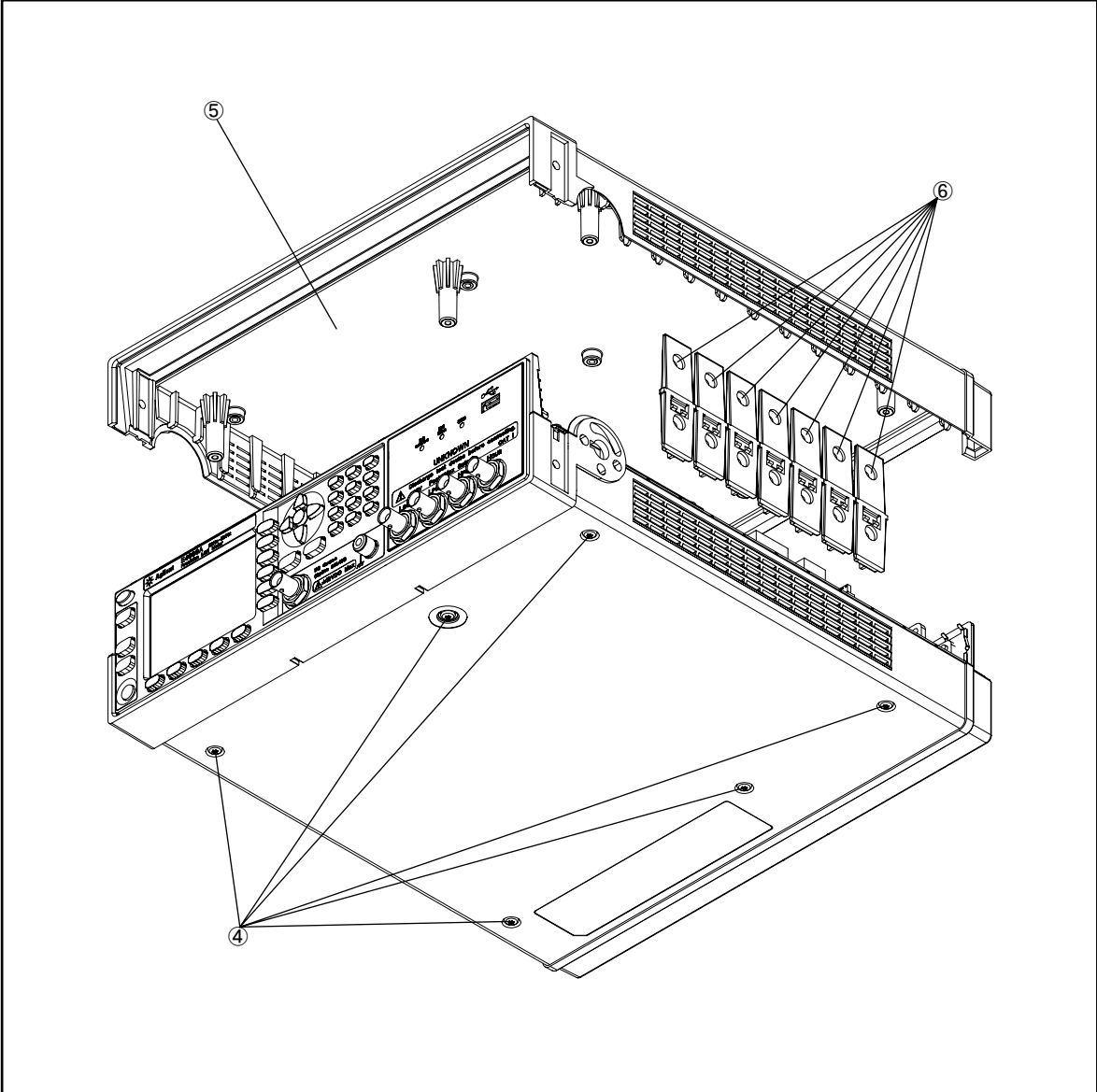
Figure 6-1 3/4 Rack Module Top Removal (1 of 3)



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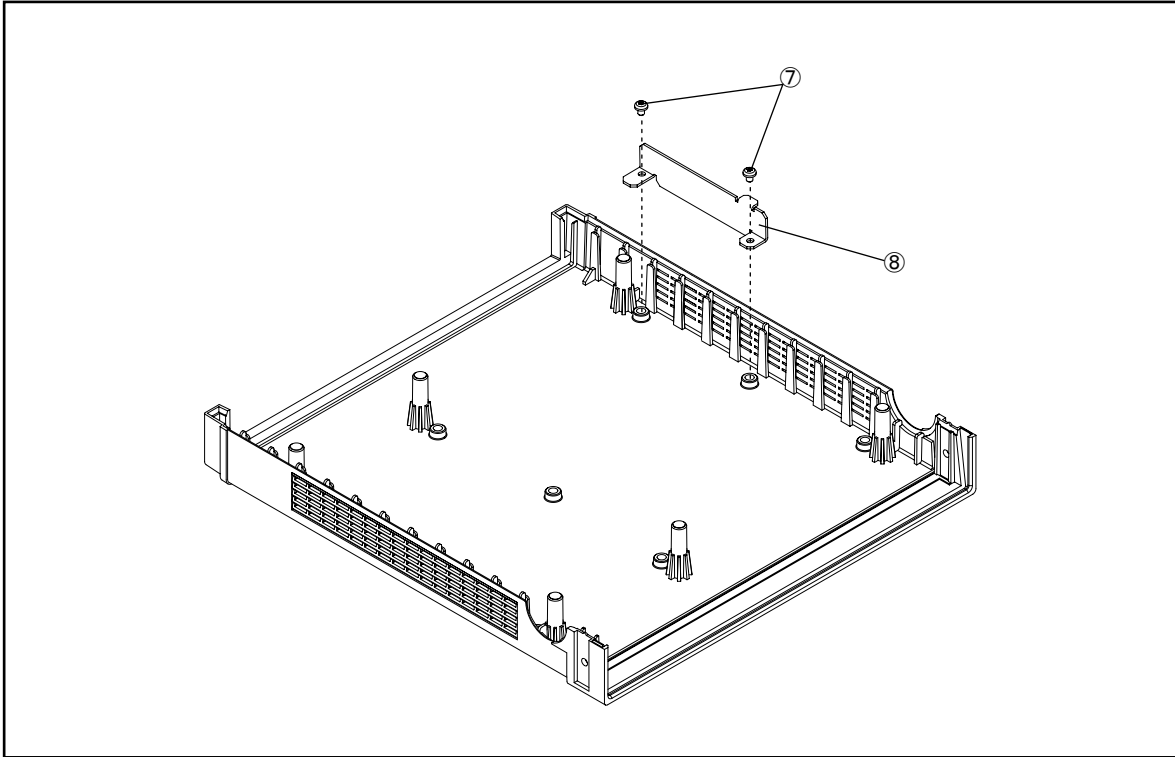
Replacement Procedure  
3/4 Rack Module Top Replacement

Figure 6-2 3/4 Rack Module Top Removal (2 of 3)



e4980ase1017

Figure 6-3 3/4 Rack Module Top Removal (3 of 3)



e4980ase1038

## **A3 Analog Daughter Board Replacement**

### **Tools Required**

- Torque screwdriver, TORX T10
- Torque screwdriver, TORX T20

### **Removal Procedure**

Refer to Figure 6-4 and for this procedure.

- Step 1.** Remove the 3/4 rack module top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Disconnect the front USB cable (item 1) from the front panel assembly.
- Step 3.** Disconnect the LCD cable (item 2) from the A1 Mother Board.
- Step 4.** Disconnect the power supply cable (item 3) from the A3 Analog Daughter Board.

---

**NOTE** Pull out the power supply cable straight without touching the hook on the cable connector.

- Step 5.** Disconnect the two SMB cables (item 4) from the A3 Analog Daughter Board.
- Step 6.** Disconnect the Analog Source Cable (item 5) from the A3 Analog Daughter Board.
- Step 7.** Remove the four TORX T10 screws (item 6) fastening the A3 Analog Daughter Board.
- Step 8.** Remove the A3 Analog Daughter Board.

### **Replacement Procedure**

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

---

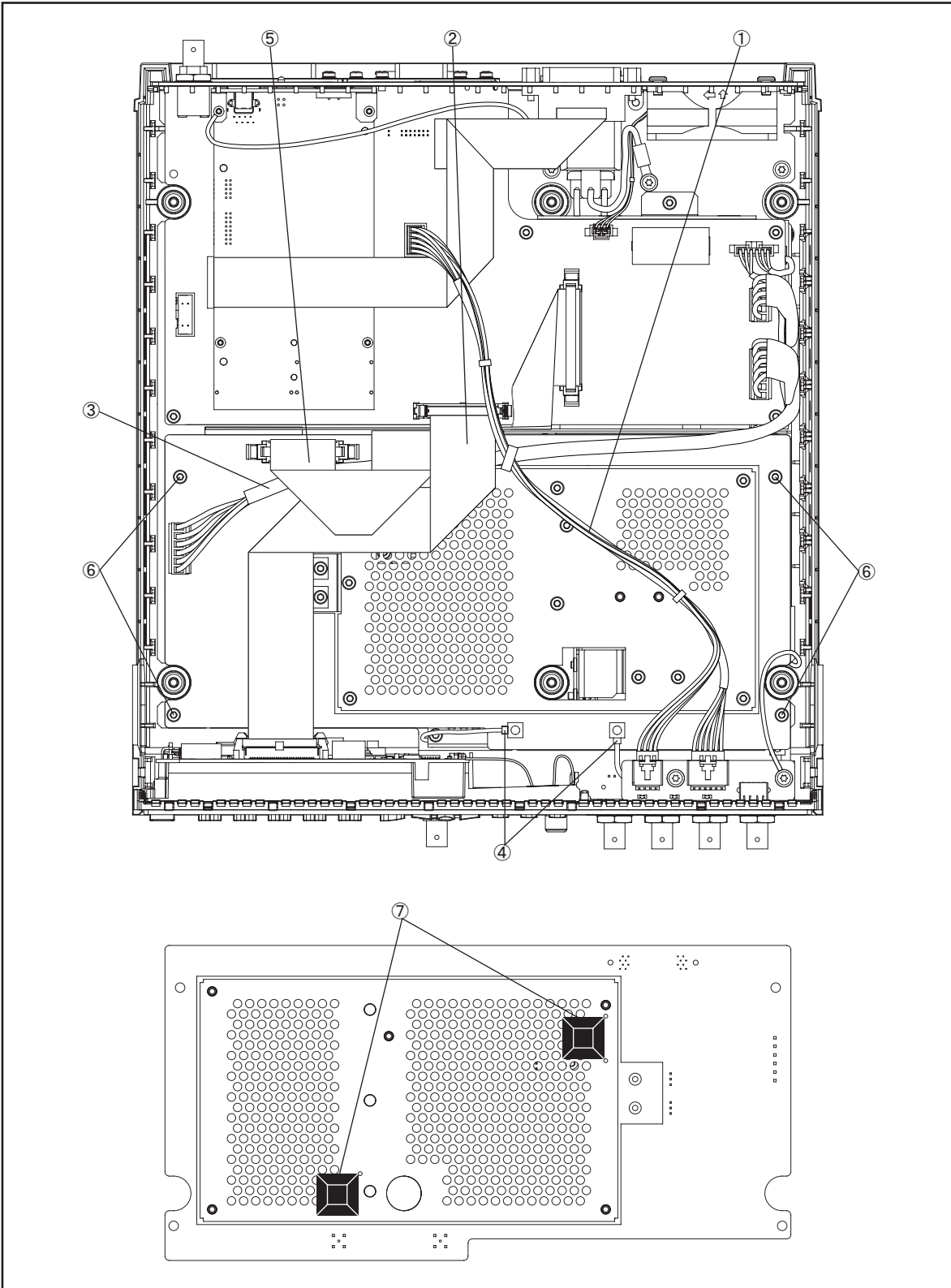
**NOTE** When you replace the A3 Analog Daughter Board, stick the Foot Bumper (item 7) to the backside of the board as location of sub-figure in Figure 6-4.

When you fasten the A3 Analog Daughter Board with the four TORX T10 screws, set screwdriver's torque to 8.7 in-lb.

When you connect the LCD Cable to the A1 Mother Board, make sure the LCD Cable lies beneath the Analog Source Cable.

---

Figure 6-4 A3 Analog Daughter Board Removal



e4980ase1018

## **A2 Analog Board Replacement**

### **Tools Required**

- Torque screwdriver, TORX T10
- Torque screwdriver, TORX T20
- Box torque wrench, 7 mm
- Box torque wrench, 5/8 inch

### **Removal Procedure**

Refer to Figure 6-5 and for this procedure.

- Step 1.** Remove the 3/4 rack module top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Remove the A3 Analog Daughter Board as described in “A3 Analog Daughter Board Replacement” on page 112.
- Step 3.** Disconnect the Mother-Analog Cable (item 1) from the A2 Analog Board.
- Step 4.** Disconnect the Analog Source Cable (item 2) from the A2 Analog Board.
- Step 5.** Remove the four 7 mm Standoff (item 3) from the A2 Analog Board.
- Step 6.** Remove the TORX T20 screw (item 4) from the PCA E4980 USB. Then, Disconnect the ground cable from the PCA E4980 USB.
- Step 7.** Lift the A2 Analog Board and front panel toward upside.
- Step 8.** Remove the five 5/8 inch nuts and washers (item 5) fastening the BNC connector.
- Step 9.** Remove the A2 Analog Board from Front Panel.
- Step 10.** Disconnect the two SMB cables (item 6) from the A2 Analog Board.

### **Replacement Procedure**

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

---

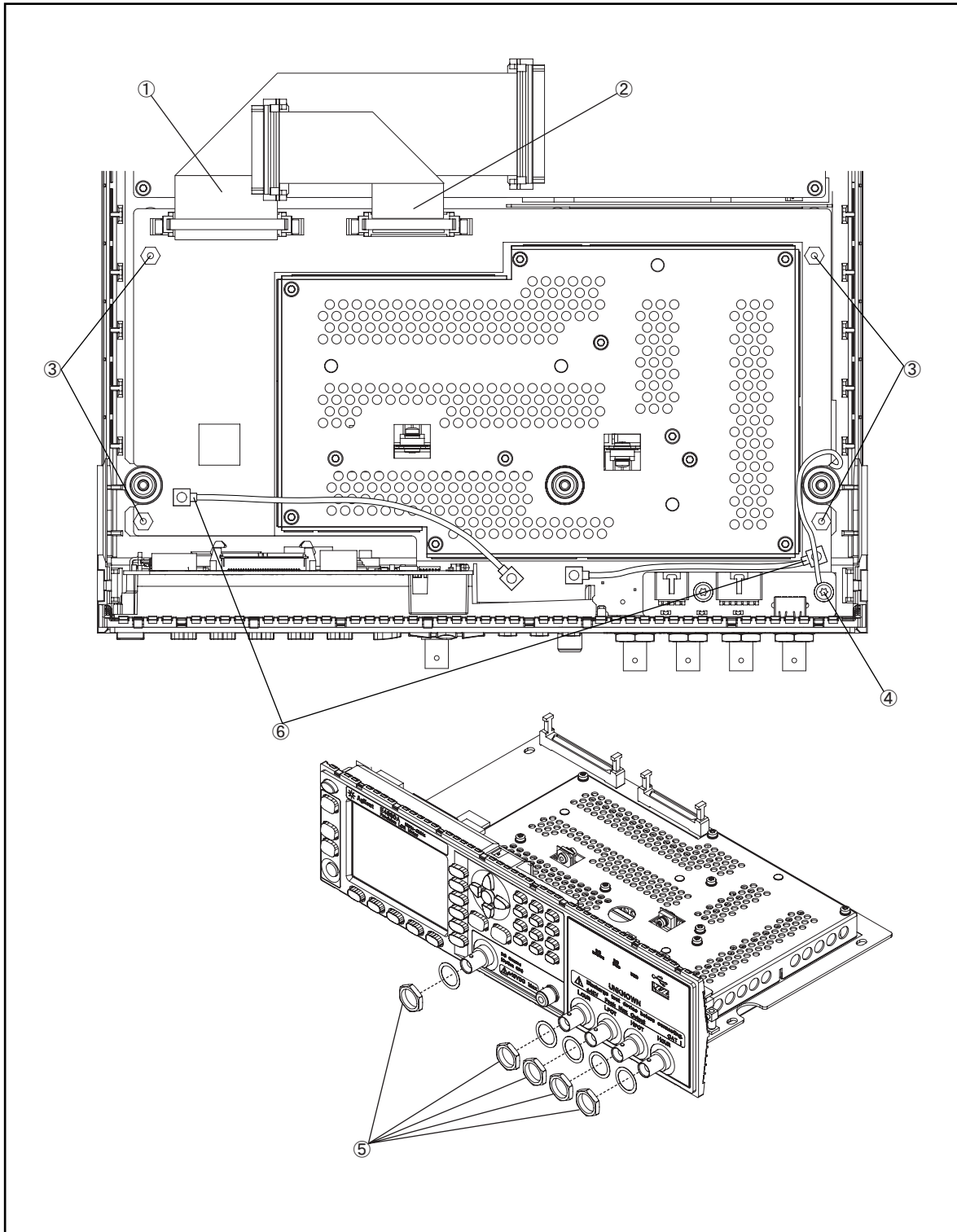
#### **NOTE**

When you fasten the A2 Analog Board with the five 5/8 inch nuts and washers, set box torque wrench's torque to 17.4 in-lb.

When you fasten the A2 Analog Board with the four 7 mm Standoff, set box torque wrench's torque to 8.7 in-lb.

---

Figure 6-5 A2 Analog Board Removal



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## **Front Panel Assembly Removal**

### **Tools required**

- Torque screwdriver, TORX T10
- Torque screwdriver, TORX T20
- Box torque wrench, 7 mm
- Box torque wrench, 5/8 inch

### **Removal Procedure**

The Front Panel Assembly removal process is same as A2 Analog Board removal process. Refer to removal procedure of the “A2 Analog Board Replacement” on page 114.

### **Replacement Procedure**

The Front Panel Assembly replacement process is reverse order of the A2 Analog Board removal process. Refer to removal procedure of the “A2 Analog Board Replacement” on page 114.



---

## Option Interface Replacement

### Tools Required

- Torque screwdriver, TORX T10

### Removal Procedure

Refer to Figure 6-6 for this procedure.

- Step 1.** Remove the two TORX T10 screws (item 1) fastening the Option Interface.
- Step 2.** Pulls the Option Interface carefully.
- Step 3.** Carefully disconnect the flat cable (item 2) of Option Interface side. Release the cable's connector by pressing the locking hooks at the sides of the connector.
- Step 4.** Remove the two TORX T10 screws (item 3) fastening the option panel.
- Step 5.** Remove the option panel from the option interface board.
- Step 6.** Disconnect the flat cable from the A1 Mother Board connector (item 4).

### Replacement Procedure

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

---

#### NOTE

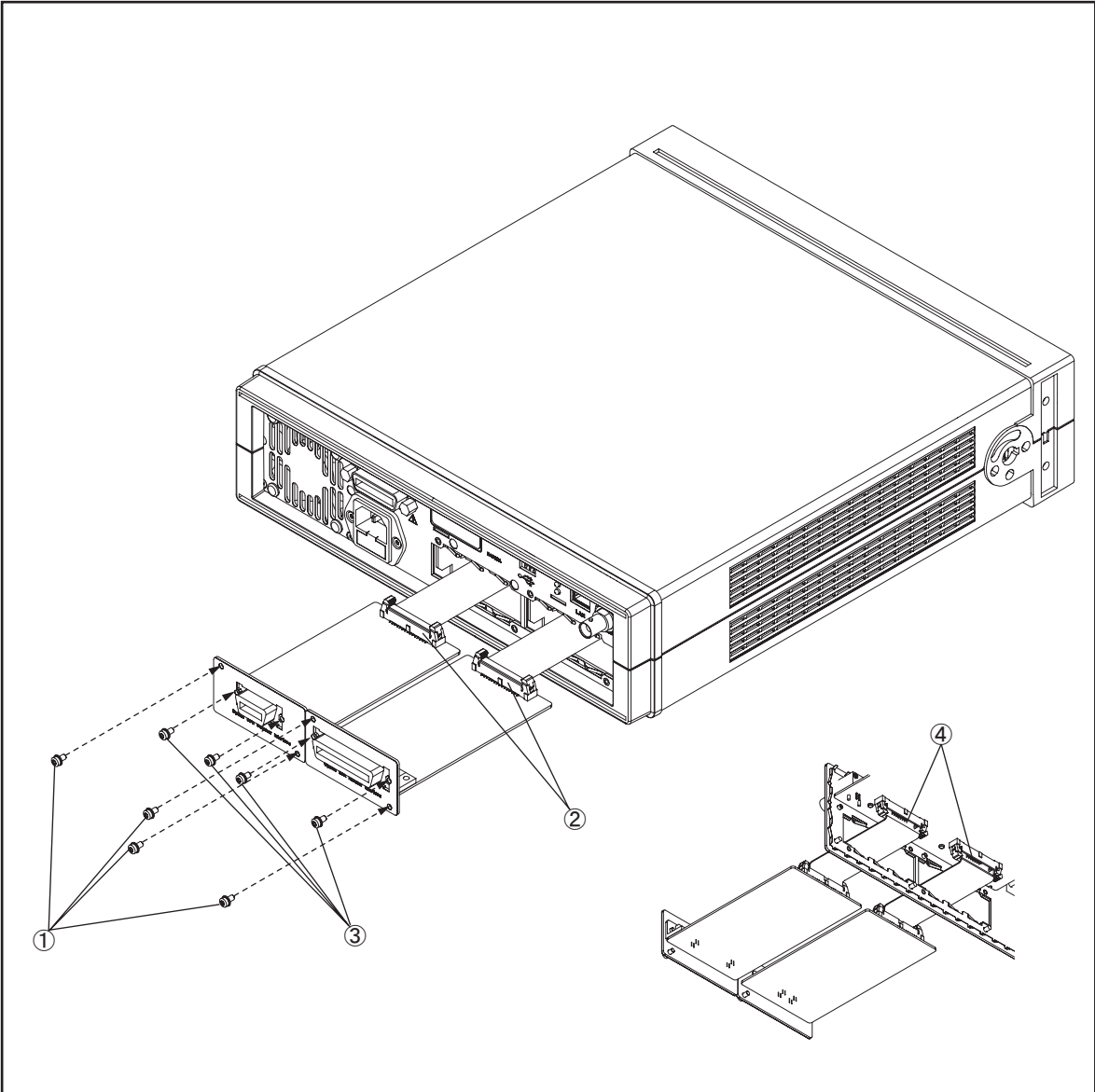
When you fasten the option panel with the two TORX T10 screws, set screwdriver's torque to 8.7 in-lb.

When you fasten the interface card with the two TORX T10 screws, set screwdriver's torque to 8.7 in-lb.

---

Replacement Procedure  
Option Interface Replacement

Figure 6-6 Option Interface Removal



e4980ase1022

---

## PPMC PCA Replacement

### Tools Required

- Torque screwdriver, TORX T20
- Torque screwdriver, TORX T8

### Removal Procedure

Refer to Figure 6-7 for this procedure.

- Step 1.** Remove the 3/4 rack module top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Remove the four TORX T8 screws (item 1) fastening the PPMC PCA.
- Step 3.** Remove the Angle CPU (item 2) from the PPMC PCA.
- Step 4.** Disconnect the ground cable (item 3).
- Step 5.** Carefully disconnect the PPMC PCA from A1 Mother Board.
- Step 6.** Carefully disconnect the GPIB cable (item 4) from PPMC PCA.
- Step 7.** Remove the USB gasket (item 5) from the PPMC PCA.

### Replacement Procedure

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

---

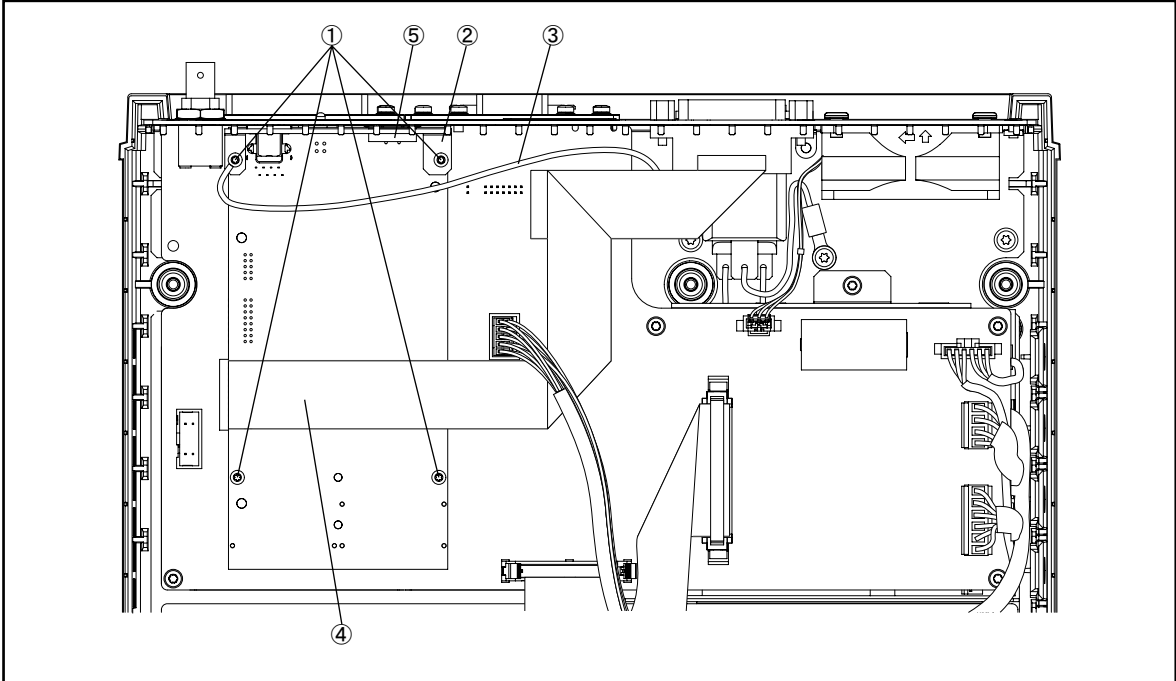
**NOTE**

When you fasten the PPMC PCA with the four TORX T8 screws, set screwdriver's torque to 3 in-lb.

---

Replacement Procedure  
PPMC PCA Replacement

Figure 6-7 PPMC PCA Removal



e4980ase1020

---

## A1 Mother Board Replacement

### Tools Required

- Torque screwdriver, TORX T20
- Torque screwdriver, TORX T8
- Torque screwdriver, TORX T10
- Box torque wrench, 5/8 inch

### Removal Procedure

Refer to Figure 6-8 for this procedure.

- Step 1.** Remove the 3/4 rack module top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Remove the PPMC PCA as described in “PPMC PCA Replacement” on page 119.
- Step 3.** Disconnect the Mother-Analog cable (item 1) from A1 Mother Board.
- Step 4.** Disconnect the front USB cable (item 2) from A1 Mother Board.
- Step 5.** Disconnect the cable power control (item 3) from A1 Mother Board.
- Step 6.** Disconnect the power supply cables (item 4) from A1 Mother Board.

---

**NOTE** Pull out the power supply cables straight without touching the hook on the cable connector.

- Step 7.** Disconnect the LCD cable (item 5) from Front Panel Assembly.
- Step 8.** Disconnect the fan cable (item 6) from FAN Assembly.
- Step 9.** Remove the 5/8 inch nut and washer (item 7) fastening the BNC connector.
- Step 10.** Remove the five TORX T10 screws (item 8) from the A1 Mother Board.
- Step 11.** Remove the A1 Mother Board toward front side.

### Replacement Procedure

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

---

**NOTE** When you fasten the BNC connector with the 5/8 inch nut and washer, set box torque wrench's torque to 17.4 in-lb.

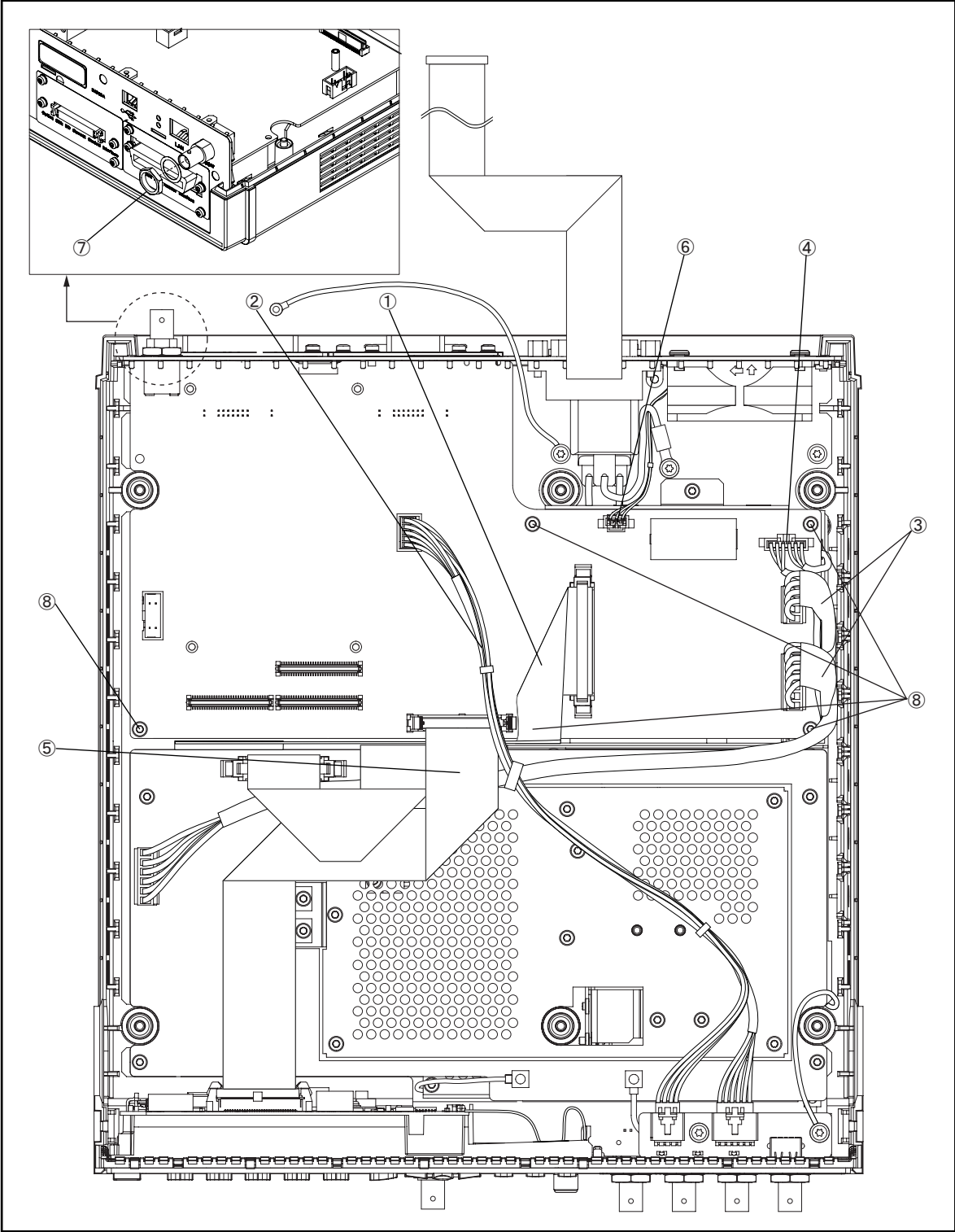
When you fasten the A1 Mother Board with the five TORX T10 screws, set screwdriver's torque to 8.7 in-lb for left-under screw of item 8 in the Figure 6-8, and set screwdriver's torque to 4.35 in-lb for other screws.

When you connect the LCD Cable to the A1 Mother Board, make sure the LCD Cable is at the bottom of the Analog Source Cable.

---

Replacement Procedure  
**A1 Mother Board Replacement**

**Figure 6-8** A1 Mother Board Replacement



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## Power Supply Assembly Replacement

### Tools Required

- Torque screwdriver, TORX T20
- Torque screwdriver, TORX T8
- Torque screwdriver, TORX T10
- Box torque wrench, 5/8 inch
- Box torque wrench, 5.5 mm

### Removal Procedure

Refer to Figure 6-9 for this procedure.

- Step 1.** Remove the 3/4 rack module top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Remove the PPMC PCA as described in “PPMC PCA Replacement” on page 119.
- Step 3.** Remove the A1 Mother Board as described in “A1 Mother Board Replacement” on page 121.
- Step 4.** Disconnect the cable of the inlet (item 1) from the Power Supply Assembly.
- Step 5.** Remove the four 5.5 mm Standoff (item 2).
- Step 6.** Remove the TORX T10 screw (item 3) fastening the CPU cover.
- Step 7.** Remove the CPU cover (item 4).
- Step 8.** Remove the Power Supply Assembly with the cable power control.
- Step 9.** Disconnect the cable power control (item 5) from the Power Supply Assembly.

---

#### NOTE

Do not pull out the power cable (P/N : E4980-61601) from the Power Supply Assembly when you detach the Power Supply Assembly. There is a possibility that the Power Supply Assembly could break when the power cable is forcibly pulled out. (Refer to sub-figure in Figure 6-9.)

---

### Replacement Procedure

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

---

#### NOTE

When you fasten the CPU cover with the TORX T10 screw, set screwdriver's torque to 8.7 in-lb.

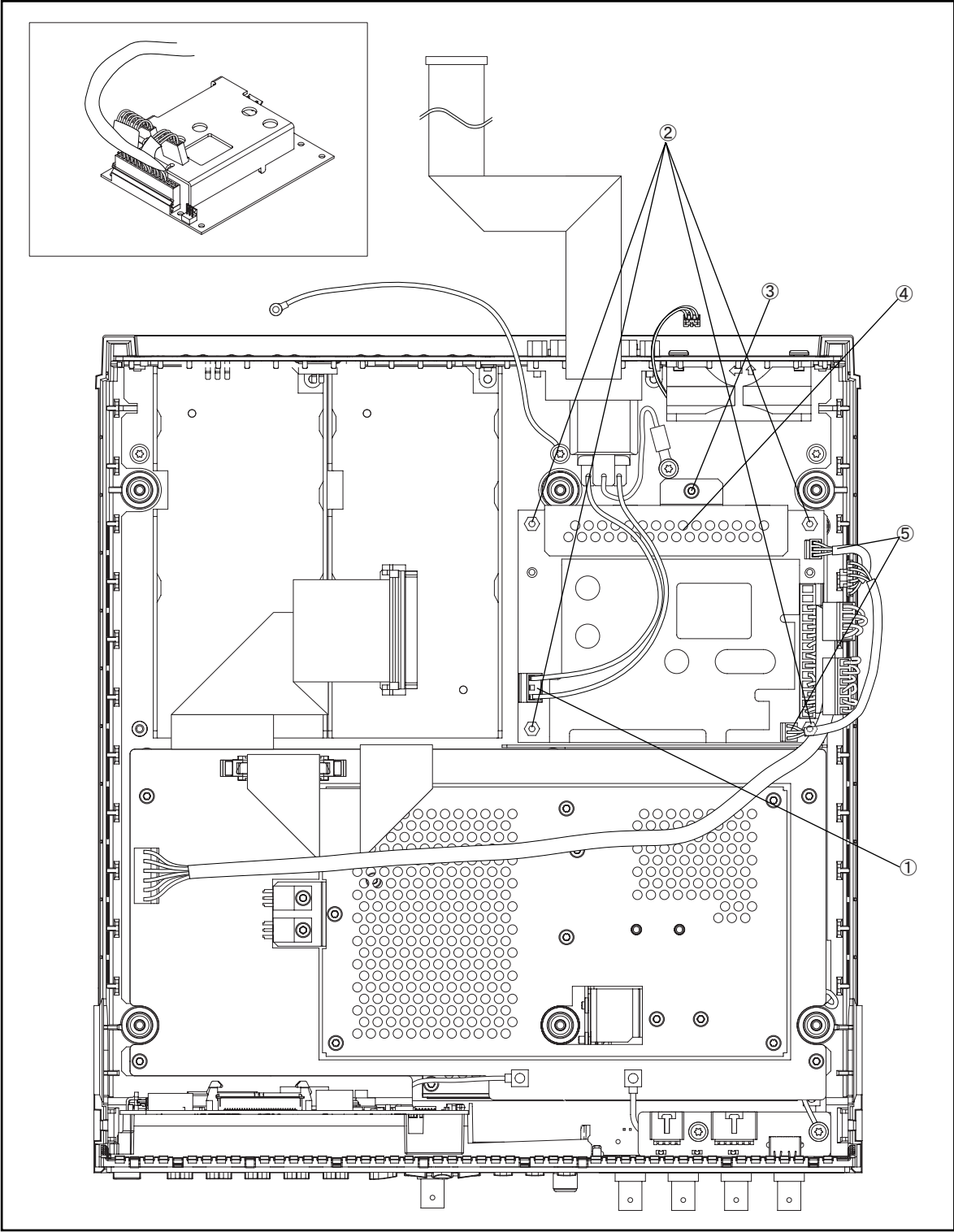
When you fasten the Power Supply Assembly with the 5.5 mm Standoff, set box torque wrench's torque to 7 in-lb.

When you replace the Power Supply Assembly with a new one, use a new power cable (P/N : E4980-61601).

---

Replacement Procedure  
Power Supply Assembly Replacement

Figure 6-9 Power Supply Assembly Removal



e4980ase1023



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## Base Plate Replacement

### Tools Required

- Torque screwdriver, TORX T20
- Torque screwdriver, TORX T8
- Torque screwdriver, TORX T10
- Box torque wrench, 5/8 inch
- Box torque wrench, 5.5 mm
- Box torque wrench, 7 mm

### Removal Procedure

Refer to Figure 6-10 for this procedure.

- Step 1.** Remove the Option Interface as described in “Option Interface Replacement” on page 117.
- Step 2.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 3.** Remove the A3 Analog Daughter Board as described in “A3 Analog Daughter Board Replacement” on page 112.
- Step 4.** Remove the A2 Analog Board as described in “A2 Analog Board Replacement” on page 114.
- Step 5.** Remove the two TORX T10 screws (item 1) fastening the Shield Angle.
- Step 6.** Remove the Shield Angle (item 2) from the Base Plate.
- Step 7.** Remove the PPMC PCA as described in “PPMC PCA Replacement” on page 119.
- Step 8.** Remove the A1 Mother Board as described in “A1 Mother Board Replacement” on page 121.
- Step 9.** Remove the Power Supply Assembly as described in “Power Supply Assembly Replacement” on page 123.
- Step 10.** Remove the seven TORX T20 screws (item 3) fastening the Base Plate.
- Step 11.** Remove the two TORX T20 screws (item 4) fastening the Base Plate and the ground cables. Then, remove the ground cables (item 5).
- Step 12.** Remove the Rack Module Bottom from the Base Plate.
- Step 13.** Remove the Rear Panel as described from Step 9 to Step 11 in “Rear Panel Assembly Replacement” on page 127.
- Step 14.** Remove the Base Plate from the Rear Panel.

### Replacement Procedure

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

## Replacement Procedure

### Base Plate Replacement

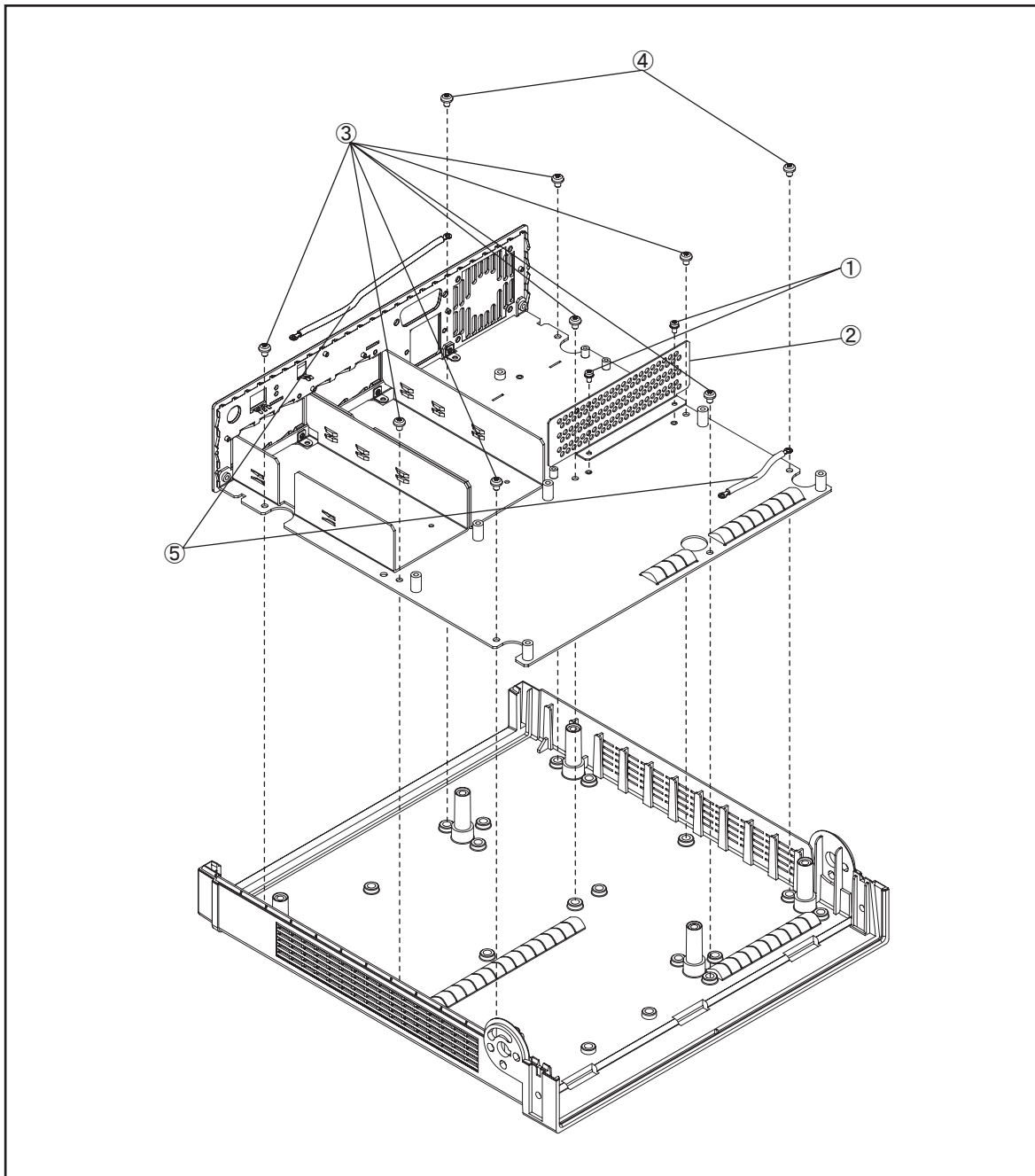
#### NOTE

When you fasten the ground cable and the Base Plate with the two TORX T20 screws, set screwdriver's torque to 21.1 in-lb.

When you fasten the Base Plate with the seven TORX T20 screws, set screwdriver's torque to 21.1 in-lb.

When you fasten the Shield Angle with the two TORX T10 screws, set screwdriver's torque to 8.7 in-lb.

**Figure 6-10**      **Base Plate Board Removal**



e4980ase1044

---

## Rear Panel Assembly Replacement

### Tools Required

- Torque screwdriver, TORX T20
- Torque screwdriver, TORX T8
- Torque screwdriver, TORX T10
- Box torque wrench, 5/8 inch
- Box torque wrench, 5.5 mm
- Box torque wrench, 7 mm

### Removal Procedure

Refer to Figure 6-11 for this procedure.

- Step 1.** Remove the Option Interface as described in “Option Interface Replacement” on page 117.
- Step 2.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 3.** Remove the A3 Analog Daughter Board as described in “A3 Analog Daughter Board Replacement” on page 112.
- Step 4.** Remove the A2 Analog Board as described in “A2 Analog Board Replacement” on page 114.
- Step 5.** Remove the PPMC PCA as described in “PPMC PCA Replacement” on page 119.
- Step 6.** Remove the A1 Mother Board as described in “A1 Mother Board Replacement” on page 121.
- Step 7.** Remove the Power Supply Assembly as described in “Power Supply Assembly Replacement” on page 123.
- Step 8.** Remove the bottom clamshell as described from Step 10 to Step 12 in “Base Plate Replacement” on page 125.
- Step 9.** Remove the one TORX T20 screw (item 1) fastening the ground cable.
- Step 10.** Remove the five TORX T10 screws (item 2) fastening the Rear Panel Assembly.
- Step 11.** Remove the Rear Panel Assembly from the Base Plate.

### Replacement Procedure

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

---

#### NOTE

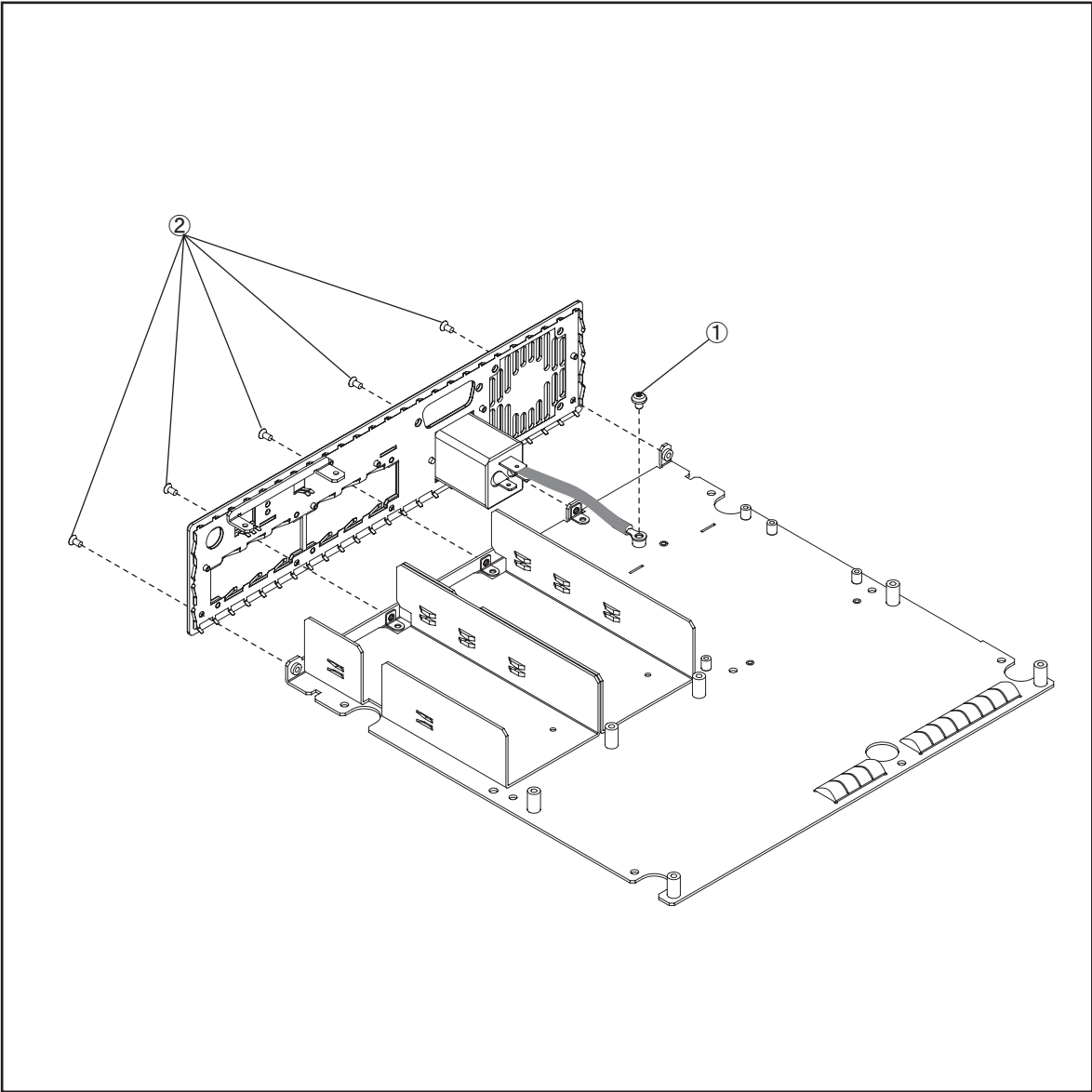
When you fasten the Rear Panel with the five TORX T10 screws, set screwdriver's torque to 8.7 in-lb.

When you fasten the ground cable with the TORX T20 screw, set screwdriver's torque to 21.1 in-lb.

---

Replacement Procedure  
Rear Panel Assembly Replacement

Figure 6-11 Rear Panel Assembly Removal



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---

## FAN Assembly Replacement

### Tools Required

- Torque screwdriver, TORX T20

### Removal Procedure

Refer to Figure 6-12 for this procedure.

- Step 1.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Disconnect the connector of the fan cable on the A1 Mother Board (item 1) from Fan Assembly.
- Step 3.** Push the four Rivets (item 2) from the inside, then, remove the four Rivets fastening the Fan Assembly.

---

**NOTE** If you can not push the rivets out easily, push the rivets out using a flat-edge driver.

- Step 4.** Remove the Fan Assembly (item 3) from the Rear Panel.

### Replacement Procedure

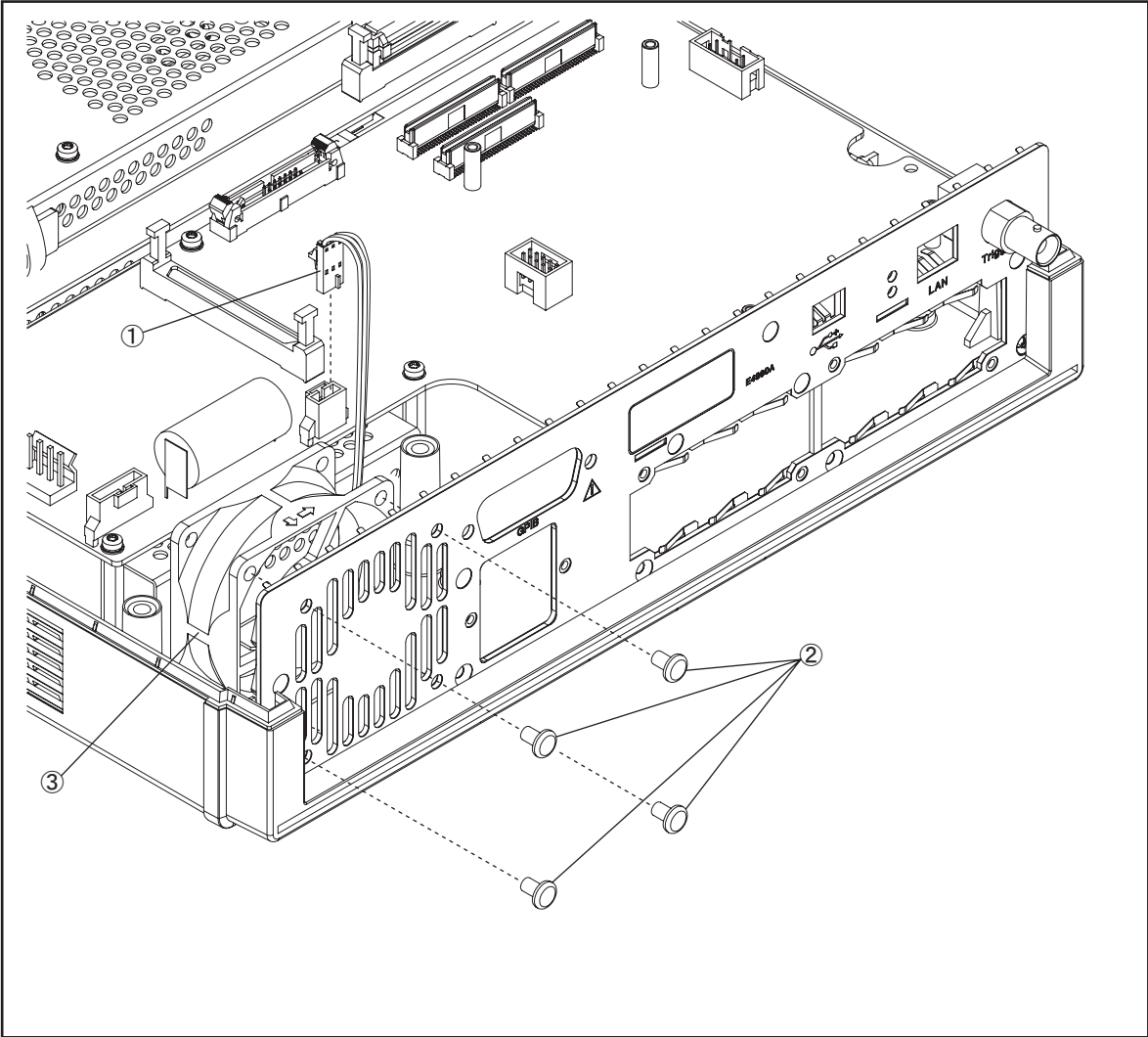
- Step 1.** Reverse the order of the removal procedure.

---

**NOTE** When you replace the Fan Assembly, use new rivets.

Replacement Procedure  
FAN Assembly Replacement

Figure 6-12 FAN Assembly Removal



e4980ase1041

---

## GPIB Cable Replacement

### Tools Required

- Torque screwdriver, TORX T20
- Box torque wrench, 7 mm

### Removal Procedure

Refer to Figure 6-13 for this procedure.

- Step 1.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Disconnect the GPIB Cable connector (item 1) from PPM PCA card.
- Step 3.** Remove the two 7mm standoff (item 2) fastening the GPIB cable.
- Step 4.** Remove the GPIB Cable (item 3) from the Rear Panel Assembly.

### Replacement Procedure

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

---

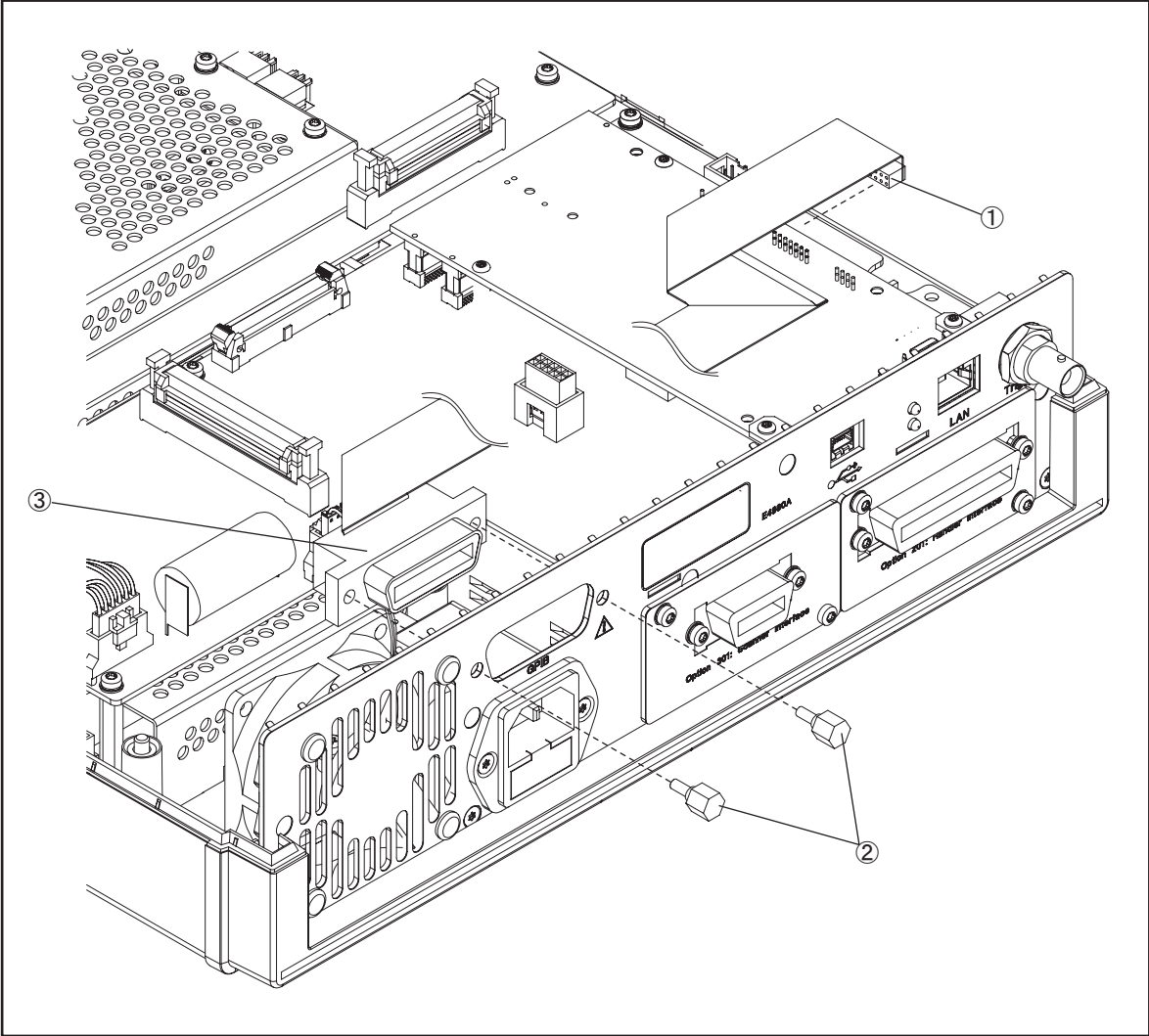
#### NOTE

When you fasten the GPIB Cable with the two 7 mm standoff, set box torque wrench's torque to 8.7 in-lb.

---

Replacement Procedure  
GPIB Cable Replacement

Figure 6-13 GPIB Removal



e4980ase1042



---

## Power Inlet Assembly Replacement

### Tools Required

- Torque screwdriver, TORX T20
- Torque screwdriver, TORX T8
- Torque screwdriver, TORX T10
- Box torque wrench, 5/8 inch

### Removal Procedure

Refer to Figure 6-14 for this procedure.

- Step 1.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Remove the PPMC PCA as described in “PPMC PCA Replacement” on page 119.
- Step 3.** Remove the A1 Mother Board as described in “A1 Mother Board Replacement” on page 121.
- Step 4.** Disconnect the power cable connector (item 1) from the Power Supply Assembly.
- Step 5.** Remove the TORX T20 screw (item 2) fastening the ground cable.
- Step 6.** Remove the two TORX T10 screws (item 3) fastening the Inlet Assembly.
- Step 7.** Remove the Inlet Assembly (item 4) from the Rear Panel.
- Step 8.** Detach the fuse box (item 5) from the original Inlet Assembly and remove the fuse (item 6).

### Replacement Procedure

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

---

#### NOTE

When you fasten the ground cable with the TORX T20 screw, set screwdriver's torque to 21.1 in-lb.

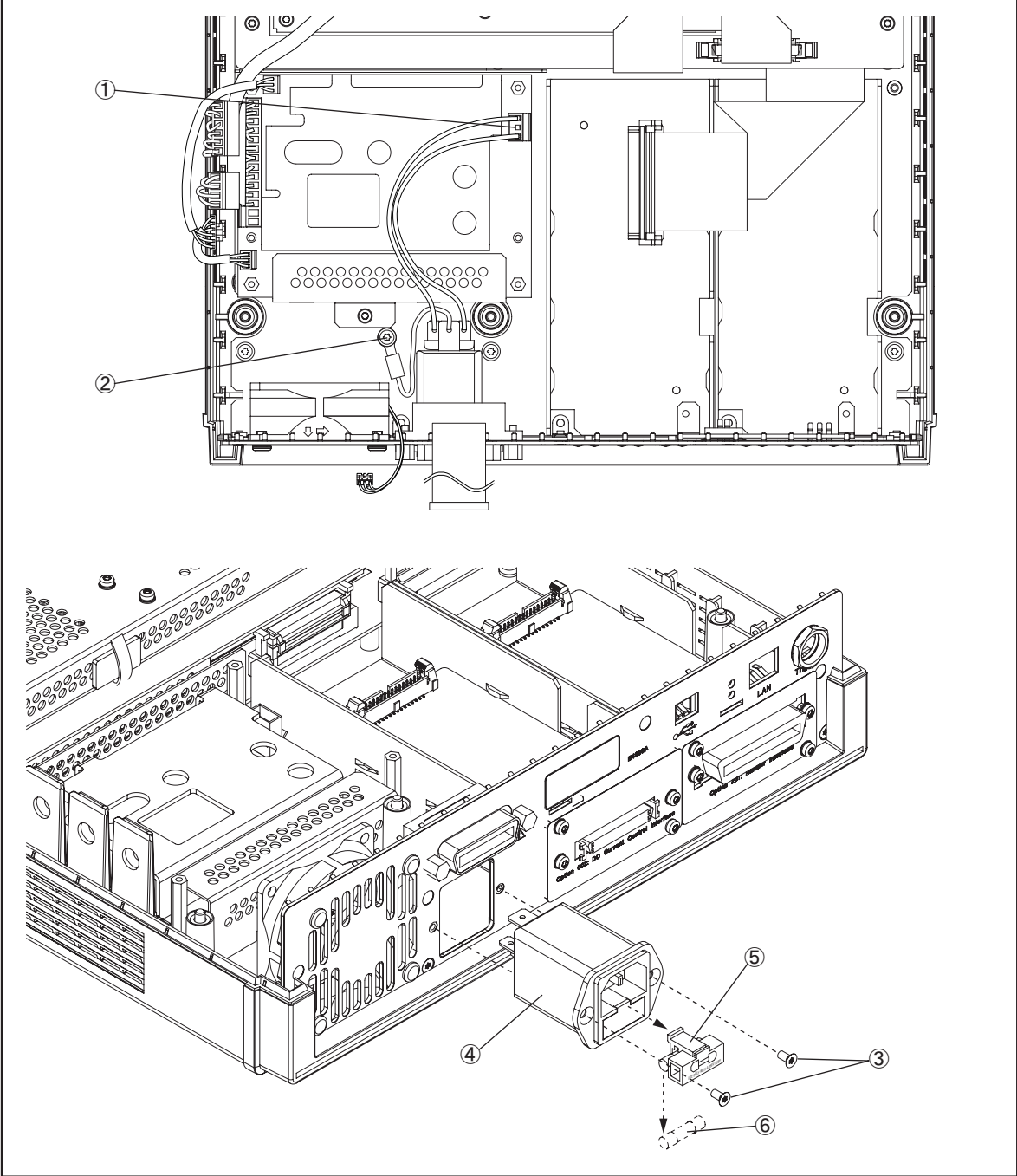
When you fasten the Inlet Assembly with the two TORX T10 screws, set screwdriver's torque to 8.7 in-lb.

Do not forget to insert the fuse in the new Inlet Assembly.

---

Replacement Procedure  
Power Inlet Assembly Replacement

Figure 6-14 POWER INLET Assembly Removal



e4980ase1043

## PCA E4980 USB Replacement

### Tools Required

- Torque screwdriver, TORX T20

### Removal Procedure

Refer to Figure 6-15 for this procedure.

- Step 1.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Disconnect the Front USB Cable (item 1) from PCA E4980 USB.
- Step 3.** Remove the two TORX T20 screws (item 2) fastening the PCA E4980 USB and the ground cable.
- Step 4.** Remove the PCA E4980 USB (item 3) from the Front Panel Assembly.

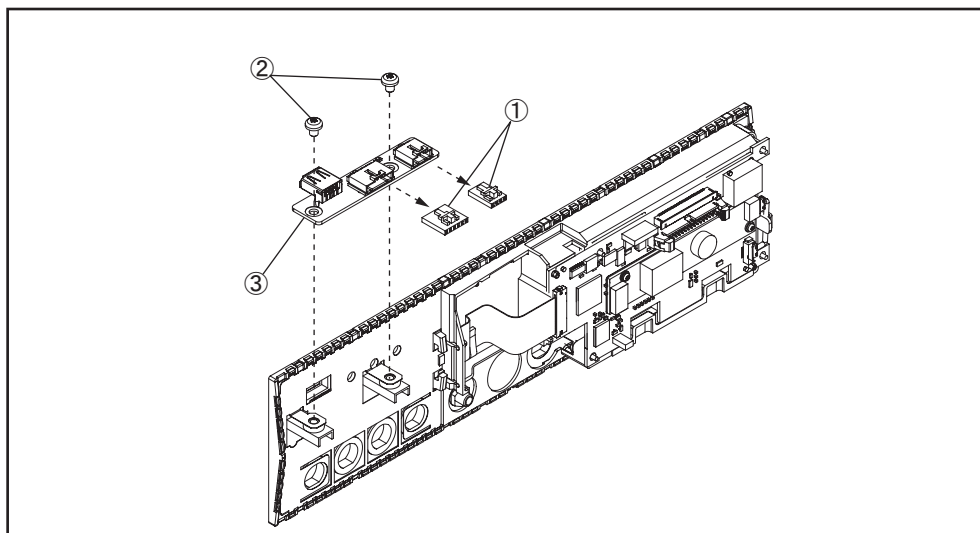
### Replacement Procedure

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

#### NOTE

When you fasten the PCA E4980 USB and the ground cable with the two TORX T20 screws, set screwdriver's torque to 14 in-lb.

Figure 6-15 PCA E4980 USB Removal



e4980ase1033

## **Binding Post Sgl Replacement**

### **Tools Required**

- Torque screwdriver, TORX T10
- Torque screwdriver, TORX T20
- Box torque wrench, 7 mm
- Box torque wrench, 5/8 inch
- Box torque wrench, 3/8 inch

### **Removal Procedure**

Refer to Figure 6-16 for this procedure.

- Step 1.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Remove the A3 Analog Daughter Board as described in “A3 Analog Daughter Board Replacement” on page 112.
- Step 3.** Remove the A2 Analog Board as described in “A2 Analog Board Replacement” on page 114.
- Step 4.** Remove the Front Panel as described in “Front Panel Assembly Removal” on page 116.
- Step 5.** Remove the 3/8 inch nut (item 1) and washer (item 2) fastening the Binding Post Sgl.
- Step 6.** Slide the Binding Post Sgl (item 3) from the Front Panel Assembly.

### **Replacement Procedure**

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

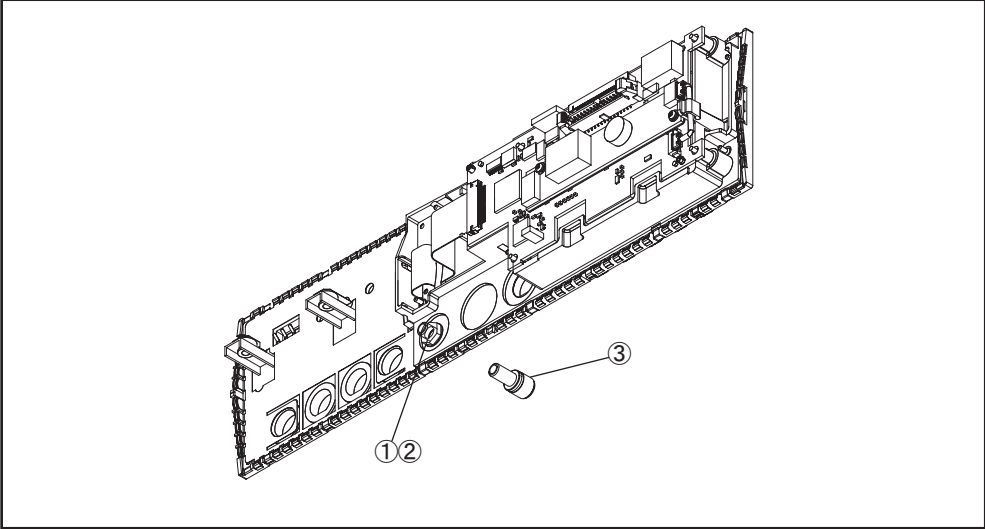
---

**NOTE**

When you fasten the Binding Post Sgl with the 3/8 inch nut and washer, set box torque wrench's torque to 17.4 in-lb.

---

Figure 6-16 Binding Post Sgl Removal



e4980ase1034

## Inverter Replacement

### Tools Required

- Torque screwdriver, TORX T10
- Torque screwdriver, TORX T20
- Torque screwdriver, TORX T6
- Box torque wrench, 7 mm
- Box torque wrench, 5/8 inch

### Removal Procedure

Refer to Figure 6-17 for this procedure.

- Step 1.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Remove the A3 Analog Daughter Board as described in “A3 Analog Daughter Board Replacement” on page 112.
- Step 3.** Remove the A2 Analog Board as described in “A2 Analog Board Replacement” on page 114.
- Step 4.** Remove the Front Panel Assembly as described in “Front Panel Assembly Removal” on page 116.
- Step 5.** Disconnect the display cable (item 1) from the Inverter.
- Step 6.** Release the Cable Assy from the clip (item 2) on the Front Panel Assembly.
- Step 7.** Disconnect the Cable Assy (item 3) from the Front Panel Assembly.
- Step 8.** Remove the two TORX T6 screws (item 4) fastening the Inverter and the insulator.
- Step 9.** Remove the Inverter (item 5) with the insulator (item 6) from the Front Panel Assembly. Then, remove the Inverter from the insulator.

### Replacement Procedure

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

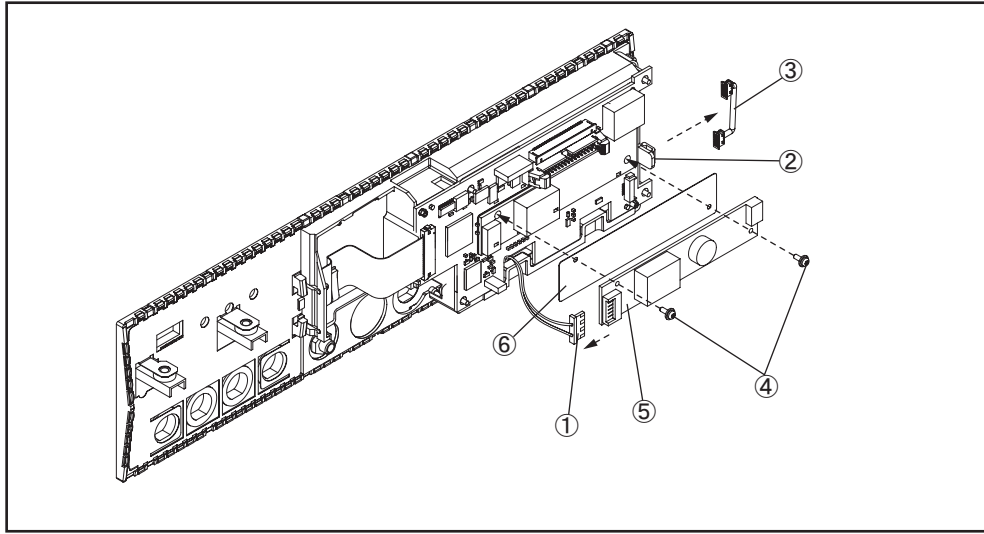
---

**NOTE**

When you fasten the Inverter and the insulator with the two TORX T6 screws, set screwdriver's torque to 3.05 in-lb.

---

Figure 6-17 Inverter Removal



e4980ase1035

## Front Panel, Key Pad, and Key Flex Circuit Replacement

### Tools Required

- Torque screwdriver, TORX T10
- Torque screwdriver, TORX T20
- Box torque wrench, 7 mm
- Box torque wrench, 5/8 inch

### Removal Procedure

Refer to Figure 6-18 for this procedure.

- Step 1.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Remove the PCA E4980 USB as described in “PCA E4980 USB Replacement” on page 135.
- Step 3.** Remove the A3 Analog Daughter Board as described in “A3 Analog Daughter Board Replacement” on page 112.
- Step 4.** Remove the A2 Analog Board as described in “A2 Analog Board Replacement” on page 114.
- Step 5.** Remove the Front Panel Assembly as described in “Front Panel Assembly Removal” on page 116.
- Step 6.** Disconnect the Display Cable (item 1) from the Key Flex Circuit.
- Step 7.** Carefully remove the Display Support with the LCD display (item 2) from the Front Panel.

---

#### NOTE

When removing the Display Support, release the hook (flat cable side) of the Display Support first, and then carefully release the other hooks of the Display Support.

Be careful not to break the hooks.

---

- Step 8.** Remove the Front Panel (item 3) from the Key Pad (item 4), the Window EMI Shield (item 5), the Key Flex Circuit (item 6), and the EMI Shield (item 7).

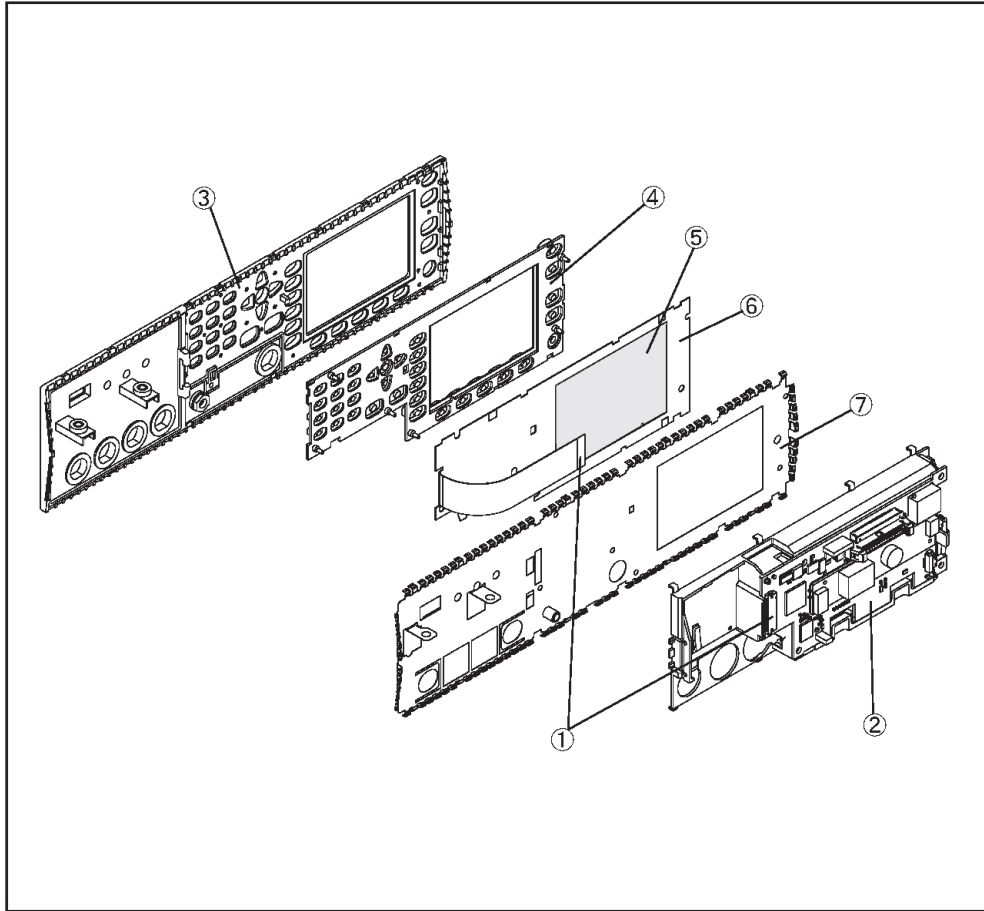
### Replacement Procedure

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



Replacement Procedure  
Front Panel, Key Pad, and Key Flex Circuit Replacement

Figure 6-18 Front Panel, Key Pad, and Key Flex Circuit Removal



e4980ase1036

## Display Interface Replacement

### Tools Required

- Torque screwdriver, TORX T10
- Torque screwdriver, TORX T20
- Torque screwdriver, TORX T6
- Box torque wrench, 7 mm
- Box torque wrench, 5/8 inch

### Removal Procedure

Refer to Figure 6-19 for this procedure.

- Step 1.** Remove the 3/4 Rack Module Top as described in “3/4 Rack Module Top Replacement” on page 108.
- Step 2.** Remove the PCA E4980 USB as described in “PCA E4980 USB Replacement” on page 135.
- Step 3.** Remove the A3 Analog Daughter Board as described in “A3 Analog Daughter Board Replacement” on page 112.
- Step 4.** Remove the A2 Analog Board as described in “A2 Analog Board Replacement” on page 114.
- Step 5.** Remove the Front Panel Assembly as described in “Front Panel Assembly Removal” on page 116.
- Step 6.** Remove the Inverter as described in “Inverter Replacement” on page 138.
- Step 7.** Remove the Front Panel, the Key Pad, and the Key Flex Circuit as described in “Front Panel, Key Pad, and Key Flex Circuit Replacement” on page 140.
- Step 8.** Remove the four TORX T6 screws (item 1) fastening the LCD Display.
- Step 9.** Remove the LCD Display (item 2) from the Display Support with the Display Interface.
- Step 10.** Carefully remove the Display Interface (item 3) from the Display Support (item 4).

### Replacement Procedure

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

---

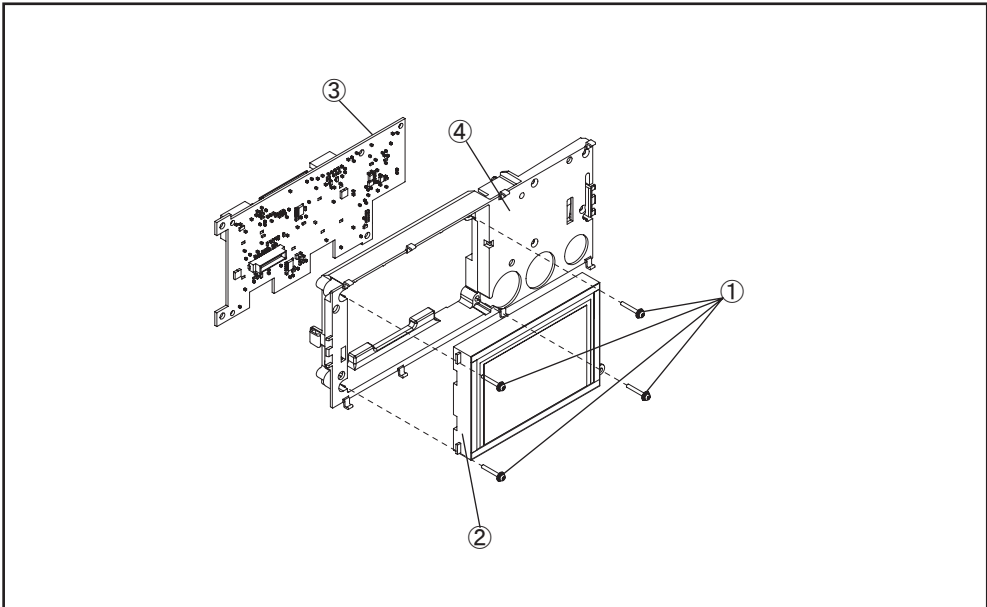
**NOTE**

When you fasten the LCD Display with the four TORX T6 screws, set screwdriver's torque to 3.05 in-lb.

When you replace the LCD Display with a new one, stick new gaskets (P/N : E4980-25003 × 2, E4980-25004 × 2) to surroundings on the LCD Display.

---

Figure 6-19 Display Interface Removal



e4980ase1037

Replacement Procedure  
**Display Interface Replacement**

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

This chapter lists the procedures required to verify the E4980A operation after an assembly is replaced with a new one.

## Post-Repair Procedures

Table 7-1 *Post Repair Procedures* lists the required procedures that must be performed after the replacement of an assembly. These are the recommended minimum procedures to ensure that the replacement is successfully completed.

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

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
PPMC PCA (P1000-66501)	Perform the following required adjustments using “PPMC” in Spot Adjustment of the program.  Power On Test Limit	Inspect the booting process, and power on test result.
A1 Mother Board	Perform the following required adjustments using “A1 Board” in Spot Adjustment of the program.  Write ID	Inspect the booting process, and power on test result.
A2 Analog Board	Perform the following required adjustments using “A2 Board” in Spot Adjustment of the program.  Write Null phase track default data Null DC offset Adjustment Null ADC DC offset Adjustment ADC Linearity Adjustment DC Bias Adjustment DC level V monitor Adjustment (for opt 001) DC level I monitor Adjustment (for opt 001) DC Source Adjustment (for opt 001) DCR Adjustment (for opt 001) Impedance Adjustment AC Level monitor Adjustment OSC Level Adjustment	Inspect the booting process, and power on test result.  DC Bias V Level Monitor Accuracy Test (for opt 001) DC Bias I Level Monitor Accuracy Test (for opt 001) AC Signal Level Monitor Accuracy Test Impedance Measurement Accuracy Test DCR Measurement Accuracy Test (for opt 001)

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

Replaced Assembly or Part	Required Adjustments Correction Constants (CC)	Verification
A3 Analog Board	Perform the following required adjustments using “A3 Board” in Spot Adjustment of the program.  DC Bias Adjustment DC level V monitor Adjustment (for opt 001) DC level I monitor Adjustment (for opt 001) DC Source Adjustment (for opt 001) DCR Adjustment (for opt 001) Impedance Adjustment AC Level monitor Adjustment OSC Level Adjustment	Inspect the booting process, and power on test result.  Frequency Accuracy Test DC Source Level Monitor Accuracy Test (for opt 001) DC Bias Level Accuracy Test (for opt 001) AC Signal Level Accuracy Test Impedance Measurement Accuracy Test DCR Measurement Accuracy Test (for opt 001)
USB Board	No adjustment needed	Inspect the booting process, and power on test result.  “To Check the Front USB port” on page 61
Power Supply	No adjustment needed	Inspect the booting process, and power on test result.
Fan Assembly	No adjustment needed	Inspect the booting process, and power on test result.
LCD Assembly	No adjustment needed	Inspect the booting process, and power on test result.  “To Check the LCD” on page 61 DC Bias Level Accuracy Test (for opt 001)
Key Assembly	No adjustment needed	Inspect the booting process, and power on test result.  “To Check the Front Panel” on page 61 DC Bias Level Accuracy Test (for opt 001)
Handler I/F (option 201)	No adjustment needed	Inspect the booting process, and power on test result.  “To Check the Handler Interface Function (Option 201 only)” on page 65
Scanner I/F (option 301)	No adjustment needed	Inspect the booting process, and power on test result.  “To Check the Scanner Interface Function (Option 301 only)” on page 69

Post-Repair Procedures  
Post-Repair Procedures

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

<b>Replaced Assembly or Part</b>	<b>Required Adjustments Correction Constants (CC)</b>	<b>Verification</b>
Bias Current I/F (option 002)	No adjustment needed	Inspect the booting process, and power on test result.  “To Check the Bias Current Interface Function (Option 002 only)” on page 73



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

This appendix contains the information required to adapt this manual to versions or configurations of the E4980A manufactured earlier than the current printing date of this manual. The information in this manual applies directly to E4980A units with the serial number that is printed on the title page of this manual.

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## Manual Changes

To adapt this manual to your E4980A, refer to Table A-1 and Table A-2.

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

Serial Prefix or Number	Make Manual Changes

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

Version	Make Manual Changes

The ten-character serial number is stamped on the serial number plate (Figure A-1) on the rear panel.

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



e4980auj1003

---

## **B Firmware Update**

This appendix describes how to update the E4980A firmware. When you want to update the E4980A firmware, refer to this appendix.

## Update the E4980A firmware using USB/GPIB interface

### Required Equipment

- E4980A.
- 82357A USB/GPIB interface.
- Personal Computer with I/O Libraries Suite (Windows 2000/XP).

### How to update E4980A firmware using USB/GPIB interface

The following is the procedure to update the E4980A firmware using USB/GPIB interface.

- Step 1.** Connect the USB/GPIB interface from the USB terminal in your computer to the GPIB terminal in the E4980A rear panel. Then turn the E4980A on.
- Step 2.** Copy the following file from Agilent Technologies web site to the temporary work folder in your computer's HDD.
  - fw\_upd.exe
- Step 3.** Execute the **Command Prompt** on your computer.
- Step 4.** Change the current folder to the temporary working folder with the "fw\_upd.exe" file using **cd** command.
- Step 5.** Enter **fw\_upd.exe GPIB0::17::INSTR** command to execute the firmware update program. The numerical value of "17" in the command is GPIB address of the E4980A. Then, press the Enter key.
- Step 6.** Wait a few minutes until the command prompt is displayed again.
- Step 7.** Press **System** key on the E4980A front panel to check the firmware revision.

---

## Update the E4980A firmware using USB cable

### Required Equipment

- E4980A.
- USB cable connecting the E4980A and external controller (with type A/4-prong male or type mini-B/5-prong male connectors depending on device used).
- Personal Computer with I/O Libraries Suite (Windows 2000/XP).

### How to update E4980A firmware using USB cable

The following is the procedure to update the E4980A firmware using USB cable.

- Step 1.** Connect the USB cable from the USB terminal in your computer to the USB terminal in the E4980A rear panel. Then turn the E4980A on.
- Step 2.** Copy the following file from Agilent Technologies web site to the temporary work folder in your computer's HDD.
  - fw\_upd.exe
- Step 3.** Execute the **Command Prompt** on your computer.
- Step 4.** Change the current folder to the temporary working folder with the "fw\_upd.exe" file using **cd** command.
- Step 5.** Enter **fw\_upd.exe USB0::2391::2313::MY12345678::0::INSTR** command to execute the firmware update program. The entered value of "2391::2313::MY12345678" in the command is USB ID of the E4980A, and the entered value of "MY12345678" is serial number of the E4980A. Then, press the Enter key.
- Step 6.** Wait a few minutes until the command prompt is displayed again.
- Step 7.** Press **System** key on the E4980A front panel to check the firmware revision.

Firmware Update  
**Update the E4980A firmware using USB cable**

---

**C** **Power Requirement**

C. Power Requirement

## Replacing Fuse

### Fuse Selection

Select proper fuse according to the Table C-1.

**Table C-1 Fuse Selection**

Fuse Rating/Type	Fuse Part Number
3A 250Vac UL/CSA type Time Delay	2110-1017

### Setting up the fuse

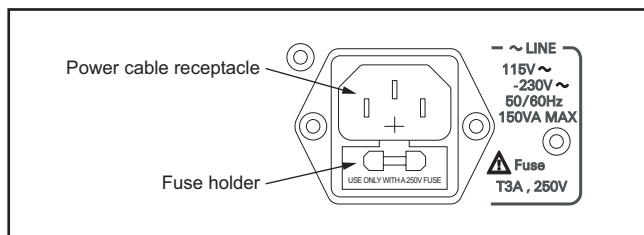
Use the fuse that meets the following specifications.

**UL/CSA type, Slo-Blo, 5x20mm miniature fuse, 3A 250V (part number: 2110-1017)**

Spare fuses are available from Agilent Technologies sales office. To check or replace the fuse, disconnect the power cable and pull out the fuse holder (refer to Figure C-1) towards you (refer to Figure C-2).

**Figure C-1**

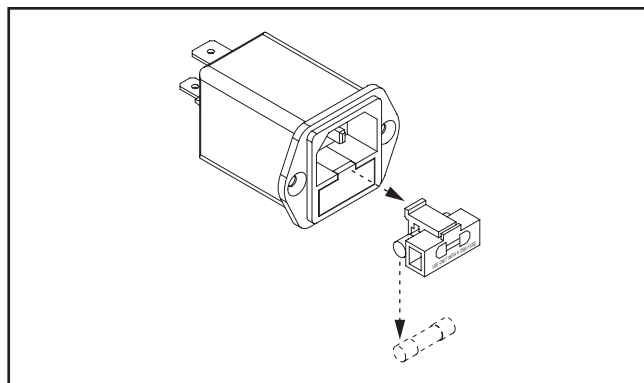
**Fuse holder and power cable socket**



e4980ase1039

**Figure C-2**

**Removing the fuse**



e4980ase1040



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## Power Requirements

The E4980A requires the following power source.

Voltage : 90 to 132 Vac, 198 to 264 Vac  
Frequency : 47 to 63 Hz  
Power : 150 VA maximum

### Power Cable

In accordance with international safety standards, this instrument is equipped with a three-wire power cable. When connected to an appropriate ac power outlet, this cable grounds the instrument frame.

The type of power cable shipped with each instrument depends on the country of destination. Refer to Figure C-3 for the part numbers of the power cables available.

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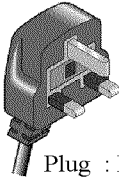
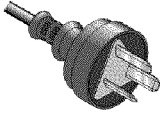

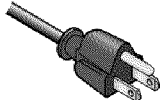

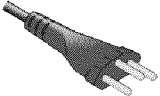
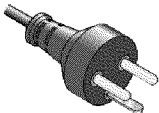
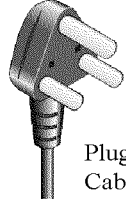
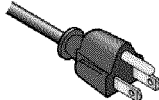
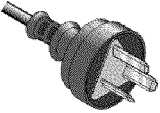
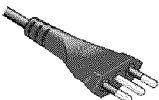
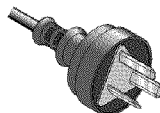
#### **WARNING**

**For protection from electrical shock, the power cable ground must not be defeated. The power plug must be plugged into an outlet that provides a protective earth ground connection.**

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Power Requirement  
Power Requirements

Figure C-3 Power Cable Supplied

<p>OPTION 900</p>  <p>United Kingdom</p> <p>Plug : BS 1363/A, 250V, 10A Cable: 8120-1351</p>	<p>OPTION 901</p>  <p>Australia/ New Zealand</p> <p>Plug : AS 3112, 250V, 10A Cable: 8120-1369</p>
<p>OPTION 902</p>  <p>Continental Europe</p> <p>Plug : CEE 7 Standard Sheet VII, 250V, 10A Cable: 8120-1689</p>	<p>OPTION 903</p>  <p>U.S./ Canada</p> <p>Plug : NEMA 5-15P, 125V, 10A Cable: 8120-1378</p>
<p>OPTION 904</p>  <p>U.S./ Canada</p> <p>Plug : NEMA 6-15P, 250V, 6A Cable: 8120-0698</p>	<p>OPTION 906</p>  <p>Switzerland</p> <p>Plug : SEV Type 12, 250V, 10A Cable: 8120-2104</p>
<p>OPTION 912</p>  <p>Denmark</p> <p>Plug : SR 107-2-D, 250V, 10A Cable: 8120-2956</p>	<p>OPTION 917</p>  <p>India/ Republic of S.Africa</p> <p>Plug : IEC 83-B1, 250V, 10A Cable: 8120-4211</p>
<p>OPTION 918</p>  <p>Japan</p> <p>Plug : JIS C 8303, 125V, 12A Cable: 8120-4753</p>	<p>OPTION 920</p>  <p>Argentina</p> <p>Plug : Argentine Resolution 63, Annex IV, 250V, 10A Cable: 8120-6870</p>
<p>OPTION 921</p>  <p>Chile</p> <p>Plug : CEI 23-16, 250V, 10A Cable: 8120-6978</p>	<p>OPTION 922</p>  <p>China</p> <p>Plug : GB 1002, 250V, 10A Cable: 8120-8376</p>
<p>If you want to use a power cable other than the supplied one, contact your nearest Agilent sales office for information.</p>	

4287aoj005

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## **D** **Error Messages**

The Agilent E4980A provides error messages to indicate its operating status. This appendix describes the error messages of the E4980A in alphabetical order.

## Error Messages

An error message is displayed in the instrument status display area in the lower-left part of the screen. Pressing the cursor arrow key on the front panel or executing the :DISP:CCL command clears the error message. Moreover, about a specific error message, when a sweep is started again, the display of an error message may disappear. Errors caused by operation of a front panel key simply appear on the display; with a few exceptions, these are not stored in the error queue.

The log of an error message, a maximum of 100 pieces are recorded, and it can go back and check from the oldest error. Executing the :SYST:ERR? command checks error logs. This operation can be performed only by "SCPI" command. It cannot be operated from the front panel.

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

1103

#### **A1 EEPROM write error**

An error is generated while writing data to A1 EEPROM. When this error occurs, contact Agilent Technology's Sales and Service Office or the company from which you bought the device.

### B

62

#### **Bias off, Turn bias on**

DC bias sweep is performed with the DC BIAS function OFF.

-160

#### **Block data error**

Block data is improper.

-168

#### **Block data not allowed**

Block data is not allowed.

### C

-140

#### **Character data error**

Character data is improper.

-148

#### **Character data not allowed**

Character data not allowed for this operation.

-144

#### **Character data too long**

Character data is too long (maximum length is 12 characters).

-100

#### **Command Error**

Improper command.

41

#### **Correction measurement aborted**

- Correction data measurement is aborted.
- 1201 **CPU Bd EEPROM write error**  
An error is generated while writing data to EEPROM. When this error occurs, contact Agilent Technology's Sales and Service Office or the company from which you bought the device.
- 1200 **CPU Bd FLASH ROM write error**  
An error is generated while writing data to FLASH. When this error occurs, contact Agilent Technology's Sales and Service Office or the company from which you bought the device.
- 29 **Cycle power of 42841A and Preset**  
The connection was not established with the 42841A. Cycle the power of the 42841A, then preset the E4980A.
- D**
- 90 **Data buffer overflow**  
This error occurs when the amount of data exceeds the defined data buffer memory size. If this error occurs during the measurement after pressing [Save/Recall] - SAVE DATA - START LOG, press SAVE & STOP.
- 230 **Data corrupt or stale**  
The setting file or correction data to be read cannot be read out with the current firmware version because the setting file or correction data is corrupt or old.
- 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, for example, when an integer-based command for which the parameter can be rounded exceeds the range of -2147483648 to +2147483647 or when a real-number-based command for which the parameter can be rounded exceeds the range of -9.9e37 to +9.9e37. This error also occurs when a numeric value other than a specified one is entered into a command in which the "BIN number" and "list table number" are specified as parameters and thus the parameters are not rounded.
- 104 **Data type error**  
Improper data type used (for example, string data was expected, but numeric data was received).
- 26 **DC bias I sink overload**  
DC bias sink current is overloaded. When this error occurs, lower the value of the current setting.
- 25 **DC bias I source overload**  
DC bias source current is overloaded. When this error occurs, lower the value of the current setting
- 19 **DC bias not available**  
DC bias cannot be turned on in Rdc measurement.
- 18 **DC bias opt not installed**

## Error Messages

### Error number: 28

Operation that requires option 001 is performed in a model not having the power amp/DC bias option (option 001).

28 **DC bias unit connection changed**

The connection with the 42841A has been changed. Cycle the power of the 42841A, then preset the E4980A.

27 **DC bias unit disconnected**

The 42841A is not connected. Confirm the connection to the 42841A.

20 **DC bias unit powered down**

The 42841A is switched off. Turn on the switch.

63 **DC source off, Turn DC source on**

DC source sweep is performed with the DC source function OFF. Set the DC source function to ON.

## E

10 **Exceeded AC+DC limit**

The amount of the voltage level exceeds 42V peak. Lower the DC voltage or AC voltage setting.

-200 **Execution error**

An error associated with execution has been generated for which this instrument cannot specify the error message. This code indicates that an error associated with execution defined in 11.5.1.1.5, IEEE488.2 has occurred.

-123 **Exponent too long**

The magnitude of the exponent was larger than 32000.

-178 **Expression data not allowed**

Expression data is not allowed.

-170 **Expression error**

Expression is improper.

## F

1070 **Fan failed**

Cooling fan hardware failure is detected. When this error occurs, contact Agilent Technology's Sales and Service Office or the company from which you bought the device.

21 **Fixture circuit defective**

A fault has occurred in a circuit to absorb back-emf of the 42842A/B. Confirm the connection to the 42842A/B.

24 **Fixture cover open**

The protective cover of the 42842A/B is open. Close the cover.

23 **Fixture OPEN det. defective**

The opening and closing detection sensor of the 42842A/B protective cover detects an

error. When this error occurs, contact Agilent Technology's Sales and Service Office or the company from which you bought the device.

22

**Fixture over temperature**

The temperature inside the 42842A/B bias test fixture exceeds the limit. Turn off the DC bias and cool down the equipment.

30

**Function type not available**

The Ls-Rdc, Lp-Rdc and Vdc-Idc are not available when the 42841A is connected.

**G**

-105

**GET not allowed**

GET is not allowed inside a program message.

**H**

70

**Handler I/F not installed**

The handler interface function is set to ON in a model that does not have a handler interface board (option 201).

-114

**Header Suffix out of Range**

The header suffix is out of range.

**I**

73

**I BIAS I/F not installed**

The DC bias interface function is set to ON in a model that does not have the DC bias interface board (option 002).

-224

**Illegal parameter value**

The parameter value is not properly set. This error occurs, for example, when the :FUNC:IMP command is used to specify an Impedance-parameter that does not exist (as CPRS).

51

**Inconsistent limit setting**

For the comparator function, user attempts to set the threshold in the sequential mode by sending the COMP:SEQ:BIN command, although the tolerance mode is now selected. Select the sequential mode using COMP:MODE.

-161

**Invalid block data**

Invalid block data was received (for example, END received before length satisfied).

-101

**Invalid character**

Invalid character was received.

-141

**Invalid character data**

Bad character data or unrecognized character data was received.

-121

**Invalid character in number**

Invalid character in numeric data.

## Error Messages

### Error number: -171

- 171      **Invalid expression**  
Invalid expression was received (for example, illegal character in expression).
- 103      **Invalid separator**  
The message unit separator (for example, “;”, “,”) is improper.
- 151      **Invalid string data**  
Invalid string data was received (for example, END received before close quote).
- 131      **Invalid suffix**  
Units are unrecognized, or the units are not appropriate.
- M**
- 250      **Mass storage error**  
An error occurred while accessing the USB memory. A USB memory-related error other than -257 error (File Name Error) occurred.
- 43        **Measurement failed**  
A measurement error occurred during correction data measurement. The OPEN or SHORT state connected to the UNKNOWN terminals may be inappropriate.
- 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 “:CORR:USE” requires one more parameter. Therefore, when a message “:CORR:USE” is sent to a correct program message “:CORR:USE 11,” this instrument receives the former message as an invalid one because all parameters have not been entered. Enter command parameters correctly.
- N**
- 83        **No data to load**  
There is no setup data for the selected number. Or the USB memory is not inserted.
- 60        **No values in sweep list**  
List sweep measurement is performed when the measurement point is not set on the LIST SWEEP SETUP screen.
- 128      **Numeric data error**  
Numeric data is improper.
- 128      **Numeric data not allowed**  
Numeric data not allowed for this operation.
- O**
- 83        **Out of Memory**  
The E4980A has insufficient memory to perform the requested operation.



## P

-220

### Parameter error

When a parameter-related error other than Errors -221 through -229 occur, this error message is displayed.

-108

### Parameter not allowed

The number of parameters exceeds that required for the command. For instance, when a program message “:FORM:BORD NORM, ASC” is sent instead of a correct program message with a command “:FORM:BORD NORM”, which requires a parameter, the instrument receives the message that the number of parameters is invalid. See the command reference to confirm the required number of parameters.

1080

### Power failed

Power unit hardware failure is detected. Contact Agilent Technology’s Sales and Service Office or the company from which you bought the device.

1000

### Power on test failed

An error occurs during a self test at power-on. The E4980A may be faulty. Contact Agilent Technology’s Sales and Service Office or the company from which you bought the device.

A self test fails when an interface board is removed or not connected properly. Check the connection with a cable when you change the setting of the interface board.

-112

### Program mnemonic too long

Program mnemonic is too long (maximum length is 12 characters).

## Q

-350

### Queue overflow

There is no room in the queue and an error occurred but was not recorded. Clear the error queue.

-430

### Query DEADLOCKED

Input buffer and output buffer are full; cannot continue.

-400

### Query error

Query is improper.

-410

### Query INTERRUPTED

Query is followed by DAB or GET before the response is completed.

-420

### Query UNTERMINATED

Addressed to talk, incomplete program message received.

-440

### Query UNTERMINATED error after indefinite response

A query that requests arbitrary data response (\*IDN? and \*OPT? queries) is sent before normal queries in a program message (for example, FREQ?;\*IDN? is expected, but \*IDN?;FREQ? is received).

Error Messages  
Error number: 16

**R**

16           **Reference Measurement aborted**

Reference data measurement is aborted.

**S**

71           **Scanner I/F not installed**

Operation that requires option 301 is performed in a model that does not have a scanner interface board (option 301).

82           **Store failed**

User attempts to save data into number 10 to 19 when a USB memory device is not inserted. Prepare the USB memory device or save data into number 0 to 9.

-150         **String data error**

String data is improper.

-158         **String data not allowed**

String data is not allowed.

-138         **Suffix not allowed**

A suffix is not allowed for this operation.

-102         **Syntax error**

Unrecognized command or data type was received.

**T**

-223         **Too many digits**

The received numeric value is too long (exceeds 255 digits).

-223         **Too much data**

The block-, expression-, or character-string-type program data that are received conform with the standard but exceed 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.

-211         **Trigger ignored**

The instrument receives and detects a trigger command (“:TRIG”) or an external trigger signal, but it is ignored due to the timing condition (the 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**

-113         **Undefined header**

A command not defined in this instrument, though not illegal in the syntactic structure, has been received. For example, when the message “:OUTP:DC:ISOL:FREQ:AUTO ON” is sent instead of the correct program message “:OUTP:DC:ISOL:LEV:AUTO ON” the message sent is received as an undefined command by this instrument. See the command

reference and use the correct command.

## V

14

### **V bias disabled**

The DC voltage bias is set when the 42841A is connected. Set the DC current bias or disconnect the 42841A.

45

### **Valid in single mode only**

SINGLE channel correction data is measured when the MULTI channel correction mode is set.

## Warning Message

A warning message is displayed in the instrument status display area in the lower-left part of the display. Pressing any of the front panel keys or executing the :DISP:CCL command clears the message.

This message simply appears on the display since it is not known to remote environments such as GPIB. This message is not displayed when another error message has been already displayed in the instrument message/warning area.

The warning messages for this instrument are as follows.

### Numeric

#### 1 I bias unit

The E4980A finds one current bias unit (42841A) connected.

#### 2 I bias units

The E4980A finds two current bias units (42841A) connected.

### A

#### ALC unable to regulate

The voltage level setting is inappropriate for using the ALC function. The ALC function does not work and the operation will be the same as when the ALC function is turned off. The measurement data status is set to 4. Refer to E4980A User's Guide.

### C

#### Clear the table first

This error occurs when the value of MODE has been changed when the LIMIT TABLE SETUP screen is moved to another screen or the sweep parameter on the LIST SWEEP SETUP screen is changed even though a sweep list for another measurement parameter exists. Clear the table first.

#### Correction, not effective

The correction function does not work because the MULTI correction mode is used but the test frequency is not equal to the spot frequency.

### I

#### Improper high/low limits

The upper limit value is less than the lower limit value. Set the lower limit value to less than the upper limit value.

#### Incompatible state file

The setting file recalled from a USB memory device has been saved using an E4980A with a different firmware version or different options. There may be some parameters set up incorrectly. Check the setting.

## S

### **Signal source overload**

The signal source is overloaded. The measurement data is not guaranteed to be valid. The measurement result data status of the measurement result output is set to 3.

When measuring Ls-Rdc/Lp-Rdc, set both RANGE and DCR RNG properly, or “OVERLOAD” will be displayed.

### **Signal source overvoltage**

The signal source voltage exceeds its limit. Lower the voltage setting of the signal source.

Error Messages  
**Error number: 45**

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