

**Maintenance Manual**

# **Microwave Site Master™ S820E Cable and Antenna Analyzer**

**1 MHz to 8/14/20/30/40 GHz**

The Anritsu logo, featuring the word "Anritsu" in a stylized, blue, sans-serif font. The letter "A" is unique, with a diagonal line extending from the top left corner.



# Table of Contents

---

## Chapter 1—General Information

1-1	Introduction . . . . .	1-1
1-2	Description . . . . .	1-1
	Standard Accessories . . . . .	1-1
1-3	Related Documents . . . . .	1-1
1-4	Options . . . . .	1-1
1-5	Contacting Anritsu . . . . .	1-1
1-6	Product Information, Compliance, and Safety . . . . .	1-2
1-7	Recommended Test Equipment . . . . .	1-2
1-8	Recommended Tools and Supplies . . . . .	1-4
1-9	Replaceable Parts and Assemblies . . . . .	1-5

## Chapter 2— Performance Verification

2-1	Introduction . . . . .	2-1
2-2	Manual Performance Test – Frequency Accuracy Verification . . . . .	2-1
	Equipment Required . . . . .	2-1
	Procedure . . . . .	2-1
2-3	Automated Performance Tests . . . . .	2-2
	Test Sequence . . . . .	2-2
	Test Reports . . . . .	2-2
	Equipment Required for Automated Tests . . . . .	2-3
	S-parameter Measurements Verification Test . . . . .	2-4
	Transmission Dynamic Range Verification . . . . .	2-5
	Transmission High Level Noise Verification . . . . .	2-5
	Automated Test Procedure . . . . .	2-5
2-4	SC8268 Verification Procedure . . . . .	2-6
	Equipment Required . . . . .	2-6
	Procedure . . . . .	2-6

## Chapter 3—Battery Information

3-1	Introduction . . . . .	3-1
3-2	Battery Pack Removal and Replacement . . . . .	3-1
	Battery Pack Information . . . . .	3-3

## Chapter 4—Assembly Removal and Replacement

4-1	Introduction . . . . .	4-1
4-2	Electrostatic Discharge Prevention . . . . .	4-1
4-3	Real Time Clock (RTC) Battery . . . . .	4-1
4-4	Replaceable Parts, Assemblies, and Accessories . . . . .	4-1

## Table of Contents (Continued)

---

4-5	Instrument Case for Site Master S820E	4-2
	Front and Back	4-2
	Case Outer Components	4-3
	Opening the Case	4-4
	Basic Case Parts	4-6
	Front Panel Components	4-7
	Back Panel Components	4-8
4-6	Test Panel Connectors	4-9
4-7	Internal Anatomy of the Site Master S820E	4-10
	Case Assembly Components with Complete PCB	4-10
	Case Assembly Components with Motherboard PCB	4-11
	Motherboard and Connector Panel	4-11
	Motherboard and Connector Panel for Option S820E-0708	4-12
	Motherboard and Connector Panel for Higher Frequency Options	4-13
4-8	Disassembly Sequence Overview	4-14
	Removal and Replacement Instructions	4-14
4-9	Replacements That Do Not Require Opening the Case	4-15
	Removing the Bumpers	4-15
	Removing the Battery Door and Battery	4-15
	Removing and Replacing the Rotary Knob	4-16
	Removing and Replacing the Tilt Bail	4-16
4-10	Opening the Instrument Case	4-17
	Procedure	4-17
4-11	Closing the Case	4-22
	Installing Battery	4-22
	Restarting the Instrument	4-22
4-12	Main/VNA PCB and Connector Panel Removal	4-23
	Procedure	4-24
4-13	Main/VNA PCB Assembly Installation	4-25
	Procedure	4-26
4-14	Connector Panel Removal	4-27
	Procedure	4-28
4-15	Connector Panel Installation	4-30
4-16	Port Connector Removal	4-31
	Procedure	4-31
4-17	Port Connector Installation	4-33
4-18	Microwave Module Removal	4-34
	Procedure	4-34
4-19	Microwave Module Installation	4-35
4-20	Dual Sampler Assembly Removal	4-36
	Procedure	4-36
4-21	Dual Sampler Assembly Installation	4-37
4-22	Fan Assembly Removal	4-38
	Procedure	4-38



## Table of Contents (Continued)

---

4-23	Fan Assembly Installation .....	4-40
4-24	LCD Assembly Removal .....	4-42
	Procedure .....	4-42
4-25	LCD Assembly Installation .....	4-46
4-26	Keypad PCB Removal .....	4-46
	Procedure .....	4-46
4-27	Keypad Rubber Membrane and Keypad PCB Installation .....	4-48
4-28	Touch Screen Removal .....	4-49
	Procedure .....	4-49
4-29	Touch Screen Replacement .....	4-50
4-30	Rotary Encoder Removal .....	4-51
	Procedure .....	4-51
4-31	Rotary Encoder Installation .....	4-51
4-32	Speaker Removal .....	4-52
4-33	Speaker Installation .....	4-52

### Chapter 5—Troubleshooting

5-1	Introduction .....	5-1
5-2	Turn-on Problems .....	5-1
	Unit Cannot Boot Up (Battery Powered) .....	5-1
	Unit Cannot Boot Up (AC Powered) .....	5-1
	Unit Cannot Complete Boot-Up .....	5-1
	Unit Boots with No Display .....	5-2
5-3	Operating Problems .....	5-2
	Failed Instrument Self Test .....	5-2
	Return Loss Trace has power dropout when Port 1 is terminated with Short .....	5-3
	Transmission Trace has power dropout when Thru Cable is connected between VNA Ports .....	5-3

### Appendix A—Test Records

A-1	Introduction .....	A-1
A-2	S820E Site Master Test Record .....	A-2
	VNA Frequency Accuracy .....	A-2
	VNA Measurements Accuracy Verification .....	A-2
	VNA Transmission Dynamic Range .....	A-2
	VNA High Level Noise (Trace Noise) .....	A-2
	SC8268 Verification .....	A-2

### Index



# Chapter 1 — General Information

## 1-1 Introduction

This manual provides service and maintenance information for the Anritsu Site Master S820E Cable & Antenna Analyzer. The information includes product descriptions, replaceable parts information, performance verification procedures, parts removal and replacement procedures, and troubleshooting information. The following terms are equivalent:

- Soft Key is the same as Submenu Key
- Hard Key is the same as Main Menu Key

Throughout this manual, the following terms apply:

- Site Master refers to the S820E Cable & Antenna Analyzer

## 1-2 Description

The Site Master S820E is a Cable & Antenna Analyzer with frequency coverage up to 40 GHz. It utilizes the very latest technologies to deliver accuracy and performance previously reserved only for benchtop instruments.

### Standard Accessories

Refer to the Technical Data Sheet (part number 11410-00749) for lists of standard and optional accessories.

## 1-3 Related Documents

Other documents are available for the Site Master S820E at the Anritsu web site at: [www.anritsu.com](http://www.anritsu.com)

- Site Master S820E User Guide – part number 10580-00343
- Site Master S820E Programming Manual – part number 10580-00344
- Site Master S820E Technical Data Sheet – part number 11410-00650

## 1-4 Options

**Table 1-1.** Option Numbers and Descriptions

Option Number	Option Description
Option 708	1 MHz to 8 GHz, type N(f) ports
Option 714	1 MHz to 14 GHz, type N(f) ports
Option 720	1 MHz to 20 GHz, type K(m) ports
Option 730	1 MHz to 30 GHz, type K(m) ports
Option 740	1 MHz to 40 GHz, type K(m) ports

## 1-5 Contacting Anritsu

To contact Anritsu, follow the link [www.anritsu.com/contact-us](http://www.anritsu.com/contact-us) and select the services in your region.

## 1-6 Product Information, Compliance, and Safety

Read the Handheld Instruments Product Information, Compliance, and Safety Guide (PN: 10100-00065) for important safety, legal, and regulatory notices before operating the equipment. For additional information and literature, visit [www.anritsu.com](http://www.anritsu.com) and go to the Test and Measurement Products page to find your instrument type and model, then select the Library tab.

## 1-7 Recommended Test Equipment

The following test equipment is recommended for use in testing and maintaining the Site Master S820E.

**Table 1-2.** Recommended Test Equipment (1 of 2)

Equipment	Critical Specification	Recommended Manufacturer/Model
Frequency Counter	Frequency: 1 GHz	Anritsu Model MF2412B or MF2412C
Frequency Reference	Frequency: 10 MHz	Symmetricom Model RubiSource T&M
VNA (for SC8268)	Frequency: 10 MHz to 40 GHz	Anritsu Model MS4644B
Open/Short/Load (for Option 708)	Frequency: DC to 8 GHz Connector: N(m)	Anritsu Model OSLN50A-8, OSLN50A-18, TOSLN50A-8 or TOSLN50A-18
Open/Short/Load (for Option 708)	Frequency: DC to 8 GHz Connector: N(f)	Anritsu Model OSLNF50A-8, OSLNF50A-18, TOSLNF50A-8 or TOSLNF50A-18
Open/Short/Load (for Options 708 or 714)	Frequency: DC to 18 GHz Connector: N(m)	Anritsu Model OSLN50A-18 or TOSLN50A-18
Open/Short/Load (for Options 708 or 714)	Frequency: DC to 18 GHz Connector: N(f)	Anritsu Model OSLNF50A-18 or TOSLNF50A-18
Verification Kit (for Options 708 or 714)	Connector: N Type	Anritsu Model 3663-1
Adapter (for Options 708 or 714)	Frequency: DC to 18 GHz Connector: N(m) to K(m)	Anritsu Model 34NK50
Adapter (for Options 708 or 714)	Frequency: DC to 18 GHz Connector: N(m) to K(f)	Anritsu Model 34NKF50
Torque Wrench (for Options 708 or 714)	3/4 in. (0.75 in.) Open End Wrench 12 lbf·in (1.35 N·m)	Anritsu Model 01-200
Open/Short/Load (for Option 720)	Frequency: DC to 20 GHz Connector: K(m)	Anritsu Model TOSLK50A-20 or TOSLK50A-40
Open/Short/Load (for Option 720)	Frequency: DC to 20 GHz Connector: K(f)	Anritsu Model TOSLKF50A-20 or TOSLKF50A-40
Open/Short/Load (for Options 720, 730, or 740)	Frequency: DC to 40 GHz Connector: K(m)	Anritsu Model TOSLK50A-40
Open/Short/Load (for Options 720, 730, or 740)	Frequency: DC to 40 GHz Connector: K(f)	Anritsu Model TOSLKF50A-40 or 28KF50
Verification Kit (for Option 720, 730, or 740)	Connector: K Type	Anritsu Model 3668-1

**Table 1-2.** Recommended Test Equipment (2 of 2)

<b>Equipment</b>	<b>Critical Specification</b>	<b>Recommended Manufacturer/Model</b>
Calibration Kit (for SC8268)	Frequency: 10 MHz to 40 GHz Connector: K Type	Anritsu Model 3652A-1
Adapter (for Option 720, 730, or 740)	Frequency: DC to 40 GHz Connector: K(m) to K(f)	Anritsu Model 33KKF50B
Adapter (for Option 720, 730, or 740)	Frequency: DC to 40 GHz Connector: K(f) to K(f)	Anritsu Model 33KFKF50B
Torque Wrench (for Option 720, 730, or 740)	5/16 in. (0.325 in.) Open End Wrench 8 lbf·in (0.90 N·m)	Anritsu Model 01-201
RF Coaxial Cable	Frequency: DC to 40 GHz Impedance: 50 ohm Connector: K(f) to K(m)	Anritsu Model 3670K50-2
RF Coaxial Cable	Impedance: 50 ohm Connector: BNC(m) to BNC(m)	Anritsu Part Number 2000-1627-R
Interface Cable	USB: USB A to USB mini B Ethernet: RJ48, cross-over, Cat.5E Ethernet: RJ48, Cat.5E	Anritsu Part Number 3-2000-1498 Anritsu Part Number 3-806-152 Anritsu Part Number 2000-1371-R
Connector Wrench		Anritsu Part Number 01-204
Personal Computer	Operating System: Windows 7 Interface: Ethernet, RJ-48 Software: National Instruments VISA version 4.4.1 or later	Any
System Verification Software		Anritsu Part Number 2300-555

## 1-8 Recommended Tools and Supplies

- Medium Phillips-head Screwdriver
- 7.5 lbf ·in (0.85 N ·m) Torque-Limiting Phillips-head Screwdriver
- Felo brand Series Nm adjustable torque screwdriver set, 0.6 N ·m to 1.5 N ·m
- Small Flat-Blade Screwdriver, with tip width of less than 3.5 mm – For Front Panel Keypad Bezels
- Small square of rubber or similar non-scratch material approximately 25 mm x 25 mm (1 in x 1 in) – For Front Panel Keypad Bezels
- 5.5 mm Angled-Head Open End Wrench
- 5/16 inch (~8 mm) Open End Wrench, 2 each recommended – For SMA and K Connectors
- 5/16 inch and 8 lbf ·in (0.9 N ·m) Open End Torque Wrench
  - Anritsu Model 01-201
- 7/16 inch (~12 mm) Nut Driver – For Rotary Encoder
- 3/4 inch and 12 lbf ·in (1.35 N ·m) Open End Torque Wrench, Anritsu Model 01-200
- Needle-Nose Pliers
- Small Cable Ties
- Scraper Tool – For removing RTV from connectors
- Room Temperature Vulcanizing (RTV) Silicon Sealant – For Keypad Flex PCB Replacement  
Anritsu Part Number 3-783-1102
- Approved cleaning supplies – For touch screen of the LCD Display, and instrument Case

## 1-9 Replaceable Parts and Assemblies

To ensure that the correct options are provided on the replacement assembly when ordering a Main/VNA PCB Assembly, all installed instrument options must be declared on the order.

The installed options are listed on a label on the back of the S820E. They can also be viewed in the System Status display.

Table 1-3 summarizes the available replaceable parts and assemblies with links to [Chapter 4, “Assembly Removal and Replacement”](#) detailed procedures.

**Table 1-3.** Replaceable Parts and Assemblies (1 of 4)

Part Number	Description
<b>ND80107&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 708, s/n < 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>3-ND82224&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 708, s/n > 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>ND80108&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 714, s/n < 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>3-ND82225&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 714, s/n > 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>ND80109&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 720, s/n < 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>3-ND82226&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 720, s/n > 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>ND80110&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 730, s/n < 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>3-ND82227&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 730, s/n > 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>ND80111&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 740, s/n < 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>3-ND82228&lt;R&gt;</b>	Main/VNA PCB Assembly for S820E instruments with Option 740, s/n > 1603000 – LCD Display not included – <a href="#">Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23</a>
<b>3-75251&lt;R&gt;</b>	Dual Sampler Assembly for all S820E instruments with Options 714, 720, 730, and 740 – <a href="#">Section 4-20 “Dual Sampler Assembly Removal” on page 4-36</a>
<b>3-72005-3&lt;R&gt;</b>	20 GHz Microwave Source and Transfer Switch Assembly for S820E instruments with Option 714 or 720 – <a href="#">Section 4-18 “Microwave Module Removal” on page 4-34</a>
<b>3-72005-4&lt;R&gt;</b>	40 GHz Microwave Source and Transfer Switch Assembly for S820E instruments with Option 730 or 740 – <a href="#">Section 4-18 “Microwave Module Removal” on page 4-34</a>

**Table 1-3.** Replaceable Parts and Assemblies (2 of 4)

Part Number	Description
<b>3-68175</b>	N female Test Port Adapter – For all S820E instruments with Options 708 or 714 – <a href="#">Section 4-16 “Port Connector Removal” on page 4-31</a>
<b>3-75651</b>	Ruggedized K male Test Port Adapter – For all S820E instruments with Options 720, 730, or 740 – <a href="#">Section 4-16 “Port Connector Removal” on page 4-31</a>
<b>3-75261-1</b>	Cable, BNC(f) to MCX(m), 254 mm, External Trigger In – For all S820E instruments – <a href="#">Section 4-14 “Connector Panel Removal” on page 4-27</a>
<b>3-75261-2</b>	Cable, BNC(f) to MCX(m), 127 mm, External Reference In – For all S820E instruments – <a href="#">Section 4-14 “Connector Panel Removal” on page 4-27</a>
<b>3-15-165</b>	LCD Display – For S820E instruments with serial numbers less than 1603000 – <a href="#">Section 4-24 “LCD Assembly Removal” on page 4-42</a>
<b>3-15-174</b>	LCD Display – For S820E instruments with serial numbers greater than 1603000 – <a href="#">Section 4-24 “LCD Assembly Removal” on page 4-42</a>
<b>3-ND80480</b>	Touch Screen with Gasket – For all S820E instruments – <a href="#">Section 4-28 “Touch Screen Removal” on page 4-49</a>
<b>3-72621-4</b>	Cable, LCD Display to Main/VNA PCB Assembly, 7 cm, Black – For S820E instruments with serial numbers less than 1603000 – <a href="#">Section 4-24 “LCD Assembly Removal” on page 4-42</a>
<b>3-70674-4</b>	Cable, LCD Display to Main/VNA PCB Assembly, 7 cm, Black – For S820E instruments with serial numbers greater than 1603000 – <a href="#">Section 4-24 “LCD Assembly Removal” on page 4-42</a>
<b>3-72773</b>	Keypad Rubber Membrane – For all S820E instruments – <a href="#">Section 4-26 “Keypad PCB Removal” on page 4-46</a>
<b>3-ND80115</b>	Keypad PCB – For all S820E instruments – <a href="#">Section 4-26 “Keypad PCB Removal” on page 4-46</a>
<b>3-905-2744</b>	Keypad PCB Screw – For all S820E instruments – <a href="#">Section 4-26 “Keypad PCB Removal” on page 4-46</a>
<b>3-72767</b>	Keypad PCB Washer – For all S820E instruments – <a href="#">Section 4-26 “Keypad PCB Removal” on page 4-46</a>
<b>3-71625-1</b>	Cable, Keypad PCB to LCD Display Backlight – For S820E instruments with serial numbers less than 1603000 – <a href="#">Section 4-26 “Keypad PCB Removal” on page 4-46</a>
<b>3-70675-1</b>	Cable, Keypad PCB to LCD Display Backlight – For S820E instruments with serial numbers greater than 1603000 – <a href="#">Section 4-26 “Keypad PCB Removal” on page 4-46</a>
<b>3-74842-3</b>	Cable, Keypad PCB to Main/VNA PCB Assembly, 15 cm, white – For all S820E instruments – <a href="#">Section 4-26 “Keypad PCB Removal” on page 4-46</a>



Table 1-3. Replaceable Parts and Assemblies (3 of 4)

Part Number	Description
<b>3-410-103</b>	Rotary Encoder – For all S820E instruments – Does not include the Rotary Knob 3-61360-2 – <a href="#">Section 4-30 “Rotary Encoder Removal” on page 4-51</a>
<b>3-61360-2</b>	Encoder Rotary Knob (excluding encoder) – For all S820E instruments – Does not include the Rotary Encoder 3-410-101 – <a href="#">Section “Removing and Replacing the Rotary Knob” on page 4-16</a>
<b>3-ND81940</b>	Fan Assembly – For all S820E instruments – <a href="#">Section 4-22 “Fan Assembly Removal” on page 4-38</a>
<b>3-790-727</b>	Fan Mount – For all S820E instruments – <a href="#">Section 4-22 “Fan Assembly Removal” on page 4-38</a>
<b>ND73192</b>	Speaker Assembly – For all S820E instruments The replacement procedure is not described separately. The speaker is attached to the Front Case. Refer to: – <a href="#">Section 4-10 “Opening the Instrument Case” on page 4-17</a> Remove components until speaker is exposed, as in: – <a href="#">Section 4-30 “Rotary Encoder Removal” on page 4-51</a>
<b>ND73191</b>	Front Case – For all S820E instruments – Does not include Model ID Label and keypad items – <a href="#">Section 4-30 “Rotary Encoder Removal” on page 4-51</a>
<b>ND73199</b>	Back Case – For all S820E instruments – Does not include Tilt Bail – <a href="#">Section 4-10 “Opening the Instrument Case” on page 4-17</a>
<b>ND73200</b>	Tilt Bail – For all S820E instruments – <a href="#">Section “Removing and Replacing the Tilt Bail” on page 4-16</a>
<b>3-75255-8</b>	Model ID Label for S820E instruments with Option 708
<b>3-75255-14</b>	Model ID Label for S820E instruments with Option 714
<b>3-75255-20</b>	Model ID Label for S820E instruments with Option 720
<b>3-75255-30</b>	Model ID Label for S820E instruments with Option 730
<b>3-75255-40</b>	Model ID Label for S820E instruments with Option 740
<b>ND73201</b>	Battery Door – For all S820E instruments – Refer to <a href="#">Chapter 3, “Battery Information”</a> for replacement of the battery door, and – <a href="#">Section 3-2 “Battery Pack Removal and Replacement” on page 3-1</a> – <a href="#">Section “Removing the Battery Door and Battery” on page 4-15</a>

**Table 1-3.** Replaceable Parts and Assemblies (4 of 4)

Part Number	Description
<b>3-806-221</b>	Battery Connector Harness – For all S820E instruments – The replacement procedure is not described separately. Refer to: – <a href="#">Section 4-10 “Opening the Instrument Case” on page 4-17</a> and – <a href="#">Step 6– on page 4-19</a> and – <a href="#">Figure 4-17, “Battery Connector on Motherboard” on page 4-20</a> and – <a href="#">Figure 4-18, “Battery Connector on Motherboard” on page 4-21</a>
<b>3-72758</b>	Vent 1 (Fan Vent, above Battery Door) – For all S820E instruments – <a href="#">Section 4-10 “Opening the Instrument Case” on page 4-17</a>
<b>3-72759</b>	Vent 2 (Intake Vent, top vent on keypad side) – For all S820E instruments – <a href="#">Section 4-10 “Opening the Instrument Case” on page 4-17</a>
<b>3-72760</b>	Vent 3 (Battery Vent, bottom vent on keypad side) – For all S820E instruments – <a href="#">Section 4-10 “Opening the Instrument Case” on page 4-17</a>
<b>3-69770-2</b>	Top Bumper – For all S820E instruments – <a href="#">Section “Removing the Bumpers” on page 4-15</a>
<b>3-69771-2</b>	Bottom Bumper – For all S820E instruments – <a href="#">Section “Removing the Bumpers” on page 4-15</a>
<b>40-187-R</b>	AC to DC Power Adapter – For all S820E instruments
<b>633-75</b>	Rechargeable high capacity battery, Lithium-Ion – For all S820E instruments
<b>2000-1654-R</b>	Soft Carrying Case – For all S820E instruments
<b>806-141</b>	Automotive 12 Volt DC Adapter – For all S820E instruments
<b>3-2000-1498</b>	USB Type 2 A to Mini B Cable, 3 meters (10 feet) – For all S820E instruments
<b>2000-1371-R</b>	Category 5 (Cat5) Ethernet Cable – For all S820E instruments

# Chapter 2 — Performance Verification

## 2-1 Introduction

This chapter provides procedures to be used to verify the performance of Site Master S820E.

The procedures consists of two parts:

- Manual Performance Test
  - Frequency Accuracy Verification
- Automated Performance Tests
  - S-parameters Measurements Verification
  - Transmission Dynamic Range Verification
  - Transmission High Level Noise Verification

## 2-2 Manual Performance Test – Frequency Accuracy Verification

This manual performance test procedure is used to verify the CW frequency accuracy of the vector network analyzer in the Site Master S820E. Measurement calibration of the VNA is not required for this test.

### Equipment Required

- Frequency Reference, Symmetricom RubiSource T&M
- Frequency Counter, Anritsu Model MF2412B or MF2412C
- RF Coaxial Cable, Anritsu Model 3670K50-2
- N male to K female Adapter, Anritsu Model 34NKF50
- N male to K male Adapter, Anritsu Model 34NK50 (For units with Options 708 or 714)
- BNC male to BNC male coaxial cable, Anritsu part number 2000-1627-R

### Procedure

1. Turn on the Frequency Reference.
2. Install a BNC male to BNC male cable between the 10 MHz Output of the Frequency Reference and the Reference Input of the MS241xx Frequency Counter.
3. On the Frequency Counter, press the **Preset** key.
4. Turn on the Site Master S820E.
5. On the Site Master, press the **Shift** key, the **Preset (1)** key, and then the Preset soft key to reset the instrument to the default starting conditions.

<b>Note</b> Before continuing, allow a 30-minute warm up for the internal circuitry to stabilize.
---

6. Press the **Freq/Dist** soft key on the bottom of the LCD display, and then press the Start Frequency (F1) soft key.
7. Enter 1 and press the GHz soft key to set the Start Frequency to 1 GHz.
8. Press the Stop Frequency (F2) soft key.
9. Enter 1 and press the GHz soft key to set the Stop Frequency to 1 GHz.
10. Attach the RF cable from the Site Master Port 1 to the RF Input 1 connector on the Frequency Counter.

11. Verify that the Frequency Counter reading is  $1 \text{ GHz} \pm 5 \text{ kHz}$ .
12. Record the Frequency Counter reading in Hz to the test record in [“VNA Frequency Accuracy” on page A-2](#) of Appendix A.

## 2-3 Automated Performance Tests

The automated performance tests consists of the following:

- S-parameter Measurements Verification
- Transmission Dynamic Range Verification
- Transmission High Level Noise Verification

These tests are automated using the Site Master S820E Performance Verification Software, part number 2300-555, in conjunction with the equipment listed in [Table 2-1, “Equipment Required for Automated Tests”](#).

**Note**

The Site Master S820E Performance Verification Software should already be installed to the PC controller prior to performing the automated performance tests described in this chapter.

The software guides the user to perform a measurement calibration on the Site Master S820E using the appropriate calibration tees and then proceeds to guide the user through the steps for S-parameter Measurements Verification, Transmission Dynamic Range Verification, and Transmission High Level Noise Verification.

Pass/Fail status of the measurements is displayed on the computer. The software can also provide hardcopy (printout) of the test reports which include the measured data, the measurement uncertainties, and the Pass/Fail status.

## Test Sequence

The user can run all the automated tests in a consecutive fashion or run individual test selectively.

If all are selected, the test sequence is:

- VNA Calibration
- Airline (DAT) Measurements
- Airline (UNC) Uncertainty Computation [Pass/Fail Determination]
- Beatty Airline (DAT) Measurements
- Beatty Airline (UNC) Uncertainty Computation
- 20 dB Offset (Pad) (DAT) Measurements
- 20 dB Offset (Pad) (UNC) Uncertainty Computation
- 50 dB Offset (Pad) (DAT) Measurements
- 50 dB Offset (Pad) (UNC) Uncertainty Computation
- Transmission Dynamic Range Measurements
- Transmission High Level Noise Measurements

## Test Reports

Each test generates data report in TXT file format. The data report files can be viewed and printed either using the software built-in “Print” function or other software applications, such as NotePad or other word processors. The data report files are:

- 20DB OFFSET (UNC) #VER.TXT
- 50DB OFFSET (UNC) #VER.TXT

- AIRLINE (UNC) #VER.TXT
- BEATTY (UNC) #VER.TXT
- TRANSMISSION DYNAMIC RANGE.TXT
- TRANSMISSION HIGH LEVEL NOISE.TXT

These files can be found in the following folder on the hard drive of the PC Controller:

C:\Anritsu HH Analyzer Verification\VNA\_Reports\S820E\_xxxxxxx

[where xxxxxxx is the serial number of the S820E being tested]

## Equipment Required for Automated Tests

Table 2-1 shows the required equipment to perform the procedures in this manual.

**Table 2-1.** Equipment Required for Automated Tests (part 1 of 2)

Equipment	Critical Specification	Recommended Manufacturer/Model
Open/Short/Load (for Option 708)	Frequency: DC to 8 GHz Connector: N(m)	Anritsu Model OSLN50A-8, OSLN50A-18, TOSLN50A-8 or TOSLN50A-18
Open/Short/Load (for Option 708)	Frequency: DC to 8 GHz Connector: N(f)	Anritsu Model OSLNF50A-8, OSLNF50A-18, TOSLNF50A-8 or TOSLNF50A-18
Open/Short/Load (for Options 708 or 714)	Frequency: DC to 18 GHz Connector: N(m)	Anritsu Model OSLN50A-18 or TOSLN50A-18
Open/Short/Load (for Options 708 or 714)	Frequency: DC to 18 GHz Connector: N(f)	Anritsu Model OSLNF50A-18 or TOSLNF50A-18
Verification Kit (for Options 708 or 714)	Connector: N Type	Anritsu Model 3663-1
Adapter (for Options 708 or 714)	Frequency: DC to 18 GHz Connector: N(m) to K(m)	Anritsu Model 34NK50
Adapter (for Options 708 or 714)	Frequency: DC to 18 GHz Connector: N(m) to K(f)	Anritsu Model 34NKF50
Torque Wrench (for Options 708 or 714)	3/4 in. (0.75 in.) Open End Wrench 12 lbf·in (1.35 N·m)	Anritsu Model 01-200
Open/Short/Load (for Option 720)	Frequency: DC to 20 GHz Connector: K(m)	Anritsu Model TOSLK50A-20 or TOSLK50A-40
Open/Short/Load (for Option 720)	Frequency: DC to 20 GHz Connector: K(f)	Anritsu Model TOSLKF50A-20 or TOSLKF50A-40
Open/Short/Load (for Options 720, 730, or 740)	Frequency: DC to 40 GHz Connector: K(m)	Anritsu Model TOSLK50A-40
Open/Short/Load (for Options 720, 730, or 740)	Frequency: DC to 40 GHz Connector: K(f)	Anritsu Model TOSLKF50A-40 or 28KF50
Verification Kit (for Option 720, 730, or 740)	Connector: K Type	Anritsu Model 3668-1
Adapter (for Option 720, 730, or 740)	Frequency: DC to 40 GHz Connector: K(m) to K(f)	Anritsu Model 33KKF50B
Adapter (for Option 720, 730, or 740)	Frequency: DC to 40 GHz Connector: K(f) to K(f)	Anritsu Model 33KFKF50B

**Table 2-1.** Equipment Required for Automated Tests (part 2 of 2)

Equipment	Critical Specification	Recommended Manufacturer/Model
Torque Wrench (for Option 720, 730, or 740)	5/16 in. (0.325 in.) Open End Wrench 8 lbf·in (0.90 N·m)	Anritsu Model 01-201
RF Coaxial Cable	Frequency: DC to 40 GHz Impedance: 50 ohm Connector: K(f) to K(m)	Anritsu Model 3670K50-2
Interface Cable	USB: USB A to USB mini B Ethernet: RJ48, cross-over, Cat.5E Ethernet: RJ48, Cat.5E	Anritsu Part Number 3-2000-1498 Anritsu Part Number 3-806-152 Anritsu Part Number 2000-1371-R
Connector Wrench		Anritsu Part Number 01-204
Personal Computer	Operating System: Windows 7 Interface: Ethernet, RJ-48 Software: National Instruments VISA version 4.4.1 or later	Any
System Verification Software		Anritsu Part Number 2300-555

### S-parameter Measurements Verification Test

This test verifies S-parameter measurement capabilities of the Site Master S820E, calibration tees, test port cable, and any required adapters as a system by analyzing the measurement of artifacts that are traceable to national standards laboratories.

The 2300-555 Performance Verification software guides you to perform a measurement calibration on the Site Master S820E by using the appropriate calibration tees, to measure the S-parameters of the impedance transfer standards in the verification kit, and to verify that the measured values are within the specified measurement uncertainty limits.

The impedance transfer standards that are contained in the Anritsu 3663-1 (N connector) or 3668-1 (K connector) verification kit are:

- 50 ohm Air Line Standard
- 25 ohm Mismatch (Beatty) Standard
- 20 dB Attenuation Standard
- 50 dB Attenuation Standard

The devices in the verification kit are selected based on their ability to stress the envelope of possible measurement parameters while still providing a very stable and repeatable behavior. The key attribute of the devices is that of long term stability.

The quality of the verification result is dependent on the degree of care taken by the user in maintaining, calibrating, and using the system. The most critical factors are:

- The stability and quality of the devices in the calibration tee and the verification kit.
- The condition of the VNA test port connectors and test port cables.
- The pin depths of all connectors.
- The proper torquing of connections.

**Caution** The use of non-Anritsu calibration tees or verification kits is not supported.

## Special Precautions

When performing the procedures, observe the following precautions:

- Minimize vibration and movement of the system, attached components, and test cable.
- Clean and check the pin depth and condition of all adapters, test port cables, calibration components, and impedance transfer standards.
- Pre-shape the test cable so as to minimize its movement during calibration and measurement activities.

## If Verification Fails

If the verification fails, then check the quality, cleanliness, and installation methods for the calibration and verification components. Specifically, check:

- The VNA test port connectors
- The calibration tee
- The impedance transfer standards
- The test port cables, for damage and cleanliness
- The test port cables, for proper connection and torquing
- The test port cables, for phase stability

These are the most common causes for verification failures.

## Transmission Dynamic Range Verification

This test verifies the transmission dynamic range performance of the VNA receiver in the Site Master S820E. It is performed with loads connected to Port 1 and the open end of the through cable from Port 2 after a measurement calibration has been performed.

## Transmission High Level Noise Verification

This test verifies the high level noise (trace noise) performance of the VNA receiver in the Site Master S820E. This is a measure of the scatter of data when measuring a high level signal (transmission through a short transmission line). The test is performed with the through cable from Port 2 connected to Port 1 after a measurement calibration has been performed.

## Automated Test Procedure

1. Turn on power to the PC controller and the Site Master S820E.
2. Use a USB A to USB Mini B cable to connect the mini USB port of the S820E to the USB port of the PC Controller..

**Note**

Alternatively, use a Cat5-E Ethernet cable to connect the Site Master to a Local Area Network port that is close to the PC controller. Or use a Cat5-E Ethernet Crossover cable to connect the Site Master directly to the PC Controller Ethernet port. Refer to the S820E User Guide, PN 10580-00343, for setup procedures.

3. For units with female N connector test ports:
  - a. Install the 34NK50 and 34NKF50 Adapters to the 3670K50-2 Through Cable. Use torque wrench to tighten the K connectors to insure that the connections do not work themselves loose during the test.
  - b. Install the Through Cable with the Adapter to Port 2 of the Site Master.
4. For units with male K connector test ports:
  - a. Install the 3670K50-2 Through Cable to Port 2 of the Site Master.

- b. Install the 33KK50B Adapter to the open end of the cable.
- c. Install the 33KFKF50B Adapter to Port 1 of the Site Master.
- 5. Run the Site Master Verification software on the PC and select **Verify System**.
- 6. Verify that the PC controller is communicating with the Site Master.
- 7. Insert the USB flash drive that is supplied with the verification kit to an available USB port on the PC controller. Set the data location of the verification software to the USB flash drive when prompted.
- 8. Follow the directions that are displayed on the computer to perform calibration with the appropriate calibration kit.

**Caution** Use an appropriate torque wrench to insure proper connection of calibration devices during calibration and prior to starting verification measurements.

- 9. Follow the directions on the computer to perform measurements of the four impedance transfer standards of the appropriate verification kit.
- 10. Follow the directions on the computer to perform the transmission dynamic range measurements.
- 11. Follow the directions on the computer to perform the transmission high level noise measurements.
- 12. After all tests have been completed, print the test results and attach the printouts to the test record in [Appendix A, "S820E Site Master Test Record"](#).

## 2-4 SC8268 Verification Procedure

This test procedure is used to verify the functionality and SWR of the SC8268 USB Transmission Sensor.

### Equipment Required

- VNA Calibration Kit, Anritsu Model 3652A-1
- VNA, Anritsu Model MS4644B
- Microwave Site Master, Anritsu Model S820E

### Procedure

1. Set the S820E to Cable and Antenna Analyzer Advanced Mode and then perform a Preset.
2. From the **Measurements > Advanced** menu, select **Transmission (Ext. Sensor)**.
3. Insert the USB cable of the SC8268 into one of the two USB connectors on the S820E and:
  - a. Confirm that the message at the bottom of the screen is removed a few seconds after connecting the SC8268: "Transmission (Ext. Sensor) measurement requires supported USB sensor"
  - b. Confirm that the message at the top of the screen changes from: "Transmission (Ext. Sensor)" to "Transmission (Ext. Sensor:SC8268)"
4. Perform a **TRES** calibration:
  - a. Change the Cal Type within the Cal Setup menu, from: "Full Reflection - Port 1" to "TRES: Transmission - Fwd Path (Ext. Sensor)"
  - b. Exit Cal Setup and perform the TRES calibration.
  - c. Confirm there are no errors, and the trace is near 0 dB across the frequency range when the transmission sensor is still connected to Port 1.
5. Set the MS4644B start frequency to 10 MHz and stop frequency to 40 GHz.
6. Set the MS4644B number (#) of points to 4000.



7. Using the MS4644B calibration kit, perform a 1-Port Calibration with Sliding Load on the MS4644B.
8. Set the MS4644B trace format to SWR.
9. Set the MS4644B Reference Value to 1U.
10. Set the MS4644B Scale to 0.2U per division.
11. Connect the SC8268 to port 1 of the MS4644B.
12. Set the MS4644B Start and Stop frequencies to the values shown in [Table A-2, “SC8268 SWR Verification” on page A-2](#) and, using a marker peak search, record the peak value for each frequency range.



# Chapter 3 — Battery Information

## 3-1 Introduction

This chapter describes battery information for Site Master Model S820E.

**Note**

Some of the procedures in this section are generic, and apply to many similar instruments. Photos and illustrations are representative and may show instruments other than the S820E.

## 3-2 Battery Pack Removal and Replacement

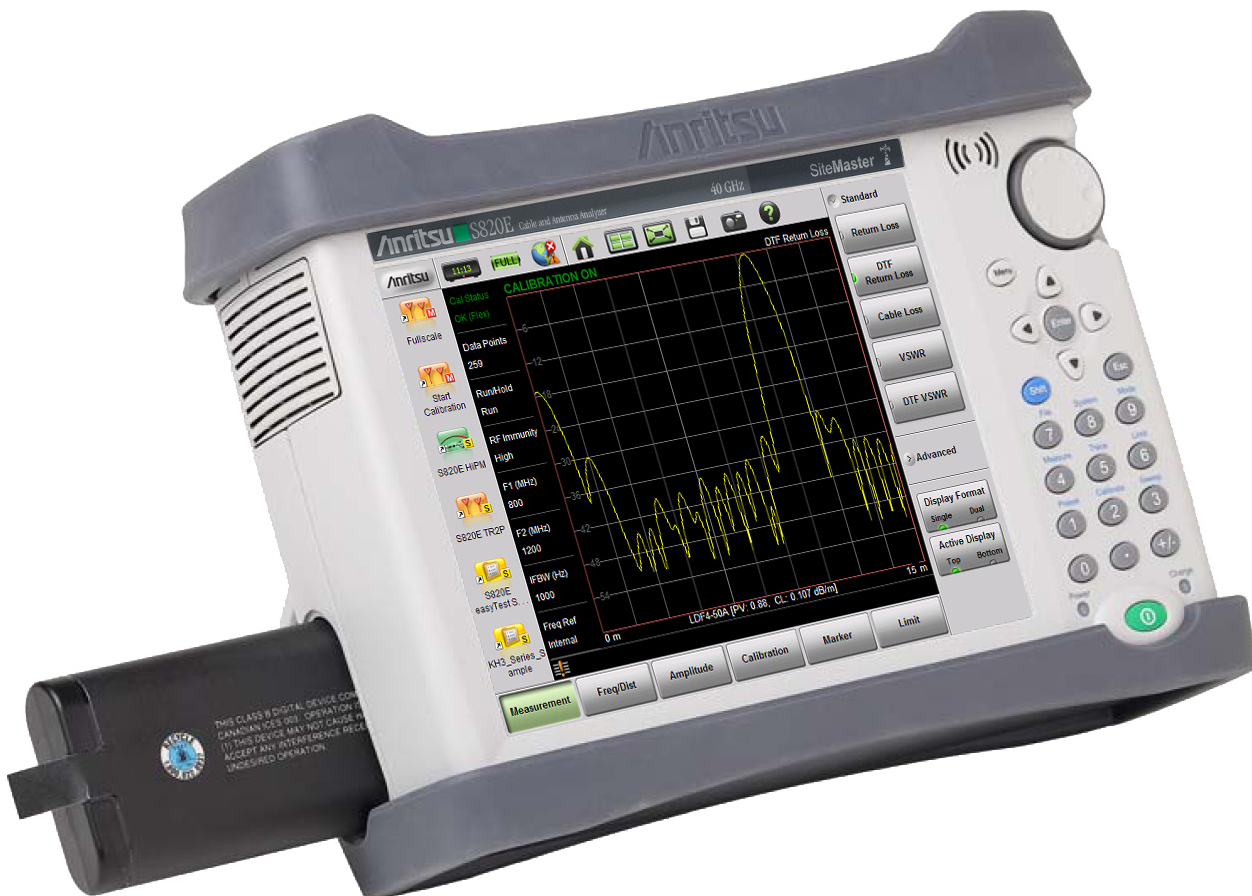
This section provides instructions for the removing and replacing the battery pack.

1. With the instrument standing upright on its base and standing on a stable surface, locate the battery access door, as illustrated in [Figure 3-1](#).

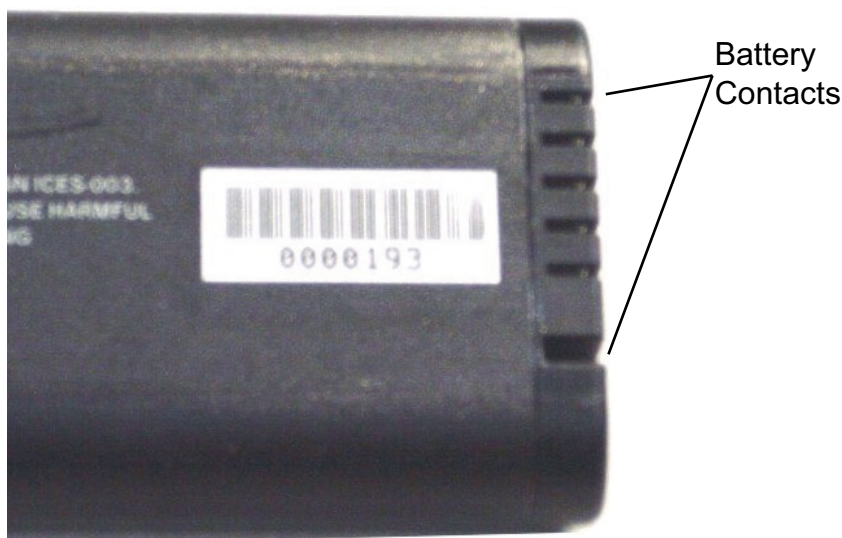


**Figure 3-1.** Battery Access Door

2. Place a finger on the actuator in the recess at the top of the battery access door and press downward toward the bottom of the instrument and also outward. The door must be moved against spring pressure in order to release the upper catch.
3. Remove the battery access door.
4. With the battery access door completely removed, grasp the flexible handle of the battery and pull the battery straight out of the instrument (refer to [Figure 3-2](#)).
5. Replacement is the opposite of removal. Note the orientation of the battery contacts (refer to [Figure 3-3 on page 3-3](#)), and be sure to insert the new battery with the contacts facing the bottom of the instrument.



**Figure 3-2.** Battery Insertion and Removal



**Figure 3-3.** Battery Contacts

## Battery Pack Information

The following information relates to the care and handling of the Anritsu 633-75 battery pack and Lithium-Ion batteries in general.

- The 633-75 battery pack that is supplied with your instrument may need charging before use. Before using the Site Master, the internal battery may be charged in the Site Master, using either the AC-DC Adapter (40-187-R) or the 12 Volt DC adapter (806-141), or may be charged separately in the optional Dual Battery Charger (2000-1374).
- Use only Anritsu approved battery packs. Some non-approved battery packs will fit into the Site Master, but are electrically incompatible and will not charge correctly.
- Recharge the battery only in the Site Master or in an Anritsu approved charger.
- When the Site Master or the charger is not in use, disconnect it from the power source.
- Do not charge batteries for longer than 24 hours. Overcharging may shorten battery life.
- If left unused, a fully charged battery will discharge itself over time.
- Temperature extremes affect the ability of the battery to charge. Allow the battery to cool down or warm up as necessary before use or charging.
- Discharge the battery from time to time in order to improve battery performance and battery life.
- The battery can be charged and discharged hundreds of times, but it will eventually wear out.
- The battery may need to be replaced when the operating time between chargings becomes noticeably shorter than normal.
- Never use a damaged or worn out charger or battery.
- Storing the battery in extremely hot or cold places will reduce the capacity and lifetime of the battery.
- Never short-circuit the battery terminals.
- Do not drop, mutilate, or attempt to disassemble the battery.
- Do not dispose of batteries in a fire!
- Batteries must be recycled or disposed of properly. Do not place batteries in household garbage.
- Always use the battery for its intended purpose only.



# Chapter 4 — Assembly Removal and Replacement

## 4-1 Introduction

This chapter describes the removal and replacement procedures for the various assemblies. Illustrations (drawings or photographs) in this manual may differ slightly from the instrument that you are servicing, but the basic removal and replacement functions will remain as specified. The illustrations are meant to provide assistance with identifying parts and their locations.

## 4-2 Electrostatic Discharge Prevention

An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 is mandatory to avoid ESD damage when handling subassemblies or components found in the S820E Microwave Site Master.

<b>Warning</b>	All electronic devices, components, and instruments can be damaged by electrostatic discharge. It is important to take preventative measures to protect the instrument and its internal subassemblies from electrostatic discharge.
----------------	---

## 4-3 Real Time Clock (RTC) Battery

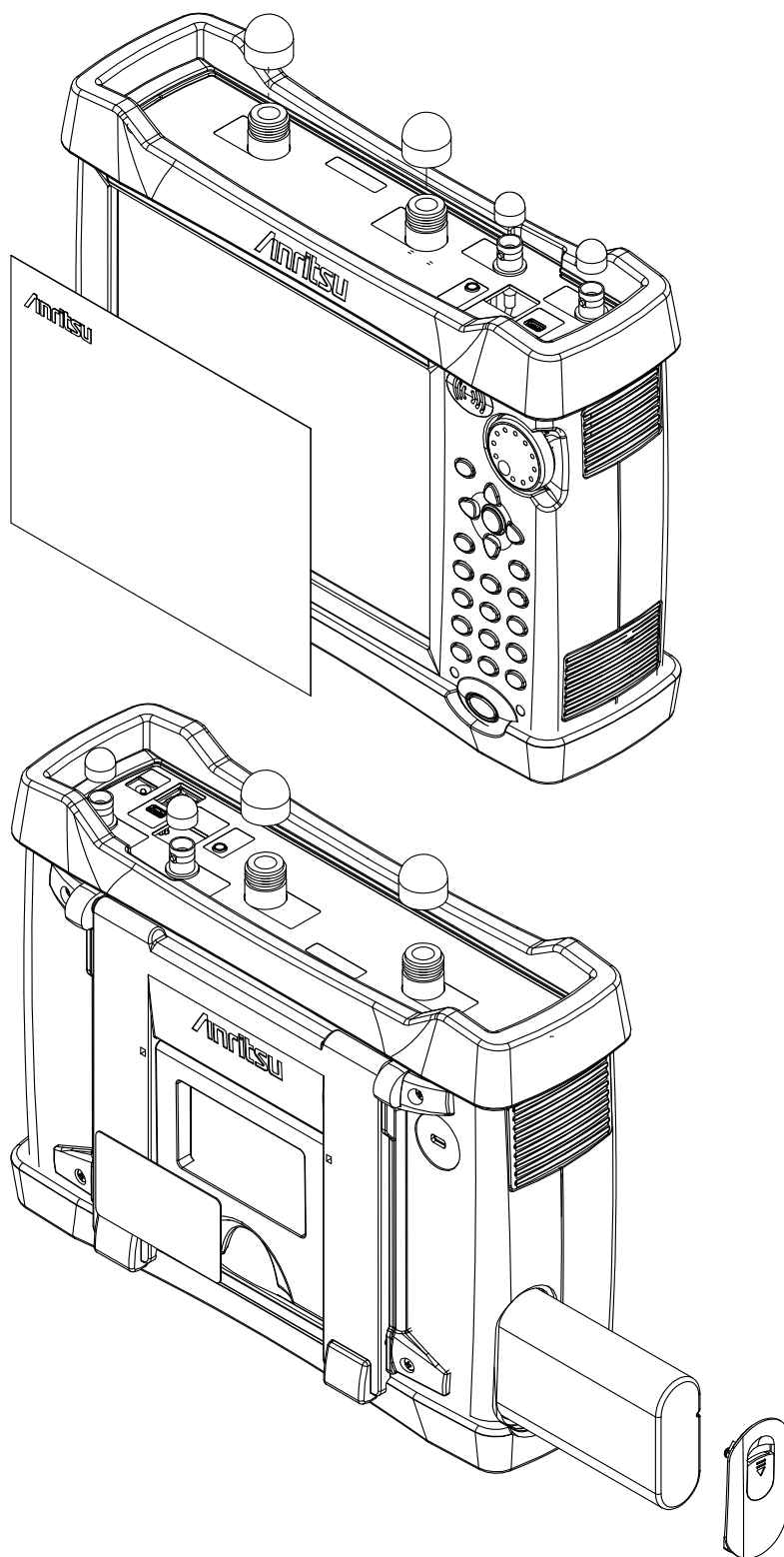
<b>Note</b>	The Real Time Clock (RTC) battery is not field replaceable. The instrument must be returned to the factory for service.
-------------	---

## 4-4 Replaceable Parts, Assemblies, and Accessories

To ensure that the correct options are provided on the replacement assembly when ordering a Main PCB Assembly, all options that are installed on your instrument must be declared on the order. The installed options are listed on a label on the top of the S820E and can also be viewed in the System/Status display. For a list of replaceable parts, refer to [Table 1-3, “Replaceable Parts and Assemblies” on page 1-5](#).

## 4-5 Instrument Case for Site Master S820E

Front and Back .

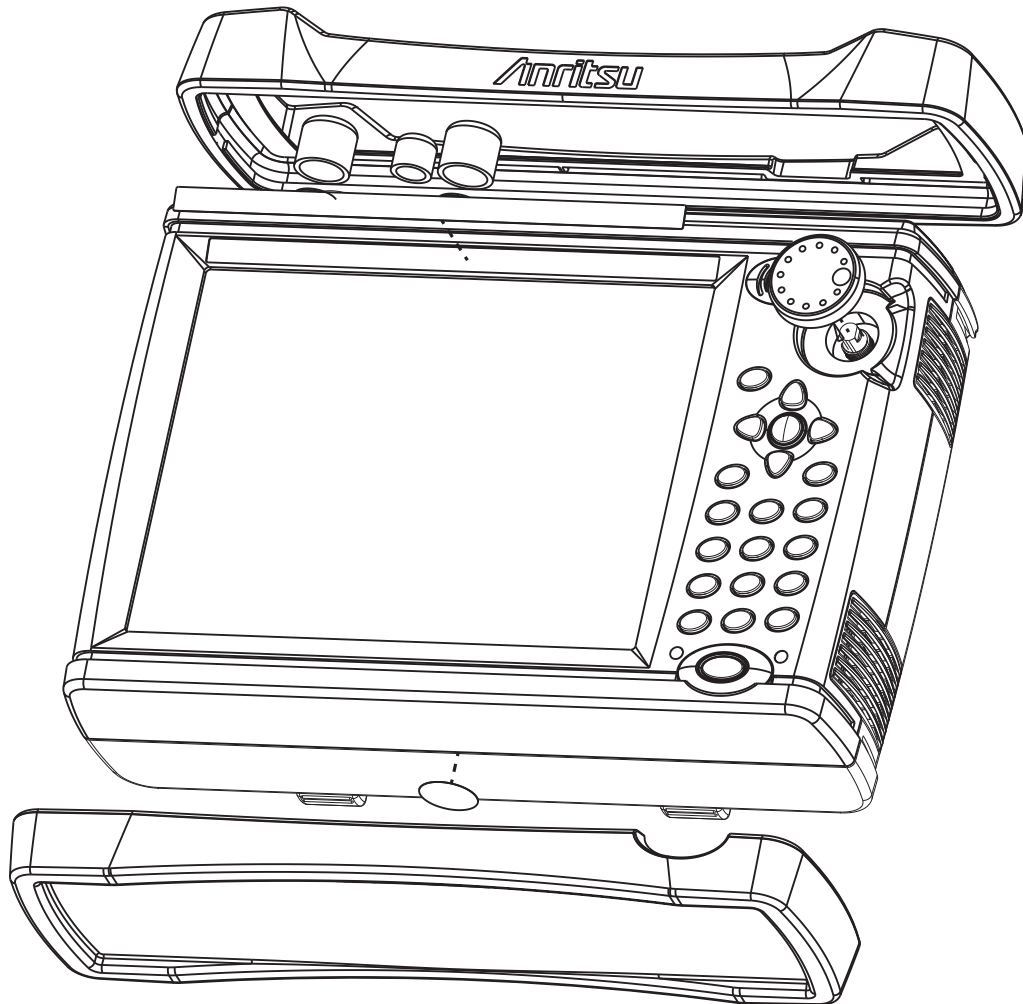


**Figure 4-1.** Case Front and Rear



## Case Outer Components

---

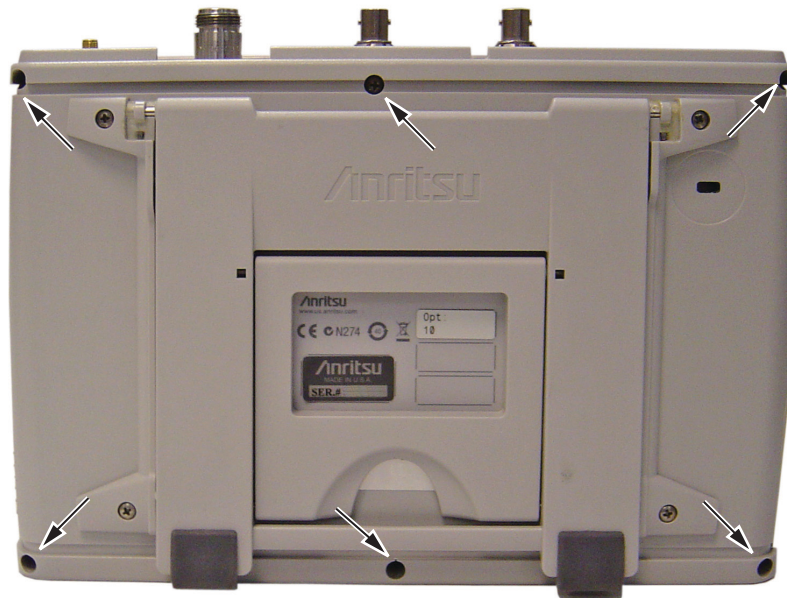


**Figure 4-2.** Case and Bumpers

## Opening the Case

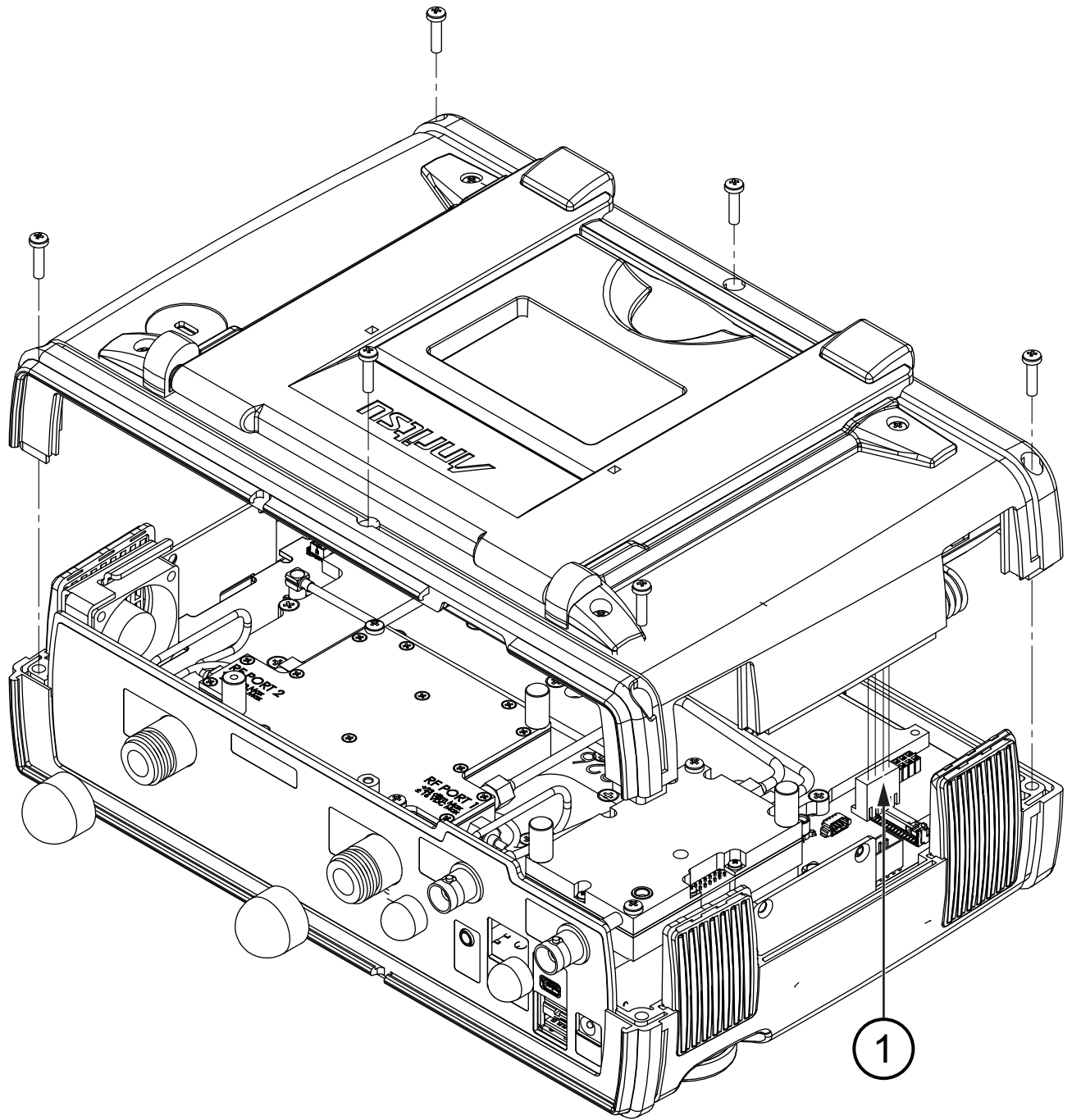
The bumpers are removed to expose the six screws that secure the front and back case when closed.

---



---

**Figure 4-3.** Location of Six Screws that Secure Case Back to Case Front

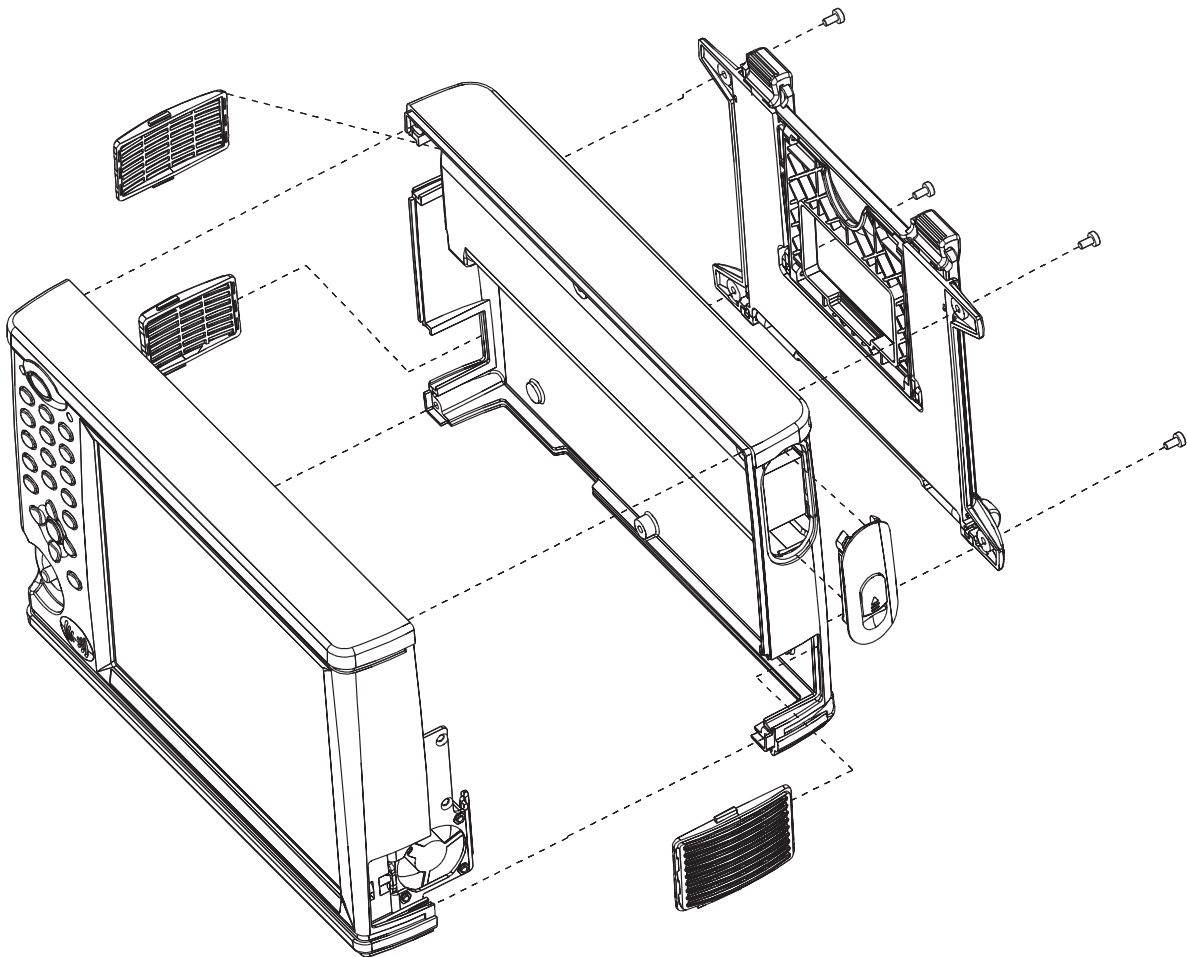


1. The battery connection to the Main PCB

**Figure 4-4.** Opening the Case, Removing the Back

The case back is held by 6 screws, as shown in [Figure 4-4](#). When the back case is clear of all parts in the front case, the back is folded open to allow disconnecting the battery cable (item [1](#)).

## Basic Case Parts

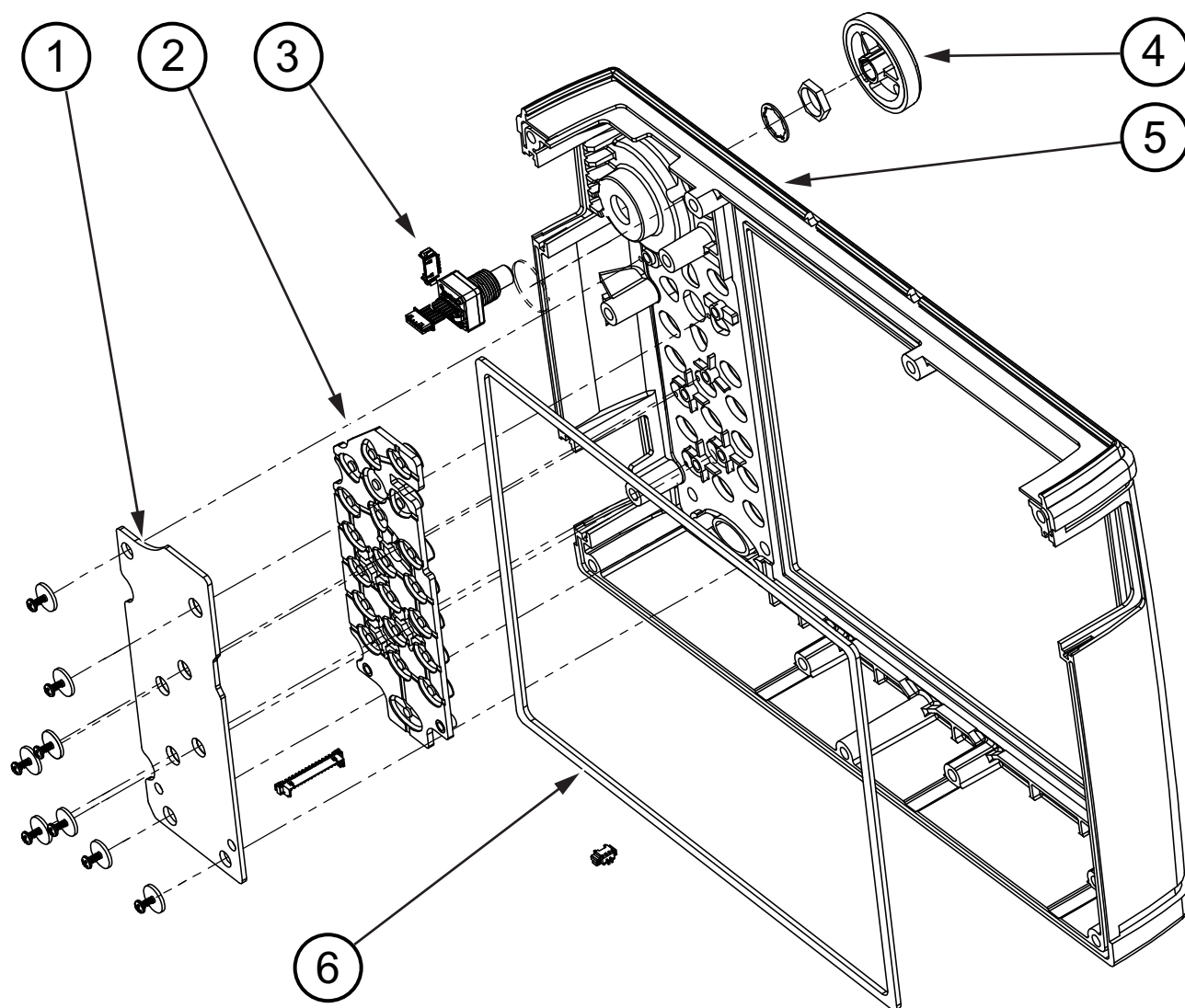


**Figure 4-5.** Perspective View of Case Parts (Case bottom is Facing Upward)

The Case Front includes the Keypad, Touch Screen, LCD, and Fan.

The Case Back includes the Battery Compartment and its Door and the Tilt Bail.

## Front Panel Components

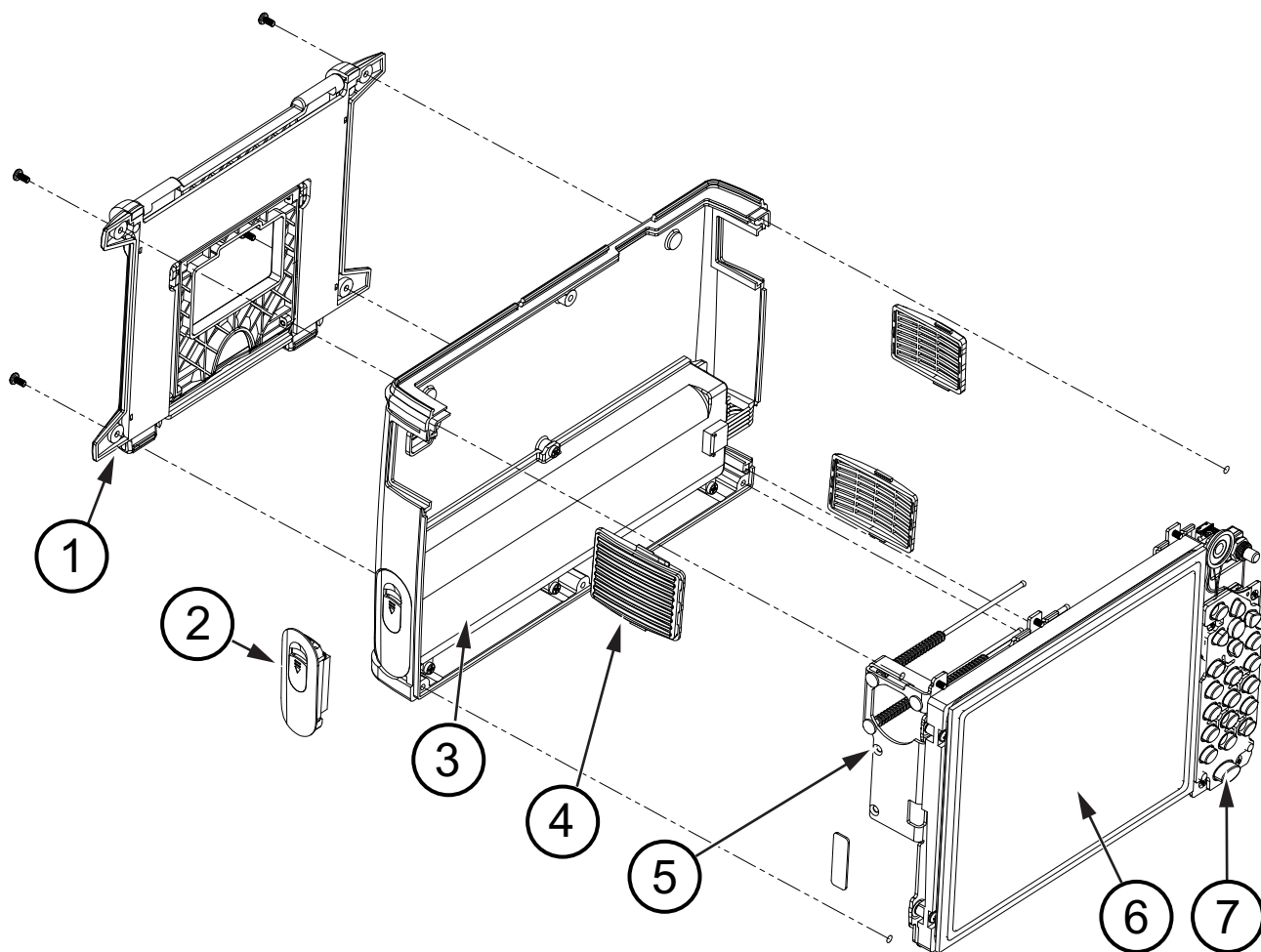


**Figure 4-6.** Front Panel Components

1.	Keypad PCB
2.	Keypad Rubber Membrane
3.	Rotary Encoder
4.	Knob for Rotary Encoder
5.	Case Bezel
6.	Gasket (between touchscreen and case bezel)

## Back Panel Components

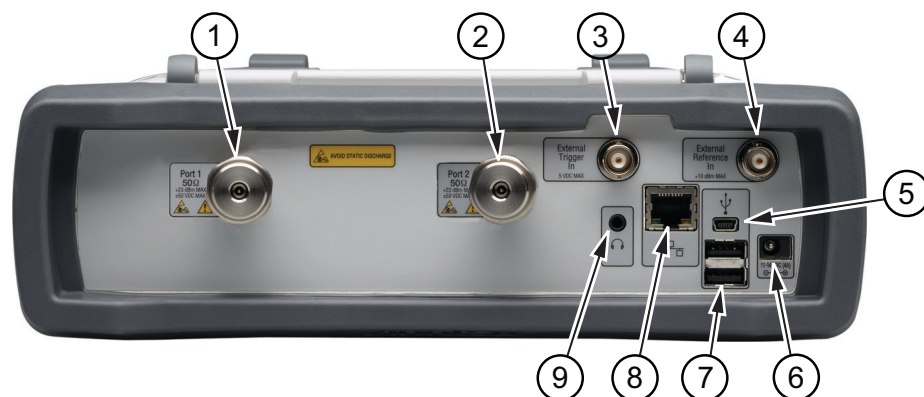
The fan, touch screen, and keypad are front case components.



**Figure 4-7.** Back Panel Components

1.	Tilt Bail
2.	Door to Battery Compartment
3.	Battery Location
4.	Ventilation Grill for Fan Inlet
5.	Fan Location
6.	Touchscreen
7.	Keypad

## 4-6 Test Panel Connectors



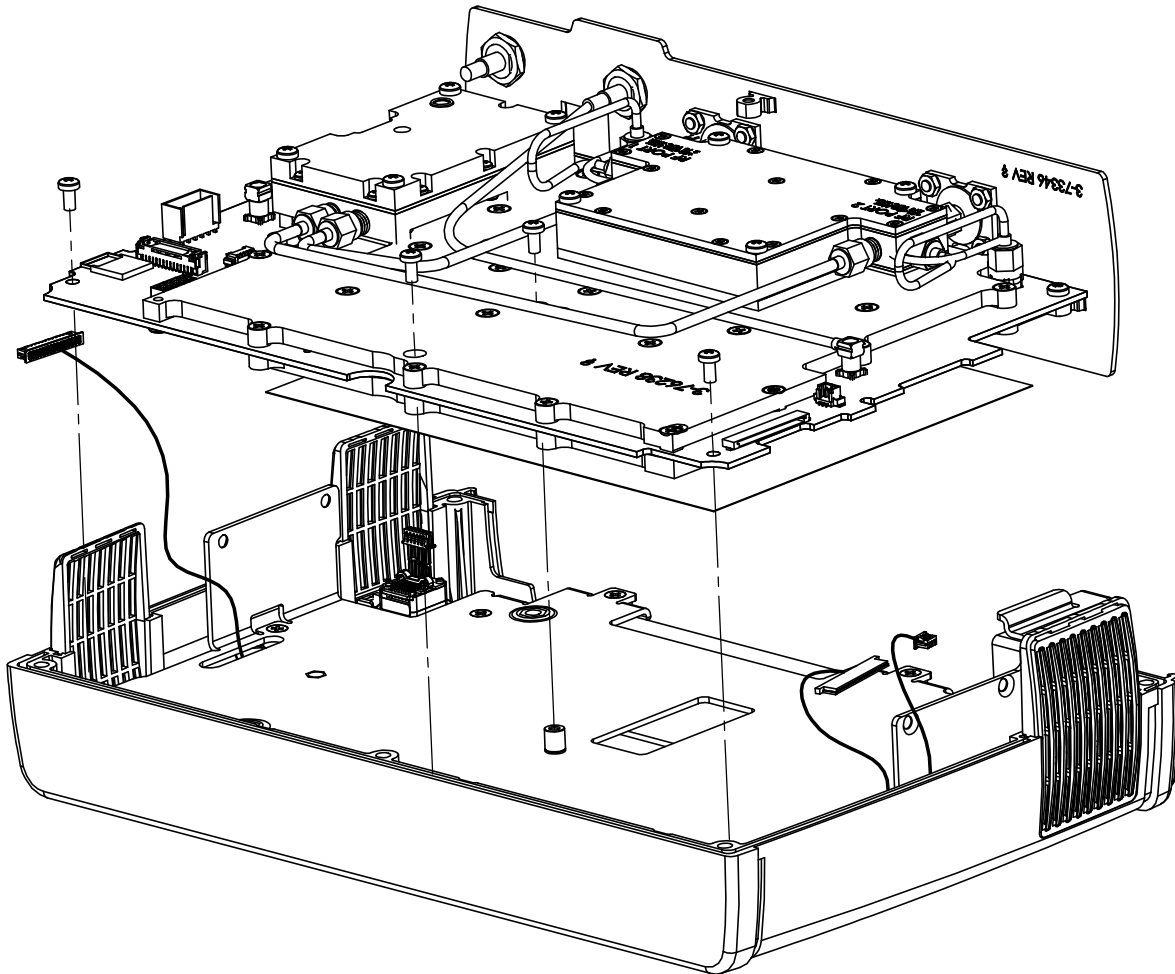
1.	Port 1, Type N, Female (Options 0708, 0714) or Ruggedized K, Male (Options 0720, 0730, 0740) 50 ohm impedance. Maximum input is +23 dBm at $\pm 50$ VDC. Torque to 12 lbf·in or 1.4 N·m (N connector) or to 8 lbf·in or 0.90 N·m (K connector).
2.	Port 2, Type N, Female (Options 0708, 0714) or Ruggedized K, Male (Options 0720, 0730, 0740) 50 ohm impedance. Maximum input is +23 dBm at $\pm 50$ VDC. Torque to 12 lbf·in or 1.4 N·m (N connector) or to 8 lbf·in or 0.90 N·m (K connector).
3.	External Trigger In, Type BNC(f), 50 ohm This function is currently not enabled, but it will be enabled via a future firmware update. Maximum input is +5 VDC.
4.	External Reference In, Type BNC(f), 50 ohm Auto-detects a 10 MHz external reference. When active the Measurement Setting for Freq Ref will display "External". Maximum input is +10 dBm.
5.	USB Interface – Type Mini-B (version 2.0) The USB 2.0 Mini-B connector can be used to connect the Site Master directly to a PC.
6.	External Power, 5.5 mm Barrel Connector The external power connector is used to power the instrument and for battery charging. Input is 11 VDC to 14 VDC at up to 4.0 A. When using the AC-DC Adapter, always use a grounded three-wire power cable that is connected to a three-wire power line outlet. Failure to use properly grounded electrical equipment may result in severe or potentially fatal injury.
7.	USB Interface – Type A (version 2.0) The Site Master has two Type A USB 2.0 connectors that accept USB Flash Memory devices for storing or transferring measurements, setups, and screen shots. USB sensors that are used for 2-port cable loss measurements and high accuracy power meter measurements and certain USB peripheral devices (such as a USB GPS module, USB mouse, or USB keyboard) may also be supported.
8.	RJ45 connector (10/100 Ethernet) Used to connect the Site Master to a local area network. When the instrument is connected to a network, the instrument will obtain an IP address via DHCP.
9.	Headset Jack The jack accepts a 3.5 mm 3-wire miniature phone plug such as those commonly used with cellular telephones. The speaker output is diverted to the headphone when the headphone is plugged into this jack.

**Figure 4-8.** S820E Test Panel Connectors



## 4-7 Internal Anatomy of the Site Master S820E

### Case Assembly Components with Complete PCB

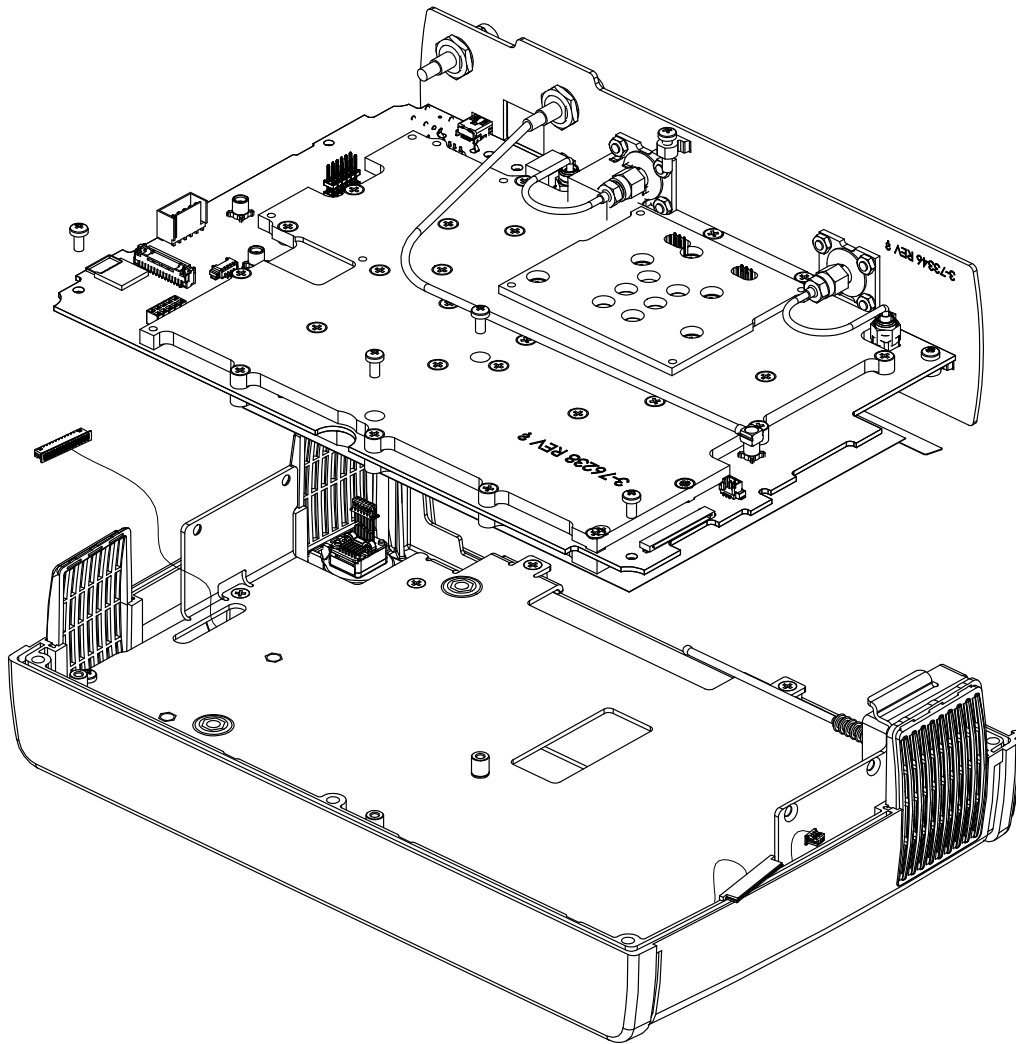


**Figure 4-9.** Case Assembly Components with Case Back Removed – Complete PCB

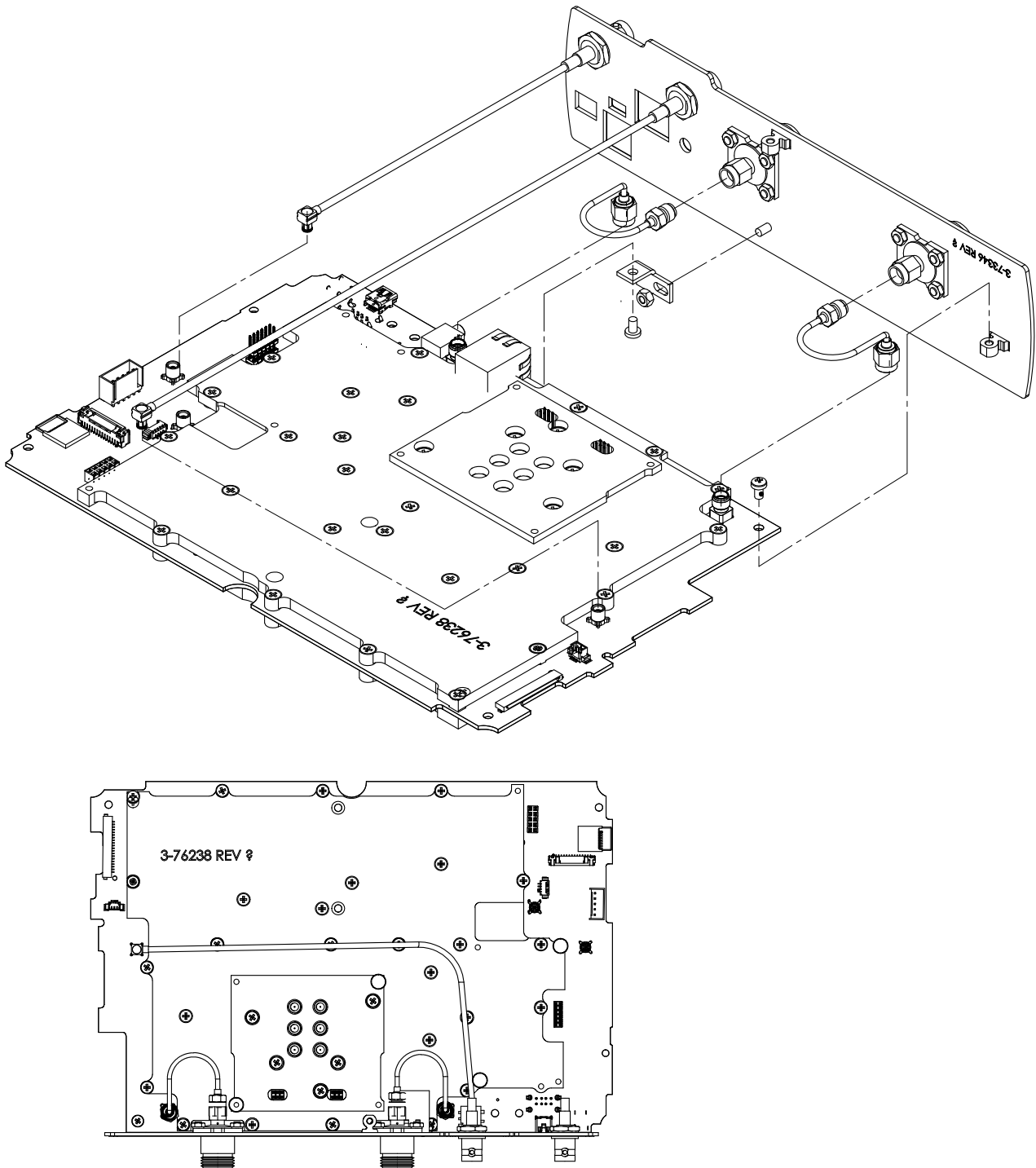


## Case Assembly Components with Motherboard PCB

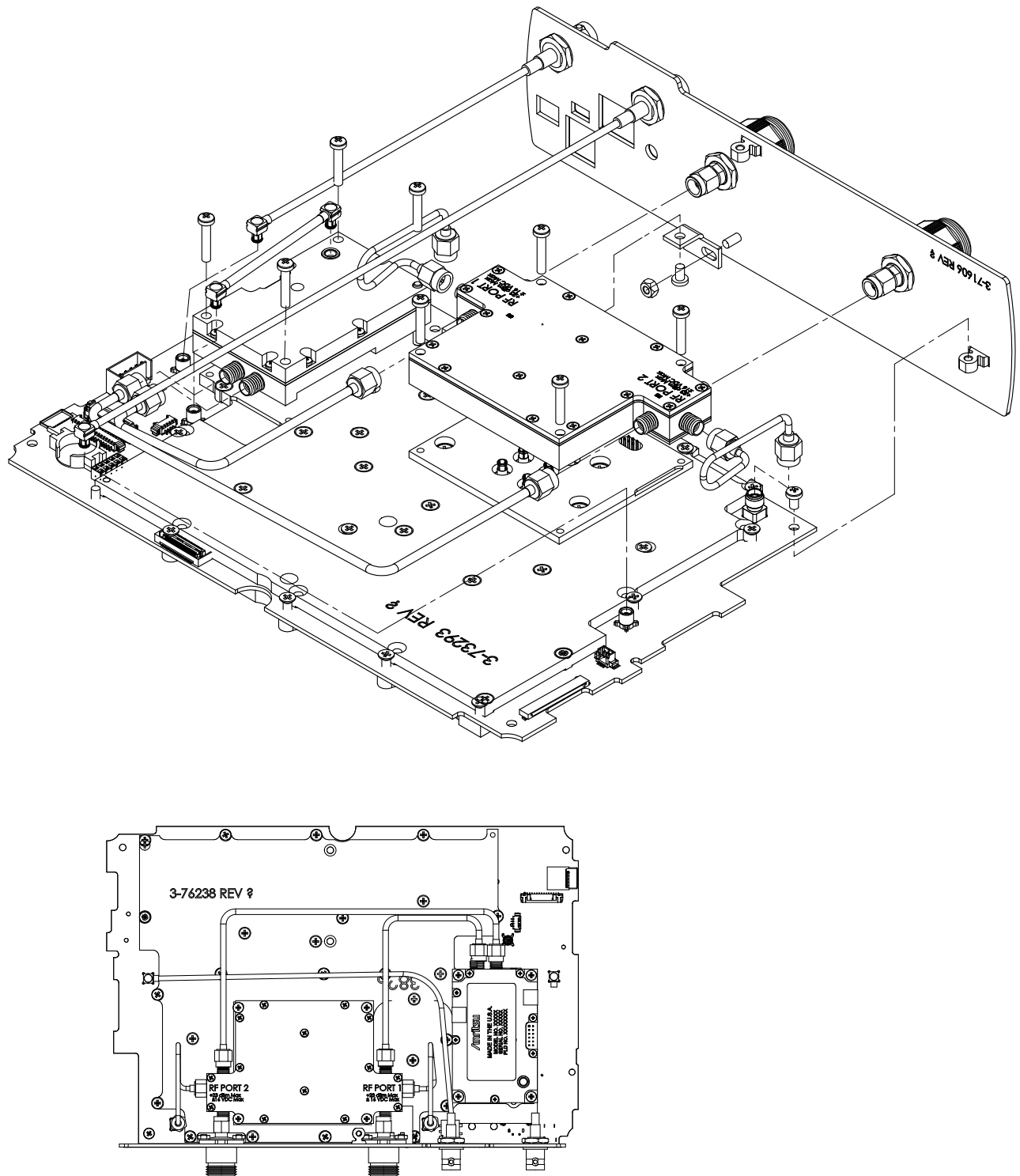
### Motherboard and Connector Panel



**Figure 4-10.** Case Assembly Components with Case Back Removed – 8 GHz Motherboard PCB

**Motherboard and Connector Panel for Option S820E-0708****Figure 4-11.** Main PCB and Connector Panel for 8 GHz Option

## Motherboard and Connector Panel for Higher Frequency Options



**Figure 4-12.** Main PCB and Connector Panel (all except 8 GHz option)

## 4-8 Disassembly Sequence Overview

Except for replacing the rotary knob, bumpers, battery door, and tilt bail, the case must be opened for all maintenance operations. Part numbers for all replaceable parts are found in [Table 1-3, “Replaceable Parts and Assemblies” on page 1-5](#).

**Caution**

Only qualified personnel should open the case and replace internal assemblies. Assemblies that are shown in the replaceable parts list are typically the only items that may be replaced.

Because they are highly fragile, items that must be soldered may not be replaced without specialized training.

Removing RF shields from PC boards, or adjusting screws on or near the shields may detune sensitive RF circuits and will result in degraded instrument performance.

All work must be performed in a static-safe work area.

**Note**

Before opening the case, Anritsu Company strongly recommends that all internally-saved files be saved to a PC, or that they be copied to an external USB flash drive. In the event that the Main/VNA PCB needs to be replaced, this recommended action will prevent permanent loss of these files.

## Removal and Replacement Instructions

The removal and replacement instructions are described in the following sections:

- [Section 4-9 “Replacements That Do Not Require Opening the Case” on page 4-15](#)
- [Section 4-10 “Opening the Instrument Case” on page 4-17](#)
- [Section 4-11 “Closing the Case” on page 4-22](#)
- [Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23](#)
- [Section 4-14 “Connector Panel Removal” on page 4-27](#)
- [Section 4-16 “Port Connector Removal” on page 4-31](#)
- [Section 4-18 “Microwave Module Removal” on page 4-34](#)
- [Section 4-20 “Dual Sampler Assembly Removal” on page 4-36](#)
- [Section 4-22 “Fan Assembly Removal” on page 4-38](#)
- [Section 4-24 “LCD Assembly Removal” on page 4-42](#)
- [Section 4-26 “Keypad PCB Removal” on page 4-46](#)
- [Section 4-28 “Touch Screen Removal” on page 4-49](#)
- [Section 4-30 “Rotary Encoder Removal” on page 4-51](#)
- [Section 4-32 “Speaker Removal” on page 4-52](#)

## 4-9 Replacements That Do Not Require Opening the Case

This section provides instructions for replacing parts without opening the Site Master case. The part numbers are listed in [Table 1-3, “Replaceable Parts and Assemblies” on page 1-5](#).

### Removing the Bumpers

Remove the top and bottom bumpers ([Figure 4-13](#)) to expose the screw holes on the back case of the instrument ([Figure 4-3 on page 4-4](#)). Pull on a corner of each rubber bumper to stretch and disengage the rubber from the case.



**Figure 4-13.** Remove the Bumpers

### Removing the Battery Door and Battery

Removal of the battery door and battery are described in [Section 3-2 “Battery Pack Removal and Replacement” on page 3-1](#).

## Removing and Replacing the Rotary Knob

This procedure covers removing and replacing the Rotary Knob. The case does not need to be opened for this procedure. Note that this part does not include the Rotary Encoder. To replace the Rotary Encoder, refer to [Section 4-30 “Rotary Encoder Removal”](#) on page 4-51.

1. Use a medium flat blade screwdriver and a small protective piece of rubber (as a fulcrum) to remove the Rotary Knob.
2. Position the rubber piece next to the knob, and slide in the screwdriver between the knob and the case.
3. Gentle lever the knob up and off of its mounting shaft.
4. Position the replacement knob over the shaft and press into place. No specific orientation is required for the knob.

## Removing and Replacing the Tilt Bail

Four screws secure the tilt bail to the back (bottom) case of the Site Master. Remove these four screws to separate the tilt bail from the bottom case. When replacing the tilt bail, tighten these screws to 6.2 lbf in (0.70 N · m).



**Figure 4-14.** Remove the Four Screws to Replace the Tilt Bail

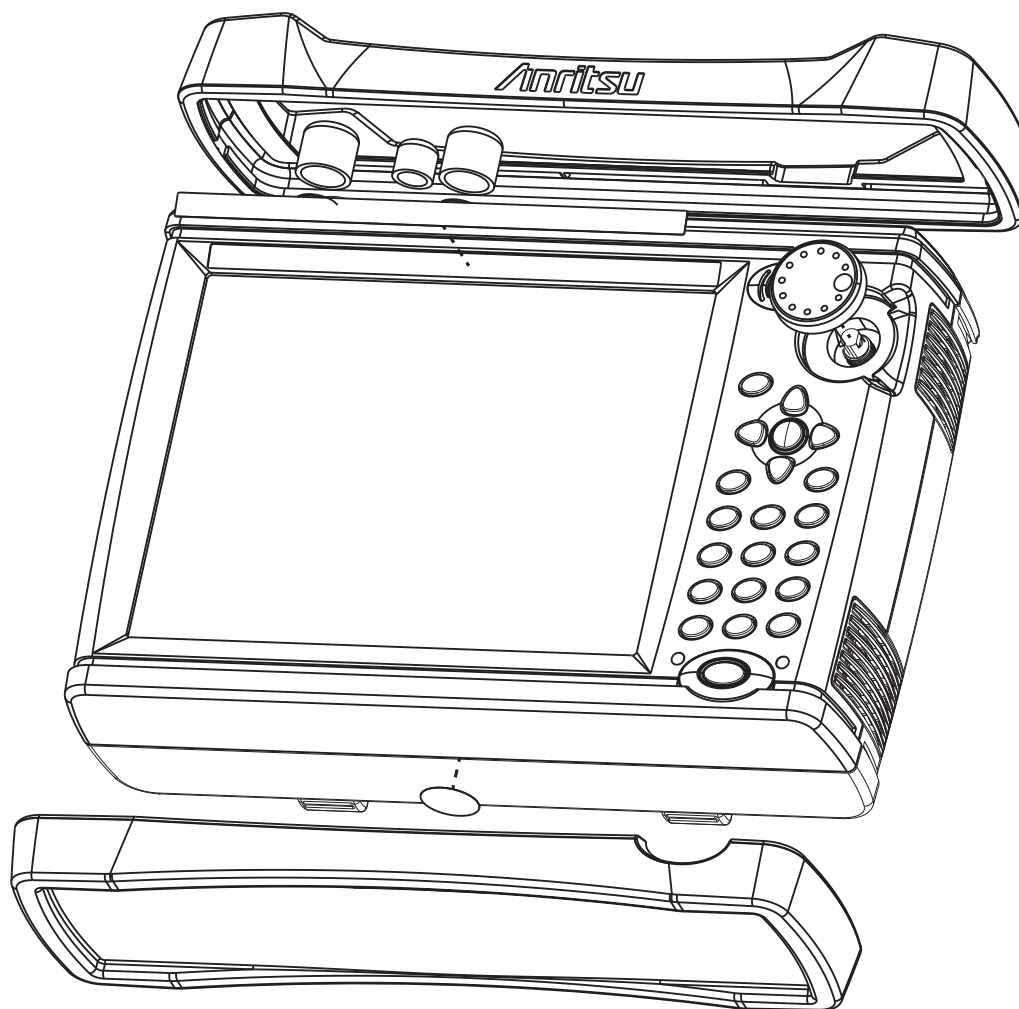
## 4-10 Opening the Instrument Case

This procedure provides instructions for opening the Site Master case. With the case opened, the internal assemblies can be removed and replaced, as described in the rest of this chapter.

<b>Caution</b>	Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument.
	Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.
	The Site Master contains components that can be easily damaged by electrostatic discharge (ESD). An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 are mandatory to avoid ESD damage when handling sub-assemblies or components that are found in these instruments.

### Procedure

1. Remove the battery door and battery as shown in [Section 3-2 “Battery Pack Removal and Replacement” on page 3-1](#).
2. Remove the top and bottom bumpers ([Figure 4-15 on page 4-18](#)) to expose the screw holes on the back of the unit. Pull on a corner of each rubber bumper to stretch and disengage the rubber from the case.

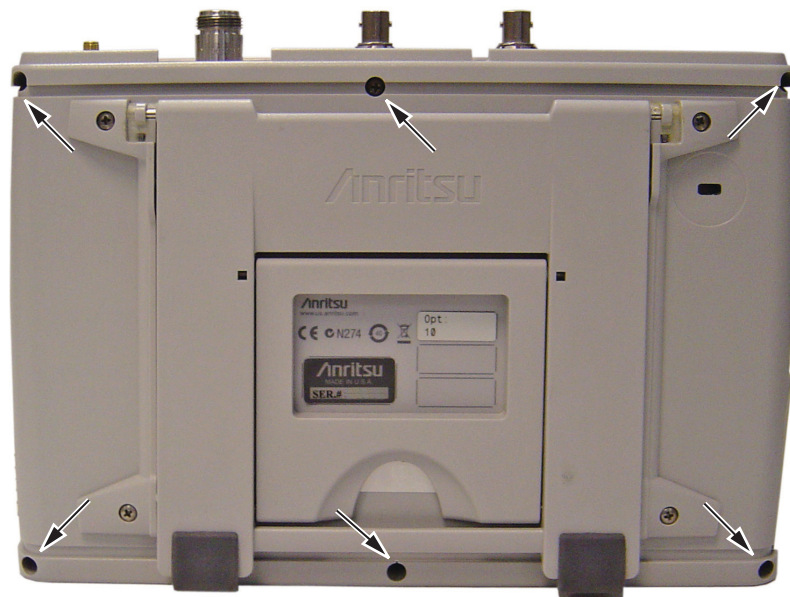


**Figure 4-15.** Removal of Bumpers and Rotary Knob

3. Place the Site Master face down on a stable work surface that will not scratch the display.



4. Use a Phillips screwdriver to remove the six screws securing the two halves of the case together. The instrument that is shown in [Figure 4-16](#) is not a Site Master, but the case is the same.



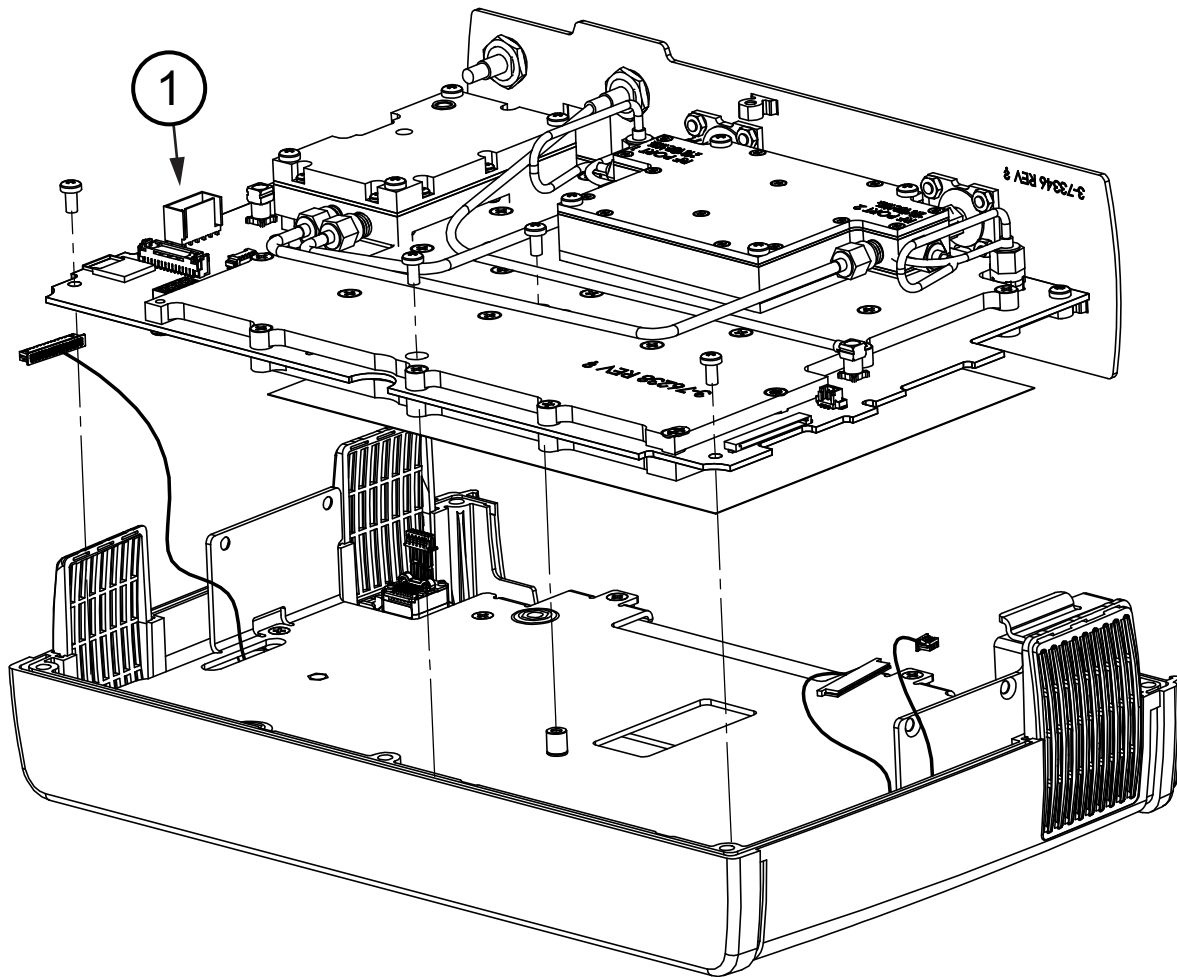
**Figure 4-16.** Remove the Six Screws

5. As you begin to separate the two halves of the case, carefully lift up a small amount first on the right side of the case (as viewed from the back – in other words, the side opposite the keypad when viewed from the front).

Then lift the entire case back (bottom) away from the case front just far enough to clear the internal parts and the vent grills.

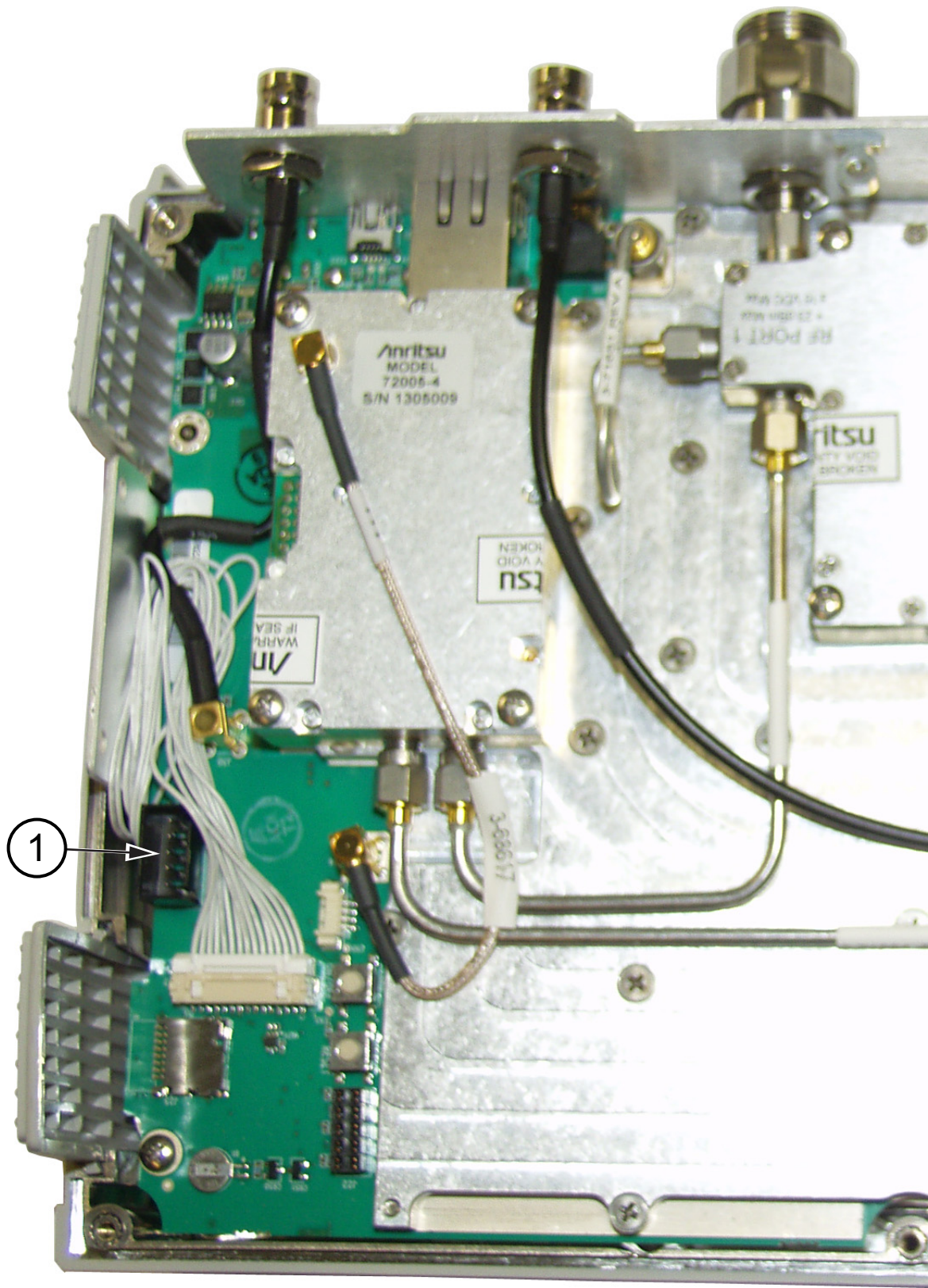
Then open the case as if opening a book, laying the back to the left, hinging the two case halves on the one cable (battery power) that links the two case halves together. Take care to avoid damage to the cable or its connector.

6. With the Site Master back case laying flat beside the front case, remove the battery cable connector (item 1 in [Figure 4-17](#) and [Figure 4-18](#)) from the Mother Board. The two halves of the case may then be separated.



1. Battery Connector

**Figure 4-17.** Battery Connector on Motherboard



1. Battery Connector

**Figure 4-18.** Battery Connector on Motherboard

## 4-11 Closing the Case

Closing the case is the reverse of opening.

1. With the Case Front Assembly face down on a clean, stable work surface that will not scratch the front panel, place the Case Back Assembly beside the case front assembly, as when opening the case (refer to [Step 5 on page 4-19](#) in “Opening the Instrument Case”).
2. Connect the battery cable to the Mother board and close the case (see [Figure 4-18 on page 4-21](#) and [Figure 4-4 on page 4-5](#)). Tuck excess battery cable behind the battery connector as you fold the case back assembly over the case front assembly, taking care to align the top connector panel into the case grooves, and to align the 3 vents with grooves in the case halves. Ensure that the battery cable is not pinched by the case.
3. Use a Phillips screwdriver to replace the six (6) Pan Head Phillips-head screws that secure the two case halves together. Torque these 6 screws to 6.2 lbf · in (0.70 N · m).

### Installing Battery

Refer to [Section 3-2 “Battery Pack Removal and Replacement” on page 3-1](#).

4. Install the Battery.
5. Install the Battery Door.

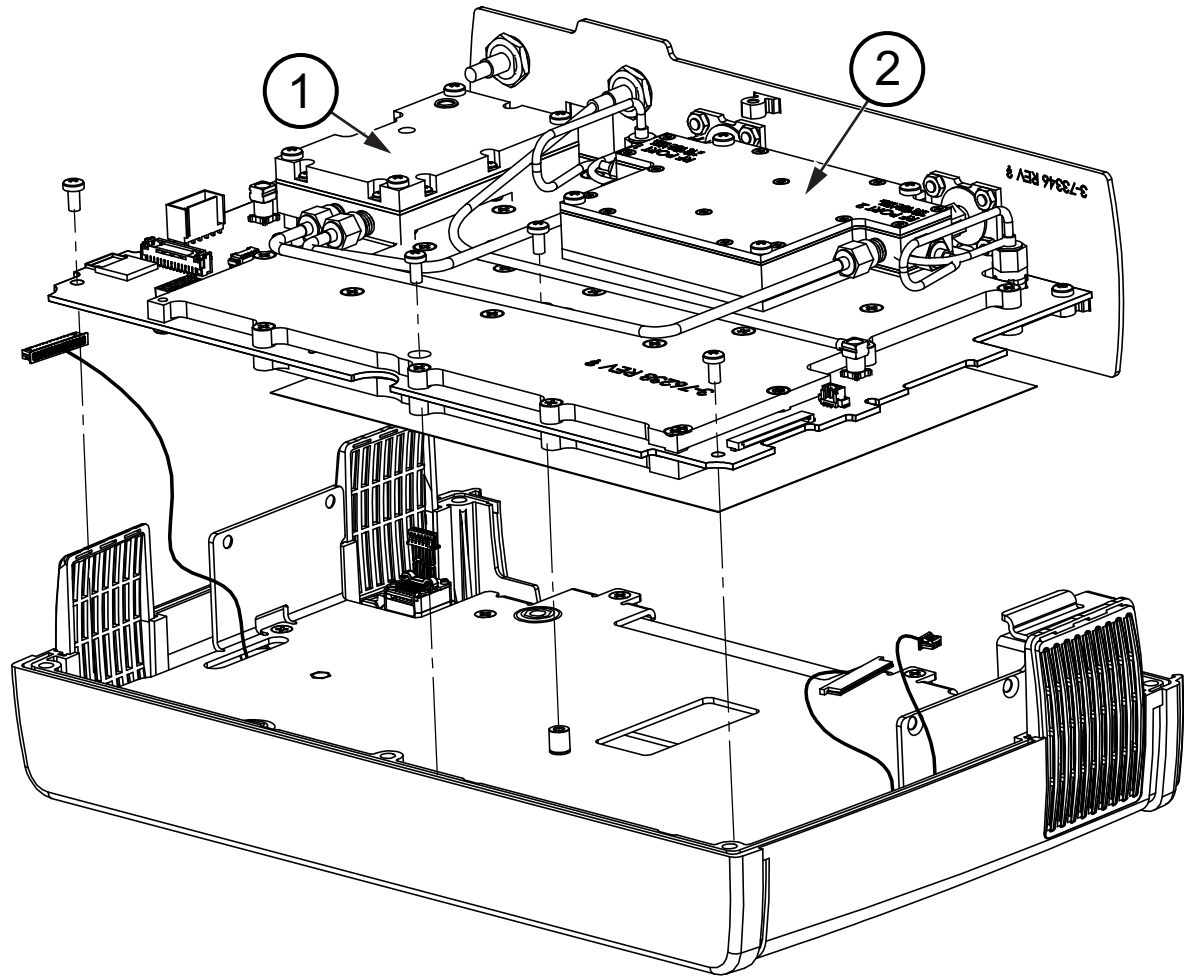
### Restarting the Instrument

6. Restart the instrument.
7. Perform a function check to verify all repairs and part replacements.



## 4-12 Main/VNA PCB and Connector Panel Removal

The Main/VNA PCB Assembly includes the top connector panel. This procedure provides instructions for removing the Main/VNA PCB assembly from all S820E Site Masters. [Figure 4-19](#) shows the Main/VNA PCB assembly of Option 714, Option 720, Option 730, and Option 740. Main/VNA PCB Assembly removal from Option 708 is similar. Refer to [Table 1-3, “Replaceable Parts and Assemblies”](#) on page 1-5.



1. Microwave Source and Transfer Switch Assembly

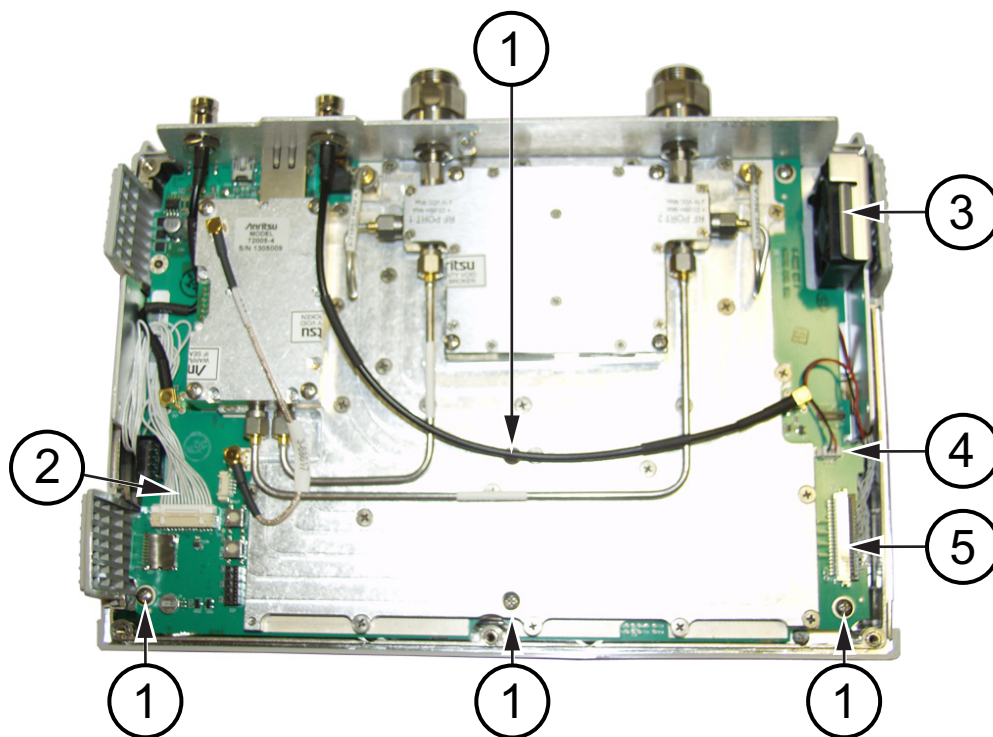
2. Dual Sampler Assembly

**Figure 4-19.** Removing PCB from Front Case (Option 714 Shown)

The Main/VNA PCB for these higher-frequency options includes two additional components, the Microwave Source and Transfer Switch (item 1 in [Figure 4-19](#)) and the Dual Sampler Assembly (item 2 in [Figure 4-19](#)).

## Procedure

Refer to [Figure 4-20](#) for component identification.



1. MIAN/VNA PCB mounting screws
2. Keypad PCB cable
3. Fan
4. Fan cable
5. LCD cable

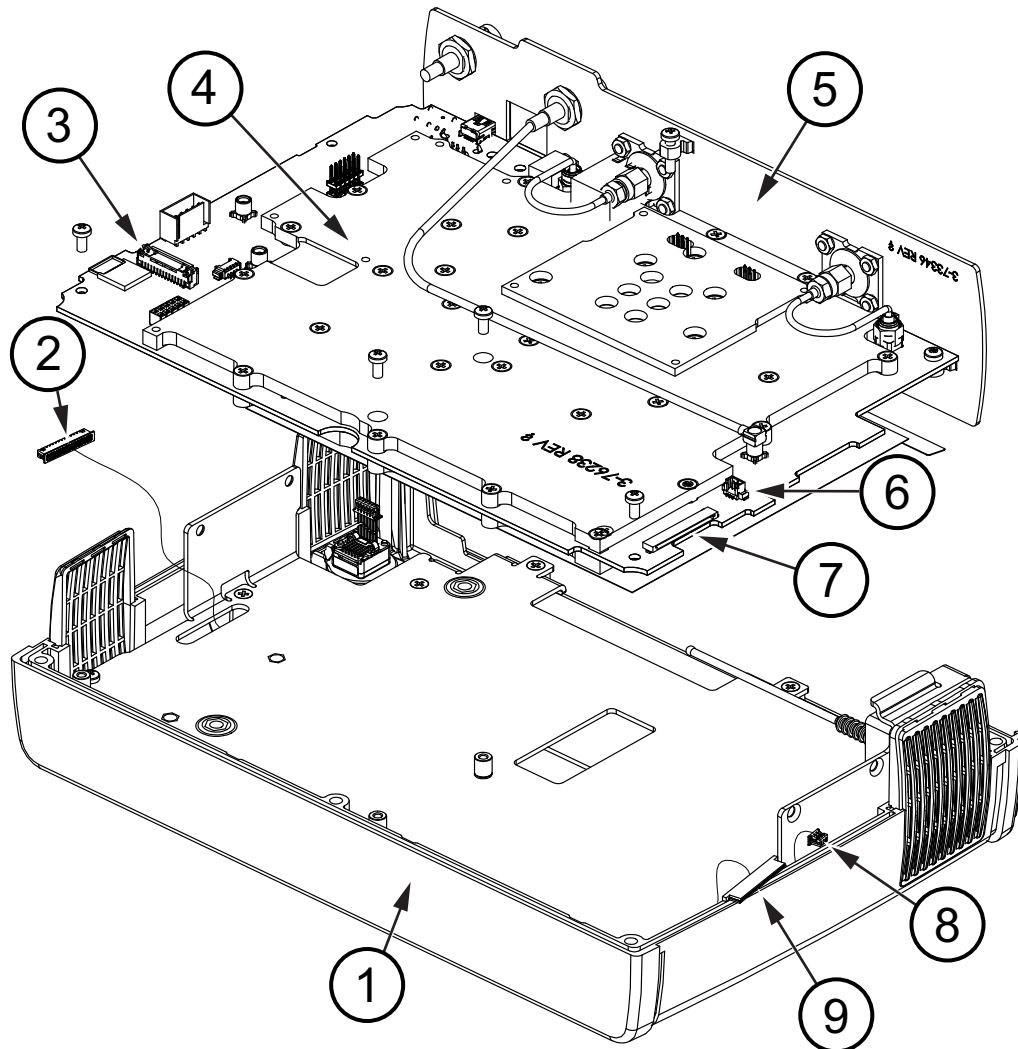
**Figure 4-20.** 40 GHz Main PCB (in Front Case)

**Note** [Figure 4-20](#) Main PCB is from a 40 GHz Site Master (Option 740). The procedure for removal of the PCB and the attached top connector panel is the same for all Site Masters.

1. Follow the procedure in [Section 4-10 “Opening the Instrument Case”](#) on page 4-17.
2. Disconnect the keypad cable (item 2) from motherboard connector J27 and carefully fold it out the way.
3. Disconnect the LCD cable (item 5) from J18 and carefully fold it out the way.
4. Disconnect the fan cable (item 4) from connector J24 and fold it out of the way.
5. Remove the 4 screws (item 1) holding the PCB assembly to the instrument case.
6. Carefully lift the Main/VNA PCB assembly from the front case, keeping all cables clear.

## 4-13 Main/VNA PCB Assembly Installation

This procedure provides instructions for installing the Main/VNA PCB assembly (with connector panel). Installation is the reverse of removal. The 8 GHz Option 708 PCB assembly is shown in [Figure 4-21](#). Installing the PCB assembly of other frequency options is similar.



1. Case Front
2. Keypad cable to Main/VNA PCB
3. Connector J27 for keypad cable
4. Main/VNA PCB
5. Top Connector Panel
6. Connector J24 for fan cable
7. Connector J18 for the LCD
8. Fan cable
9. LCD cable

**Figure 4-21.** Removing 8 GHz PCB Assembly from Front Case.

## Procedure

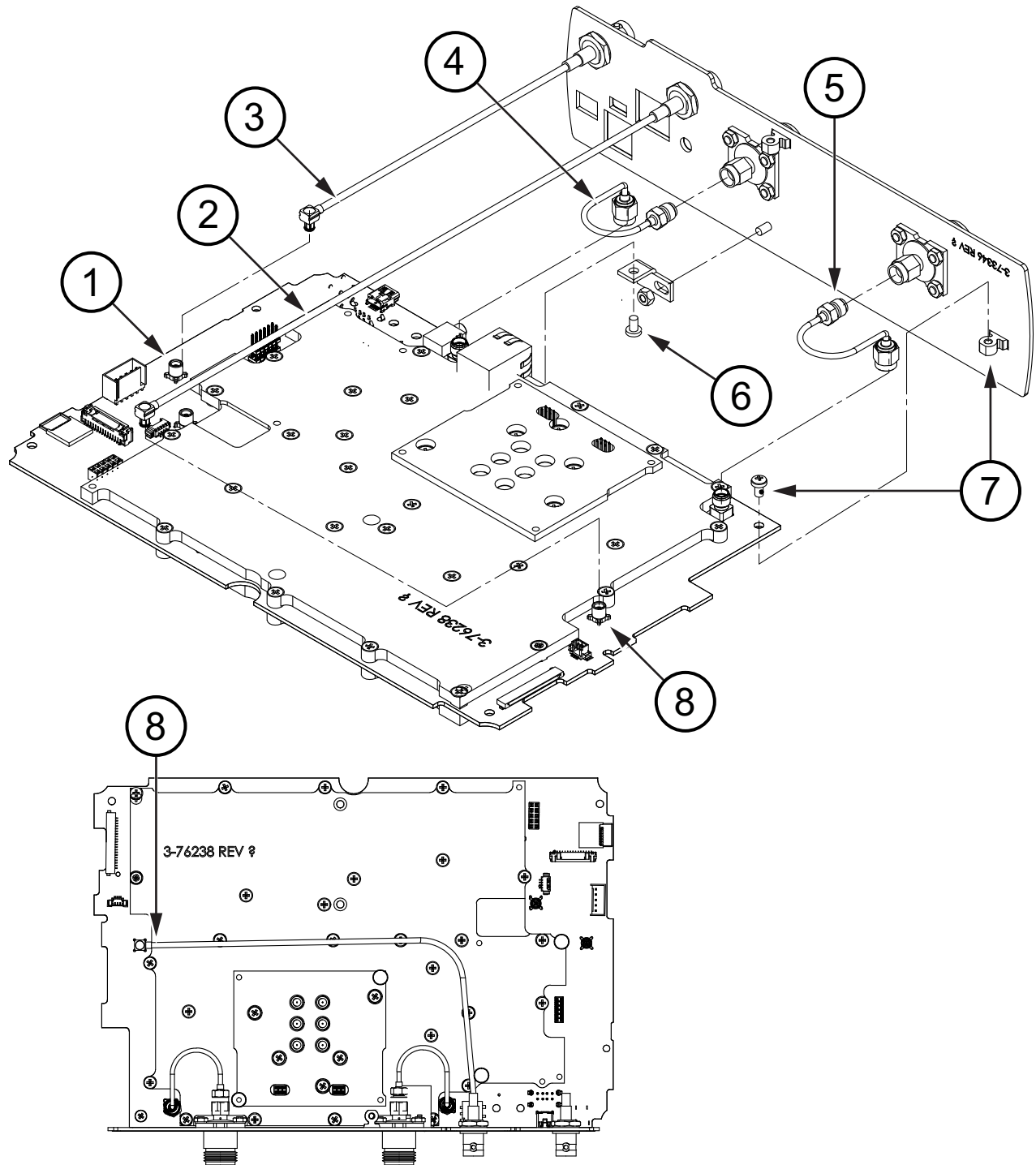
Refer to [Figure 4-21](#) for part identification. The front case (item 1) holds the keypad, LCD, Main/VNA PCB (item 4), and the top Connector Panel (item 5). Refer to [Table 1-3 on page 1-5](#) for part numbers of PCB assemblies of the available frequency options. The cable (item 2) from the keypad to the PCB plugs into connector J27 (item 3) on the Main/VNA PCB. The fan cable (item 8) plugs into connector J24 (item 6). The LCD cable (item 9) plugs into connector J18 (item 7).

1. With the Site Master front case face down on a stable work surface that will not scratch the display, gently insert the Main/VNA PCB and connector panel into the front case. Carefully guide the keypad cable (item 2) and the fan and LCD cables (item 8 and item 9) as you install the PCB into the front case.
2. Secure the replacement Main/VNA PCB to the front case with the 4 screws shown as item 1 in [Figure 4-20 on page 4-24](#). Torque these 4 screws to 7.5 lbf · in (0.85 N · m).
3. Connect the LCD cable (item 9) to connector J18 (item 7).
4. Connect the fan cable (item 8) to connector J24 (item 6).
5. Connect the keypad cable (item 2) to connector J27 (item 3).
6. Close the case as described in [Section 4-11 “Closing the Case” on page 4-22](#).



## 4-14 Connector Panel Removal

This procedure provides instructions for separating the connector panel from the Main/VNA PCB Assembly.



**Figure 4-22.** Main PCB and Connector Panel for 8 GHz Option

1.	MCX Connector J30
2.	MCX Cable for External Trigger In (connects to J34)
3.	MCX Cable for External Reference In (connects to J30)
4.	U-loop semi-rigid cable for Port 2

5.	U-loop semi-rigid cable for Port 1
6.	Bracket and pan head Phillips screw
7.	Bracket and pan head Phillips screw
8.	MCX Connector J34

## Procedure

1. Follow the procedure in [Section 4-10 “Opening the Instrument Case” on page 4-17.](#)
2. Follow the procedure in [Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23.](#)

### For 8 GHz Option 708 Main/VNA PCB Assembly

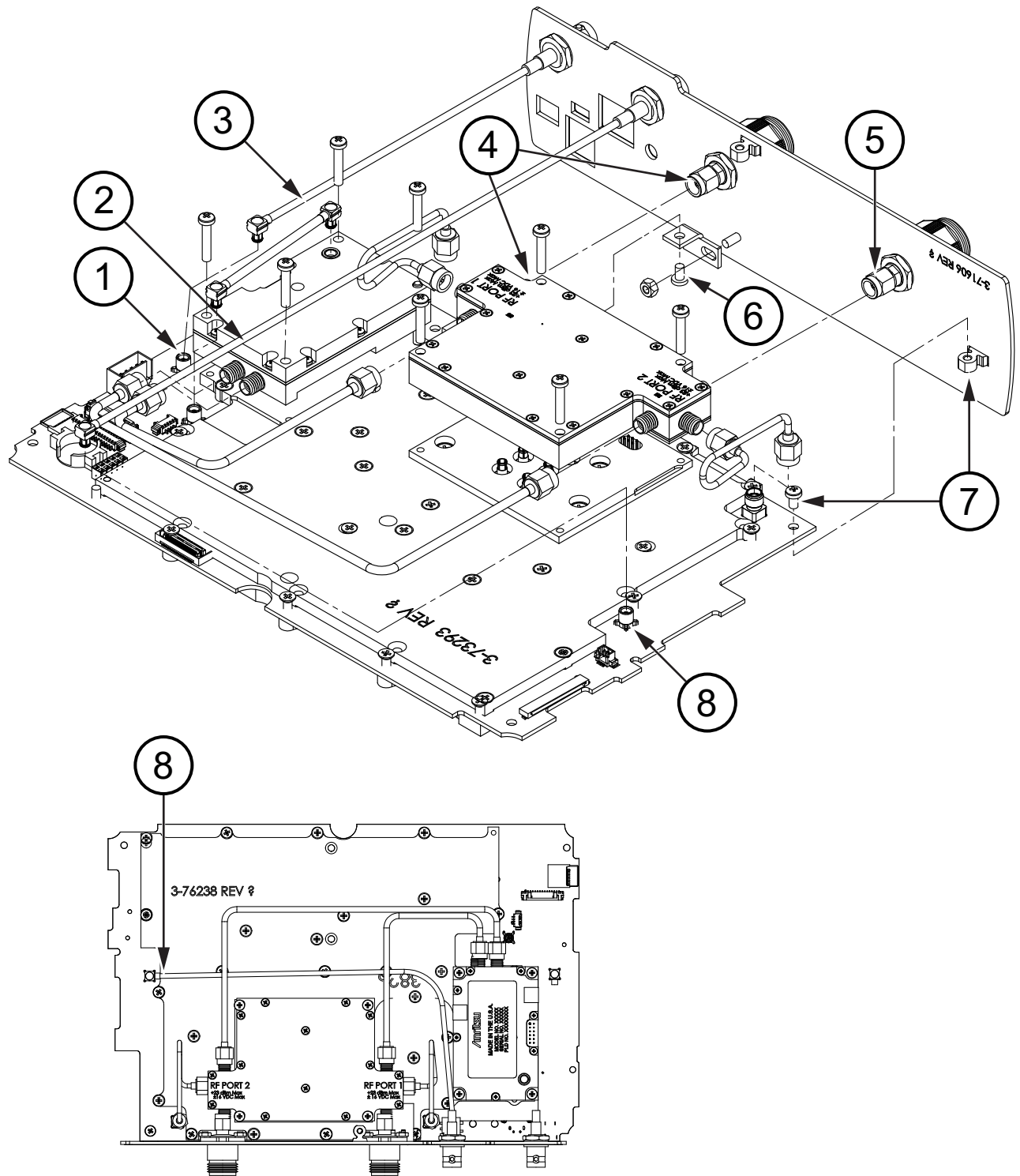
Refer to [Figure 4-22 on page 4-27](#) for items in this procedure.

1. Remove the two U-loop semi-rigid cables between the port connectors and the Main/VNA PCB. Refer to item [4](#) and item [5](#).
2. Disconnect the MCX cables of the External Reference In connector (refer to item [3](#) and item [1](#)) and the External Trigger In connector (refer to item [2](#) and item [8](#)).
3. Remove the pan head Phillips screw on the top side of the PCB, located nearest to the Port 1 connector. Refer to item [7](#).
4. Remove the pan head Phillips screw located near the center on the bottom side. Refer to item [6](#).
5. Carefully separate the connector panel from the motherboard.

### For Other Main/VNA PCB Assemblies

Refer to [Figure 4-23 on page 4-29](#) for items in this procedure.

1. Disconnect the MCX cable of the External Reference In connector (refer to item [3](#) and item [1](#)) and the External Trigger In connector (refer to item [2](#) and item [8](#)).
2. Remove the pan head Phillips screw on the top side of the PCB, located nearest to the Port 1 connector. Refer to item [7](#).
3. Remove the pan head Phillips screw located near the center on the bottom side. Refer to item [6](#).
4. Carefully disconnect the SMA connections between the Dual Sampler Module and the Port connectors. Refer to item [4](#) and item [5](#).
5. Carefully separate the connector panel from the motherboard.



**Figure 4-23.** Main PCB and Connector Panel (all except 8 GHz option)

1.	MCX Connector J30
2.	MCX Cable for External Trigger In (connects to J34)
3.	MCX Cable for External Reference In (connects to J30)

4.	SMA Connection for Port 2
5.	SMA Connection for Port 1
6.	Bracket and pan head Phillips screw
7.	Bracket and pan head Phillips screw
8.	MCX Connector J34

## 4-15 Connector Panel Installation

Installation of the connector panel is the reverse of removal. Refer to [Table 1-3, “Replaceable Parts and Assemblies” on page 1-5](#).

1. For Option 714, Option 720, Option 730, and Option 740 assemblies, torque the SMA connectors (at Port 1 and Port 2) to 8.0 lbf · in (0.90 N · m). Refer to item 4 and item 5 in [Figure 4-23 on page 4-29](#).
2. Secure the connector panel to the Main/VNA PCB by tightening the two pan head Phillips screws to a torque of 7.5 lbf · in (0.85 N · m). Refer to item 6 and item 7 in [Figure 4-23 on page 4-29](#), or refer to item 6 and item 7 in [Figure 4-22 on page 4-27](#).
3. For Option 708 assemblies, torque the SMA connectors of the U-loop semi-rigid cables between the port connectors and the Main/VNA PCB assembly to 8.0 lbf · in (0.90 N · m). Refer to item 4 and item 5 in [Figure 4-22 on page 4-27](#).
4. Reconnect the MCX cables from the External Reference In connector and the External Trigger In connector to the MCX connections on the PCB (J30 is shown as item 1, and J34 is shown as item 8). Refer to [Figure 4-22 on page 4-27](#) or [Figure 4-23 on page 4-29](#).
5. When the connector panel is secured to the Main/VNA PCB assembly, follow the procedure in [Section 4-13 “Main/VNA PCB Assembly Installation” on page 4-25](#).
6. Follow the procedure in [Section 4-11 “Closing the Case” on page 4-22](#).

## 4-16 Port Connector Removal

This procedure provides instructions for removing the Port Connectors from the connector panel. Port 1 and Port 2 are the same, and are either Type N or K. Type N connectors are secured by 4 nuts each on studs pressed into the connector panel. K connectors are secured by a hex nut and locking washer.

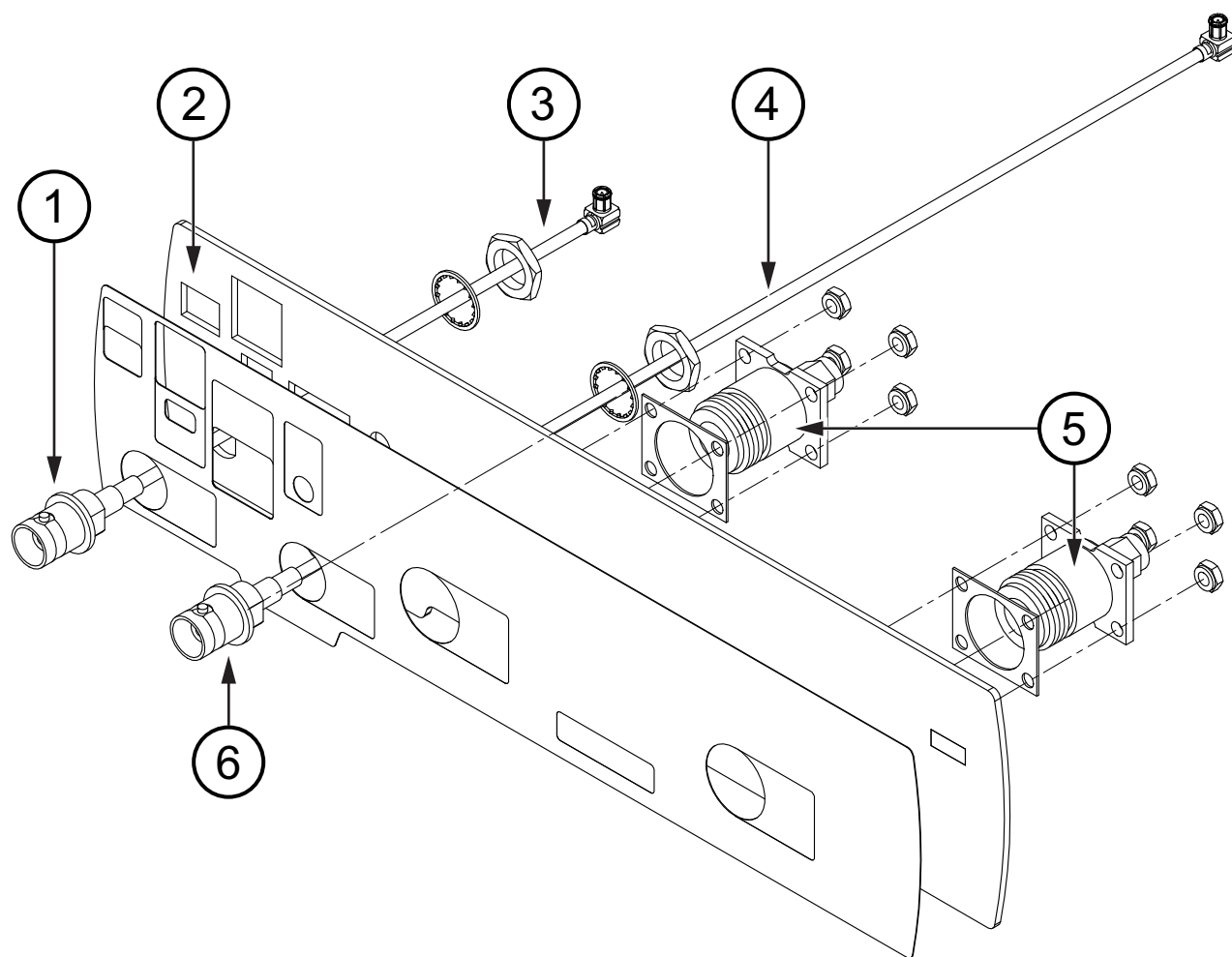
### Procedure

1. Follow the procedure in [Section 4-10 “Opening the Instrument Case”](#) on page 4-17.
2. Follow the procedure in [Section 4-12 “Main/VNA PCB and Connector Panel Removal”](#) on page 4-23.
3. Follow the procedure in [Section 4-14 “Connector Panel Removal”](#) on page 4-27.

### For 8 GHz Option 708

Refer to [Figure 4-24 on page 4-31](#).

1. Remove the four nuts that secure the Type N Port connector to the Connector Panel. Refer to item 5 in [Figure 4-24](#).
2. Remove the Type N Port connector from the Connector Panel.



**Figure 4-24.** Connector Panel for 8 GHz Option 708

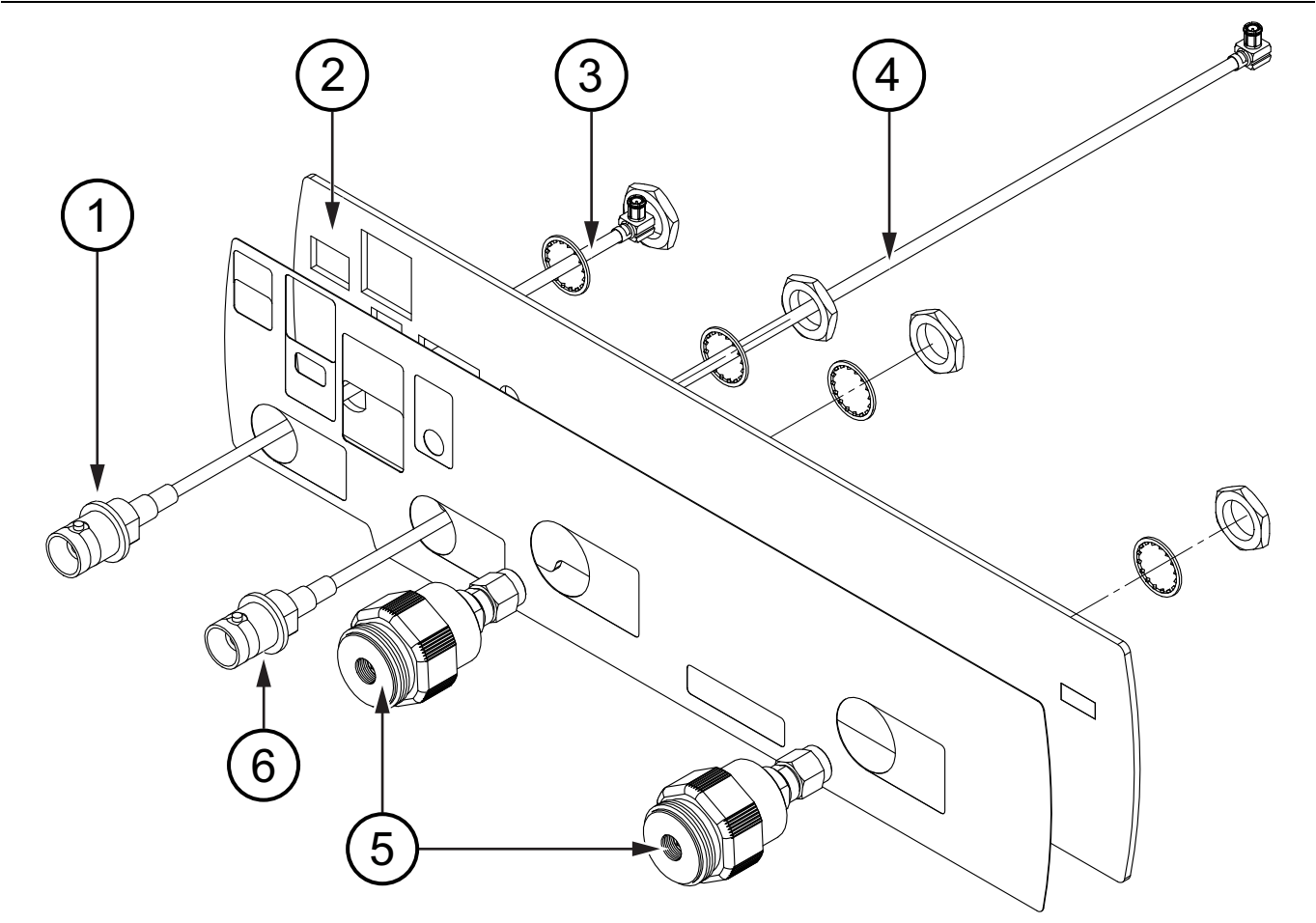
1.	External Reference In Connector
2.	Connector Panel

3.	MCX Cable for External Reference In
4.	MCX Cable for External Trigger In
5.	Type N connectors for Port 1 and Port 2
6.	External Trigger In Connector

For Option 714, Option 720, Option 730, and Option 740

Refer to [Figure 4-25](#) on [page 4-32](#).

1. Remove the nut and locking washer that secure the Port connector (K connector) to the Connector Panel.  
Refer to item 5 in [Figure 4-25](#).
2. Remove the Port connector (K connector) from the Connector Panel.



**Figure 4-25.** Connector Panel for Option 714, Option 720, Option 730, and Option 740

1.	External Reference In Connector
2.	Connector Panel
3.	MCX Cable for External Reference In
4.	MCX Cable for External Trigger In
5.	K connectors for Port 1 and Port 2
6.	External Trigger In Connector

## 4-17 Port Connector Installation

This procedure provides instructions for installing the Port Connectors into the connector panel. Port 1 and Port 2 are the same, and are either Type N or K. Type N connectors are secured by 4 nuts each on studs that are pressed into the connector panel. K connectors are secured to the connector panel by a hex nut and locking washer. Installation of the Port connectors is the reverse of removal. Refer to [Table 1-3, “Replaceable Parts and Assemblies” on page 1-5](#).

1. Align and install the Port connector into the connector panel.
2. Secure a Type N Port connector to the connector panel with 4 nuts. Torque these nuts to 6.2 lbf · in (0.70 N · m).  
  
Secure a K Port connector to the connector panel with a nut and locking washer. Torque the nut to 16.0 lbf · in (1.8 N · m).
3. When the Port connectors are secured to the connector panel, attach the connector panel to the Main/VNA PCB as described in [Section 4-15 “Connector Panel Installation” on page 4-30](#).
4. Follow the procedure in [Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23](#).
5. Follow the procedure in [Section 4-11 “Closing the Case” on page 4-22](#).

4-18 Microwave Module Removal

This procedure provides instructions for removing the Microwave Source and Transfer Switch Assembly. Refer to [Table 1-3, “Replaceable Parts and Assemblies”](#) on page 1-5.

Procedure

1. Follow the procedure in [Section 4-10 “Opening the Instrument Case”](#) on page 4-17.
2. Follow the procedure in [Section 4-13 “Main/VNA PCB Assembly Installation”](#) on page 4-25.
3. If desired, follow the procedure in [Section 4-14 “Connector Panel Removal”](#) on page 4-27.

Use [Figure 4-26](#) for the following steps:

4. Disconnect the two semi-rigid cables from the Microwave Module RF output connectors. Refer to item 3 in [Figure 4-26 on page 4-34](#).
5. Remove the four pan head Phillips mounting screws from the corners of the microwave module.
6. Careful lift the module from the motherboard.

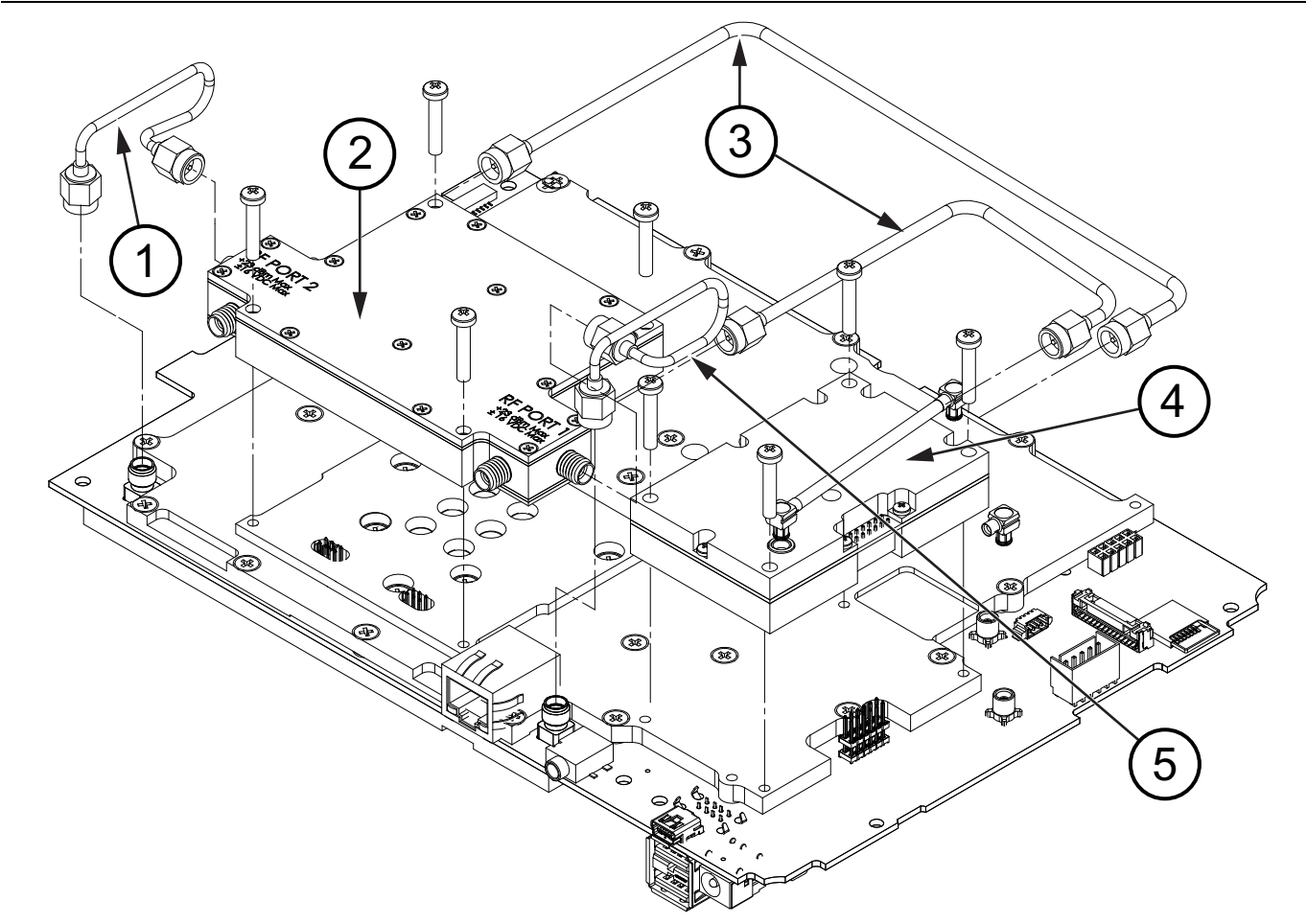


Figure 4-26. Microwave Source and Transfer Switch Module

1.	Semi-Rigid Cable Assembly, Dual Sampler to Motherboard
2.	Dual Sampler Assembly



3.	Semi-Rigid Cable Assemblies, Dual Sampler to Microwave Source and Transfer Switch
4.	Microwave Source and Transfer Switch Assembly (Microwave Module)
5.	Semi-Rigid Cable, Dual Sampler to Motherboard

## 4-19 Microwave Module Installation

Installation of the Microwave Source and Transfer Switch Module is the reverse of removal. Refer to [Table 1-3, “Replaceable Parts and Assemblies”](#) on page 1-5.

1. Torque the four mounting screws to 7.5 lbf · in (0.85 N · m).
2. Torque the SMA connectors to 8.0 lbf · in (0.90 N · m).
3. When the Microwave Module installation is complete, you can reassemble the S820E.
4. If required, follow the procedure in [Section 4-15 “Connector Panel Installation”](#) on page 4-30.
5. Follow the procedure in [Section 4-13 “Main/VNA PCB Assembly Installation”](#) on page 4-25.
6. Follow the procedure in [Section 4-11 “Closing the Case”](#) on page 4-22.

## 4-20 Dual Sampler Assembly Removal

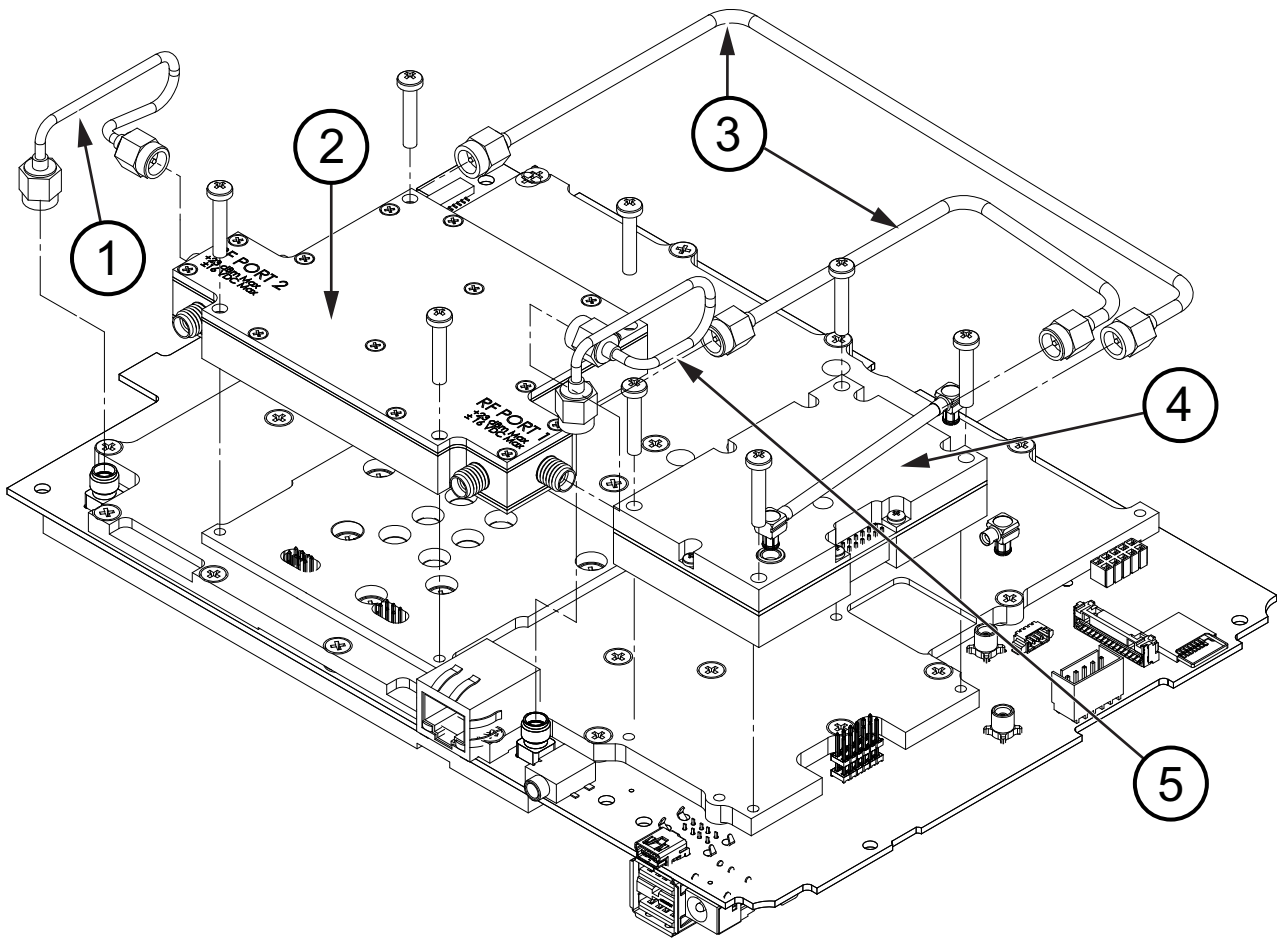
This procedure provides instructions for removing the Dual Sampler Assembly.

### Procedure

1. Follow the procedure in [Section 4-10 “Opening the Instrument Case”](#) on page 4-17.
2. Follow the procedure in [Section 4-12 “Main/VNA PCB and Connector Panel Removal”](#) on page 4-23.
3. Follow the procedure in [Section 4-14 “Connector Panel Removal”](#) on page 4-27.

Use [Figure 4-27 on page 4-36](#) for the following steps:

4. Disconnect the semi-rigid cables (item 1, item 3, and item 5) from the Dual Sampler Assembly (item 2).
5. Remove the four pan head Phillips mounting screws from the corners of the Dual Sampler Assembly.
6. Carefully lift the Dual Sampler Assembly, disengaging the six connection pins between the bottom of the assembly and the motherboard.



**Figure 4-27.** Microwave Source and Transfer Switch Module

1.	Semi-Rigid Cable Assembly, Dual Sampler to Motherboard
2.	Dual Sampler Assembly
3.	Semi-Rigid Cable Assemblies, Dual Sampler to Microwave Source and Transfer Switch
4.	Microwave Source and Transfer Switch Assembly (Microwave Module)
5.	Semi-Rigid Cable, Dual Sampler to Motherboard

## 4-21 Dual Sampler Assembly Installation

Installation of the Dual Sampler Assembly is the reverse of removal. Refer to [Table 1-3, “Replaceable Parts and Assemblies”](#) on page 1-5.

1. Torque the four mounting screws to 7.5 lbf · in (0.85 N · m).
2. Torque the SMA connectors to 8.0 lbf · in (0.90 N · m).
3. When the Dual Sampler Assembly installation is complete, you can reassemble the S820E.
4. Follow the procedure in [Section 4-15 “Connector Panel Installation”](#) on page 4-30.
5. Follow the procedure in [Section 4-13 “Main/VNA PCB Assembly Installation”](#) on page 4-25.
6. Follow the procedure in [Section 4-11 “Closing the Case”](#) on page 4-22.

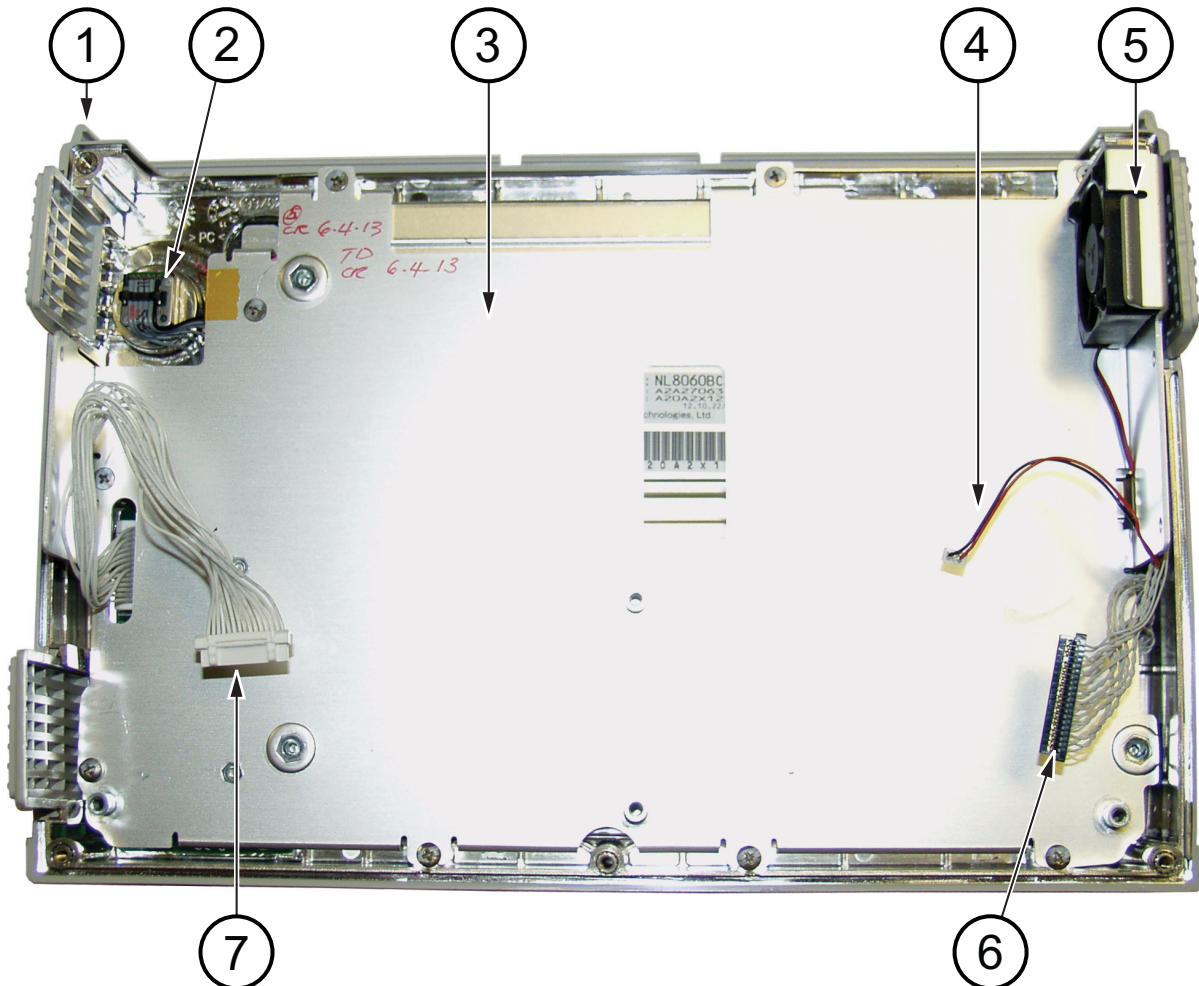
## 4-22 Fan Assembly Removal

This procedure provides instructions for removing and replacing the Fan Assembly.

### Procedure

1. Open the case as described in [Section 4-10 “Opening the Instrument Case”](#) on page 4-17.
2. Remove the Main/VNA PCB assembly from the case front as described in [Section 4-12 “Main/VNA PCB and Connector Panel Removal”](#) on page 4-23.

[Figure 4-28](#) and [Figure 4-29](#) on page 4-39 show the fan and its mounting.

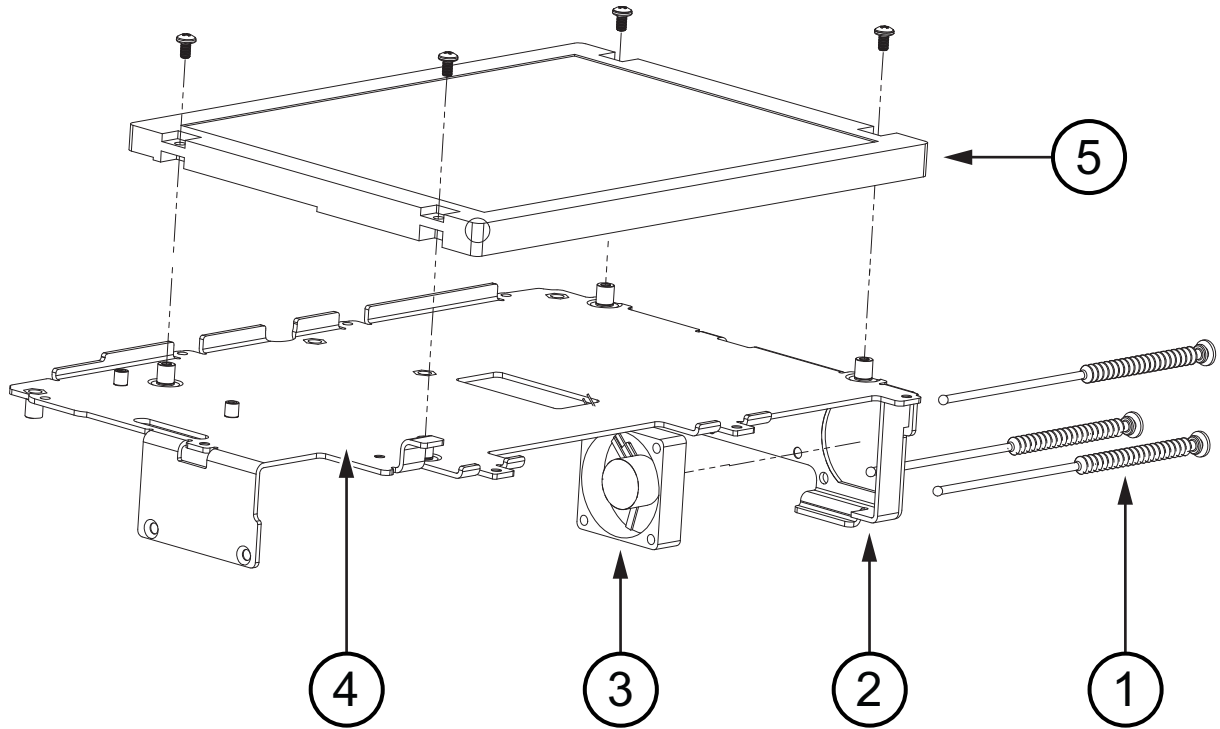


1. Front case assembly
2. Rotary encoder
3. Metal pan framing the LCD assembly
4. Cable connection for fan (cable passes through LCD assembly)
5. Fan assembly
6. Cable connection from LCD to Mother Board
7. Cable connection from keypad to Mother Board

**Figure 4-28.** Case Front with LCD and Fan

3. Remove the fan vent (item 4 in [Figure 4-7](#) on page 4-8) near the fan assembly from the case front.

4. Cut and remove the silicone rubber fasteners holding the Fan Assembly to the metal pan (LCD frame, item 4 in [Figure 4-29](#)). The silicone rubber fasteners are item 1 in [Figure 4-29](#) (also shown in [Figure 4-30](#)).
5. Referring to [Figure 4-28 on page 4-38](#), disconnect the fan cable (item 4) and extract it from the metal pan (item 3) and remove the fan assembly (item 5).

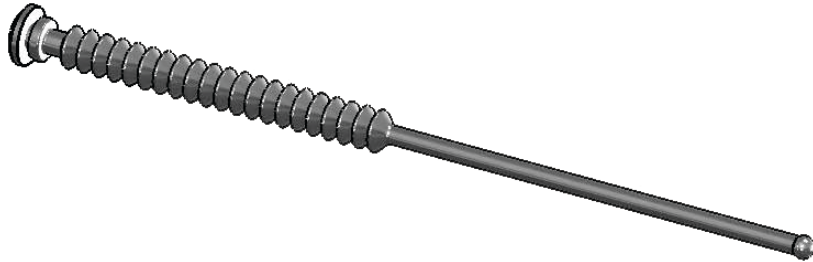


**Figure 4-29.** Fan Assembly Replacement

## 4-23 Fan Assembly Installation

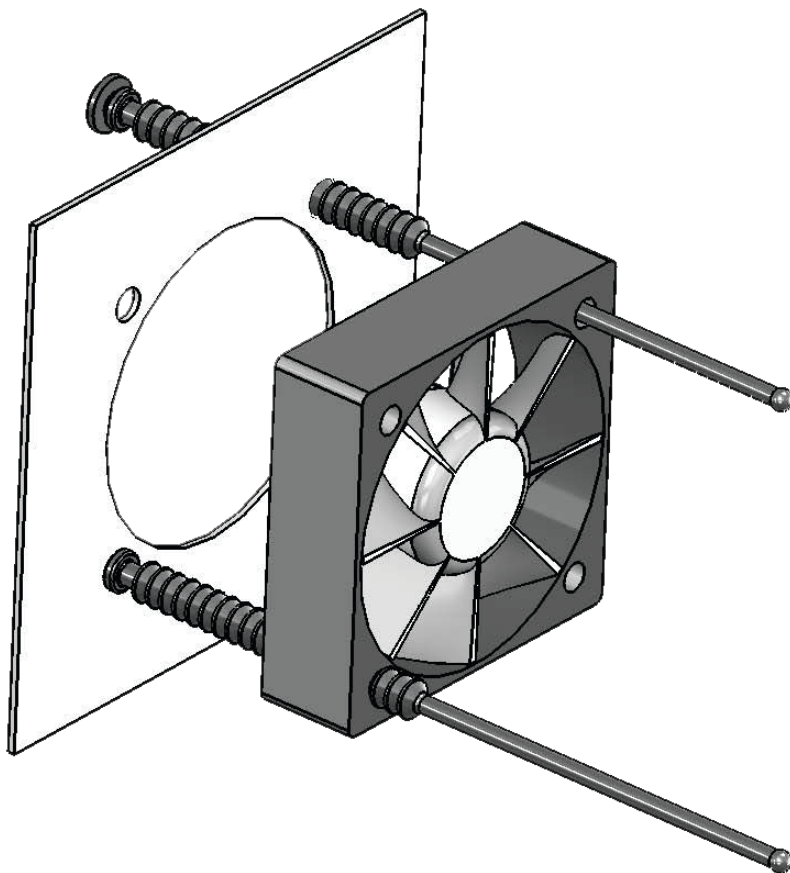
Refer to [Table 1-3, “Replaceable Parts and Assemblies”](#) on page 1-5.

1. Installation is the reverse of removal. Follow replacement instructions for each of the parts and assemblies that were removed, as appropriate.
2. Use new silicone rubber fasteners (supplied with the replacement fan assembly). Pull the fasteners through the metal pan and the fan as shown in [Figure 4-31](#) on page 4-40. Trim the fasteners after ensuring that the fan is firmly attached to the bracket.



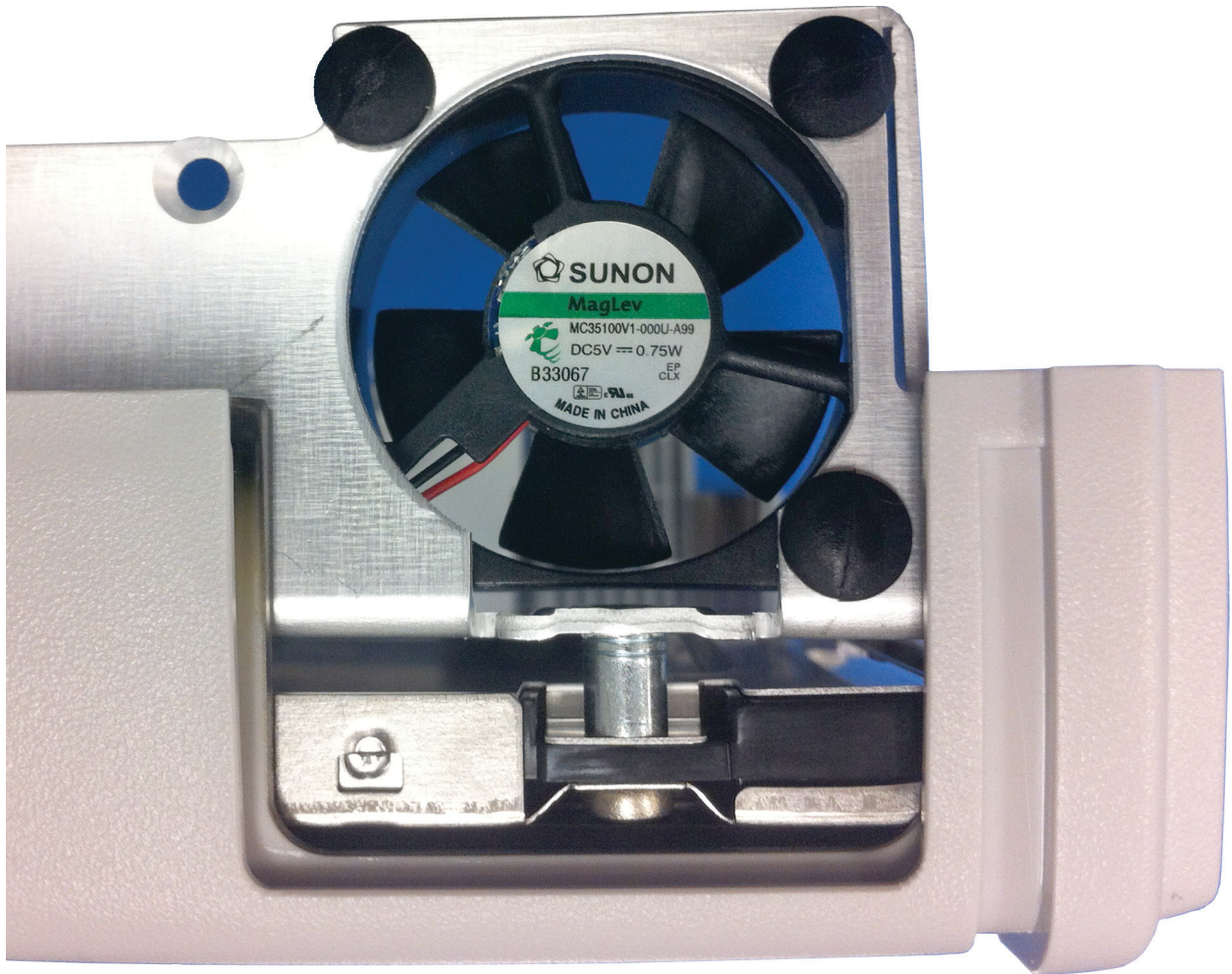
**Figure 4-30.** Fan Fastener, Silicone Rubber

When the fasteners are secured and trimmed, the fan appears as in [Figure 4-32](#) on page 4-41.



**Figure 4-31.** Fan Assembly Replacement





**Figure 4-32.** Fan Assembly Mounted

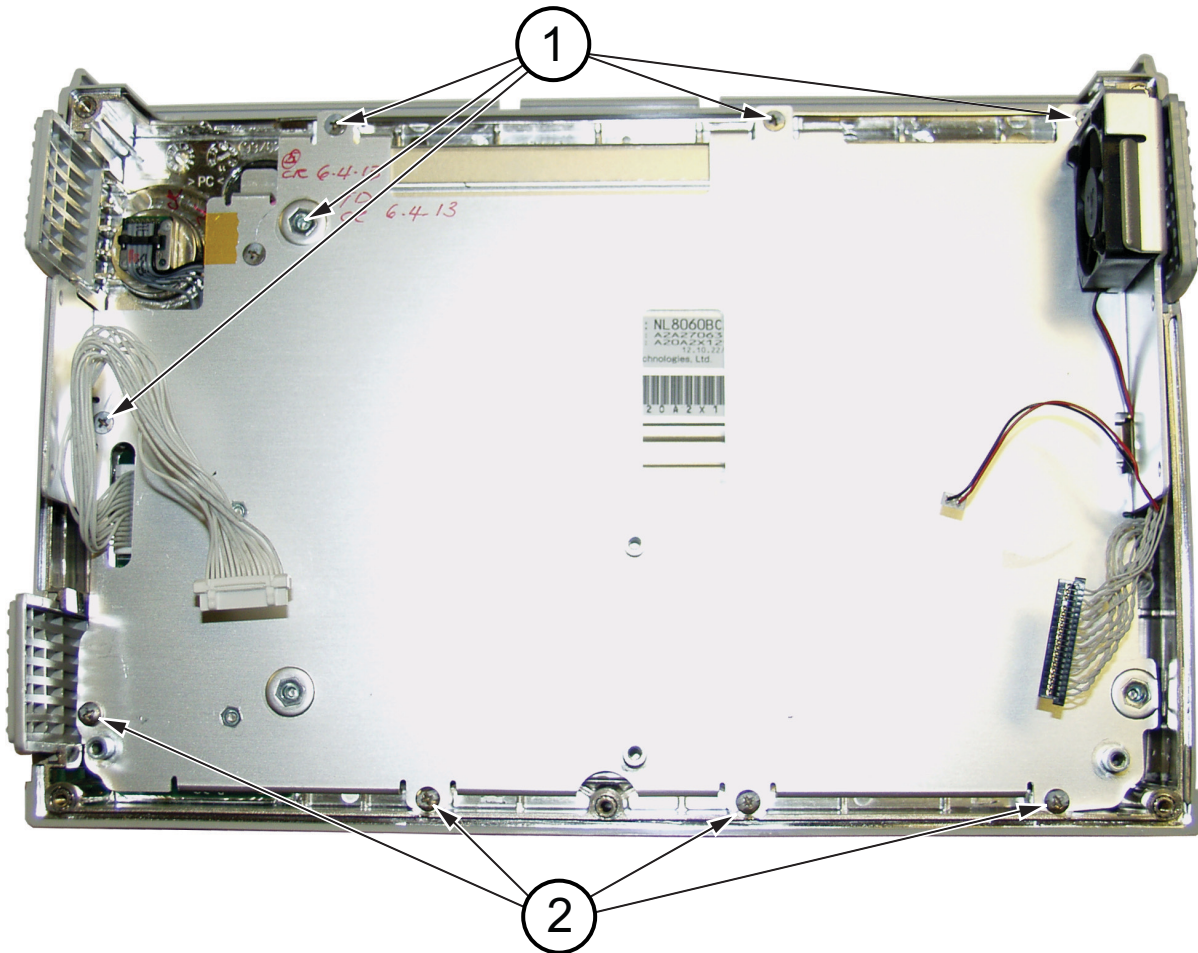
3. Route the fan cable through the opening in the metal pan. Refer to item 4 in [Figure 4-28 on page 4-38](#).
4. Replace the fan vent (item 4 in [Figure 4-7 on page 4-8](#)).
5. Replace the PCB assembly in the case front as described in [Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23](#).
6. Close the case as described in [Section 4-11 “Closing the Case” on page 4-22](#).

## 4-24 LCD Assembly Removal

This procedure provides instructions for removing and replacing the Liquid Crystal Display (LCD).

### Procedure

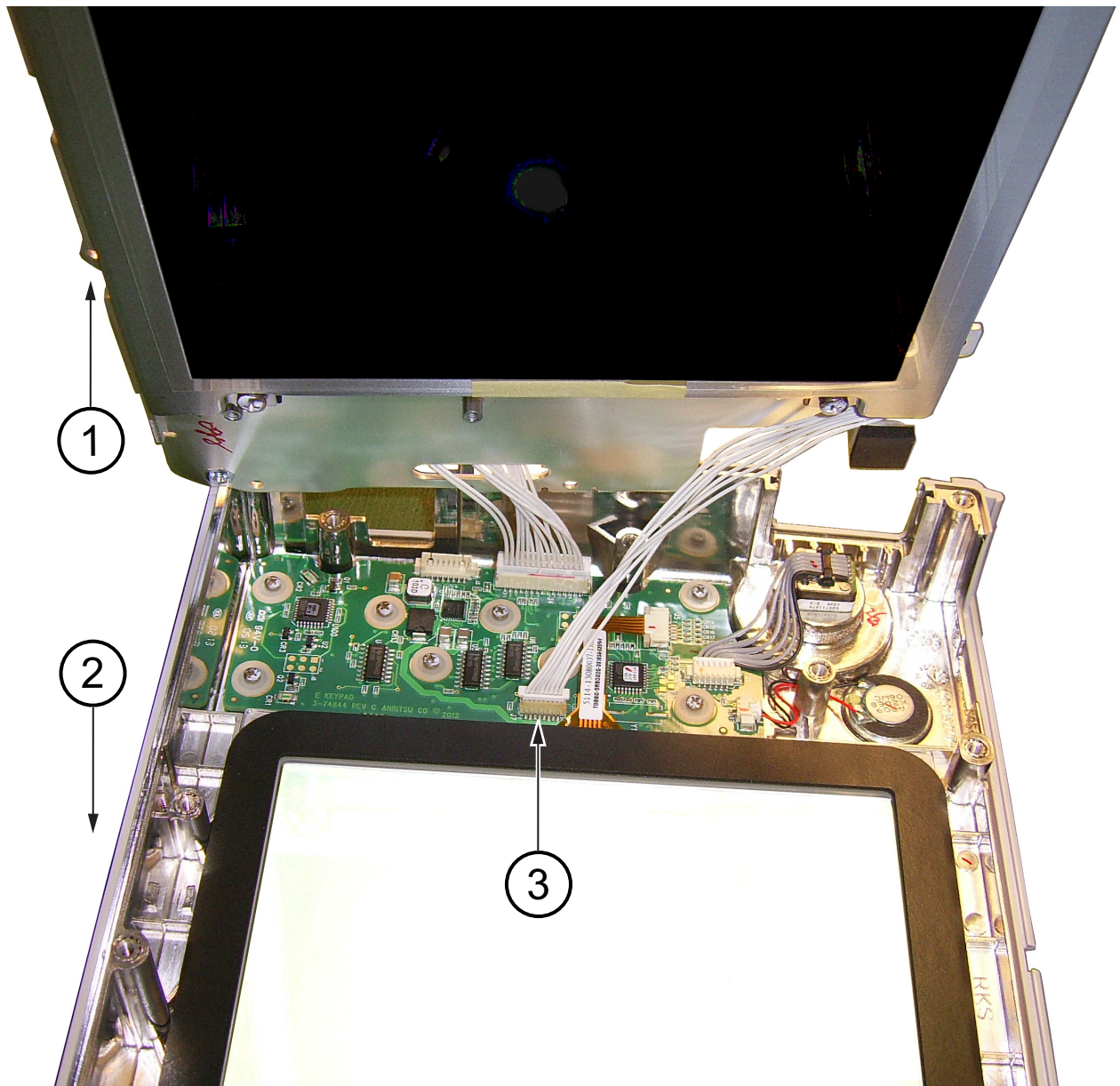
1. Open the case as described in [Section 4-10 “Opening the Instrument Case”](#) on page 4-17.
2. Remove the Main PCB assembly as described in [Section 4-12 “Main/VNA PCB and Connector Panel Removal”](#) on page 4-23.
3. Remove the 9 screws (noted by item 1 and item 2 in [Figure 4-33](#)) securing the metal pan (part of LCD Assembly) to the front half of the case.



**Figure 4-33.** Nine Screws Secure LCD Chassis (Metal Pan) Over LCD Display

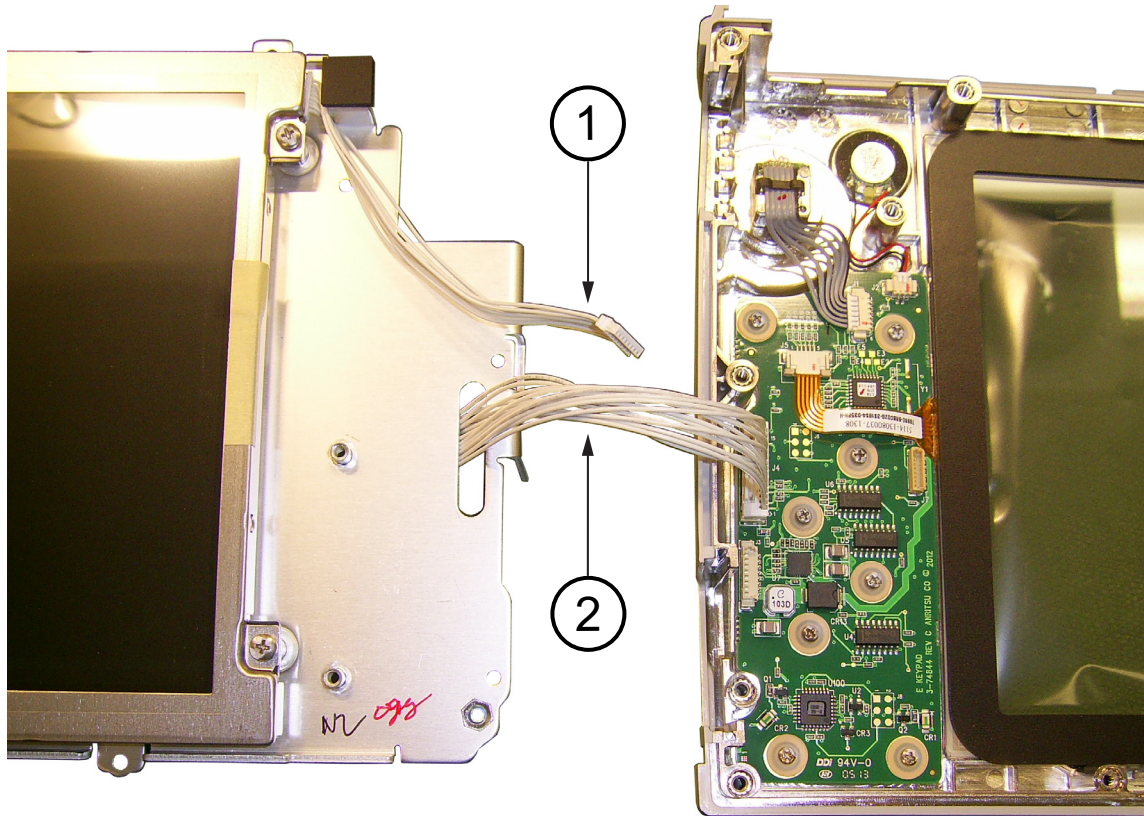


4. Lift and turn up the LCD assembly as shown in [Figure 4-34](#), being careful to avoid strain on the LED Backlight cable (item 3).



**Figure 4-34.** Replacing the LCD Assembly

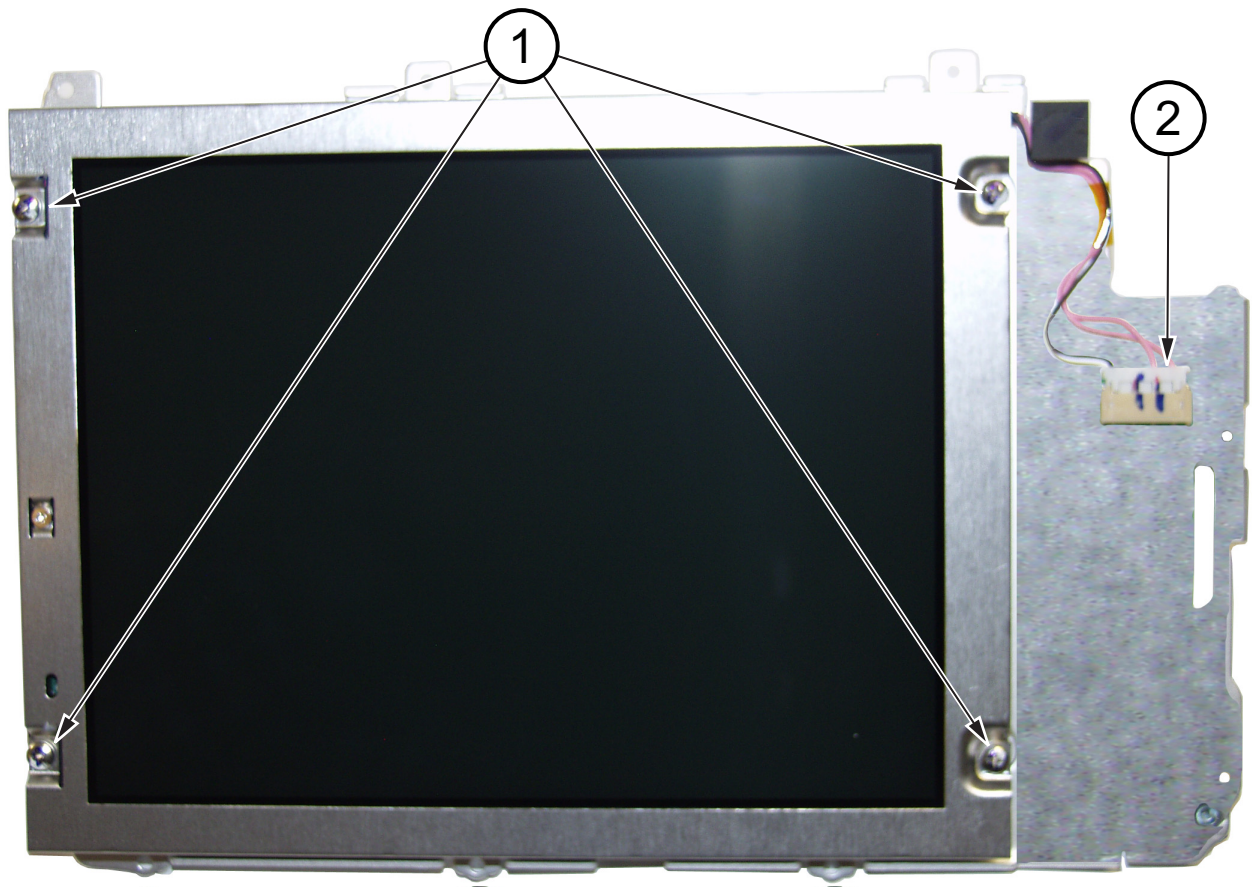
5. Disconnect the LED Backlight cable from the Keypad PCB (see item 1 in [Figure 4-35](#) on page 4-44).



**Figure 4-35.** Replacing the LCD Assembly

6. Remove the Keypad cable (see item 2 in [Figure 4-35](#)) to the Main/VNA PCB. The cable is routed through a slot in the LCD chassis (metal pan).

7. Use a Phillips screw driver to remove the four screws securing the LCD to the LCD assembly chassis.



1. Four LCD mounting screws

2. LED Backlight cable

**Figure 4-36.** LCD in Chassis

8. Carefully remove the LCD.
9. Disconnect the LCD cable from the side of the LCD (see item 6 in [Figure 4-28 on page 4-38](#)).



## 4-25 LCD Assembly Installation

Refer to [Table 1-3, “Replaceable Parts and Assemblies” on page 1-5](#). Installation is the reverse of removal. Follow replacement instructions for each of the parts and assemblies that were removed, as appropriate.

<b>Note</b>	Pay attention to the routing of the LCD Backlight Cable and the LCD to Main/VNA PCB cable. The LCD to Main/VNA PCB cable is routed through an opening in the LCD assembly chassis. The cables must be positioned so that they are not pinched when the instrument is reassembled.
-------------	---

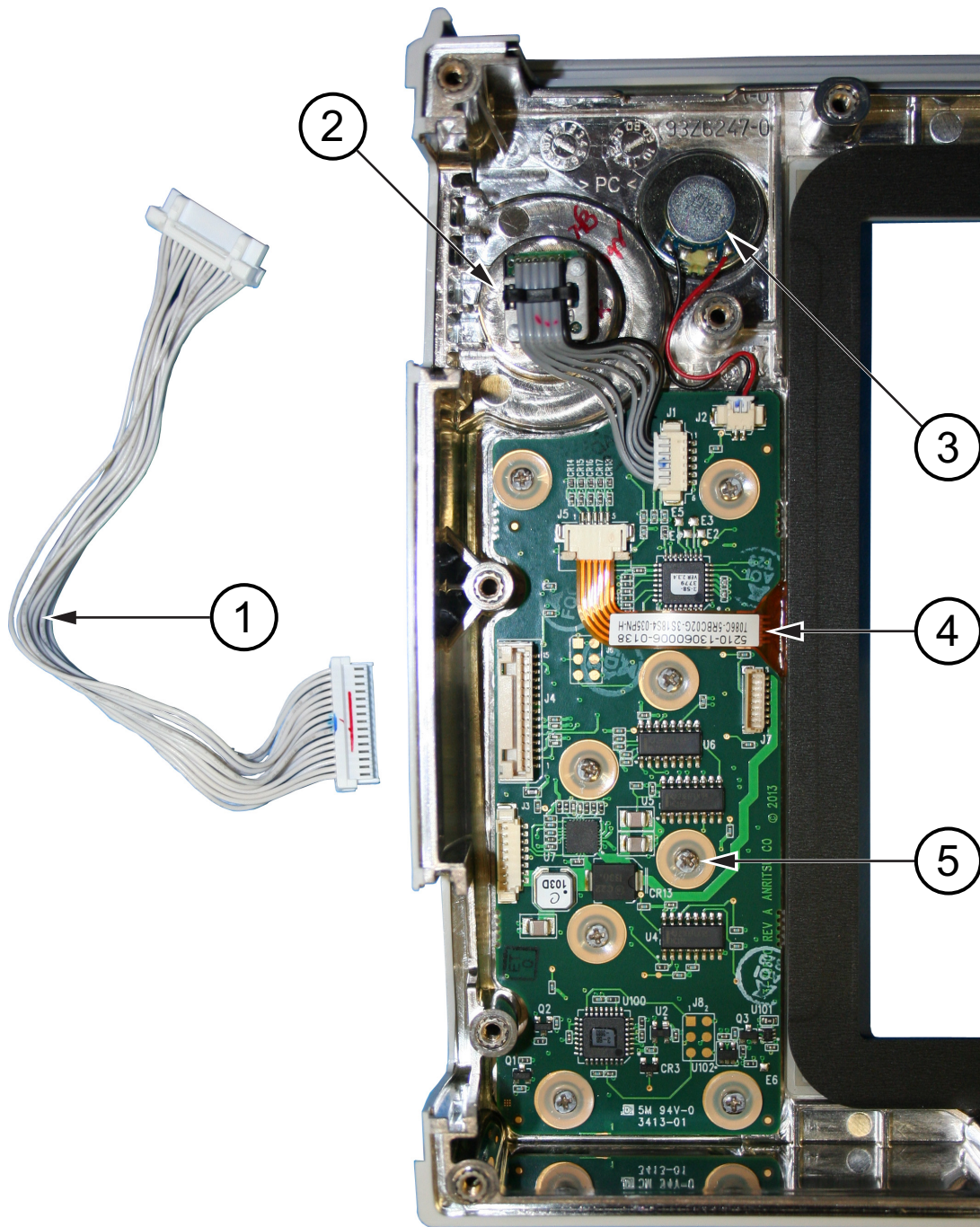
1. Connect the LCD cable to the side of the LCD.
2. Carefully insert the LCD into the LCD Assembly chassis (metal pan).
3. Use a Phillips screw driver to install the four pan head screws that secure the LCD to its chassis. Torque these 4 screws to 7.0 lbf · in (0.80 N · m).
4. Place the LCD Assembly chassis adjacent to the case front. Then route the Keypad cable (see item 2 in [Figure 4-35 on page 4-44](#)) through the opening in the LCD Assembly chassis. This cable connects to the Main/VNA PCB).
5. While holding the LCD Assembly turned up, as shown in [Figure 4-34 on page 4-43](#), connect the LED backlight cable to the Keypad PCB (see item 3 in [Figure 4-34](#)).
6. Carefully position the LCD assembly into the front half of the case.
7. Use the 9 flathead screws (noted by item 1 and item 2 in [Figure 4-33 on page 4-42](#)) to secure the LCD Assembly chassis to the front half of the case. Torque these 9 screws to 8.0 lbf · in (0.90 N · m).
8. Replace the PCB assembly in the case front as described in [Section 4-13 “Main/VNA PCB Assembly Installation” on page 4-25](#).
9. Close the case as described in [Section 4-11 “Closing the Case” on page 4-22](#).

## 4-26 Keypad PCB Removal

This procedure provides instructions for removing and replacing the keypad PCB, the Keypad Rubber Membrane, or both.

### Procedure

1. Open the case as described in [Section 4-10 “Opening the Instrument Case” on page 4-17](#).
2. Remove the Main PCB assembly from the front panel as described in [Section 4-14 “Connector Panel Removal” on page 4-27](#).
3. Perform [Step 1](#) through [Step 6](#) of [Section 4-24 “LCD Assembly Removal” on page 4-42](#).
4. Disconnect the Keypad cable from the Keypad PCB (item 1 in [Figure 4-37 on page 4-47](#), which goes to the Main/VNA PCB).
5. Remove the 8 screws to remove the keypad PCB ([Figure 4-37](#)). The keypad rubber membrane is located under the keypad PCB.



1. Keypad Cable to MAIN/VNA PCB
2. Rotary Encoder
3. Speaker
4. Touchscreen cable
5. Screw (8 screws hold the PCB to the front case)

**Figure 4-37.** Front Panel Keypad Replacement

## 4-27 Keypad Rubber Membrane and Keypad PCB Installation

Refer to [Table 1-3, “Replaceable Parts and Assemblies” on page 1-5](#).

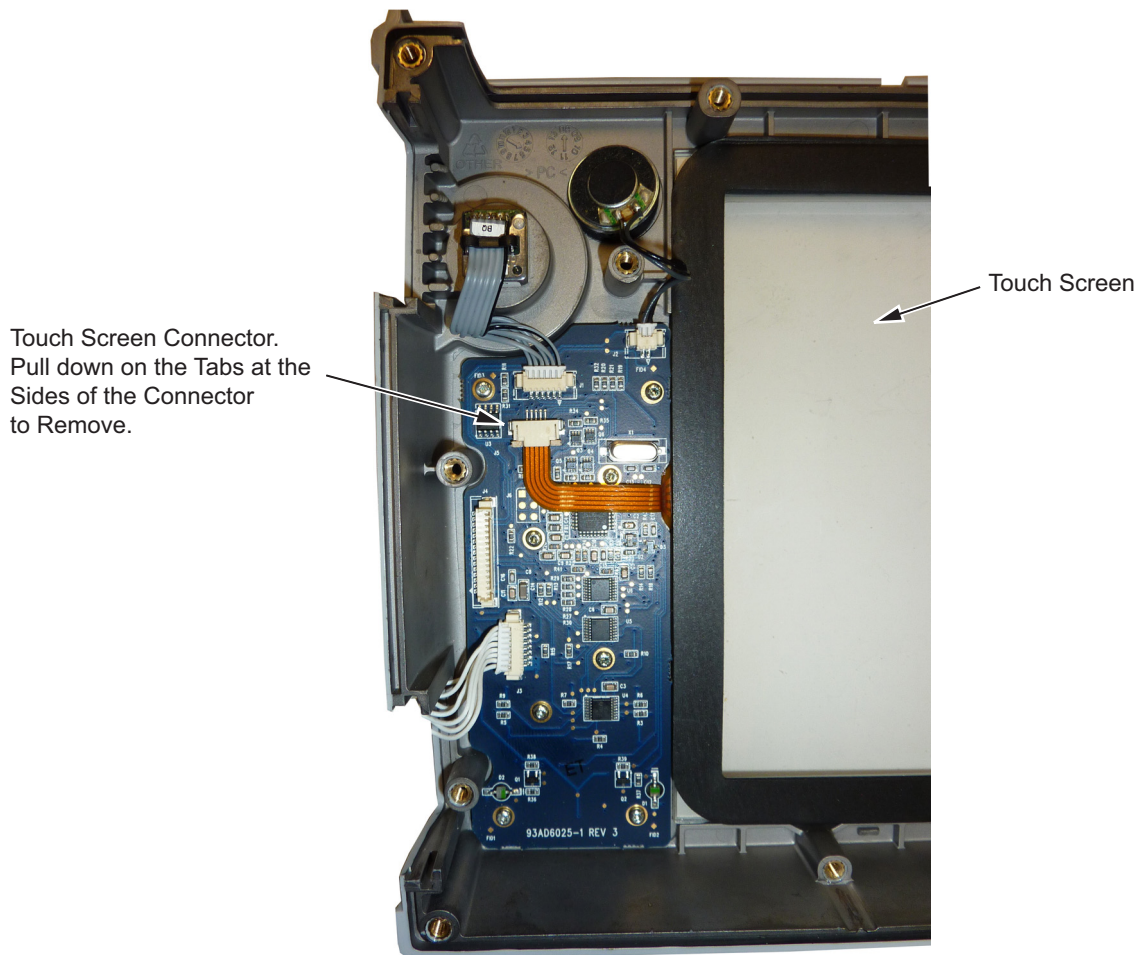
1. Installation is the reverse of removal. Follow replacement instructions for each of the parts and assemblies that were removed, as appropriate.
2. The Keypad Rubber Membrane is the first item installed into the front case.
3. Place the Keypad PCB over the rubber membrane and secure it in place with the 8 screws (item [5](#) in [Figure 4-37 on page 4-47](#)). Torque these screws to 3 lbf · in (0.30 N · m).
4. Replace the LCD Assembly as described in [Section 4-25 “LCD Assembly Installation” on page 4-46](#).
5. Replace the Main/VNA PCB assembly in the case front as described in [Section 4-13 “Main/VNA PCB Assembly Installation” on page 4-25](#).
6. Close the case as described in [Section 4-11 “Closing the Case” on page 4-22](#).

## 4-28 Touch Screen Removal

This procedure provides instructions for removing and replacing the touch screen.

### Procedure

1. Open the case as described in [Section 4-10 “Opening the Instrument Case”](#) on page 4-17.
2. Remove the Main PCB assembly from the front panel as described in [Section 4-12 “Main/VNA PCB and Connector Panel Removal”](#) on page 4-23.
3. Perform [Step 1](#) through [Step 5](#) of [Section 4-24 “LCD Assembly Removal”](#) on page 4-42.
4. Carefully pull the Keypad PCB cable out of the slot in the LCD Assembly chassis. The LCD Assembly can be put aside.
5. Remove the touch screen flex circuit connector from the Keypad PCB by pulling the tabs on each side of the connector away from the connector and in the direction of the flex circuit. Refer to [Figure 4-38](#).
6. Pull the Touch Screen cable out of the connector housing.
7. Remove the Touch Screen from the Bezel by pulling it straight up. You must disengage the touchscreen, which is held to the gasket by adhesive.



**Figure 4-38.** Replacing the Touch Screen

## 4-29 Touch Screen Replacement

Refer to [Table 1-3, “Replaceable Parts and Assemblies” on page 1-5](#).

1. Installation is the reverse of removal. Follow replacement instructions for each of the parts and assemblies that were removed, as appropriate.
2. The touch screen gasket is attached to the touch screen with adhesive. Install the Touch Screen into the front case.
3. Connect the touch screen flex circuit connector to the Keypad PCB.
4. Replace the LCD Assembly as described in [Section 4-25 “LCD Assembly Installation” on page 4-46](#).
5. Replace the Main/VNA PCB assembly in the case front as described in [Section 4-13 “Main/VNA PCB Assembly Installation” on page 4-25](#).
6. Close the case as described in [Section 4-11 “Closing the Case” on page 4-22](#).
7. Perform a touch screen calibration by pressing the **Shift** key followed by the **0** key, and then by following the on-screen calibration instructions.



## 4-30 Rotary Encoder Removal

This procedure provides instructions for removing and replacing the rotary encoder.

### Procedure

1. Remove the rotary knob, as described in Section [“Removing and Replacing the Rotary Knob”](#) on page 4-16.
2. Loosen and remove the nut under the knob.
3. Open the case as described in Section 4-10 [“Opening the Instrument Case”](#) on page 4-17.
4. Remove the Main PCB assembly from the front panel as described in Section 4-12 [“Main/VNA PCB and Connector Panel Removal”](#) on page 4-23.
5. Perform [Step 1](#) through [Step 5](#) of Section 4-24 [“LCD Assembly Removal”](#) on page 4-42. Set aside the LCD Assembly. The LCD assembly is moved to expose the rotary encoder.
6. Disconnect the rotary encoder cable from the Keypad PCB and remove the rotary encoder.

## 4-31 Rotary Encoder Installation

Refer to [Table 1-3, “Replaceable Parts and Assemblies”](#) on page 1-5.

1. Installation is the reverse of removal. Follow replacement instructions for each of the parts and assemblies that were removed, as appropriate.
2. Install the new rotary encoder. Connect its cable to the Keypad PCB.
3. Mount and tighten the nut on the rotary encoder, applying a torque of 10 lbf · in (1.1 N · m).
4. Replace the LCD assembly as described in the section for [“LCD Assembly Installation”](#) on page 4-46.
5. Replace the PCB assembly in the case front as described in Section 4-13 [“Main/VNA PCB Assembly Installation”](#) on page 4-25.
6. Install the rotary knob as described in Section [“Removing and Replacing the Rotary Knob”](#) on page 4-16.
7. Close the case as described in Section [Section 4-11 “Closing the Case”](#) on page 4-22.

## 4-32 Speaker Removal

This procedure provides instructions for removing and replacing the speaker. Gaining access to the speaker is similar to gaining access to the rotary encoder. Refer to item 3 in [Figure 4-37 on page 4-47](#).

1. Open the case as described in [Section 4-10 “Opening the Instrument Case” on page 4-17](#).
2. Remove the Main PCB assembly from the front panel as described in [Section 4-12 “Main/VNA PCB and Connector Panel Removal” on page 4-23](#).
3. Perform [Step 1](#) through [Step 5](#) of [Section 4-24 “LCD Assembly Removal” on page 4-42](#). Set aside the LCD Assembly. The LCD assembly is moved to expose the speaker.
4. Disconnect the speaker cable from the Keypad PCB and remove the speaker from the case. Note that the speaker is attached to the case with adhesive.

## 4-33 Speaker Installation

Refer to [Table 1-3, “Replaceable Parts and Assemblies” on page 1-5](#) and to item 3 in [Figure 4-37 on page 4-47](#).

1. Installation is the reverse of removal. Follow replacement instructions for each of the parts and assemblies that were removed, as appropriate.
2. Install the new speaker. Connect its cable to the Keypad PCB.
3. Replace the LCD assembly as described in the section for [“LCD Assembly Installation” on page 4-46](#).
4. Replace the PCB assembly in the case front as described in [Section 4-13 “Main/VNA PCB Assembly Installation” on page 4-25](#).
5. Close the case as described in [Section 4-11 “Closing the Case” on page 4-22](#).

# Chapter 5 — Troubleshooting

## 5-1 Introduction

This chapter describes the primary troubleshooting operations that can be performed. Perform the troubleshooting suggestions in the order in which they are listed.

Only qualified service personnel should replace internal assemblies. Major subassemblies that are shown in the replaceable parts list are typically the items that may be replaced.

Because they are highly fragile, items that must be soldered may not be replaced without special training. Removal of RF shields from PC boards or adjustment of screws on or near the RF shields will de tune sensitive RF circuits and will result in degraded instrument performance.

## 5-2 Turn-on Problems

### Unit Cannot Boot Up (Battery Powered)

Unit cannot boot up, no activity occurs when the **On/Off** key is pressed:

1. If the unit can power on with external AC power adapter, the battery may have been fully discharged. Use an external charger (Anritsu PN 2000-1374) to charge a completely discharged battery.
2. Battery may be the wrong type. Use only Anritsu approved battery packs. Some non-approved battery packs will fit into the Site Master S820E but they are electrically incompatible and will not charge correctly.
3. **On/Off** switch may have damaged. Replace the rubber keypad Rubber Membrane.
4. Main/VNA PCB may have failed. Replace the Main/VNA PCB Assembly.

### Unit Cannot Boot Up (AC Powered)

1. External AC power adapter may have failed or be the wrong type. Replace the external power adapter.
2. **On/Off** switch may have damaged. Replace the rubber keypad rubber Membrane.
3. Main/VNA PCB may have failed. Replace the Main/VNA PCB Assembly.

### Unit Cannot Complete Boot-Up

Unit begins the boot process, but does not complete boot-up:

1. Firmware update may not have completed. Reload firmware.

#### Note

Download the latest firmware from the Anritsu Web site and load the firmware to a blank formatted USB memory stick, insert the USB memory stick to the USB A connector of the S820E and then load the firmware via the USB port of the instrument.

<http://www.anritsu.com/>

2. Main/VNA PCB may have failed. Replace the Main/VNA PCB Assembly.

## Unit Boots with No Display

Unit produces a ding sound after a while, but with no display:

1. If the display is dim, then check the Brightness setting under the System Menu | System Options.
2. LCD may have failed. Replace the LCD Display Assembly.
3. The Main PCB may have failed. Replace the Main PCB Assembly.

## 5-3 Operating Problems

### Failed Instrument Self Test

#### Failure occurred in Section 1, Power Supply

1. Main/VNA PCB Assembly may be faulty. Replace Main/VNA PCB Assembly.

#### Failure occurred in Section 2, BoardId

1. Main/VNA PCB Assembly may be faulty. Replace Main/VNA PCB Assembly.

#### Failure occurred in Section 3, EEPROM

1. Main/VNA PCB Assembly may be faulty. Replace Main/VNA PCB Assembly.

#### Failure occurred in Section 4, Keypad Controller

1. Keypad PCB Assembly may be faulty. Replace Keypad PCB Assembly.

#### Failure occurred in Section 5, Battery

1. Battery may be faulty. Replace Battery.

#### Failure occurred in Section 6, Factory Frequency Sweep

1. If all bands fail:
  - a. Main/VNA PCB Assembly may be faulty. Replace Main/VNA PCB Assembly.
2. If any of the bands < 8000 MHz fails:
  - a. Main/VNA PCB Assembly may be faulty. Replace Main/VNA PCB Assembly.
3. If any of the bands > 8000 MHz fails:
  - a. Use the Transmission (Ext. Sensor) mode along with an appropriate Anritsu USB Sensor (such as MA24118A or MA24126A) to verify whether port power is present at Port 1 connector.
  - b. If no port power is present, then replace the Microwave Source and Transfer Switch Assembly.
  - c. If port power is present, then replace the Dual Sampler Assembly.

**Return Loss Trace has power dropout when Port 1 is terminated with Short**

1. If the problem occurs in full band sweep or in frequencies < 8000 MHz:
  - a. Replace Main/VNA PCB Assembly
2. If the problem occurs in frequencies > 8000 MHz:
  - a. Use the Transmission (Ext. Sensor) mode along with an appropriate Anritsu USB Sensor (such as MA24118A or MA24126A) to verify whether port power is present at Port 1 connector.
  - b. If no port power is present, then replace the Microwave Source and Transfer Switch Assembly.
  - c. If port power is present, then replace the Dual Sampler Assembly.

**Transmission Trace has power dropout when Thru Cable is connected between VNA Ports**

1. If the problem occurs in full band sweep or in frequencies < 8000 MHz:
  - a. Replace Main/VNA PCB Assembly
2. If the problem occurs in frequencies > 8000 MHz:
  - a. Use the Transmission (Ext. Sensor) mode along with an appropriate Anritsu USB Sensor (such as MA24118A or MA24126A) to verify whether port power is present at Port 1 connector.
  - b. If no port power is present, then replace the Microwave Source and Transfer Switch Assembly.
  - c. If port power is present, then replace the Dual Sampler Assembly.



# Appendix A — Test Records

## A-1 Introduction

This appendix provides test record that can be used to record the performance of the Site Master S820E.

Make a copy of the following Test Record pages and document the measured values each time performance verification is performed. Continuing to document this process each performance verification session provides a detailed history of the instrument's performance.

The following test record form is available:

- [“S820E Site Master Test Record” on page A-2](#)

Instrument Information

Serial Number:	Firmware Revision:	Operator:
Options:		Date:

A-2S820E Site Master Test Record

VNA Frequency Accuracy

Table A-1. VNA Frequency Accuracy

VNA Output Frequency	Specification	Frequency Counter Reading	Uncertainty
1 GHz	1 GHz ± 5 kHz	Hz	± 0.006 ppm

VNA Measurements Accuracy Verification

Attached Verification Report

VNA Transmission Dynamic Range

Attached Test Data Report

VNA High Level Noise (Trace Noise)

Attached Test Data Report

SC8268 Verification

Table A-2. SC8268 SWR Verification

Start Frequency	Stop Frequency	Measured SWR	SWR Specification
10 MHz	2 GHz		< 1.10
2 GHz	12.4 GHz		< 1.19
12.4 GHz	18 GHz		< 1.22
18 GHz	32 GHz		< 1.48
32 GHz	40 GHz		< 1.72



# Index

## Numerics

1-port	
measurement at Port-1	4-9
2-port	
measurement at Port-2	4-9

## B

battery	
battery pack information	3-3
battery pack removal	3-1
battery replacement	4-22
completely discharged	5-1
door replacement	4-15
failure	5-2
real time clock	4-1
Beatty standard, VNA test	2-4
board ID failure	5-2
boot up turn-on problem	5-1
bumper replacement	4-15

## C

case	
closing	4-22
opening	4-17
cautions	
ESD, electrostatic discharge	4-17
non-Anritsu test equipment	2-4
RF shields	4-14
soldering repairs	4-14
use torque wrench	2-6
completely discharged battery	5-1
connector panel replacement	4-27
critical factors	
S-parameter measurement verification	2-4

## D

disassembly sequence overview	4-14
drawings	
case back components	4-8
case components	4-6
case front components	4-7
case with 20/ GHz MB	4-23
case with 8/ GHz MB	4-11
connector panel, K connectors	4-32
connector panel, Type/N	4-31
dual sampler assembly	4-36
microwave module	4-34
opening case	4-5
S820E internal anatomy drawing	4-10
test panel connectors	4-9
transfer switch	4-34
dual sampler replacement	4-36

## E

EEPROM failure	5-2
electrostatic discharge (ESD)	4-1

## F

failure messages	5-2
fan replacement	4-38
frequency accuracy test, VNA	2-1
frequency sweep failure	5-2

## I

internal anatomy drawing	
S820E	4-10

## K

keypad controller failure	5-2
keypad PCB replacement	4-46
keypad rubber membrane replacement	4-48

## L

LCD assembly replacement	4-42
--------------------------	------

## M

MAIN/VNA PCB	
replacement	4-23
microwave module replacement	4-34

## N

no display, troubleshooting	5-2
-----------------------------	-----

## O

opening the case	4-17
operating problems	5-2

## P

parts	
list of parts	1-5
remove and replace summary	4-14
PCB MAIN/VNA replacement	4-23
photo	
battery connector on MB	4-21
battery contacts	3-3
battery removal	3-1
case front, no MB	4-38
keypad PCB	4-47, 4-49
LCD assembly cables	4-44
LCD assembly screws	4-45
MB in case front	4-24
removing LCD assembly	4-43
port connector replacement	4-31
power supply failure	5-2
precautions	
S-parameter measurement verification	2-5

## R

real time clock (RTC) battery	4-1
-------------------------------	-----

remove - replace	
list of instructions .....	4-14
replace	
summary of replacement instructions ....	4-14
list of parts .....	1-5
battery .....	4-22
battery door .....	4-15
bumpers .....	4-15
connector panel .....	4-27
dual sampler .....	4-36
fan .....	4-38
keypad PCB .....	4-46
keypad rubber membrane .....	4-48
LCD assembly .....	4-42
MAIN/VNA PCB .....	4-23
microwave module .....	4-34
opening the case .....	4-17
port connector .....	4-31
rotary encoder .....	4-51
rotary knob .....	4-16
rubber membrane .....	4-48
speaker .....	4-52
tilt bail .....	4-16
touch screen .....	4-49
transfer switch .....	4-34
without opening case .....	4-15
rotary encoder replacement .....	4-51
rotary knob replacement .....	4-16
rubber membrane replacement .....	4-48

## S

S820E internal anatomy drawing .....	4-10
silicone rubber fasteners .....	4-40

S-parameter measurement verification	
critical factors .....	2-4
precautions .....	2-5
S-Parameters	
measurements verification test .....	2-4
speaker replacement .....	4-52
summary, remove and replace parts .....	4-14

## T

tests	
frequency accuracy .....	2-1
S-Parameter measurements verification ...	2-4
tilt bail replacement .....	4-16
touch screen replacement .....	4-49
transfer switch replacement .....	4-34
transmission dynamic range test, VNA .....	2-2
troubleshooting	
instrument boots with no display .....	5-2
instrument cannot boot up .....	5-1
instrument cannot complete boot-up .....	5-1

## U

USB	
connectors .....	4-9

## V

VNA test	
frequency accuracy .....	2-1
transmission dynamic range .....	2-2

## W

warm-up period .....	2-1
warnings	
electrostatic discharge (ESD) .....	4-1





10580-00345



D



Anritsu utilizes recycled paper and environmentally conscious inks and toner.

Anritsu Company  
490 Jarvis Drive  
Morgan Hill, CA 95037-2809  
USA  
<http://www.anritsu.com>