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Installation Note

Agilent Technologies ESA Spectrum Analyzers and EMC Analyzers Kits

Fast Time Domain Sweeps (Option AYX)

FM Demodulation (Option BAA)

Quasi Peak Detector (Option AYQ)

GPIB/Parallel (Option A4H)

RS-232/Parallel (Option 1AX)

IF, Sweep, and Video Output (Option A4J)

Bluetooth FM Demodulator (Option 106)



Agilent Technologies

Part Number E4401-90485 Supersedes: E4401-90452
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Introduction

This procedure can be used for all of the following assemblies:

- A7A1 IF Sweep, Video Output Assembly (Option A4J)
- A7A2 GPIB/Parallel Assembly (Option A4H)
- A7A3 RS-232/Parallel Assembly (Option 1AX)
- A7A5 Fast ADC Assembly (Option AYX)
- A7A6 FM Demod Assembly (Option BAA)
- A7A10 Bluetooth FM Demod Assembly (Option 106)
- A7A11 Quasi Peak Detector and FM Demod Assembly (Option AYQ)

Products Affected:	E4401B E4402B E4403B E4404B E4405B E4407B E4408B E4411B E7401A E7402A E7403A E7404A E7405A
Serial Numbers:	US00000000/US99999999 MY00000000/MY99999999 SG00000000/SG99999999
Options:	A4H, 1AX, A4J, AYX, BAA, 106, and AYQ
To Be Performed By:	(X) Agilent Technologies Service Center (X) Personnel Qualified by Agilent (X) Customer
Estimated Installation Time:	0.5 Hours per option
Estimated Verification Time:	0.5 Hours per option

Installation Kit Parts Lists

Option AYX, Fast Time Domain Sweeps Parts Kit

Quantity	Description	Part Number
1	Board Assembly, Fast ADC	E4401-60083
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	Installation Note	this note

Option BAA, FM Demodulation Parts Kit

Quantity	Description	Part Number
1	Board Assembly, FM Demodulation	E4401-60408
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	Installation Note	this note

Option A4H, GPIB/Parallel Port Parts Kit

Quantity	Description	Part Number
1	Board Assembly, GPIB/Parallel	E4401-60320
1	ESA CD ROM Doc Set / Intuilink Toolbar	————————
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	Installation Note	this note

Option AYQ, Quasi Peak Detector Parts Kit

Quantity	Description	Part Number
1	Board Assembly, Quasi Peak/FM Demod	E7401-60003
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	Installation Note	this note

Option 1AX, RS-232/Parallel Port Parts Kit

Quantity	Description	Part Number
1	Board Assembly, RS-232/Parallel	E4401-60364
1	ESA CD ROM Doc Set / Intuilink Toolbar	————————
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	RS-232 Cable	RS232-61601
1	Installation Note	this note

Option A4J, IF, Sweep, and Video Output Parts Kit

Quantity	Description	Part Number
1	Board Assembly, IF, Sweep and Video Output	E4401-60096
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	Installation Note	this note

Option 106, Bluetooth FM Demod Kit

Quantity	Description	Part Number
1	Board Assembly, Bluetooth FM Demod	E4401-60223
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	Installation Note	this note

Tools Required

- ❏ T-10 TORX screwdriver
- ❏ T-15 TORX screwdriver
- ❏ Oscilloscope (Option A4J only)
- ❏ 50Ω termination

Torque Settings

To avoid potential RFI leakage and prevent connector damage, tighten to the following torque limits:

Item	Torque	
	In-lb	N-cm
SMA Connectors	8.5	95
3-mm, T-10 TORX screws	9	102
4-mm, T-15 TORX screws	21	236

Procedure

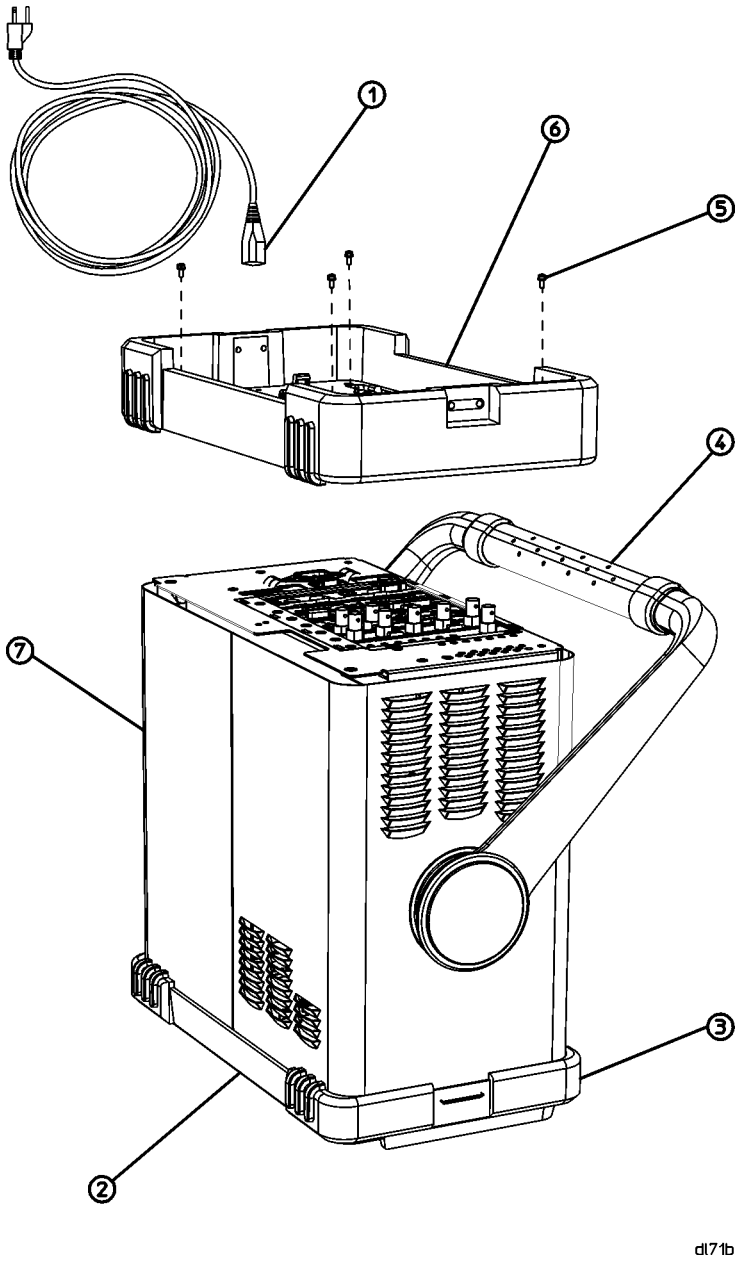
WARNING **Before you disassemble the instrument, turn the power switch OFF and unplug the instrument. Failure to unplug the instrument can result in personal injury.**

CAUTION Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe workstation. Refer to the documentation that pertains to your instrument for information about static-safe workstations and ordering static-safe accessories.

Outer Cover Removal

1. Refer to Figure 1. Disconnect the spectrum analyzer from ac power **(1)**.
2. Remove any adapters or cables **(2)** connected to the front frame.
3. Carefully place the analyzer on the work surface with the front frame **(3)** facing down.
4. Position the handle **(4)** as shown.
5. Remove the four screws **(5)** that hold the rear frame and outer case in place.
6. Remove the rear frame **(6)**.
7. Pull the outer cover **(7)** off towards the rear of the instrument.

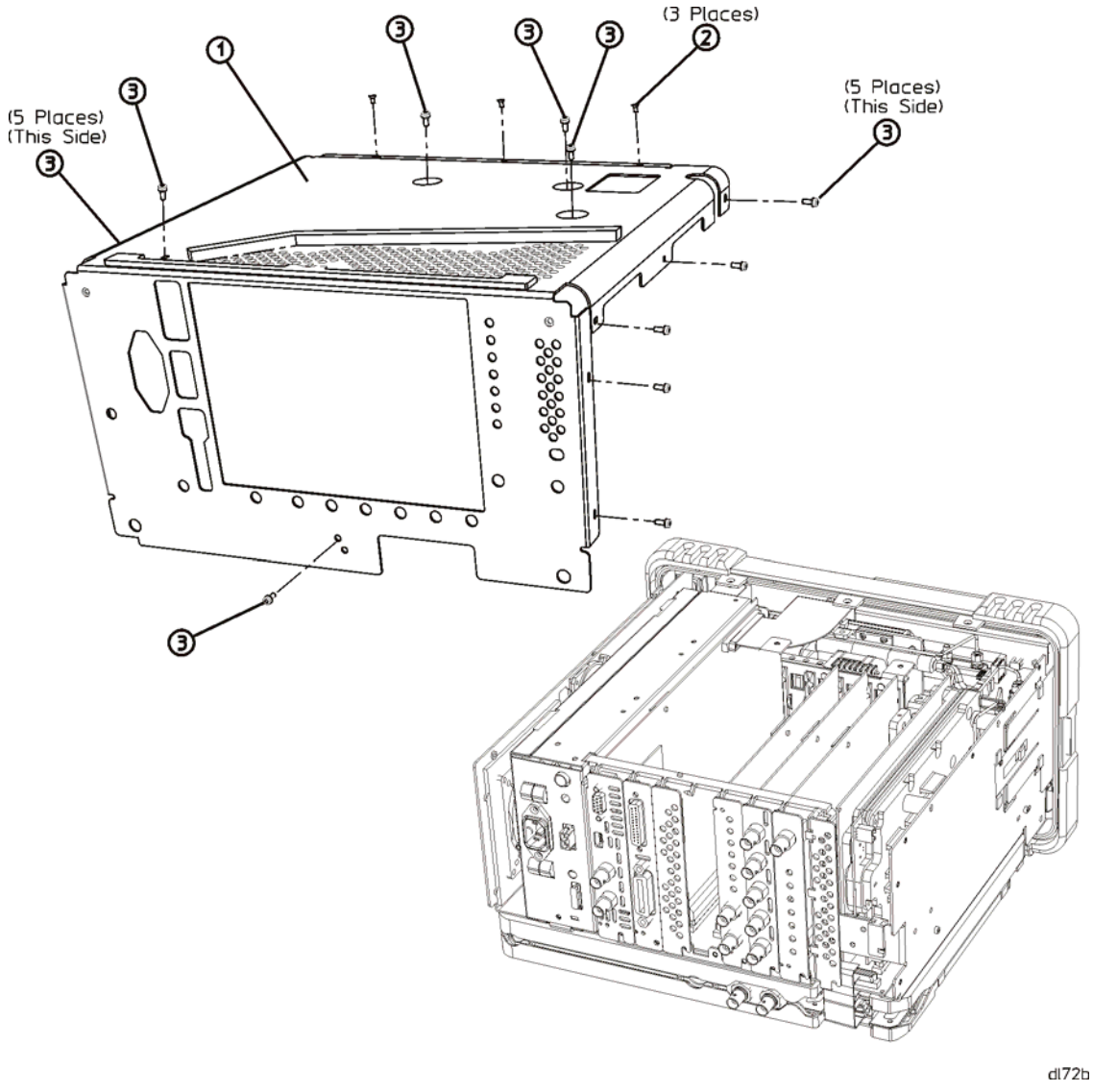
Figure 1 Outer Cover and Rear Frame Removal



Inner Shield Removal

1. Lay the instrument flat as shown in Figure 2.
2. Remove the 15 screws **(2)** and **(3)** attaching the inner shield to the chassis. Note that the number of screws attaching the inner shield may vary with option mixes.
3. Remove the inner shield **(1)** from the chassis.

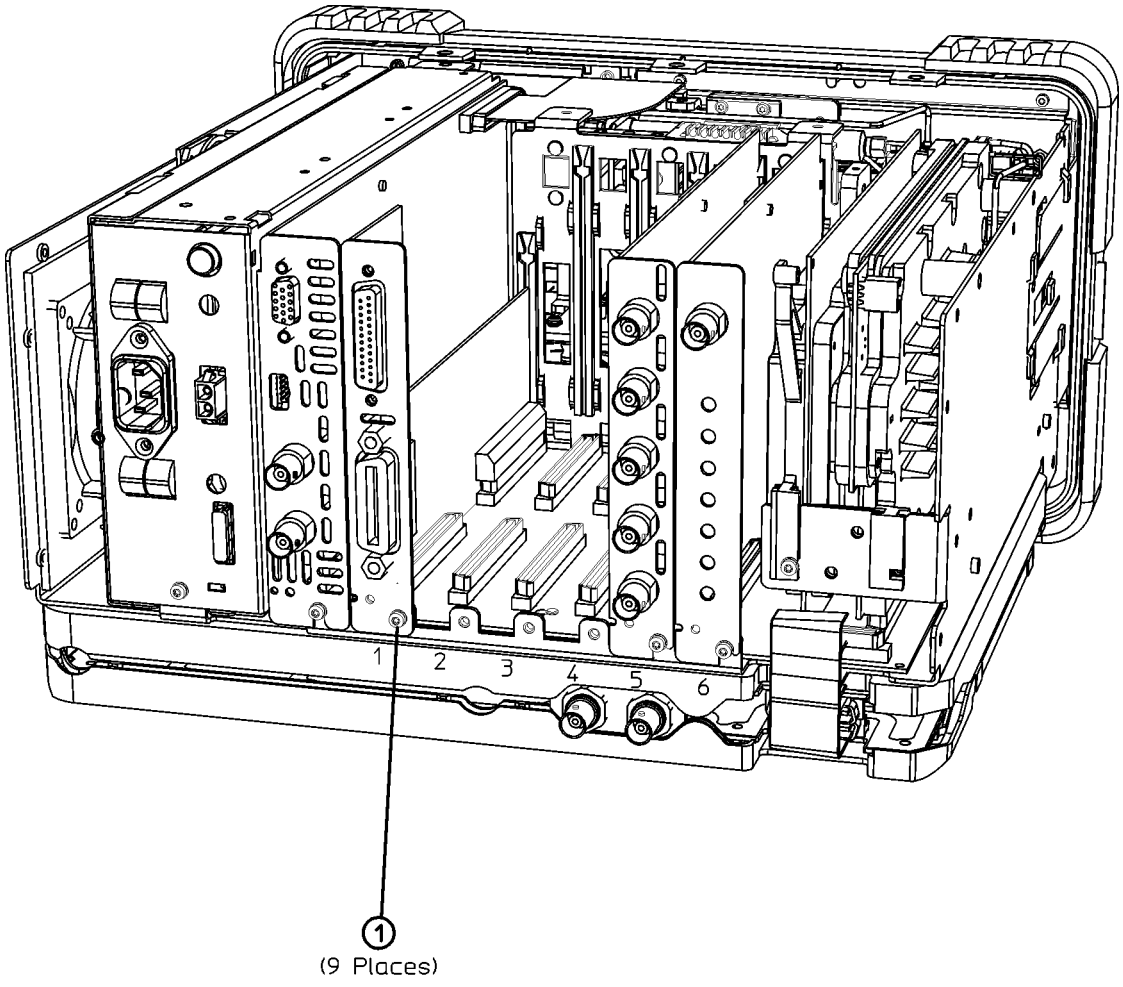
Figure 2 Inner Shield Removal



Installing the Option

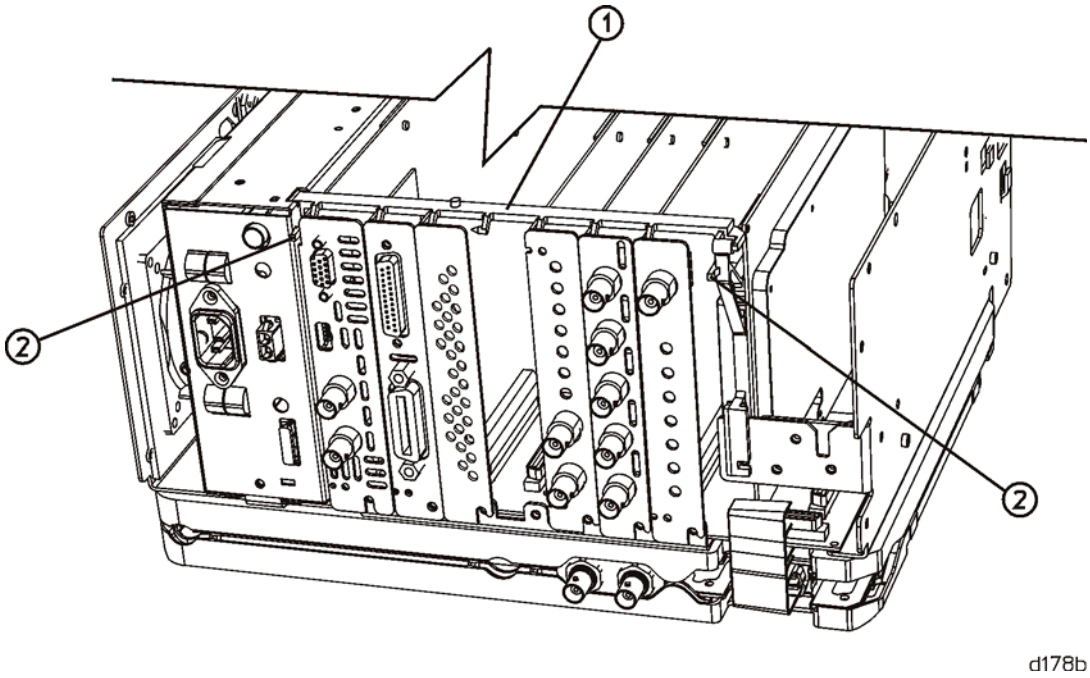
1. Refer to Figure 3. Loosen, but do not remove, all 9 of the screws **(1)** securing the boards and blank plates at the rear of the chassis.
2. Refer to Figure 4. Remove the vibration support bar **(1)** at the top rear of the instrument by pressing in the locking tabs **(2)** and rotating the bar upward. The bar can be removed by sliding it out of the holes in each assembly.

Figure 3 Instrument, Rear View



CAUTION	The vibration support bar can easily be broken if it is forced. Remove it with care.

Figure 4 Removing the Vibration Support



3. Refer to Figure 3 and Table 1 to locate where the new assembly will be installed.
4. Remove the single screw **(1)** securing the assembly or blank panel to the chassis.
5. Carefully pull up on the blank panel or assembly, to remove it from the instrument.
6. Carefully plug the assembly into one of the slots according to Table 1.
7. Replace the screw **(1)** that secures the assembly being installed, but do not tighten it yet.

Table 1 Option and Slot Compatibility

Description	Option	Slot
A7A2 GPIB/Parallel Assembly[a]	A4H	1
A7A3 RS-232/Parallel Assembly[a]	1AX	1
A7A5 Fast Time Domain Sweep Assembly	AYX	3 or 4
A7A6 FM Demod Assembly	BAA	3 or 4
A7A1 IF Sweep, Video Output Assembly	A4J	5 or 6
A7A10 Bluetooth FM Demod Assembly	106	3 or 4
A7A11 Quasi Peak/FM Demod Assembly	AYQ	3 or 4

a. Only the A7A2 GPIB/Parallel assembly OR the A7A3 RS-232/Parallel assembly should be installed at any one time. If both assemblies are installed, only the assembly in the lowest-numbered slot will be functional.

8. Refer to Figure 5. Replace the vibration support bar **(1)** as follows:

   a. Position the vibration support bar **(1)** as shown and insert the hook **(2)** into the IF's support arm.

   b. Engage each hook **(3)** of the other assemblies or blanks in turn.

   c. As you position each of the assemblies or blanks, rotate **(4)** the support bar to lock each one in place.

   d. Refer to Figure 6. Make sure that the tab **(1)** is positioned in the slot of the power supply chassis and the vibration bar is fully seated and locked **(2)** into position.

CAUTION The vibration support bar can easily be broken if it is forced. Install it with care.

Figure 5 Installing the Vibration Support Bar

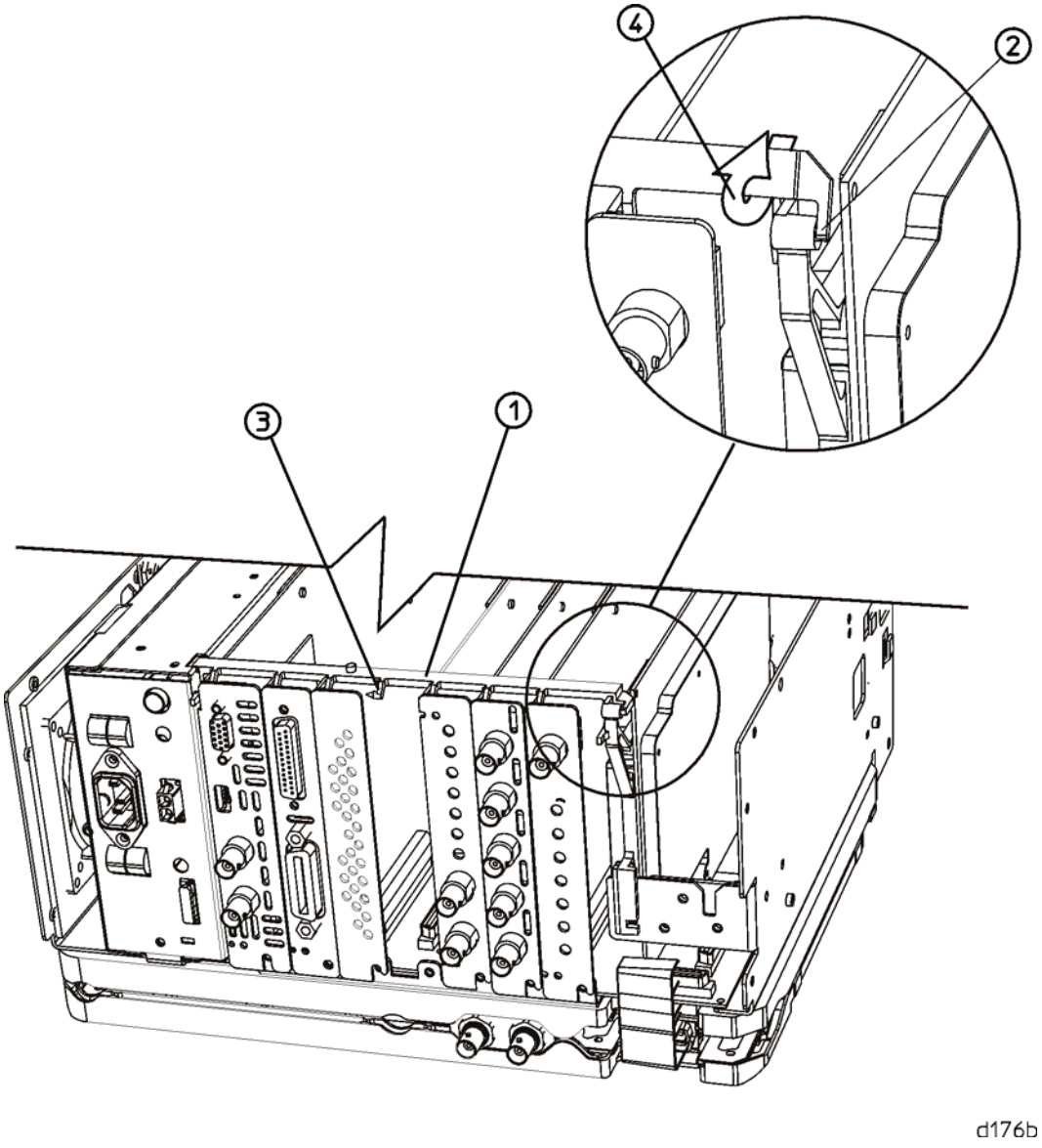
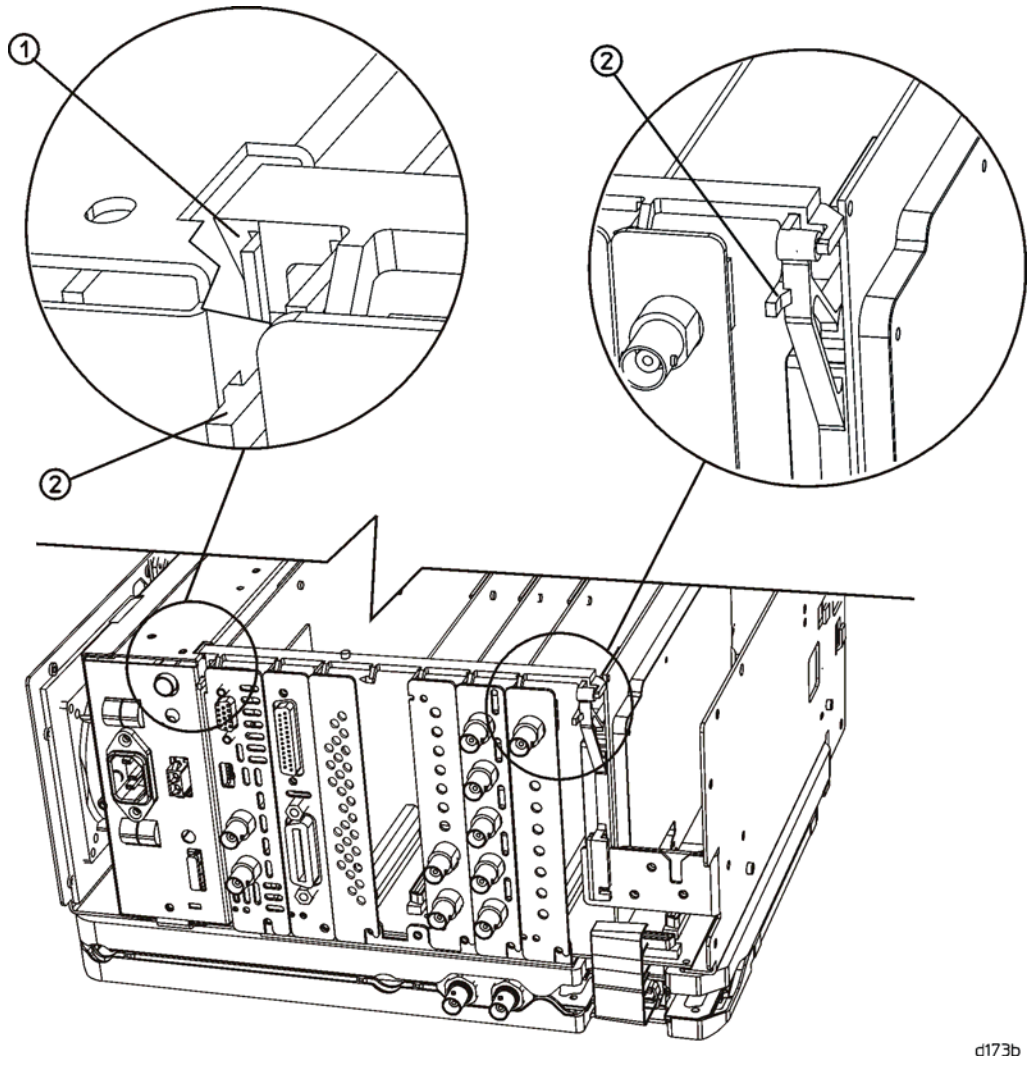


Figure 6 Seating the Vibration Support Bar



9. Tighten all the screws that were loosened in the removal procedure to 101 N-cm (9 in-lb).
10. Refer to Figure 2. Carefully position the inner shield **(1)** on the instrument.
11. Replace the screws **(2)** and **(3)**, and tighten them to 101 N-cm (9 in-lb).
12. Carefully place the spectrum analyzer on the work surface with the front frame facing down.
13. Replace the instrument outer cover aligning the grill on the side of the case to the fan on the A5 power supply assembly.
14. Fit the leading edge of the case completely into the slot on the back of the front frame assembly.
15. Refer to Figure 1. Replace the rear frame assembly **(6)** using the four screws **(5)** to fasten the rear frame to the instrument. Tighten the screws to 236 N-cm (21 in-lb).

Important Information

If the upgrade being installed is Option A4H, GPIB/Parallel or Option 1AX, RS-232/Parallel, the instrument firmware may need to be upgraded.

Firmware Revision Verification for Upgrade Options A4H and 1AX

Instructions for all ESA Spectrum Analyzers (E4401B, E4402B, E4403B, E4404B, E4405B, E4407B, E4408B, E4411B):

NOTE If you have upgraded an EMC analyzer with GPIB/Parallel or RS-232/Parallel (E7401A, E7402A, E7403A, E7404A, or E7405A) go to the section "Instructions For All EMC Analyzers (E7401A, E7402A, E7403A, E7404A, E7405A)" below

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1. Turn on the analyzer and wait for the power-on alignments to complete. Check that there are no error messages displayed.
2. Press **System**, **More**, **Show System**. Make a note of the firmware revision and see if Option B72, Expansion Memory, is listed on the display.
3. If Option B72 *is* installed, the firmware revision MUST be A.12.00 or greater. If the firmware revision is A.12.00 or greater, you can proceed to the performance and functional testing for the upgrade being performed. If the firmware revision is less than A.12.00, the firmware MUST be upgraded to the latest version using one of the following methods:
   - Download the instrument firmware via the world-wide web at http://www.agilent.com/find/esa_firmware. This entire process of upgrading firmware will take approximately 45 minutes.
   - Receive the latest firmware upgrade disk set by ordering upgrade Option UE2.
4. If Option B72 is *not* installed, you should upgrade the instrument firmware to the latest version for instruments that do not have Option B72 installed using one of the following methods:
   - Download the instrument firmware via the world-wide web at http://www.agilent.com/find/esa_firmware_std-mem. This entire process of upgrading firmware will take approximately 45 minutes. If the version of firmware in your instrument is the same as at this website, you can proceed to the performance and functional testing for the upgrade being performed.
   - Order upgrade Option B72, which includes the expansion memory and the latest ESA firmware upgrade disk set.

Instructions For All EMC Analyzers (E7401A, E7402A, E7403A, E7404A, E7405A)

1. Press **System**, **More**, **Show System**. Make a note of the firmware revision.
2. If the firmware revision is A.12.00 or greater, you do not need to upgrade the instrument firmware and you can proceed to the performance and functional testing for the upgrade being performed. If the firmware revision is less than A.12.00, the firmware MUST be upgraded to the latest version using one of the following methods
   - Download the instrument firmware via the world-wide web at http://www.agilent.com/find/emc_firmware. This entire process of upgrading firmware will take approximately 45 minutes.
   - Receive the latest firmware upgrade disk set by ordering upgrade Option UE2.

Performance Testing

Refer to the calibration guide for the instrument being upgraded and perform the following performance verification tests:

- Displayed Average Noise Level
- Residual Responses
- Sweep Time Accuracy (Option AYX only)

Functional Testing

❑ **Option A4H, GPIB/Parallel.**

1. Connect to GPIB Controller.
2. Send and receive data.
3. Remove cable from the GPIB connector and install the protective caps on the GPIB and parallel connectors.

NOTE A CD-ROM containing IntuiLink Toolbar software is included with this Option A4H installation kit. This program allows you to download spectrum analyzer display or data files to a personal computer using Microsoft® Word or Microsoft® Excel. The IntuiLink Toolbar program is not required for the installation, functional testing, or operation of Option A4H. IntuiLink Toolbar installation instructions are included with the CD-ROM should you wish to install this program.

❑ **Option 1AX, RS-232/Parallel.**

1. Connect to RS-232 Controller.
2. Send and receive data.
3. Remove cable from the RS-232 connector and install the protective caps on the RS-232 and parallel connectors.

NOTE A CD-ROM containing IntuiLink Toolbar software is included with this Option 1AX installation kit. This program allows you to download spectrum analyzer display or data files to a personal computer using Microsoft Word®[1] or Microsoft® Excel. The IntuiLink Toolbar program is not required for the installation, functional testing, or operation of Option 1AX. IntuiLink Toolbar installation instructions are included with the CD-ROM should you wish to install this program.

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❑ **Option A4J, IF, Sweep, and Video Output.**

Use an oscilloscope on the following outputs and confirm the presence of a signal.

1. SWP OUT
   a. Analyzer settings

      Preset
      Frequency 50 MHz
      Span 0 Hz

   b. Check for a sweep ramp of 0 to +10 volts.
2. HI SWP OUT
   a. Analyzer settings

      Preset
      Frequency 50 MHz
      Span 0 Hz

   b. Check for a 0 to 5 volt signal, TTL signal.
3. AUX VIDEO OUT
   a. Connect a BNC cable and type-N to BNC adapter between the AMPTD REF OUT and INPUT 50Ω (E4402B, E4403B, E4404B, E4405B, E4407B, E4408B, E7402A, E7403A, E7404A, and E7405A only)
   b. Analyzer settings

      Preset
      Input/Output, **Amptd Ref** (On) (E4401B, E4411B, and E7401A only)
      Input/Output, **Amptd Ref Out** (On) (E4402B, E4403B, E4404B, E4405B, E4407B, E4408B, E7402A, E7403A, E7404A, and E7405A only)
      Frequency 50 MHz
      Span 5 MHz, **Bw/Avg 1 MHz**
      Amplitude, **More**, **Amptd Units**, **dBm**
      Amplitude –**20 dBm**
      Scale Type (Lin)

   c. Press **Amplitude** and adjust the reference level to place the signal peak at the reference level.
   d. Trigger oscilloscope from HI SWP OUT (positive edge). Check for a 0 to 1 volt signal similar to that displayed on the analyzer's display during the time when HI SWP OUT is high.
4. AUX IF OUT
   a. Connect a BNC cable and type-N to BNC adapter between the AMPTD REF OUT and INPUT 50Ω (E4402B, E4403B, E4404B, E4405B, E4407B, E4408B, E7402A, E7403A, E7404A, and E7405A only)

b. Analyzer settings

Preset
Input/Output, **Amptd Ref** (On) (E4401B, E4411B, and E7401A only)
Input/Output, **Amptd Ref Out** (On) (E4402B, E4403B, E4404B, E4405B, E4407B, E4408B, E7402A, E7403A, E7404A, and E7405A only)
Frequency 50 MHz
Span 0 Hz
Amplitude, **More**, **Amptd Units**, **dBm**
Amplitude −**20 dBm**
Scale Type (Lin)

c. Press **Amplitude** and adjust the reference level to place the signal—the flat line—at the reference level.

d. Check for a 21.4 MHz signal, approximately 200 mV p-p, with the oscilloscope input terminated in 50Ω

5. HI SWP IN

a. Analyzer settings

Preset

b. Connect a 50Ω termination or short from the center lead of the HI SWP IN to ground. Check to see that the analyzer stops sweeping.

❑ Option BAA, FM Demodulation and Option AYQ, Quasi Peak Detector/FM Demodulation

1. Connect a BNC cable and type-N to BNC adapter between the AMPTD REF OUT and INPUT 50Ω (E4402B, E4404B, E4405B, and E4407B only)

2. Analyzer settings

Preset
Input/Output, **Amptd Ref** (On) (E4401B only)
Input/Output, **Amptd Ref Out** (On) (E4402B, E4404B, E4405B, and E4407B only)
Frequency 50 MHz
Span, **Zero Span**
Bw/Avg, **3 MHz**
Det/Demod, **Demod**, **FM**
Demod View (On)[1]
Amplitude, **Scale/Div**, **20 kHz**[2]
Frequency 49.95 MHz
Marker, **Delta**
Frequency 50.05 MHz

3. The Marker Delta reading should be 100 kHz ± 5 kHz.

1. (*firmware version A.03.03 or later only*)
2. (*firmware version earlier than A.03.03, use* **FM Deviation**, **100 kHz**)

❑ Option AYX, Fast Time Domain Sweeps

No functional testing is necessary; the Sweep Time Accuracy test is sufficient to verify performance.

❑ Option 106, Bluetooth FM Demodulation

1. Connect a BNC cable and type-N to BNC adapter between the AMPTD REF OUT and INPUT 50Ω (E4402B, E4404B, E4405B, and E4407B only)
2. Analyzer settings

   Preset
   Input/Output, **Amptd Ref Out** (On)
   Frequency 50 MHz
   Span, **Zero Span**
   Bw/Avg, **3 MHz**
   Det/Demod, **Demod**, **FM**
   BW/Avg, **Average** (On), **25**, **ENTER**
   Frequency 49.85 MHz
   Marker, **Delta**
   Frequency 50.15 MHz
3. The Marker Delta reading should be 300 kHz ± 6 kHz.

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