

# Installation Note

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## For HP ESA Spectrum Analyzers

### **Fast Time Domain Sweeps (Option AYX)**

**Kit Number E4401-60152**

### **FM Demodulation (Option BAA)**

**Kit Number E4401-60156**

### **HP-IB/Parallel (Option A4H)**

**Kit Number E4401-60177**

### **RS-232/Parallel (Option 1AX)**

**Kit Number E4401-60178**

### **IF, Sweep, and Video Output (Option A4J)**

**Kit Number E4401-60179**



**Notice.**

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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 HP-IB/Parallel Assembly (Option A4H)
- A7A3 RS-232/Parallel Assembly (Option 1AX)
- A7A5 Fast ADC Assembly (Option AXX)
- A7A6 FM Demod Assembly (Option BAA)

Products Affected: .....	HP E4401B E4402B E4403B E4404B E4405B E4407B E4408B E4411B
Serial Numbers: .....	US00000000/US99999999
Options: .....	A4H, 1AX, A4J, AXX, and BAA
To Be Performed By: .....	(X) HP Service Center (X) Personnel Qualified by HP (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, E4401-60152

Quantity	Description	Part Number
1	Board Assembly, Fast	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, E4401-60156

Quantity	Description	Part Number
1	Board Assembly, FM Demodulation	E4401-60082
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	Installation Note	this note

### Option A4H, HP-IB/Parallel Port Parts Kit, E4401-60177

Quantity	Description	Part Number
1	Board Assembly, HP-IB/Parallel	E4401-60013
1	HP ESA Spectrum Analyzers Programmer's Guide	-----
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	Protective Cap, 25-pin female	1252-4690
1	Protective Cap, 24-pin female	1252-5007
1	Installation Note	this note

**Option 1AX, RS-232/Parallel Port Parts Kit, E4401-60178**

<b>Quantity</b>	<b>Description</b>	<b>Part Number</b>
1	Board Assembly, RS-232/Parallel	E4401-60014
1	HP ESA Spectrum Analyzers Programmer's Guide	-----
1	Screw M3 x 8-mm (crest washer - pan head - TORX)	0515-0372
1	Protective Cap, 25-pin female	1252-4690
1	Protective Cap, 9-pin male	1252-4697
1	RS-232 Cable	5182-4794
1	Installation Note	this note

**Option A4J, IF, Sweep, and Video Output Parts Kit, E4401-60179**

<b>Quantity</b>	<b>Description</b>	<b>Part Number</b>
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

## Tools Required

- T-8 TORX screwdriver
- T-10 TORX screwdriver
- T-15 TORX screwdriver
- Oscilloscope
- 50Ω termination

## Torque Settings

To avoid potential RFI leakage and prevent connector damage, tighten screws and RF coax cable connectors to the following torque limits:

<b>Item</b>	<b>Torque in Inch-Pounds</b>
SMA Connector	8.5
SMC Connector	5.5
3-mm, T-8 TORX screws	9.0
3.5-mm, T-10 TORX screws	14
4-mm, T-15 TORX screws	21
Pozidrive Screws	14

## 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.

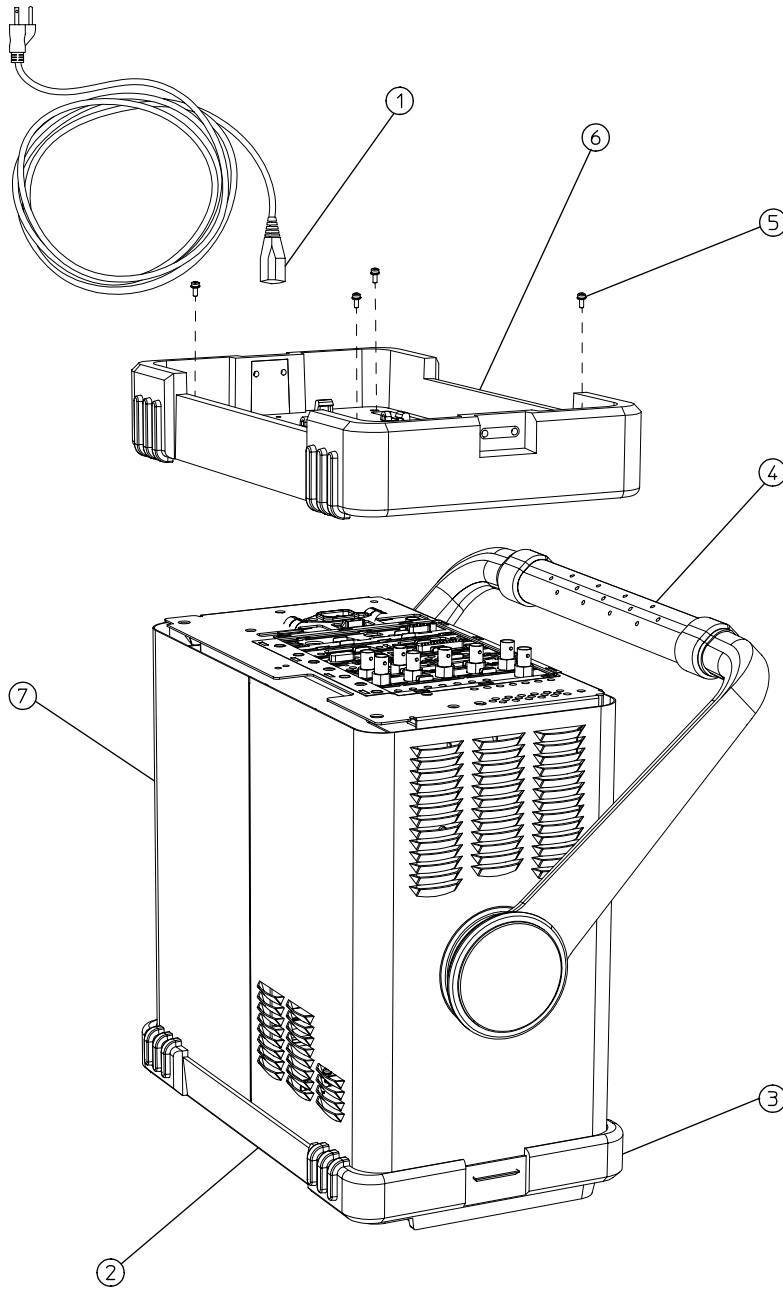
**CAUTION** Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe workstation. Refer to the documentation that pertains to your instrument for information about static-safe workstations and ordering static-safe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

### Outer Cover Removal

1. Referring 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**



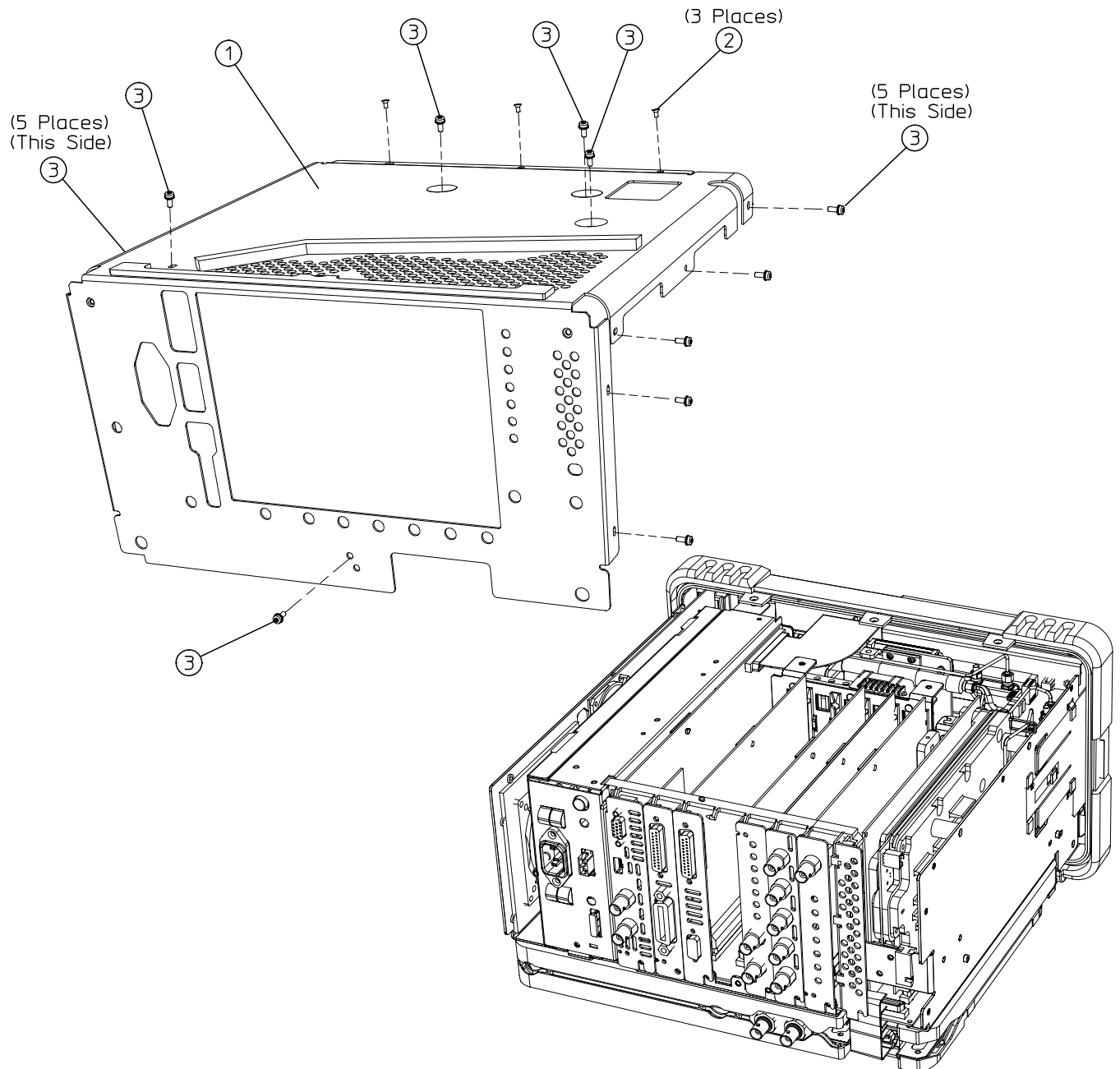
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## Inner Shield Removal

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

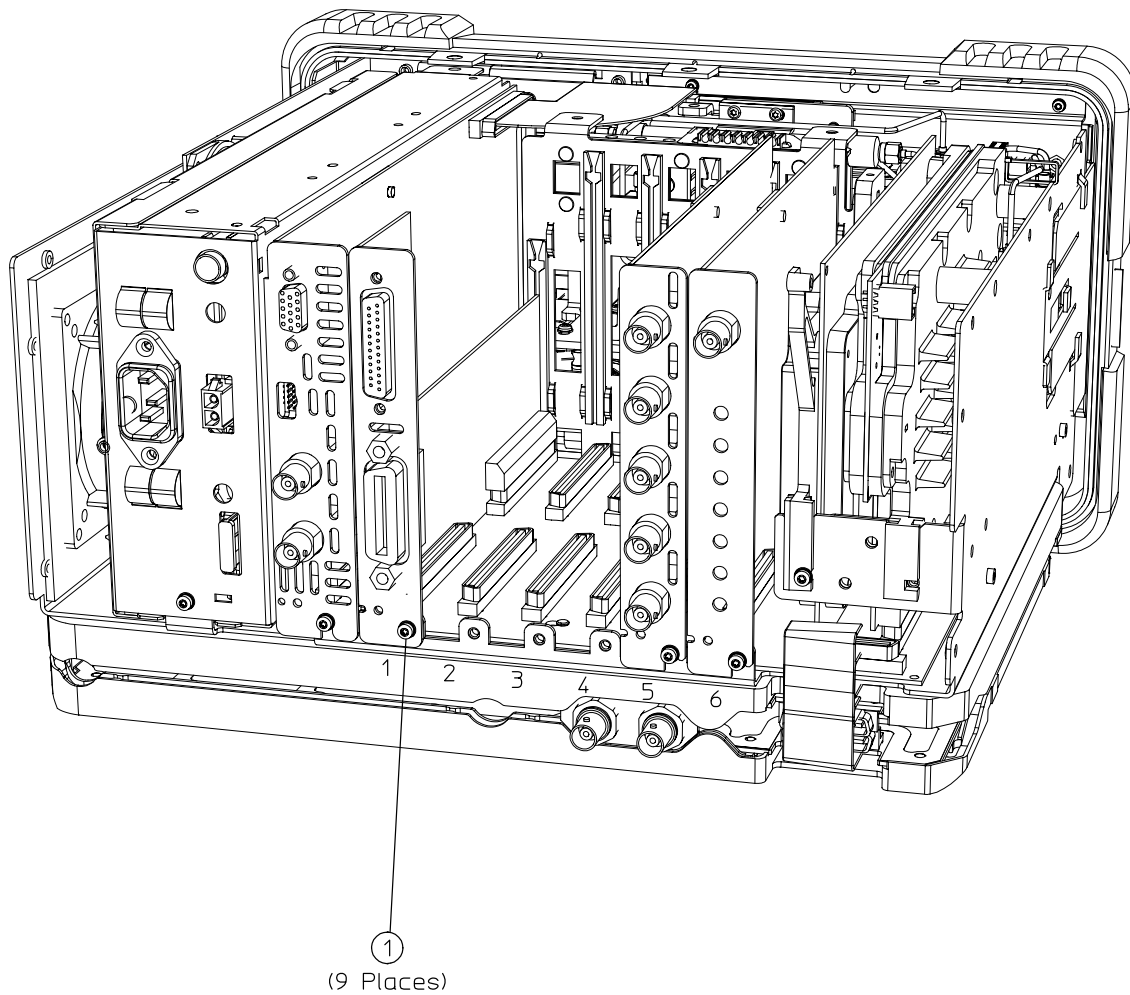


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## Installing the Option

1. Referring 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. 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**

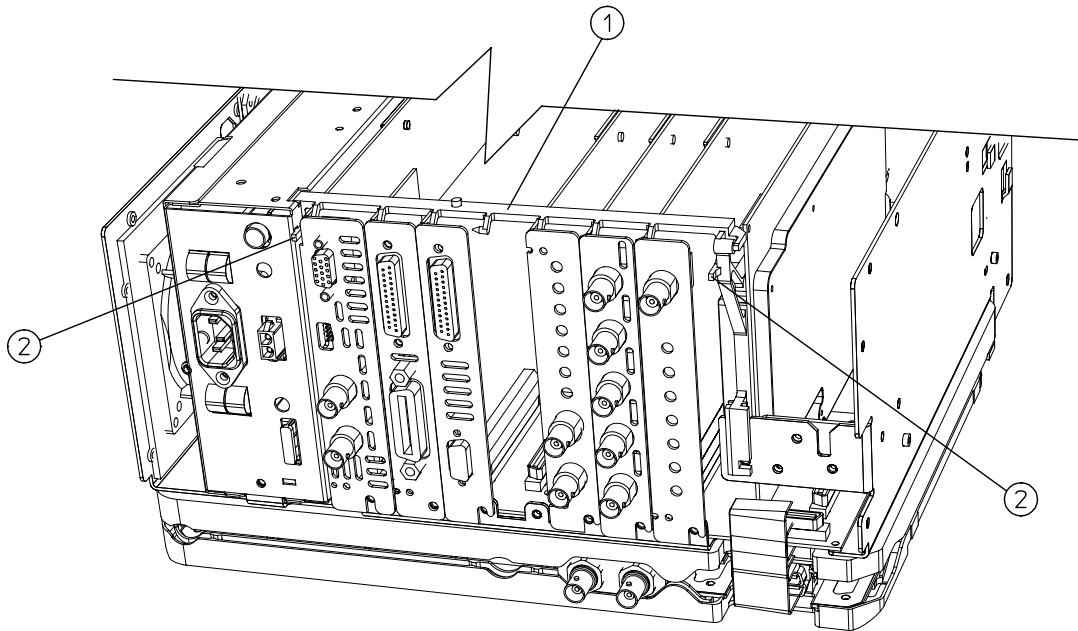


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**CAUTION**

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

**Figure 4**                    **Removing the Vibration Support**



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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. Refer to Figure 3.
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. Refer to Figure 3.

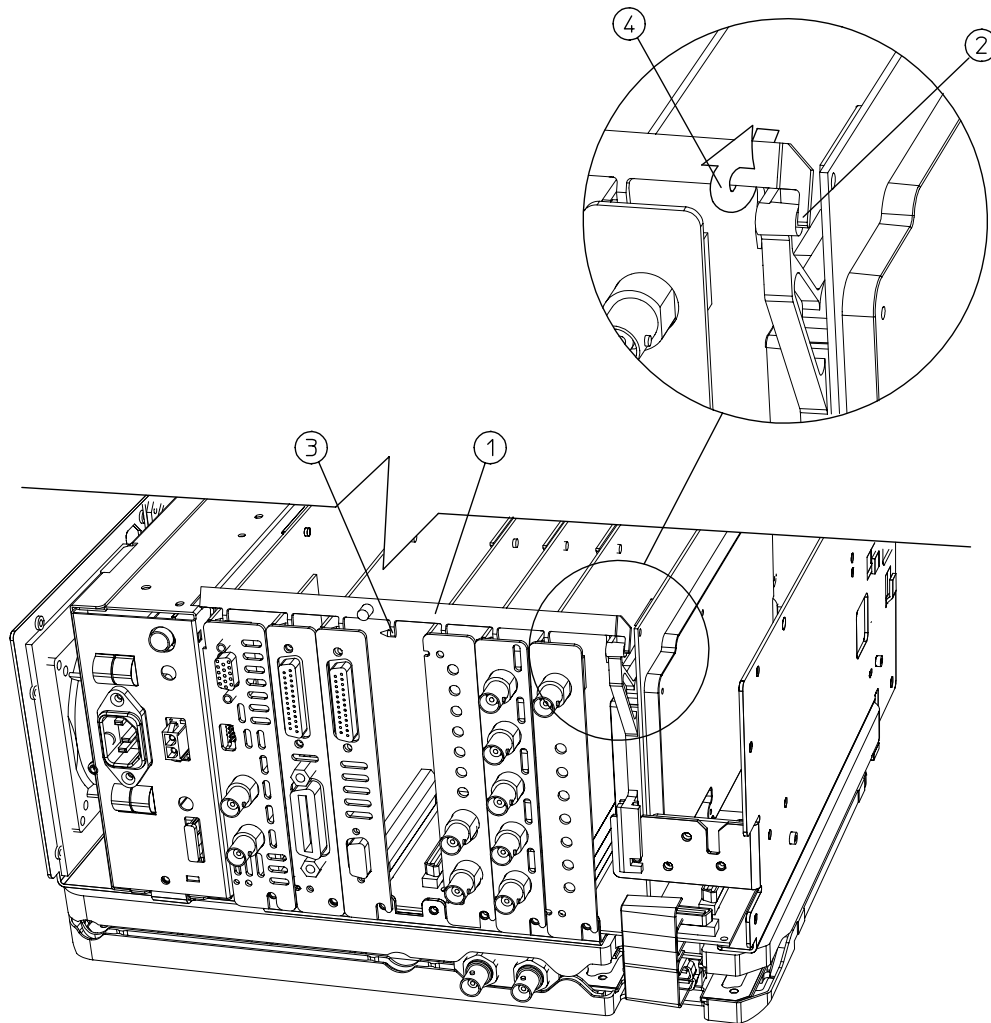
**Table 1**                    **Option and Slot Compatibility**

<b>Description</b>	<b>Option</b>	<b>Slot</b>
A7A2 HP-IB/Parallel Assembly	A4H	1 or 2
A7A3 RS-232/Parallel Assembly	1AX	1 or 2
A7A5 Fast/Parallel Assembly	AYX	3 or 4
A7A6 FM Demod/Parallel Assembly	BAA	3 or 4
A7A1 IF Sweep, Video Output Assembly	A4J	5 or 6

8. Referring 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. Referring 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.

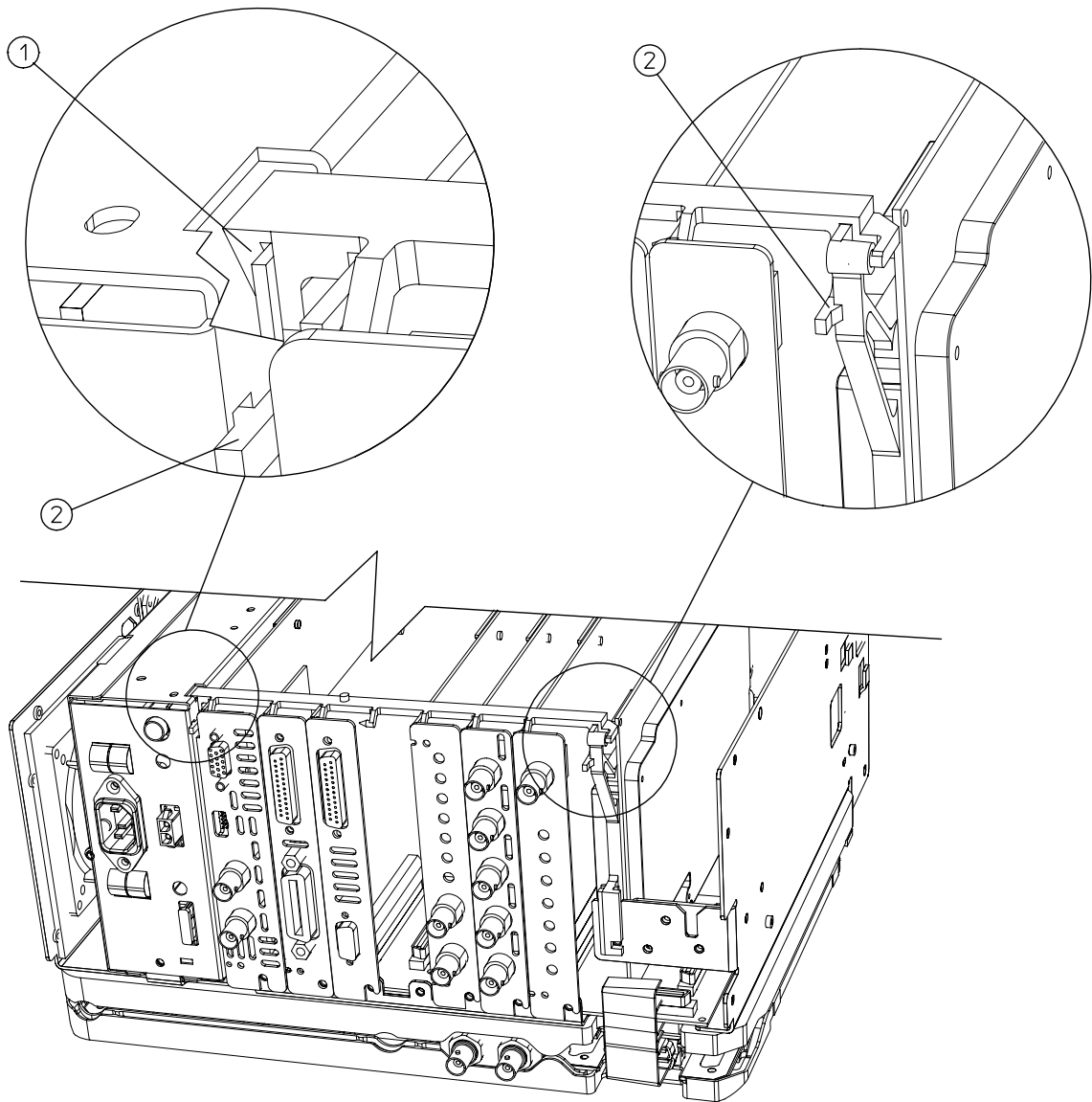
**CAUTION**                      The vibration support bar can easily be broken if it is forced. Install it with care.

**Figure 5                      Installing the Vibration Support Bar**



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**Figure 6 Seating the Vibration Support Bar**



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9. Tighten all the screws that were loosened in the removal procedure to 9 inch-pounds.
10. Referring to Figure 2, carefully position the inner shield (1) on the instrument.
11. Replace the screws (2) and (3), and tighten them to 9 inch-pounds.
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. Replace the rear frame assembly (6) using the four screws (5) to fasten the rear frame to the instrument. Tighten the screws to 21 inch-pounds torque.
16. Refer to the *HP ESA Spectrum Analyzer Calibration Guide* and perform the following performance verification tests:
  - Displayed Average Noise Level
  - Residual Responses
  - Sweep Time Accuracy (Option AYX only)

## Functional Testing

### ❑ Option A4H, HP-IB/Parallel.

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

### ❑ 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.

### ❑ 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****Input/Output, Amtpd Ref (On)** (E4401B and E4411B only)**Input/Output, Amtpd Ref Out (On)** (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B only)**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****Input/Output, Amtpd Ref (On)** (E4401B and E4411B only)**Input/Output, Amtpd Ref Out (On)** (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B only)**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 50 $\Omega$  (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B only).

- b. Analyzer settings

**Preset**

**Input/Output, Amtpd Ref (On)** (E4401B and E4411B only)

**Input/Output, Amtpd Ref Out (On)** (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B 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 50 $\Omega$ . (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B only).

- b. Analyzer settings:

**Preset**

**Input/Output, Amtpd Ref (On)** (E4401B and E4411B only)

**Input/Output, Amtpd Ref Out (On)** (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B 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 50 $\Omega$ .

### 5. HI SWP IN

- a. Analyzer settings

**Preset**

- b. Connect a 50 $\Omega$  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

1. Connect a BNC cable and type-N to BNC adapter between the AMPTD REF OUT and INPUT 50Ω. (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B only).

2. Analyzer settings

**Preset**

**Input/Output, Amtpd Ref** (On) (E4401B and E4411B only)

**Input/Output, Amtpd Ref Out** (On) (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B only)

**Frequency** 50 MHz

**Span, Zero Span**

**Bw/Avg, 3 MHz**

**Det/Demod, Demod, FM**

**FM Deviation, 100 kHz**

**Frequency** 49.95 MHz

**Marker, Delta**

**Frequency** 50.05 Mhz

3. The Marker Delta reading should be 100 kHz  $\pm$ 5 kHz.

❑ Option AYX, Fast Time Domain Sweeps

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