

# Installation Note

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## Agilent Technologies ESA Spectrum Analyzers ACPR Dynamic Range Extension (Option 120)



**Agilent Technologies**

Part Number E4402-90101 Supersedes: E4402-90042  
Printed in USA August 2006



E4402-90101

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## Introduction

This procedure can be used to retrofit ACPR Dynamic Range Extension, Option 120, into an E4402B, E4404B, E4405B, or E4407B spectrum analyzer.

Products Affected: .....	E4402B E4404B E4405B E4407B
Serial Numbers:.....	US00000000/US99999999
Options: .....	120
To Be Performed By: .....	(X) Agilent Technologies Service Center (X) Personnel Qualified by Agilent ( ) Customer
Estimated Installation Time: .....	0.75 Hours
Estimated Verification Time: .....	0.75 Hours
Additional Recommended Task: .....	Agilent recommends a full calibration be performed to verify instrument specifications

While Agilent does recommend that a full calibration be performed after the installation of this upgrade, the end user must ultimately determine whether they want this service or not. If a full calibration is required, arrangements regarding the level of calibration must be made between the end user and the calibration provider.

## Installation Kit Parts Lists

### Option 120, ACPR Dynamic Range Enhancement Retrofit Kit

Quantity	Description	Part Number
2	Cable Clip	1400-0866
1	Cable Assembly W37, (labeled red/orange)	E4402-60025
1	Cable Assembly W36, (labeled blue/black)	E4402-60026
1	ACPR Board Assembly	E4403-60065
1	Option 120 Retrofit Kit Installation Note	this note

## Tools Required

T-10 TORX screwdriver

T-15 TORX screwdriver

5/16" open-ended wrench

## 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
3.5-mm, T-10 TORX screws	14
4-mm, T-15 TORX screws	21
Pozidrive Screws	14

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## Procedure

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**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.

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**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.

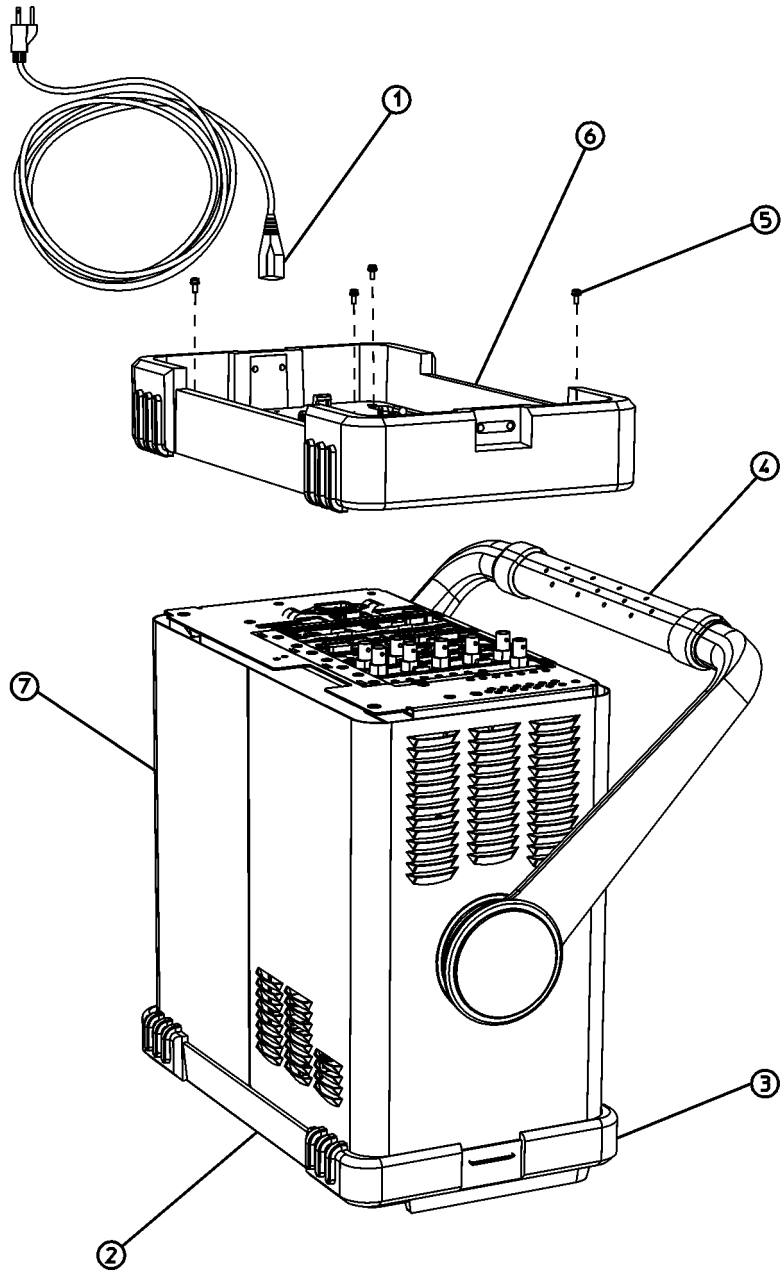
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### Dress Cover Removal

1. Referring to [Figure 1](#), disconnect the 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 dress cover in place.
6. Remove the rear frame (6).
7. Pull the dress cover (7) off towards the rear of the analyzer.

**Figure 1**

**Dress Cover and Rear Frame Removal**

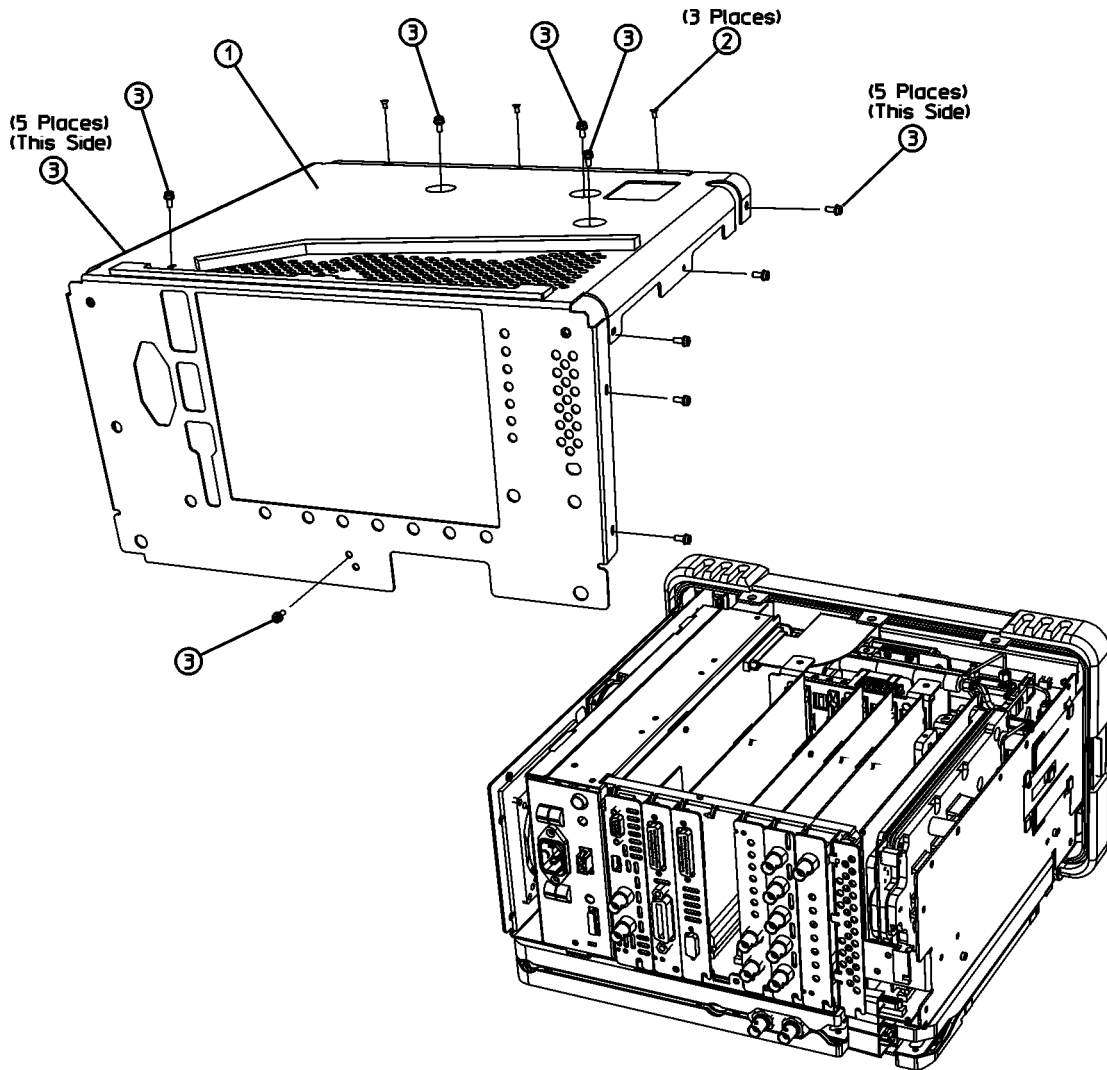


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## Chassis Cover Removal

1. Lay the analyzer flat as shown in [Figure 2](#).
2. Remove the 15 screws (2) and (3) attaching the chassis cover to the chassis. Note that the number of screws attaching the chassis cover may vary with option mixes.
3. Remove the chassis cover (1) from the chassis.

**Figure 2** Chassis Cover Removal



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## A1 Front Frame Assembly

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**CAUTION** Use ESD precautions when performing this replacement procedure.

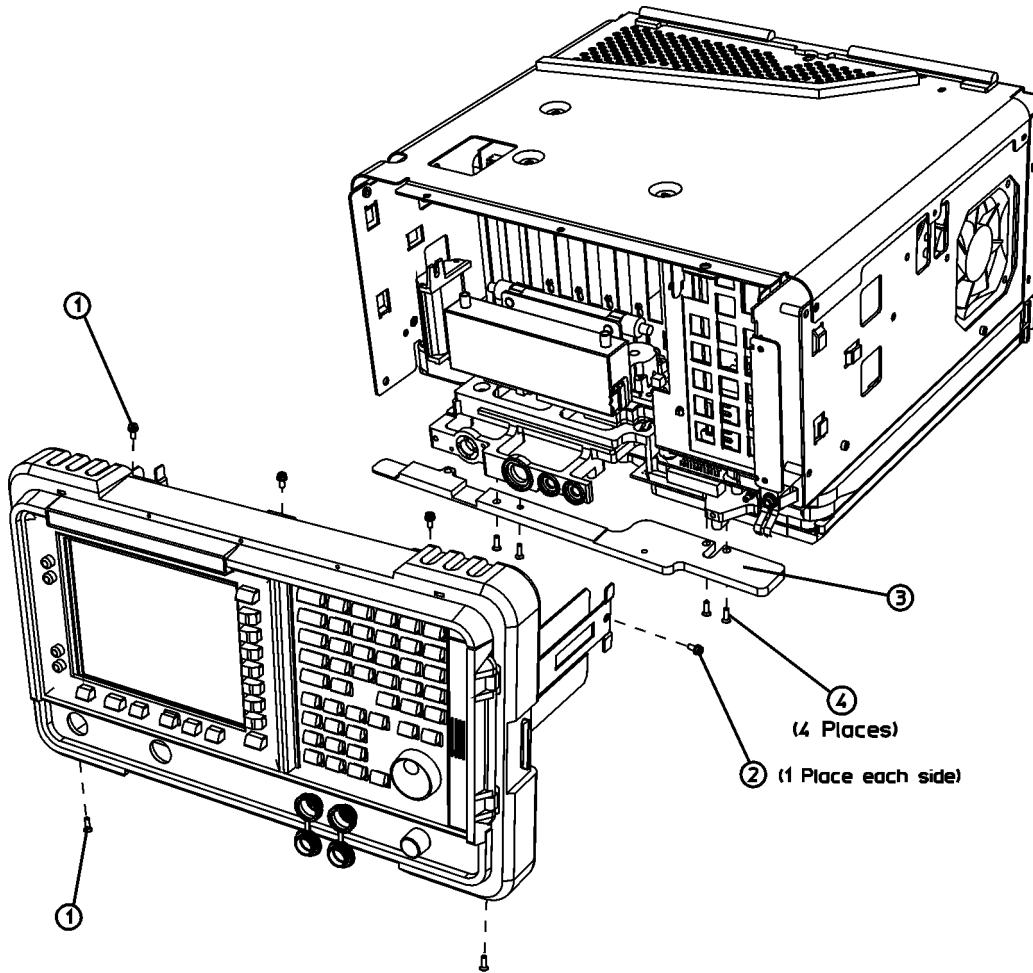
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### Extension

The A1 front frame assembly can be extended from the instrument without detaching any connections.

1. Refer to [Figure 3](#). With the instrument still on its face, remove the five screws (1), two on the bottom side and three on the top of the instrument, that secure the front frame to the RF assembly and chassis cover.

**Figure 3** A1 Front Frame Assembly Removal



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2. Place the instrument with the top side facing up and remove the remaining two screws (2) that secure the front frame subpanel to the chassis.
3. Slide the front frame forward until it catches on the tabs on the sides of the chassis.

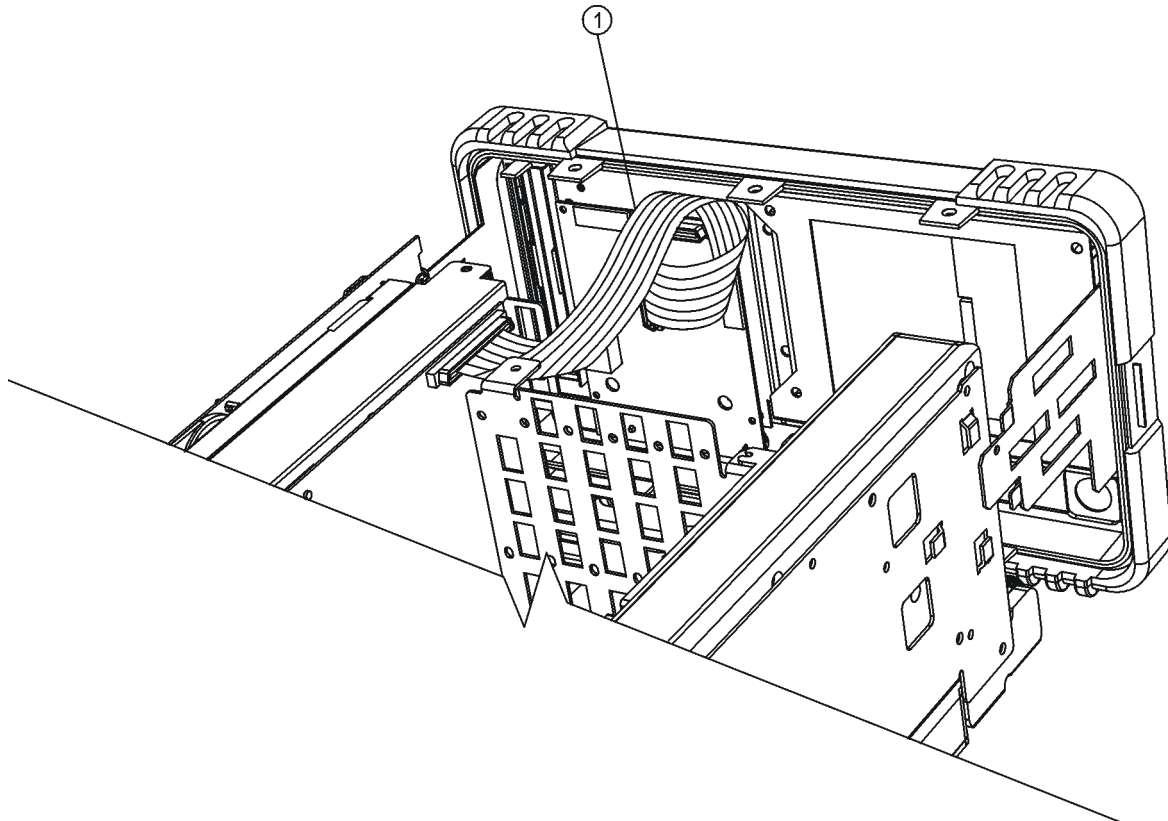


## Removal

Refer to [Figure 3](#). To completely remove the A1 front frame assembly, complete the “[Extension](#)” procedure, then continue with the following steps:

1. Refer to [Figure 4](#). Disconnect the ribbon cable (1) from the A1A1 front panel interface board. Analyzers with Option B7B will have a second ribbon cable connecting to A1A1. Disconnect the second ribbon cable if present.

**Figure 4** Front Frame Ribbon Cable



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2. Carefully pull the sides of the front frame subpanel away from the chassis and over the tabs on the chassis.
3. Slide the front frame forward to disengage from the chassis assembly.

## A8A4 LO Amp/IF Switch Assembly

(E4404B, E4405B, E4407B, and E4408B)

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**CAUTION** Use ESD precautions when performing this replacement procedure.

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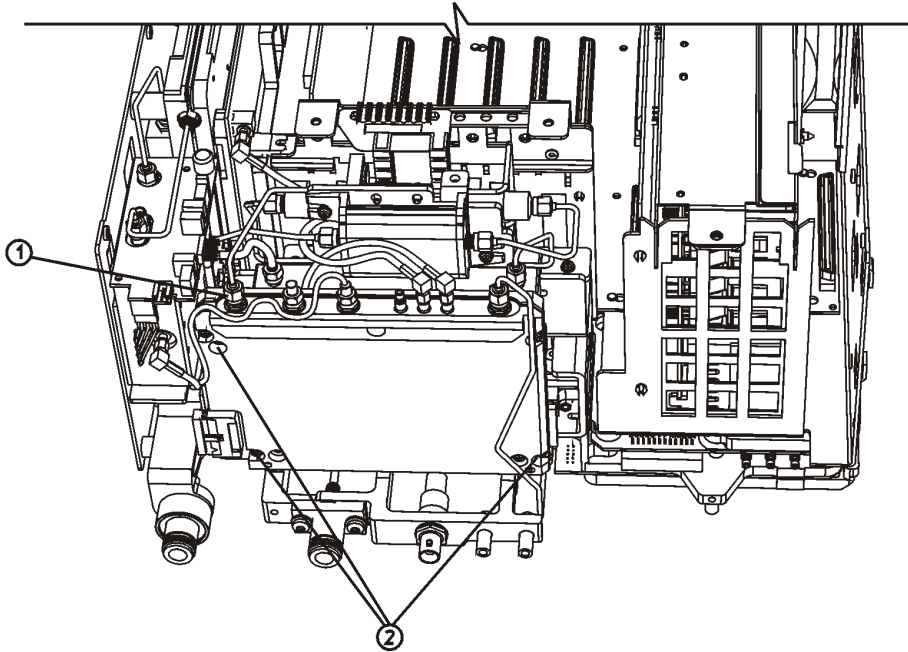
**NOTE** The LO amplifier and IF switch (LOIS) assembly can be removed without removing the RF assembly.

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### Removal

1. Referring to [Figure 5](#), disconnect any cables and loads (1) from the LOIS assembly.
2. Remove the three screws (2) and remove the LOIS assembly.

**Figure 5** Removing the LO Amplifier/IF Switch Assembly

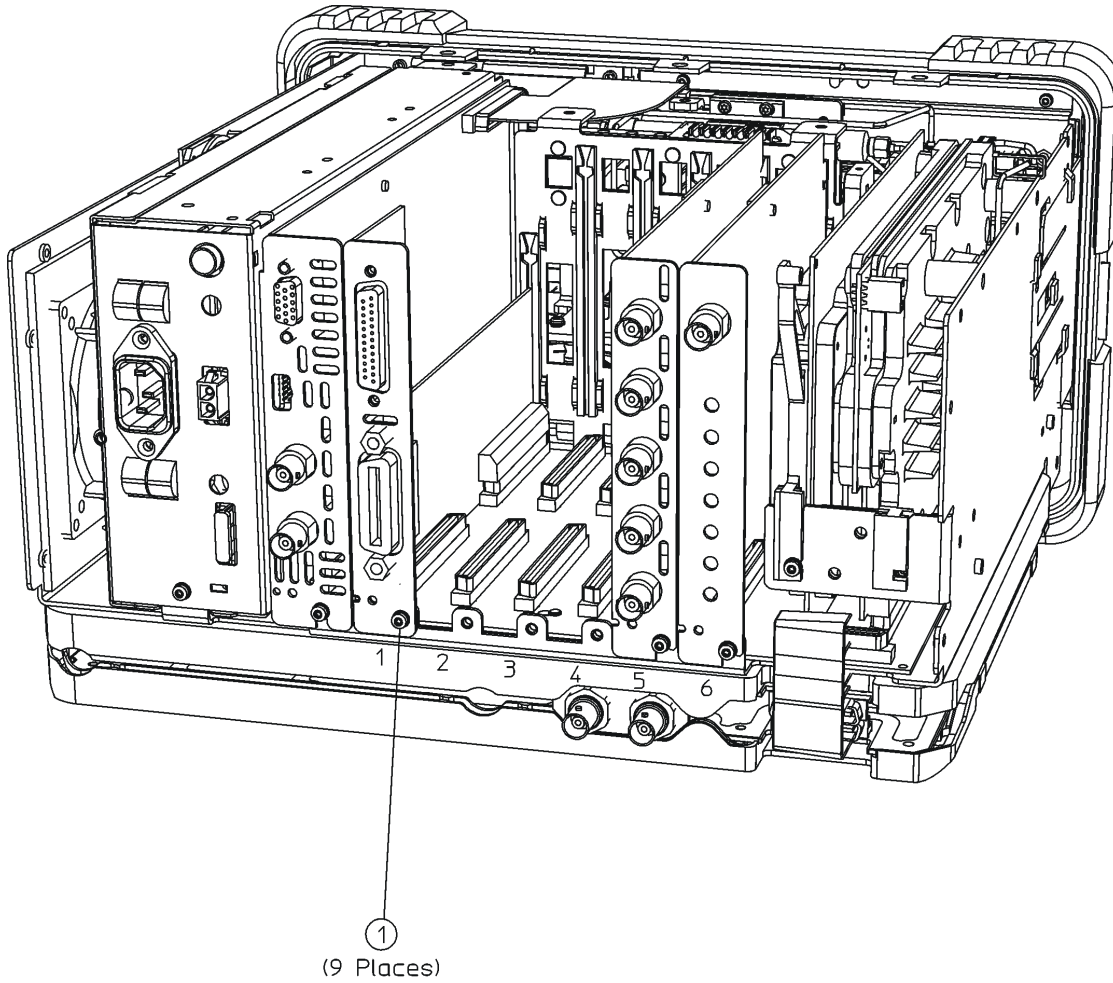


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## Install A7A9 ACPR Assembly

1. Referring to [Figure 6](#), loosen, but do not remove, all 9 of the screws (1) securing the boards and blank plates at the rear of the chassis.

**Figure 6** Instrument, Rear View



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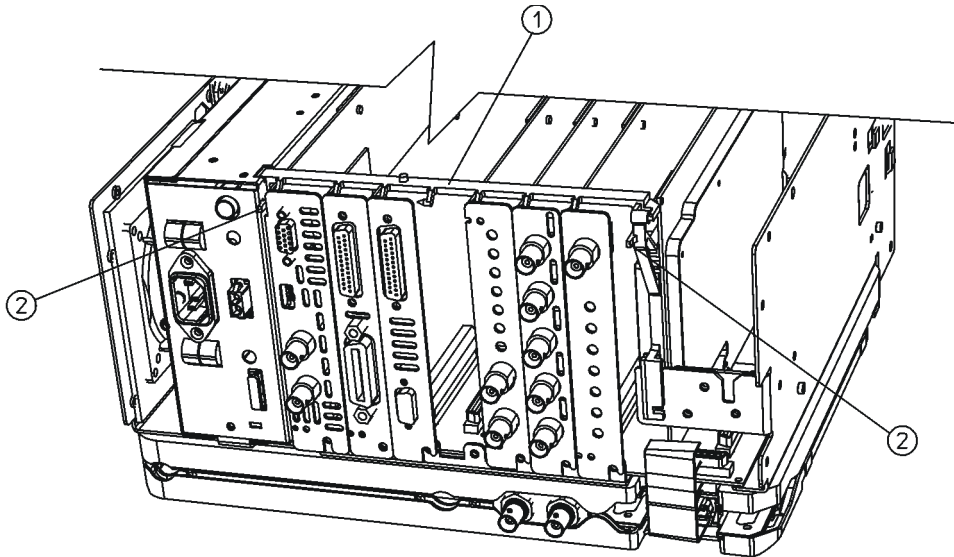
2. Referring to [Figure 7](#), remove the vibration support bar (1) at the top rear of the instrument by pressing in the locking tabs (2) and rotating the bar upward. The bar can be removed by sliding it out of the holes in each assembly.

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

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**Figure 7** Removing the Vibration Support



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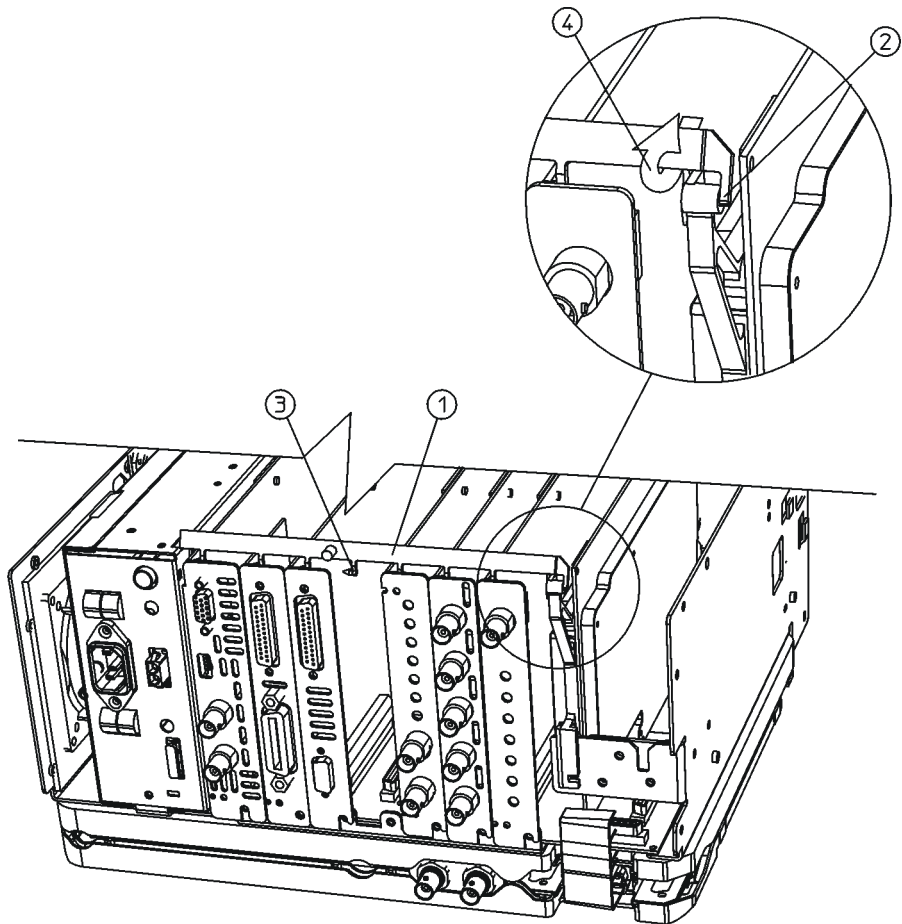
3. The preferred slot for the A7A9 ACPR Assembly is slot 2. However, it can be inserted in either slot 2, 3, 4, or 5. Identify the desired empty slot for the A7A9 ACPR Assembly.
4. Remove the single screw (1) securing the desired slot's blank panel to the chassis. Refer to [Figure 6](#).
5. Carefully pull up on the blank panel to remove it from the analyzer.
6. Carefully plug the A7A9 ACPR Assembly into the desired empty slot.
7. Replace the screw (1) that secures the A7A9 ACPR Assembly to the chassis, but do not tighten it yet. Refer to [Figure 6](#).
8. Referring to [Figure 8](#), 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 9](#), 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.

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

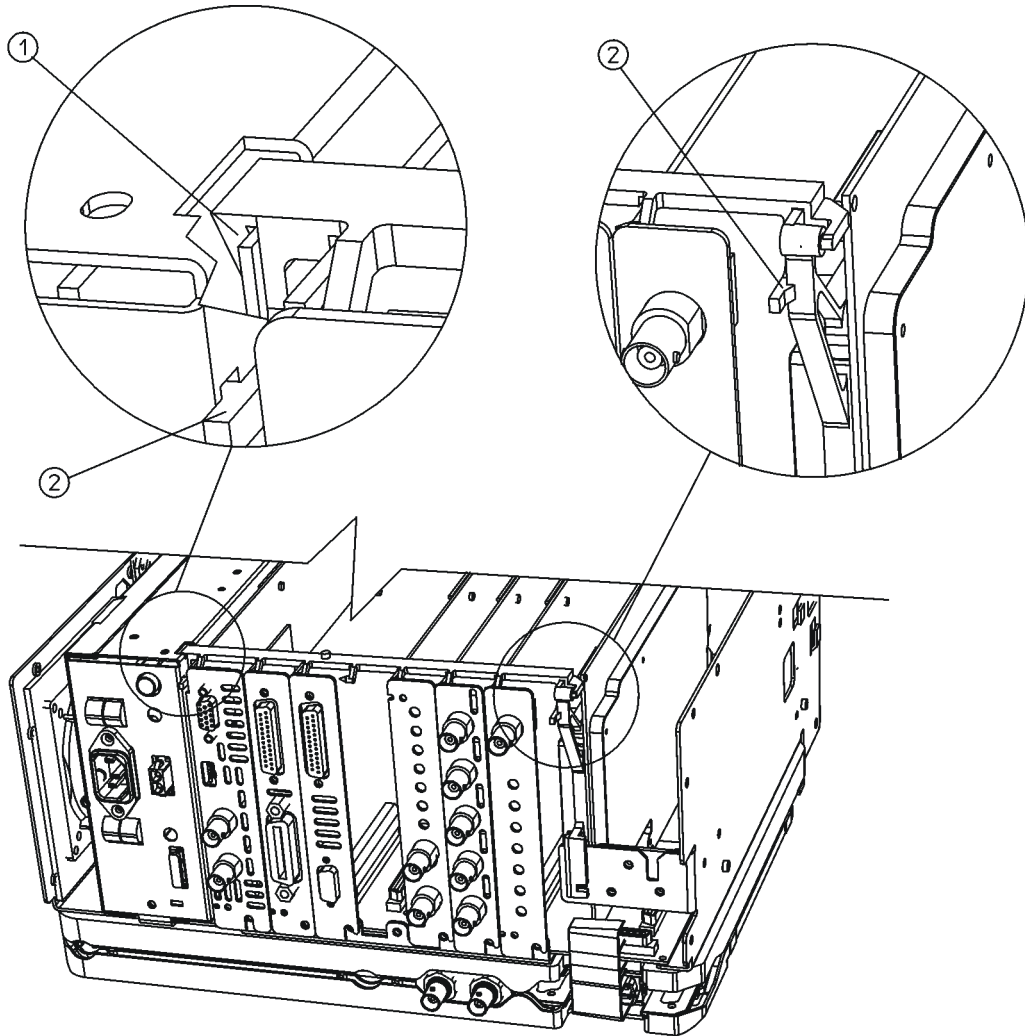
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**Figure 8**      **Installing the Vibration Support Bar**



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**Figure 9 Seating the Vibration Support Bar**



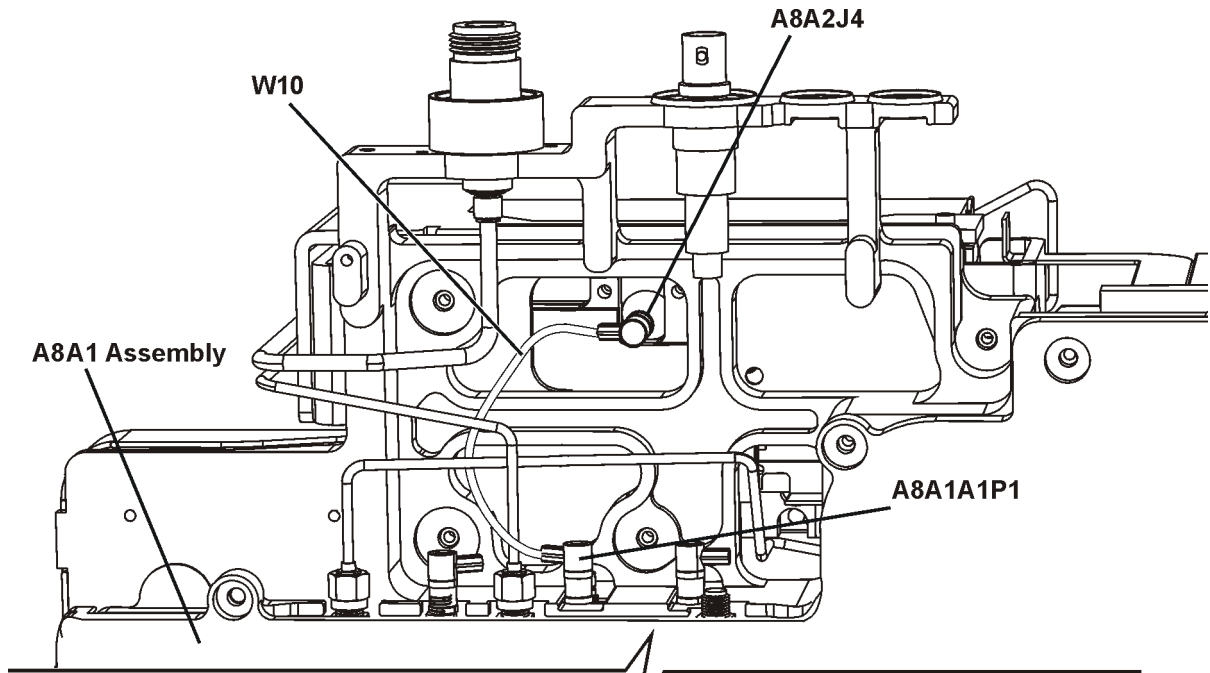
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9. Tighten all the screws that were loosened in the removal procedure to 9 inch-pounds.

## Install New Coaxial Cables

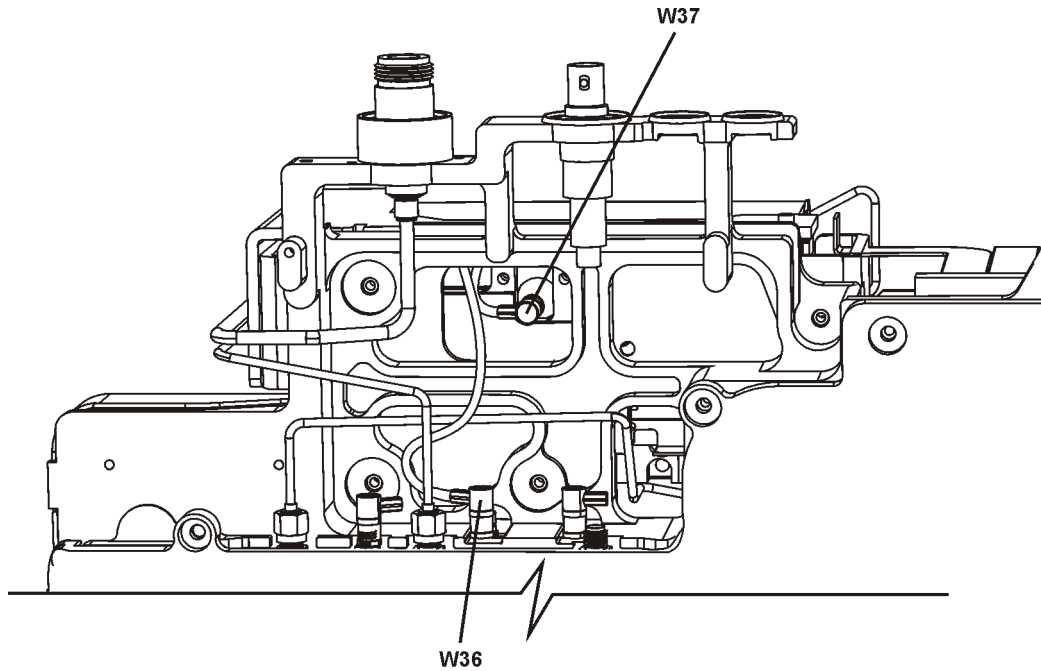
1. Rotate the analyzer so that it is sitting on its right side (floppy disk drive on the table).
2. Refer to [Figure 10](#). Locate W10, the short coaxial cable from A8A1A1P1 (on the 3 GHz RF Assembly) to A8A2J4 (on the A8A2 Second Converter). Remove this cable from A8A1 and A8A2.

**Figure 10**      **W10 Cable Location**



3. Locate W37 in the kit of parts. This cable has red and orange labels at each end, and one end has an SMB connector and the other end an MMCX connector. Connect the SMB end of the cable to A8A2J4 on the A8A2 Second Converter.
4. Locate W36 in the kit of parts. This cable has blue and black labels at each end and one end has an SMB connector and the other end an MMCX connector. Connect the SMB end of the cable to A8A1A1P1 on the A8A1 3 GHz RF Assembly.
5. Route both cables through the hole in the A8A1 3 GHz RF Assembly's "midweb" as shown in [Figure 11](#).

**Figure 11 ACPR Cable Routing**

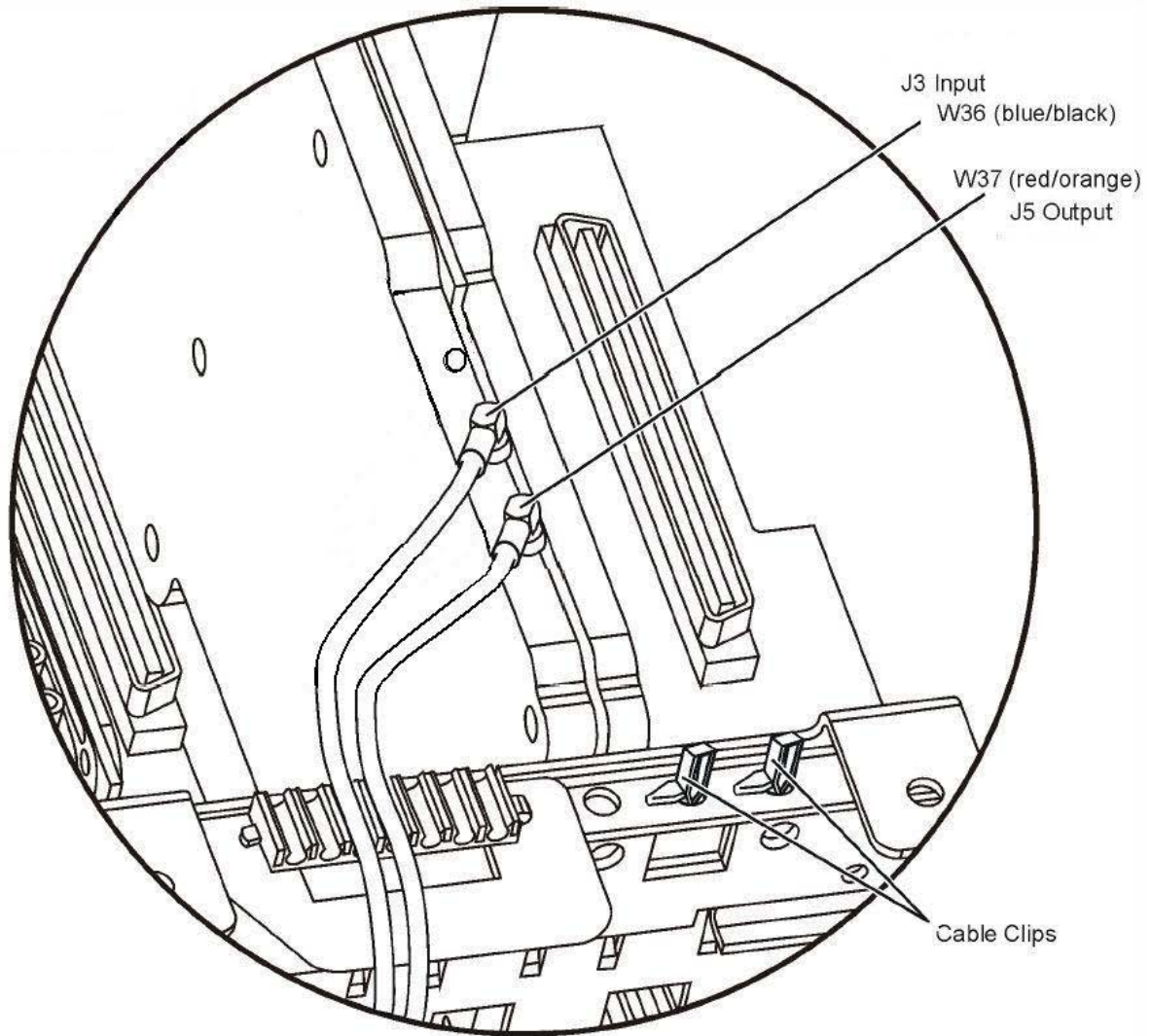


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6. Rotate the analyzer so that it is sitting right-side up (3 GHz RF Assembly on the table).
7. Refer to [Figure 12](#). Newer analyzers will have one multi-cable clip along the edge of the card cage and two single-cable clips. If the single-cable clips are missing, install the two single-cable clips included in this kit in the locations indicated in [Figure 12](#).
8. Refer to [Figure 12](#). Locate the two MMCX connectors on the top of the A7A9 ACPR Assembly. There might also be a hole in the shield for a third MMCX connector (not installed) toward the back of the A7A9 ACPR Assembly.



**Figure 12 ACPR Cable Connections**



9. Connect the W36 (blue/black) cable to the rear-most connector. Connect W37 (red/orange) to the front-most connector.
10. Fit W36 and W37 in either the multi-cable clip (if the ACPR board is installed in slot 4 or 5) or in the single-cable clips (if the ACPR board is installed in slot 2 or 3). Route the cables such that it will be easy to remove any adjacent boards in the card cage.
11. If the analyzer is an E4402B, proceed with “Front Frame Assembly Replacement”. Otherwise, proceed to “LO Amp/IF Switch Replacement”.

## LO Amp/IF Switch Replacement

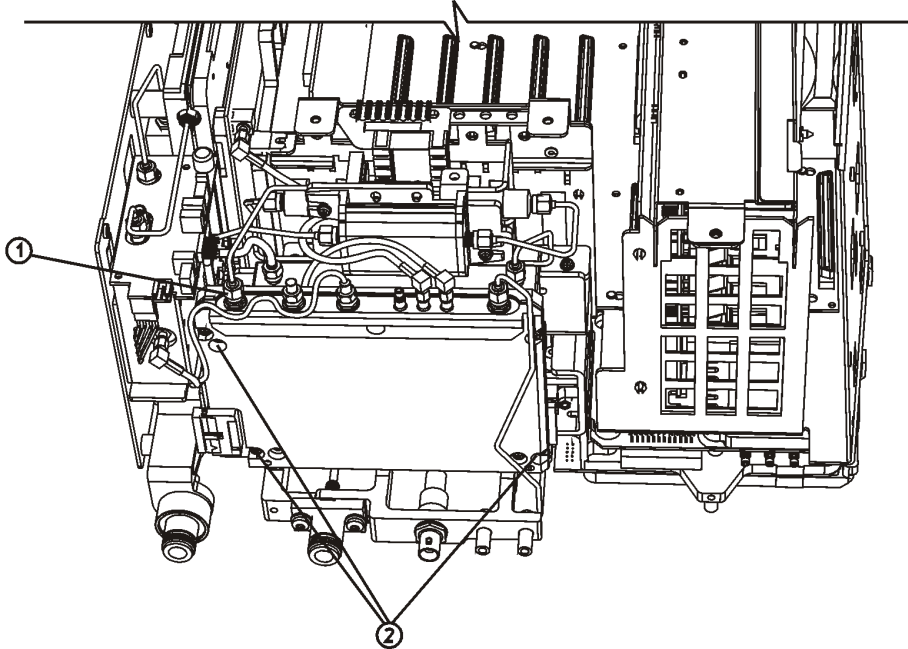
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**CAUTION** CAUTION: Use care not to pinch any cables during reassembly.

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1. Ensure that W36 and W37 lay flat against the A8A5 Input Attenuator.
2. Referring to [Figure 13](#), replace the LO Amp/IF Switch Assembly and secure in place with the three screws (2). Tighten them to 9 inch-pounds.

**Figure 13** Removing the LO Amplifier/IF Switch Assembly



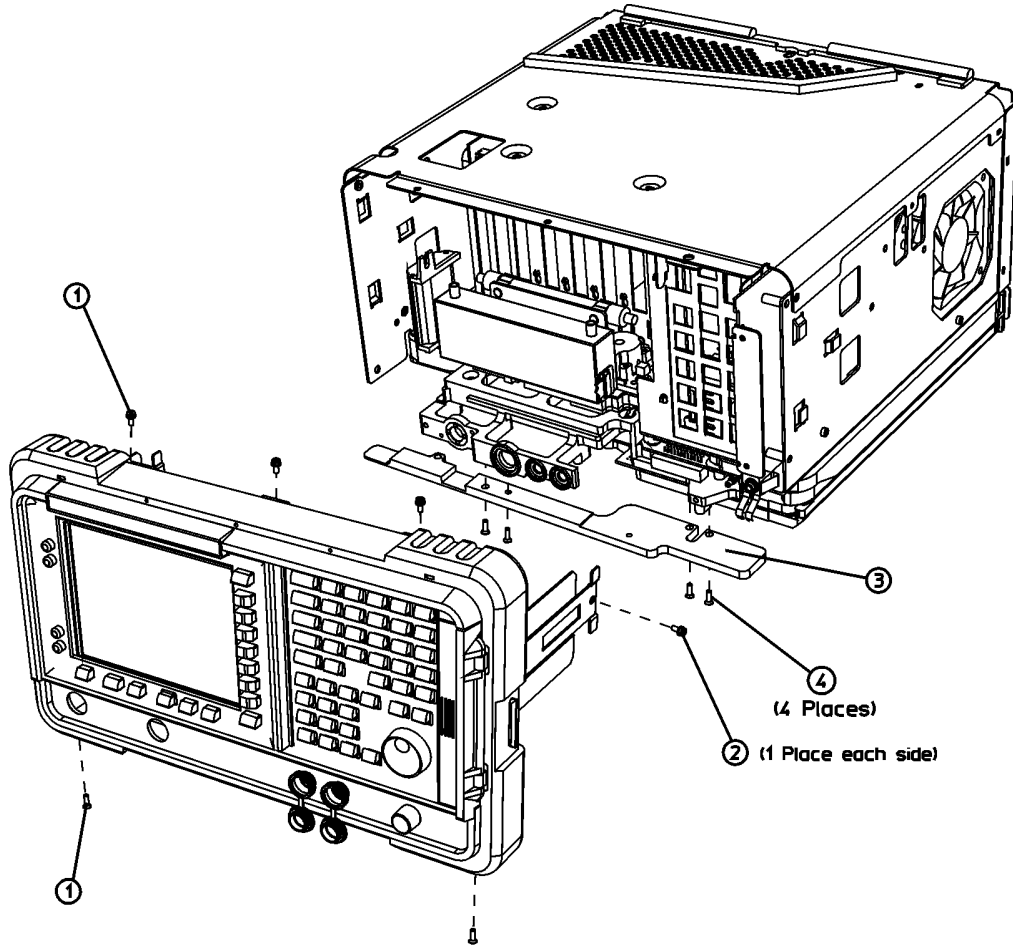
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3. Reconnect the previously removed cables and loads (1). Tighten the SMA connectors to 10 inch-pounds.

## A1 Front Frame Assembly Replacement

1. Align the A1 front frame subpanel rails with the chassis as show in [Figure 14](#).

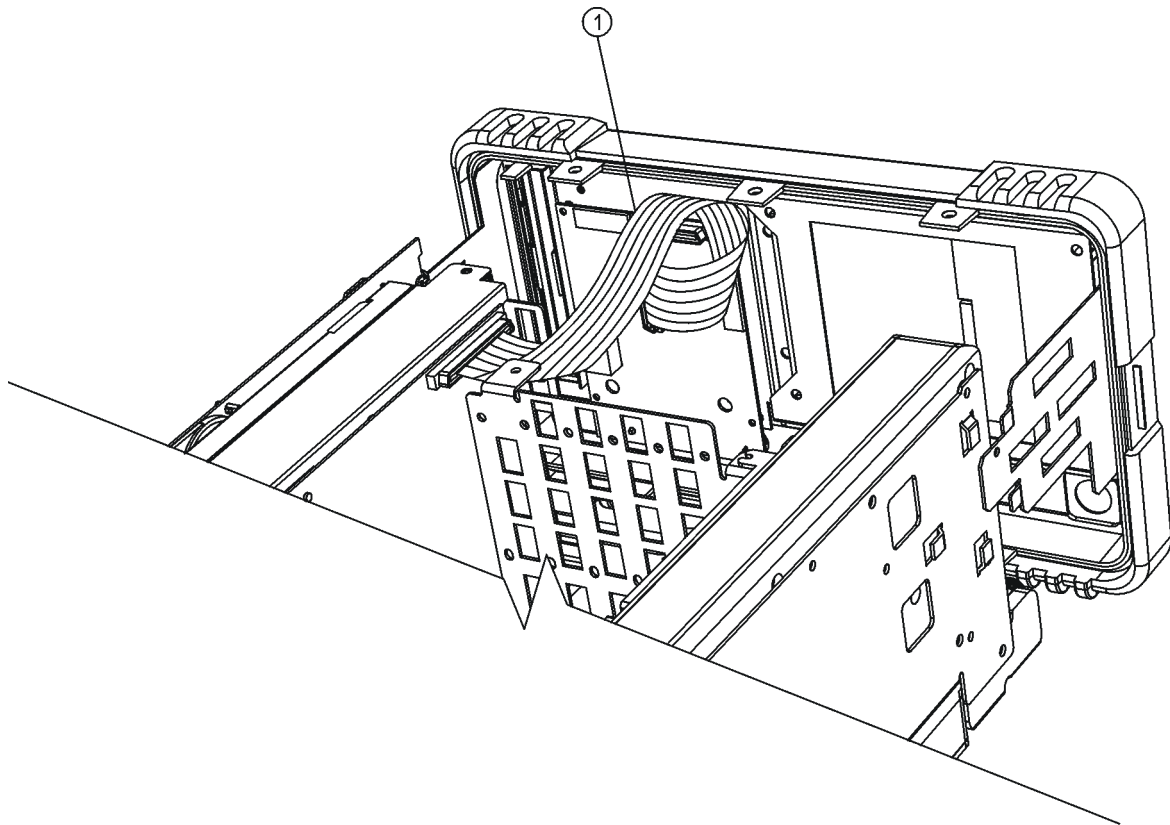
**Figure 14** A1 Front Frame Assembly Replacement



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2. Refer to [Figure 15](#). Connect the ribbon cable (1) to the front frame assembly. If Option B7B is installed, there will be two ribbon cables to connect.

**Figure 15**      **Front Frame Ribbon Cable**



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3. Carefully slide the front frame toward the chassis, assuring the ribbon cable(s) are not pinched between assemblies, and the RF input connector lines up correctly with the opening in the front frame.

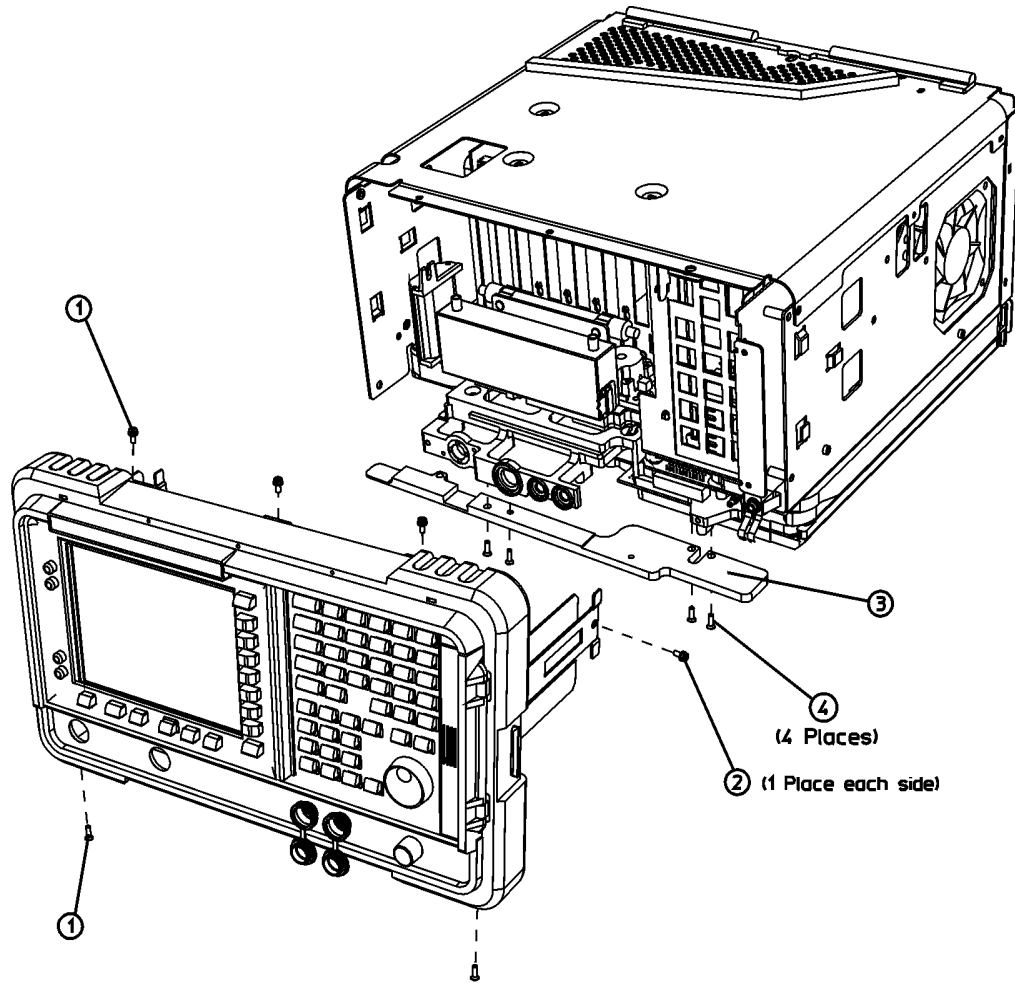
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**NOTE**      Make sure the water seal is still in place around the input connector (and around the A2 tracking generator connector if the analyzer has Option 1DN) before reinstalling the front frame assembly.

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4. Refer to [Figure 16](#). Replace the screws (1) that secure the front frame to the chassis. Tighten them to 9 inch-pounds.

**Figure 16      A1 Front Frame Assembly Replacement**

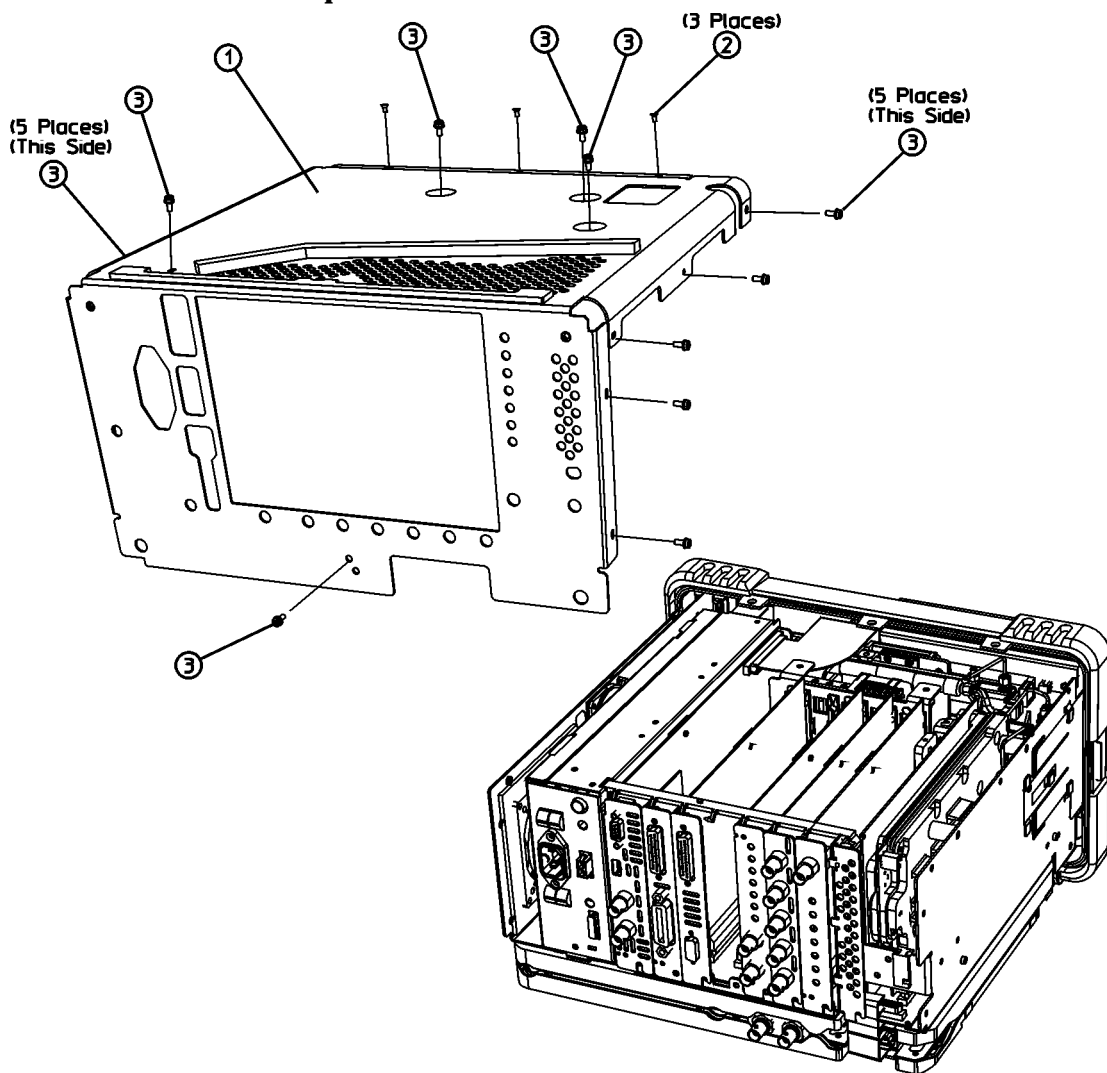


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## Chassis Cover and Dress Cover Replacement

1. Referring to [Figure 17](#), carefully position the chassis cover (1) on the analyzer.
2. Replace the screws (2) and (3) following the instructions on the chassis cover and tighten them to 9 inch-pounds.
3. Carefully place the analyzer on the work surface with the front frame facing down.
4. Replace the analyzer dress cover aligning the grill on the side of the cover to the fan on the A5 power supply assembly.
5. Fit the leading edge of the dress cover completely into the slot on the back of the front frame assembly.
6. Replace the rear frame assembly (6) using the four screws (5) to fasten the rear frame to the analyzer. Tighten the screws to 21 inch-pounds.

**Figure 17** Inner Shield Replacement



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## **Performance Testing Required**

The performance tests listed below are the minimum recommended set that will verify the upgrade just installed is functioning correctly. Performing these tests alone does not guarantee that the instrument meets all advertised performance specifications. The performance test procedures can be found in the ESA Spectrum Analyzer Calibration Guide, or the tests can be performed using the software. Information on how to obtain this software can be found at: [www.agilent.com/find/calbrationsoftware](http://www.agilent.com/find/calbrationsoftware).

- Displayed Average Noise Level
- Residual Responses
- Noise Sidebands
- Noise Sidebands - Wide Offsets

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**NOTE**      **A full calibration is required to ensure the instrument meets all advertised performance specifications.**

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