

# **Installation Note**

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**Agilent Technologies ESA-L1500A Spectrum Analyzer  
Power Supply Upgrade Kit Number E4411-60021**



**Agilent Technologies**

Part Number E4411-90047 Supersedes E4411-90042

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# E4411-60021 Power Supply Upgrade

Product Affected: . . . . .	ESA-L1500A Spectrum Analyzer
Serial Numbers: . . . . .	US37451286 and Below Require This Upgrade The Following Exceptions Do Not Require This Upgrade: US37451120, US37451121, US37451122, US37451123, US37451124, US37451143, US37451203, US37451212, US37451223, US37451229, US37451230, US37451238, US37451243, US37451253, US37451256, US37451261, US37451263, US37451264, US37451266, US37451268, US37451270, US37451272, US37451277, US37451279, US37451281, US37451284
To Be Performed By: . . . . .	(X) Agilent Technologies Service Center (X) Personnel Qualified by Agilent
Estimated Installation Time: . . . . .	1.25 Hours
Estimated Verification Time: . . . . .	0.5 Hour

## Introduction

This kit has been provided to reduce excess noise in the power supply of the ESA-L1500A spectrum analyzer.

## Installation Kit Parts List

**Table 1** Parts Kit E4411-60021 Contents

Item	Quantity	Description	Part Number
1	1	Daughter Board	E4401-60090
2	1	Capacitor, 4700 pF, 100V (small bubble cap. labeled 472K)	0160-4831
3	1	Capacitor, 4700 pF, 250V (rectangular cap. labeled 4n7 Y2)	0160-4439
4	1	Capacitor, 1000 pF, 100V (small bubble cap. labeled 102K)	0160-4574
5	2	Resistor, 10 ohm	0757-0346
6	1	Resistor, 1 ohm	0698-8812
7	1	Insulation Sleeve	0890-0099
8	1	Label, Power Supply Assembly (E4401-60111)	7121-7526
9	1	Label, Power Supply Main Power Board (E4401-60103)	9320-6209
10	1	Installation Note	E4411-90047

## Tools Required

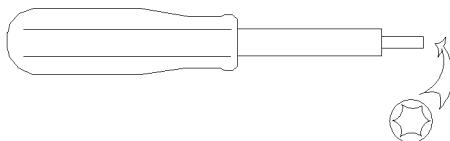
### WARNING

**A High Pot Test—also known as High Potential or Dielectric Withstand Test—is required after working on the high voltage section of the power supply. Ensure suitable test equipment is available for this test before performing this upgrade.**

Description	Part Number
TORX Hand Driver—Size T10	8710-1623
TORX Hand Driver—Size T15	8710-1622
Soldering Iron and Solder	

**Figure 1**

**TORX Tool**



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### WARNING

**Opening covers or removing parts is likely to expose dangerous voltages. Disconnect the product from all voltage sources before opening covers.**

### WARNING

**The spectrum analyzer contains potentially hazardous voltages. Failure to heed the safety precautions can result in severe or fatal 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.

# Procedure

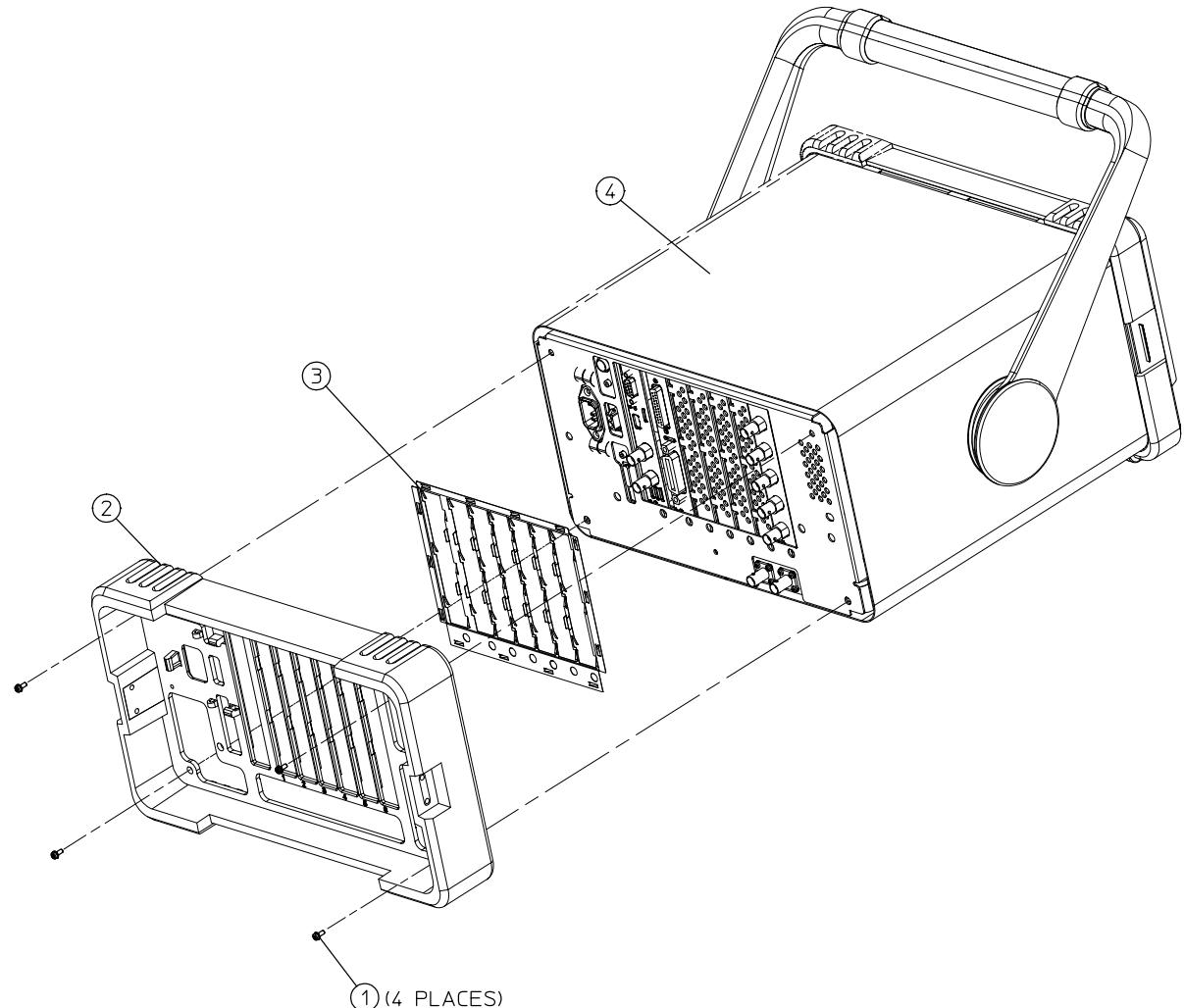
## Removing the Outer Case

1. Disconnect the spectrum analyzer power line.
2. Carefully place the analyzer on the work surface with the front frame facing down.  
Refer to Figure 2.
3. Remove the four screws (1) that hold the rear frame (2) and outer case (4) in place.
4. Pull the instrument outer case and rear frame off toward the rear of the instrument.

**CAUTION**

The Rear EMI Gasket (3) that clips onto the rear panel can come loose. Note the correct position to reattach the gasket.

**Figure 2 Outer Case, Rear Frame Removal**

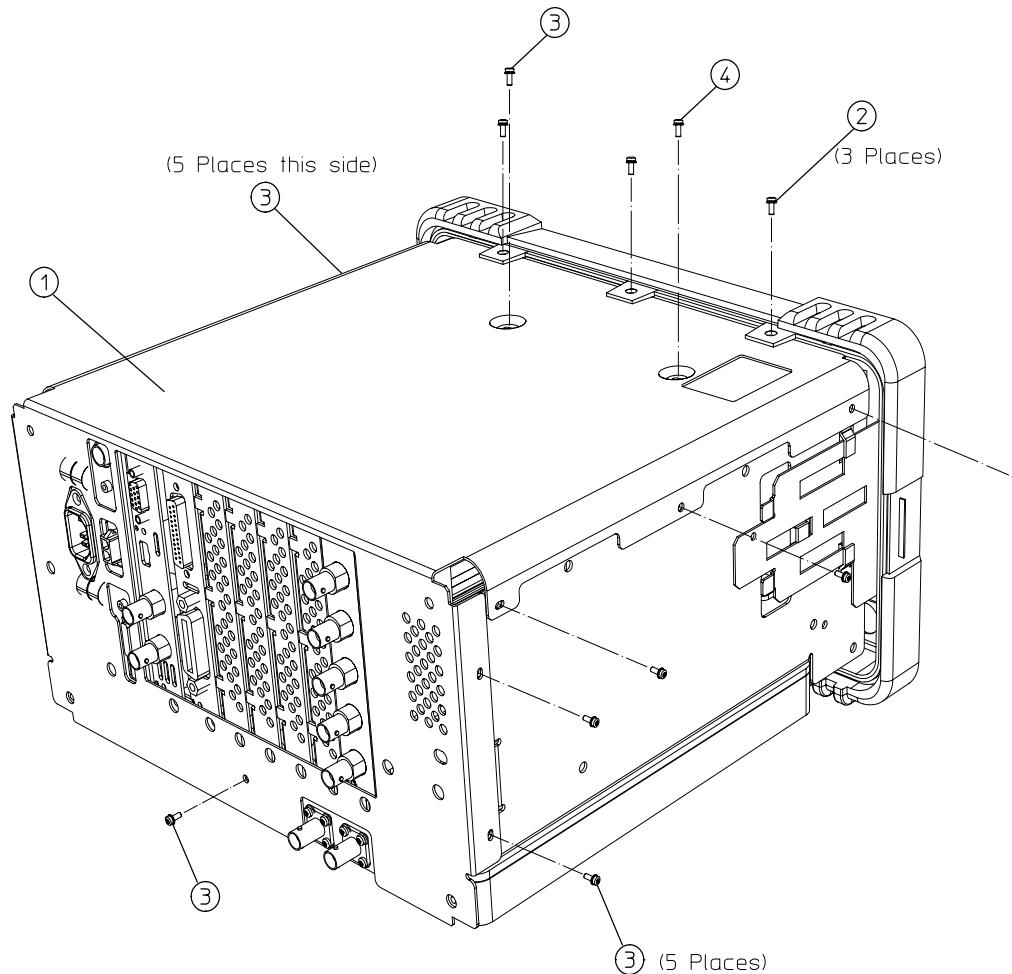


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## Removing the Inner Shield

1. Refer to Figure 3. Remove the 16 screws (2), (3), and (4) attaching the inner shield (1) to the chassis. If the tracking generator option is installed, the screw labeled (4) will not be present. In that case, there will be only 15 screws (2) and (3).

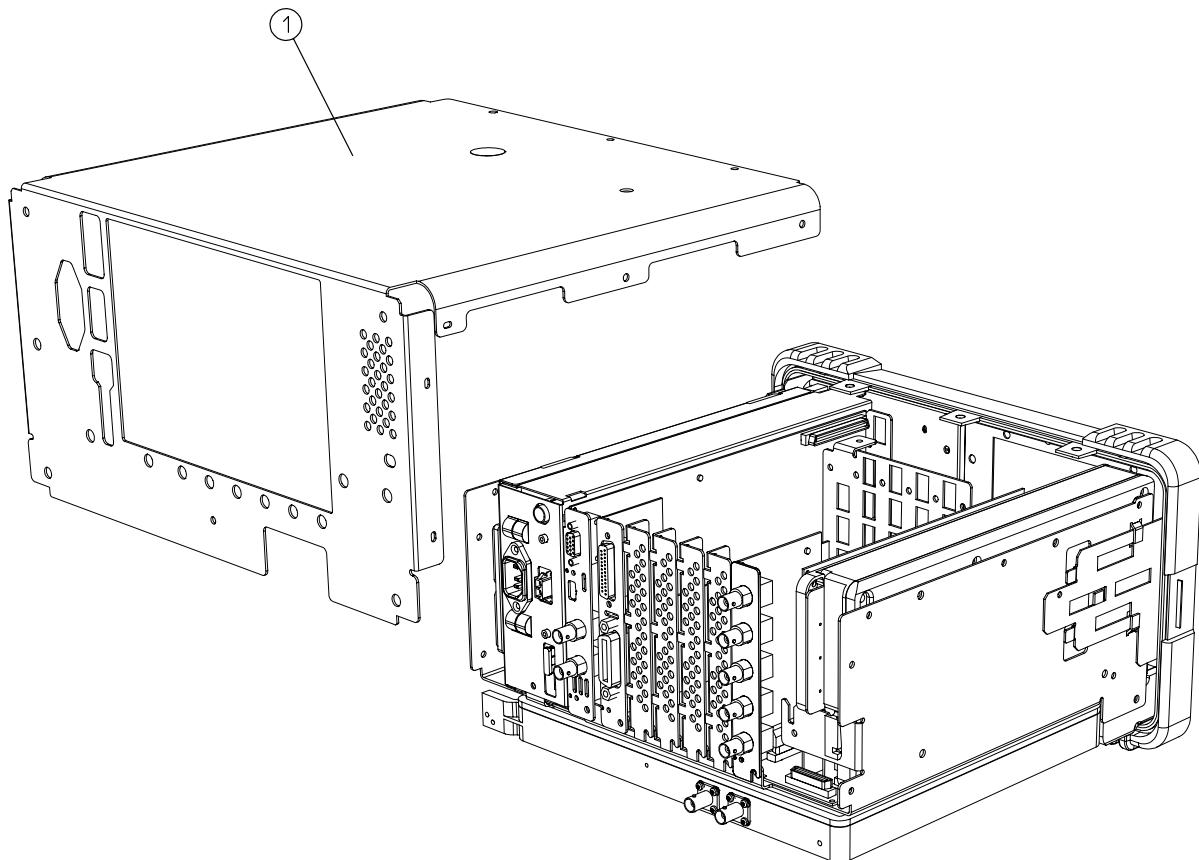
**Figure 3**      **Inner Shield Removal**



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2. Refer to Figure 4. The inner shield (1) can now be removed from the chassis.

**Figure 4**                    **Inner Shield**



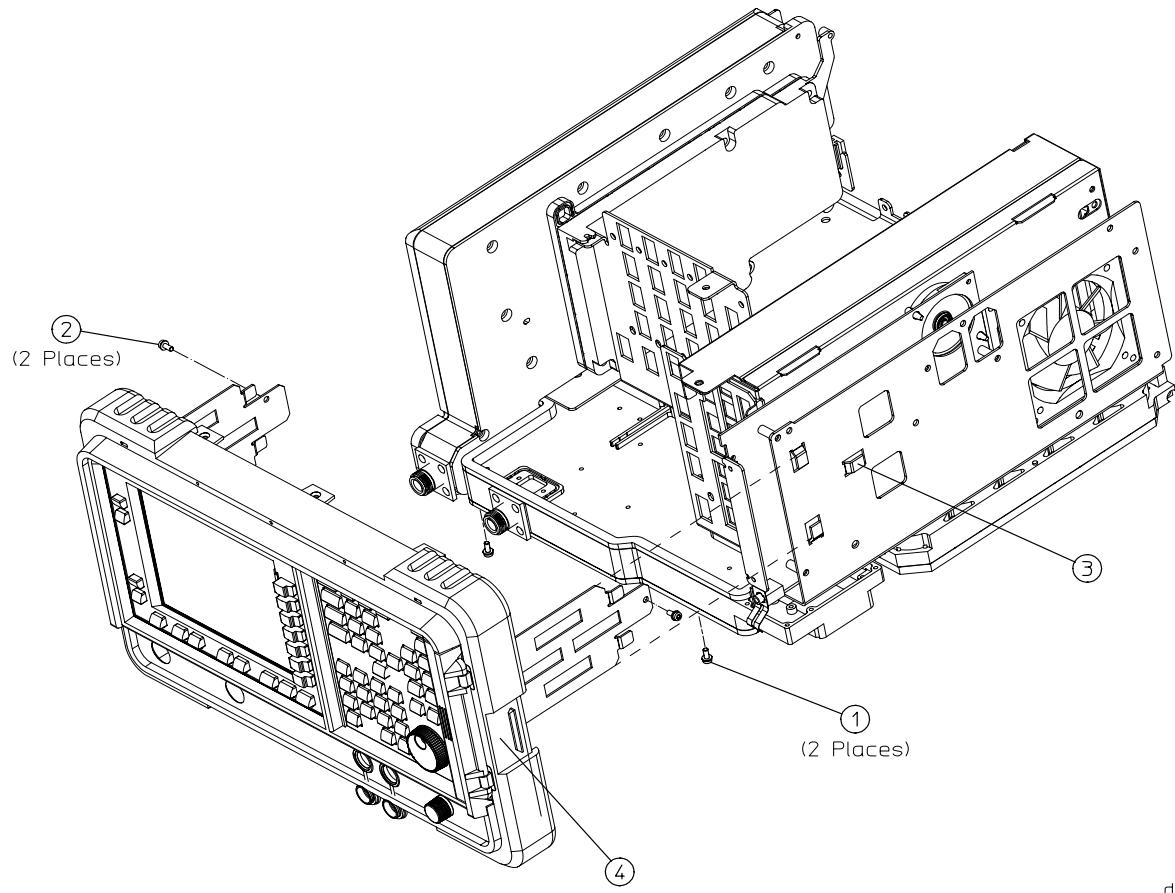
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## Removing the Front Frame

Refer to Figure 5.

1. With the instrument still on its face, remove the two screws (1) on the bottom side of the instrument that secure the front frame to the RF assembly.
2. Place the instrument with the top side facing up. Remove the two screws (2) that secure the front frame subpanel to the chassis.
3. Slide the front frame (4) forward until it catches on the tabs (3) on the sides of the chassis.

**Figure 5**      **Front Frame Assembly Removal**



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## Removing the Power Supply Assembly

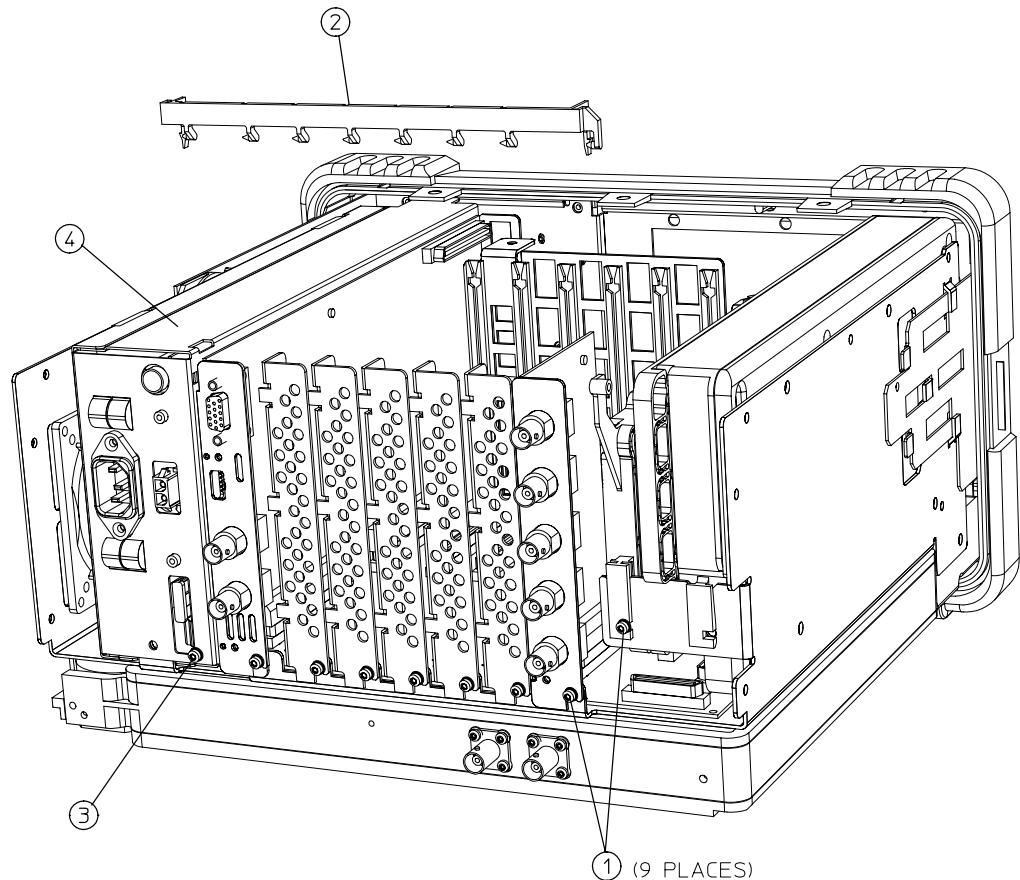
Refer to Figure 6.

1. Remove the vibration support bar (2) at the top rear of the instrument by pinching in the ends of the bar and rotating upward. The support can be removed by sliding it out of the holes in each assembly.

**CAUTION** If forced, the vibration support can be broken; remove with care.

2. Remove the single screw (3) securing the A5 power supply assembly (4) to the chassis at the rear of the instrument.
3. Carefully pull up on the power supply assembly to remove it from the motherboard connector.

**Figure 6** **Vibration Support**



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## Removing and Modifying Power Supply Board

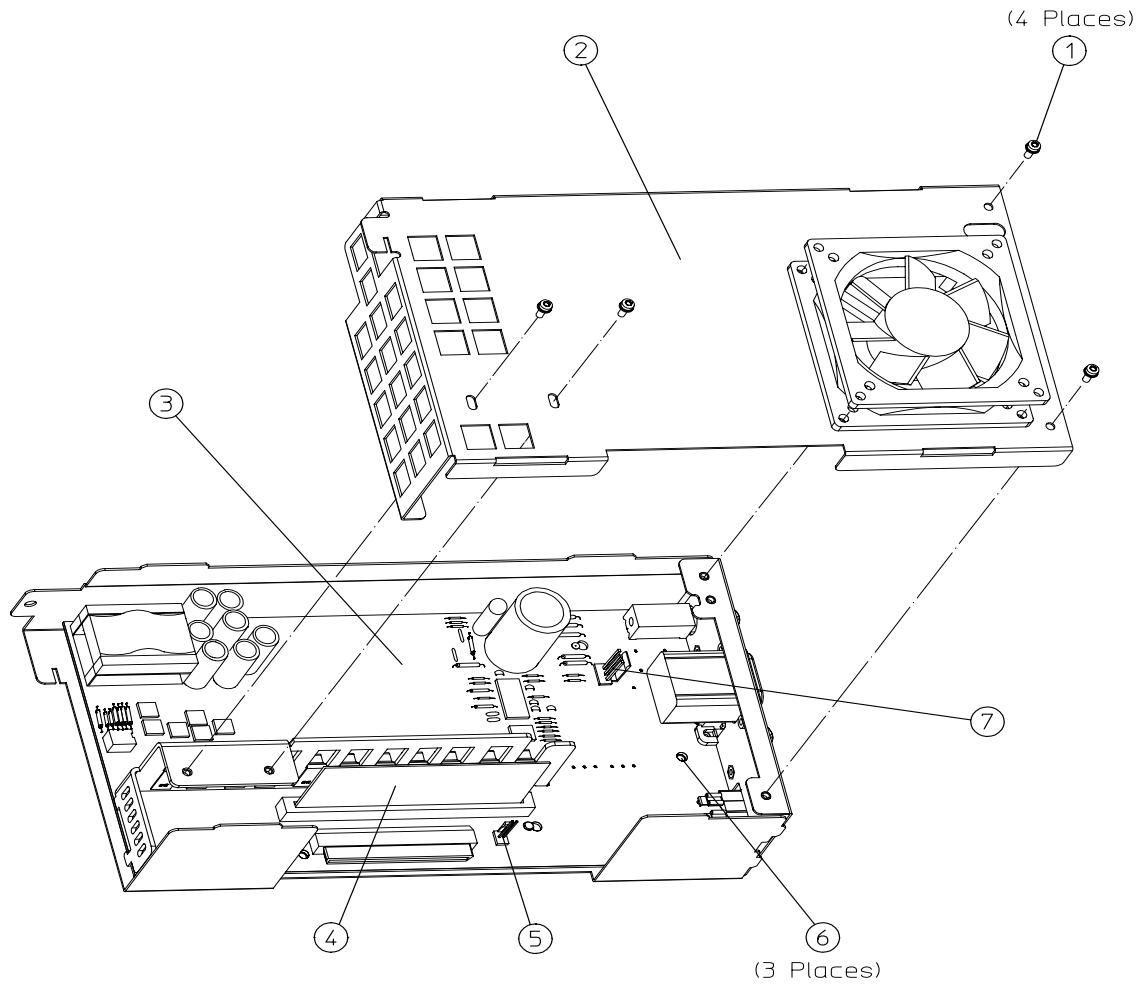
Refer to Figure 7.

### WARNING

**Before opening the cover of the power supply, ensure that at least 5 minutes have elapsed since the line power has been disconnected from the unit. Opening covers any soon is likely to expose dangerous voltages.**

1. Remove the four screws (1) securing the top cover (2) to the power supply assembly.
2. Unplug the fan (5) from the power board (3). Remove the top cover with the fan (2).
3. Unplug the incoming power line (7) from the power board (3).
4. Remove the three screws (6) that secure the power board (3) to the casing.
5. Remove the power board (3) from the casing.

**Figure 7      Power Supply Assembly 1**

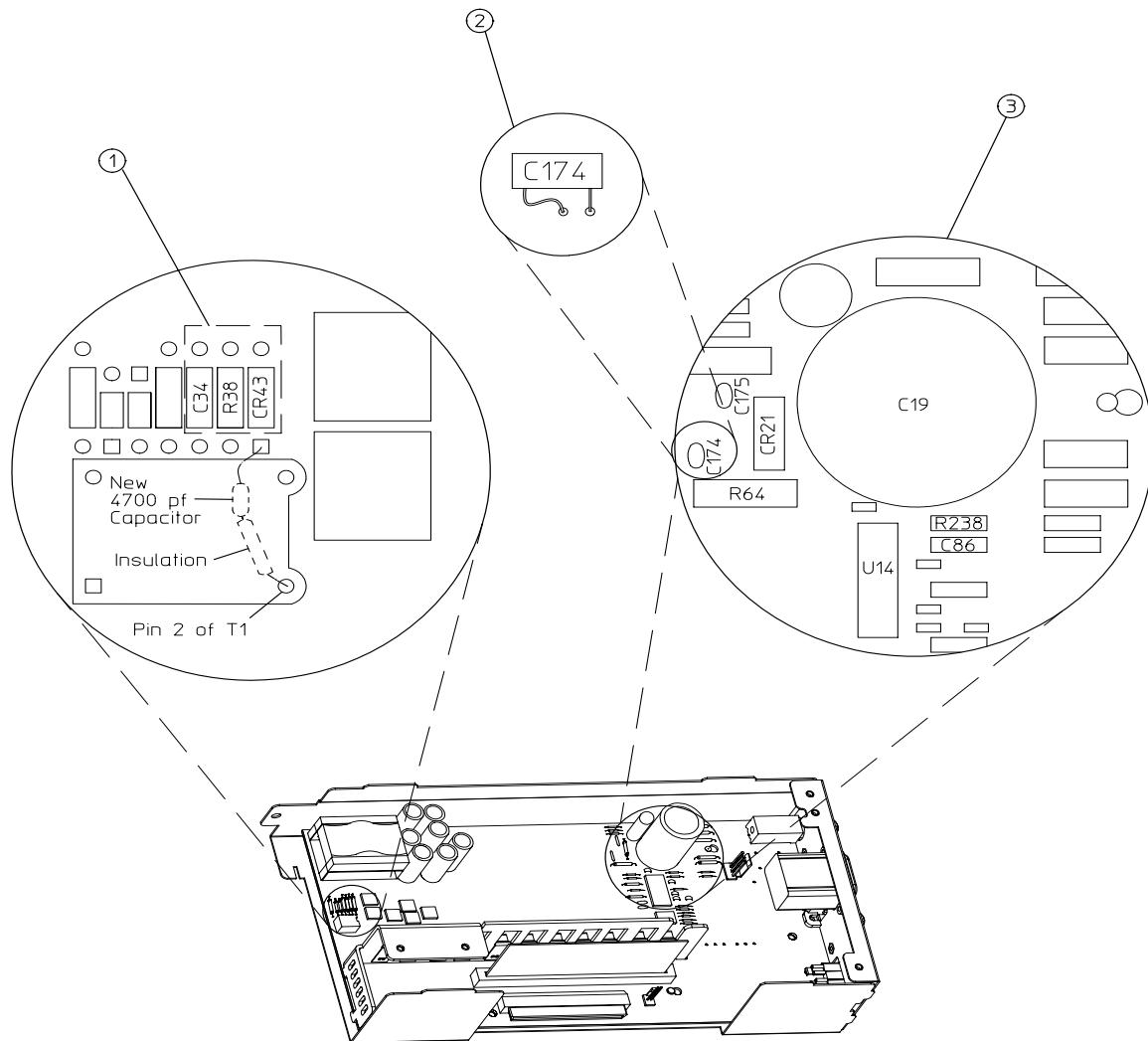


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Refer to Figure 8 for steps 6 through 12.

6. Unsolder and remove C34, R38, and CR43 (1).
7. Solder the two 10 ohm resistors (0757-0346) in place of C34 and R38.
8. Place the insulation sleeve (0890-0099) over one lead of the 4700 pF capacitor (0160-4831). Turn the board over. On the back of the board, solder the 4700 pF capacitor (0160-4831) from pin 2 of T1 to the cathode pad (square pad) of CR43.
9. Unsolder and remove C86, R238, and C174 (3).
10. Solder the 1 ohm resistor (0698-8812) in place of R238.
11. Solder the 1000 pF capacitor (0160-4574) in place of C86.
12. Place two 90° bends—as shown in Figure 8 at (2)—in one lead of the 4700 pF capacitor (0160-4439). Insert the capacitor into the board in the place of C174 with the bent lead closest to the edge of the board. Solder it in place.

**Figure 8** Power Supply Assembly 2



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## Replacing Power Supply Board and Assembly

Refer to Figure 7 for steps 1 through 7.

1. Replace the power board (3) onto the casing, and secure with the three screws (6).
2. Place the new label (9320-6209) over the barcode label on the power board.
3. Remove the controller daughter board (E4401-60063) (4) from J7 and replace with the new controller board (E4411-60090).
4. Plug in the incoming power line (7) to the power board (3).
5. Replace the power supply cover (2), with fan, on the power supply assembly. Make sure the lip on the top cover catches underneath the bottom cover.
6. Replace the four screws (1) that secure the top cover to the power supply assembly. Torque to 101 N/cmN/cm (9-inch pounds).
7. Plug the fan connector (5) into the power supply board (3).

Refer to Figure 6 for steps 8 through 11.

8. Carefully plug the A5 power supply assembly (4) into the motherboard.
9. Place the new label over the barcode label (7121-7526) on top of the power supply assembly.
10. Replace the single screw (3) that secures the power supply (4) to the chassis.
11. Replace the vibration support (2) at the top rear of the instrument. Line up the tabs on the support with the holes in each assembly and the rear blank panel. Slide the support sideways into the holes, then rotate down until the ends clip into the power supply and the IF assemblies.

## Replacing the Front Frame

1. Carefully slide the front frame toward the chassis, assuring the ribbon cable is not pinched between assemblies, and the RF input connector lines up correctly with the opening in the front frame.

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

Refer to Figure 5.

2. Replace the two screws (2) that secure the front frame to the chassis. Torque to 101 N/cm (9-inch pounds).
3. Carefully place the spectrum analyzer on the work surface with the front frame facing down.
4. Replace the two screws (1) that secure the front frame to the chassis. Torque to 101 N/cm (9-inch pounds).

## Replacing the Inner Shield

Refer to Figure 3.

1. Carefully position the inner shield (1) on the instrument.
2. Replace the 16 screws (2), (3), and (4) attaching the inner shield (1) to the chassis. If the tracking generator option is installed, the screw labeled (4) will not be present; there will be only 15 screws (2) and (3). Torque to 101 N/cm (9-inch pounds).

## Replacing the Outer Case

1. Replace the instrument outer case by matching the grill on the side of the case to the fan on the power supply assembly.
2. Fit the leading edge of the case completely into the slot on the back of the front frame assembly. Refer to Figure 2 for steps 3 through 5.
3. Replace the rear frame assembly (2) on the instrument.

**NOTE**

The Rear EMI Gasket (3) that clips onto the rear panel can come loose. When replacing the outer case, make sure the gasket is in the correct position.

In some cases, the Rear EMI Gasket may be misaligned, or the fingers may not be bent far enough to make proper contact. Poor contact will negatively impact the EMI performance of the instrument.

4. Check to make sure that all fingers of the Rear EMI Gasket (3) contact the rear panels of the boards/blank panels. Each pair of fingers should contact the faceplate to its left and right, respectively.  
If the contacts of the Rear EMI Gasket are misaligned, remove the rear frame, loosen all the rear card cage screws, power supply screw, IF screws, and option card screws, and move the whole group of parts in the direction needed to ensure that the fingers of the gasket make contact with the rear panels.  
If the panels are properly aligned, but the EMI fingers do not reach the panels, remove the rear frame and bend the fingers farther out to ensure that they make contact with the rear panels.
5. Use the four screws (1) to fasten the rear frame to the instrument. Torque to 247 N/cm (21-inch pounds).
6. Using a pen with indelible ink, write the following on the E4411A serial number label, located at the lower right side of the rear panel: SN E4411A-09 Installed.

## After a Spectrum Analyzer Repair

A High Pot Test—also known as High Potential or Dielectric Withstand Test—is required after working on the high voltage section of the power supply. In addition, after the spectrum analyzer power supply has been upgraded, perform the related adjustments and performance verification tests. Refer to Table 5-2 in Chapter 5 of the *ESA-L1500A Spectrum Analyzer Service Guide* for the related adjustments and performance verification tests required for the A5 power supply assembly.