

# Installation Note

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## Configurable Test Set Upgrade Kit

For E8361A PNA Series Microwave Network Analyzers

Network Analyzer Model Number	Upgrade Kit Part Number
E8361A	E8361-60101



**Agilent Part Number: E8361-90002**

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E8361-90002

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## Safety Notes

The following safety notes are used throughout this document. Familiarize yourself with each of these notes and its meaning before performing any of the procedures in this document.

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<b>WARNING</b>	<b>Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.</b>
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<b>CAUTION</b>	Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.
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By internet, phone, or fax, get assistance with all your test and measurement needs.

This information supersedes all prior HP contact information.			
<b>Online assistance:</b> <a href="http://www.agilent.com/find/assist">www.agilent.com/find/assist</a>			
<b>Americas</b>			
<b>Brazil</b> <i>(tel)</i> (+55) 11 3351 7012 <i>(fax)</i> (+55) 11 3351 7024	<b>Canada</b> <i>(tel)</i> +1 877 894 4414 <i>(alt)</i> +1 303 662 3369 <i>(fax)</i> +1 800 746 4866	<b>Mexico</b> <i>(tel)</i> 1 800 254 2440 <i>(fax)</i> 1 800 254 4222	<b>United States</b> <i>(tel)</i> 800 829 4444 <i>(alt)</i> (+1) 303 662 3998 <i>(fax)</i> 800 829 4433
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<b>Japan (Bench)</b> <i>(tel)</i> 0120 421 345 <i>(alt)</i> (+81) 426 56 7832 <i>(fax)</i> 0120 01 2144	<b>Japan (On-Site)</b> <i>(tel)</i> 0120 421 345 <i>(alt)</i> (+81) 426 56 7832 <i>(fax)</i> 0120 012 114	<b>Singapore</b> <i>(tel)</i> 1 800 275 0880 <i>(fax)</i> (+65) 6755 1214	<b>South Korea</b> <i>(tel)</i> 080 778 0011 <i>(fax)</i> 080 778 0013
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<b>Austria</b> <i>(tel)</i> 0820 87 44 11* <i>(fax)</i> 0820 87 44 22	<b>Belgium</b> <i>(tel)</i> (+32) (0)2 404 9340 <i>(fax)</i> (+32) (0)2 404 9395	<b>Denmark</b> <i>(tel)</i> (+45) 7013 1515 <i>(fax)</i> (+45) 7013 1555	<b>Finland</b> <i>(tel)</i> (+358) 10 855 2100 <i>(fax)</i> (+358) (0) 10 855 2923
<b>France</b> <i>(tel)</i> 0825 010 700* <i>(fax)</i> 0825 010 701*	<b>Germany</b> <i>(tel)</i> 01805 24 6333* <i>(fax)</i> 01805 24 6336*	<b>Ireland</b> <i>(tel)</i> (+353) (0)1 890 924 204 <i>(fax)</i> (+353) (0)1 890 924 024	<b>Israel</b> <i>(tel)</i> (+972) 3 9288 504 <i>(alt)</i> (+972) 3 9288 544 <i>(fax)</i> (+972) 3 9288 520
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<i>(tel)</i> = primary telephone number; <i>(alt)</i> = alternate telephone number; <i>(fax)</i> = FAX number; * = in country number 5/6/05			

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## About Installing the Upgrade Kit

Products affected. . . . .	E8361A; with or without Option 080 only
Installation to be performed by . . . . .	Agilent service center or personnel qualified by Agilent
Estimated installation time . . . . .	2.5 hours
Estimated adjustment time . . . . .	1.0 hour
Estimated full instrument calibration time . . . .	4.5 hours

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## Description of Option 014

An Option 014 analyzer can be configured to measure high-power devices and devices that require high dynamic range.

For a high-power measurement, external amplifiers and high power attenuators or isolators can be added to complete the test setup. In this configuration, test-port output-power up to 0.5 Watt (+27 dBm) can be applied to the device under test (DUT). Additionally, there is an external reference input that allows the external amplifier's frequency response and drift to be ratioed out.

For high dynamic range measurements, front panel jumpers are configured to reverse the signal path through one of the couplers. This allows for a 15 dB improvement in transmitted signal sensitivity in one direction only. These jumpers can also be configured on both ports, allowing the user to perform high dynamic range measurements in both the forward and reverse directions.

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## Items Included in the Upgrade Kit

Check the contents of your kit against this list. If any item is missing or damaged, contact Agilent Technologies. Refer to [“Getting Assistance from Agilent”](#) on page 3.

**Table 1 Contents of Option 014 Upgrade Kit (E8361-60101)**

<b>Ref Desig.</b>	<b>Description</b>	<b>Qty</b>	<b>Part Number</b>
	Installation note (this document)	1	E8361-90002
	Cable clamp	2	1400-0211
	Lower front panel overlay (Option 014)	1	E8361-80004
	1.85 mm female bulkhead connector	12	5065-4673
	Nut, hex (for bulkhead connectors)	12	1250-3311
	Washer, lock (for bulkhead connectors)	12	1250-3310
W60	Front-panel jumper	6	E8361-20023
W61	RF cable, A23 SOMA 70 to PORT 1 SOURCE OUT	1	E8361-20021
W62	RF cable, A24 SOMA 70 to PORT 2 SOURCE OUT	1	E8361-20022
W63	RF cable, PORT 1 CPLR THRU to A25 test port 1 coupler	1	E8361-20011
W64	RF cable, PORT 2 CPLR THRU to A26 test port 2 coupler	1	E8361-20012
W65	RF cable, A23 SOMA 70 to REFERENCE 1 SOURCE OUT	1	E8361-20015
W66	RF cable, A24 SOMA 70 to REFERENCE 2 SOURCE OUT	1	E8361-20016
W67	RF cable, A25 test port 1 coupler to PORT 1 CPLR ARM	1	E8361-20018
W68	RF cable, A26 test port 2 coupler to PORT 2 CPLR ARM	1	E8361-20018
W69	RF cable, PORT 1 RCVR A IN to A27 channel A mixer	1	E8361-20047
W70	RF cable, REFERENCE 1 RCVR R1 IN to A28 channel R1 mixer	1	E8361-20049
W71	RF cable, REFERENCE 2 RCVR R2 IN to A29 channel R2 mixer	1	E8361-20020
W72	RF cable, PORT 2 RCVR B IN to A30 channel B mixer	1	E8361-20048

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## Installation Procedure for the Upgrade Kit

The network analyzer must be in proper working condition prior to installing this option. Any necessary repairs must be made before proceeding with this installation.

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**WARNING**      **This installation requires the removal of the analyzer's protective outer covers. The analyzer must be powered down and disconnected from the mains supply before performing this procedure.**

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### Electrostatic Discharge Protection

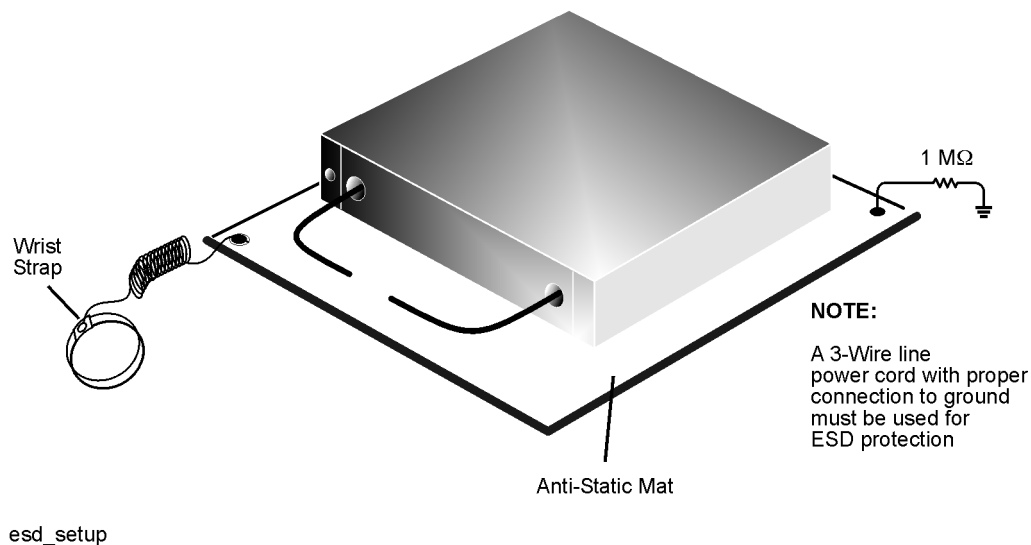
Protection against electrostatic discharge (ESD) is essential while removing or connecting cables or assemblies within the network analyzer.

Static electricity can build up on your body and can easily damage sensitive internal circuit elements when discharged. Static discharges too small to be felt can cause permanent damage. To prevent damage to the instrument:

- *always* wear a grounded wrist strap having a 1 M $\Omega$  resistor in series with it when handling components and assemblies.
- *always* use a grounded, conductive table mat while working on the instrument.
- *always* wear a heel strap when working in an area with a conductive floor. If you are uncertain about the conductivity of your floor, wear a heel strap.

Figure 1 shows a typical ESD protection setup using a grounded mat and wrist strap. Refer to “Tools and Equipment Required for the Installation” on page 7 for part numbers.

**Figure 1**    **ESD Protection Setup**



## Overview of the Installation Procedure

Step 1. Remove the Outer Cover.

Step 2. Remove the Front Panel Assembly.

Step 3. Raise the Receiver Deck.

Step 4. Remove the Existing Cables.

Step 5. Install the Front-Panel Bulkhead Connectors.

Step 6. Install the Option 014 Cables.

Step 7. Lower and Fasten the Receiver Deck.

Step 8. Replace the Lower Front Panel Overlay.

Step 9. Reinstall the Front Panel Assembly and Install the Front Panel Jumpers.

Step 10. Reinstall the Outer Cover.

Step 11. Enable Option 014.

Step 11. Enable Option 014.

## Tools and Equipment Required for the Installation

Description	Qty	Part Number
T-10 TORX driver (set to 9 in-lbs)	1	N/A
T-20 TORX driver (set to 21 in-lbs)	1	N/A
5/16-inch torque wrench (set to 10 in-lbs)	1	N/A
5/16-inch torque wrench (set to 21 in-lbs)	1	N/A
ESD grounding wrist strap	1	9300-1367
5-ft grounding cord for wrist strap	1	9300-0980
2 x 4 ft conductive table mat and 15-ft grounding wire	1	9300-0797
ESD heel strap (for use with conductive floors)	1	9300-1308

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**CAUTION** Use a 5/16-inch torque wrench set to 10 in-lbs on all cable connections except the front-panel adapters to which the front-panel jumpers attach. Use a 5/16-inch torque wrench set to 21 in-lbs for these connections.

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## Test Equipment Required for Post-Upgrade Adjustments

Description	Agilent Part Number
Power meter	E4418B/E4419B
Power sensor, Type-N (100 kHz–4.2 GHz)	8482A
Power sensor, 2.4 mm (4.2 GHz–50 GHz)	8487A
Power sensor, V-Band (50 GHz–67 GHz) <sup>a</sup>	V8486A
Adapter, WR-15 to 1.85 mm (m) <sup>a</sup>	V281B
Adapter, 1.85 mm (f) to 1.85 mm (f) <sup>b</sup>	85058-60114
Adapter, 2.4 mm (f) to 2.4 mm (f) <sup>b</sup>	11900B
Adapter, Type-N (f) to 2.4 mm (f)	11903B
Test cable, 2.4 mm (f) to 2.4 mm (f) <sup>b</sup> or Test cable, 1.85 mm (f) to 1.85 mm (f) <sup>b</sup>	85133C N4697E

- a. This sensor and adapter must be calibrated together by the Agilent factory. The data supplied are only valid as long as the sensor and adapter remain connected.
- b. The 1.85 mm connector has the same ruggedness and is compatible with the 2.4 mm connector. 1.85 mm and 2.4 mm connectors and adapters may be used interchangeably.



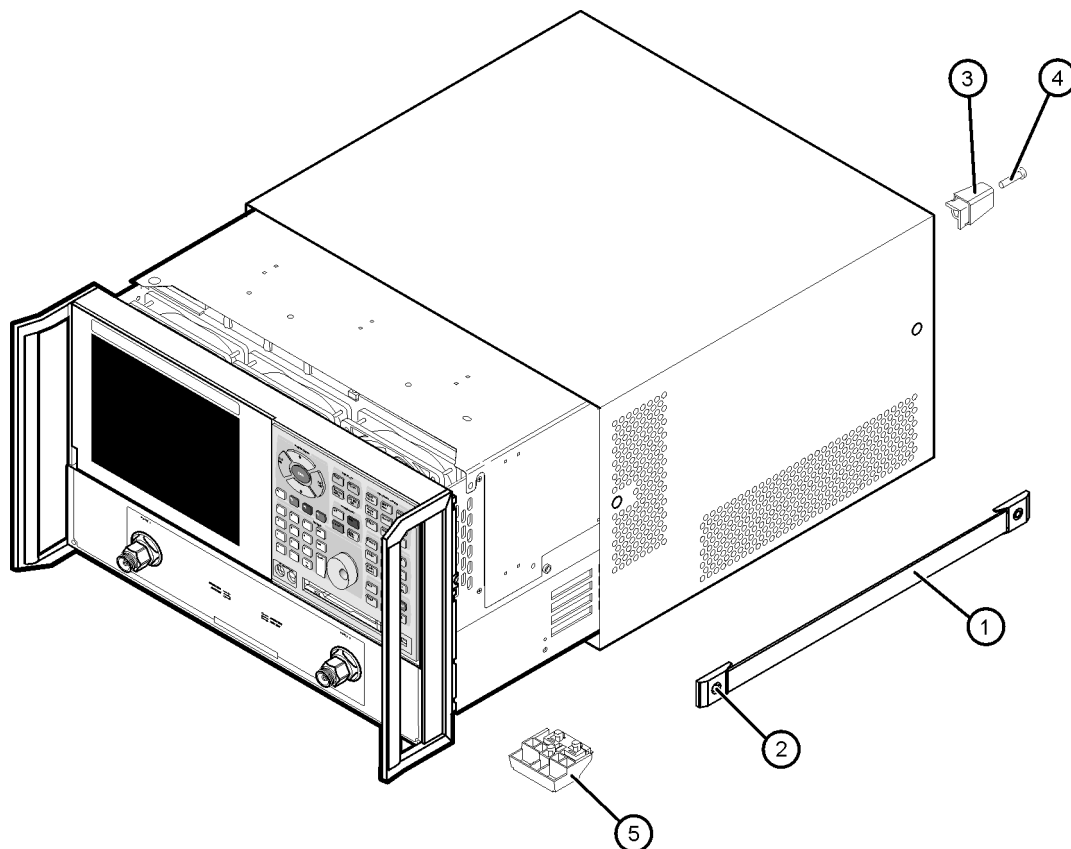
## Step 1. Remove the Outer Cover

**CAUTION** This procedure is best performed with the analyzer resting on its front handles in the vertical position. *Do not place the analyzer on its front panel without the handles.* This will damage the front panel assemblies.

Refer to [Figure 2](#) for this procedure.

1. Disconnect the power cord (if it has not already been disconnected).
2. With a T-20 TORX driver, remove the strap handles (item ①) by loosening the screws (item ②) on both ends until the handle is free of the analyzer.
3. With a T-20 TORX driver, remove the four rear panel feet (item ③) by removing the center screws (item ④).
4. Slide the four bottom feet (item ⑤) off the cover.
5. Slide the cover off of the frame.

**Figure 2 Outer Cover Removal**



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## Step 2. Remove the Front Panel Assembly

Refer to [Figure 3](#) for this procedure.

1. With a T-10 TORX driver, remove the eight screws (item ①) from the sides of the frame.

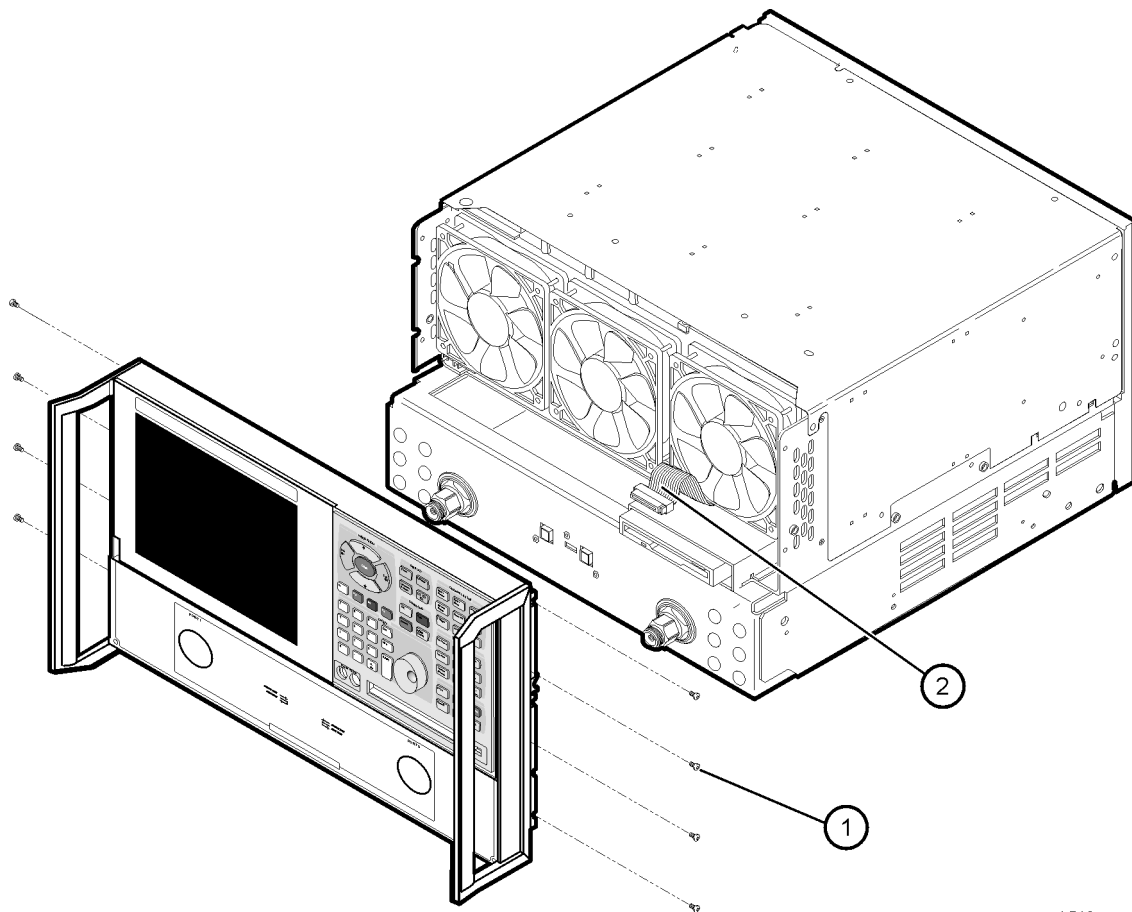
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**CAUTION** Before removing the front panel from the analyzer, lift and support the front of the analyzer chassis.

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2. Slide the front panel over the test port connectors.
3. Disconnect the front panel interface ribbon cable (item ②). The front panel is now free from the analyzer.

**Figure 3 Front Panel Assembly Removal**



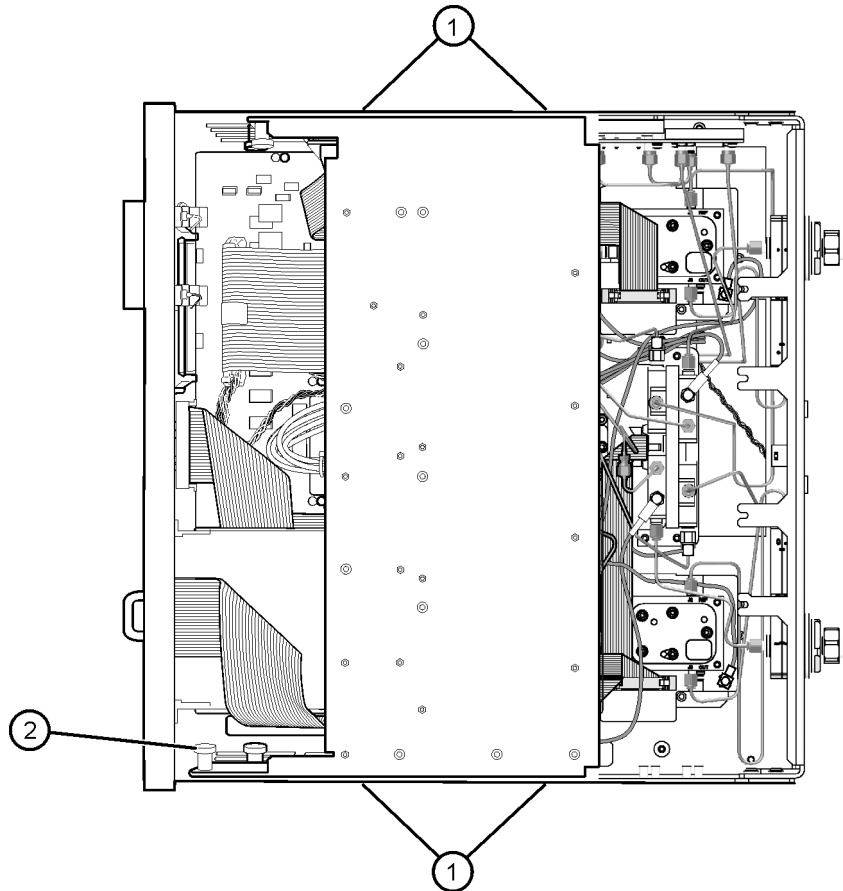
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### Step 3. Raise the Receiver Deck

Refer to [Figure 4](#) for this procedure.

1. Place the analyzer bottom-side up on a flat surface.
2. With a T-10 TORX driver, remove the four screws, (item ①), that secure the receiver deck.
3. Pull the latch pin (item ②) towards the opposite side of the analyzer to release the receiver deck. Be sure to pull only item ②. The other two latch pins are the pivot pins for the receiver deck. Pulling them will result in complete removal of the deck from the analyzer.
4. Lift the receiver deck to partially raise it, then release the latch pin (item ②). Lift the receiver deck to its fully raised position and ensure that the latch pin latches in the raised position.

**Figure 4 Receiver Deck Raising**



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## Step 4. Remove the Existing Cables

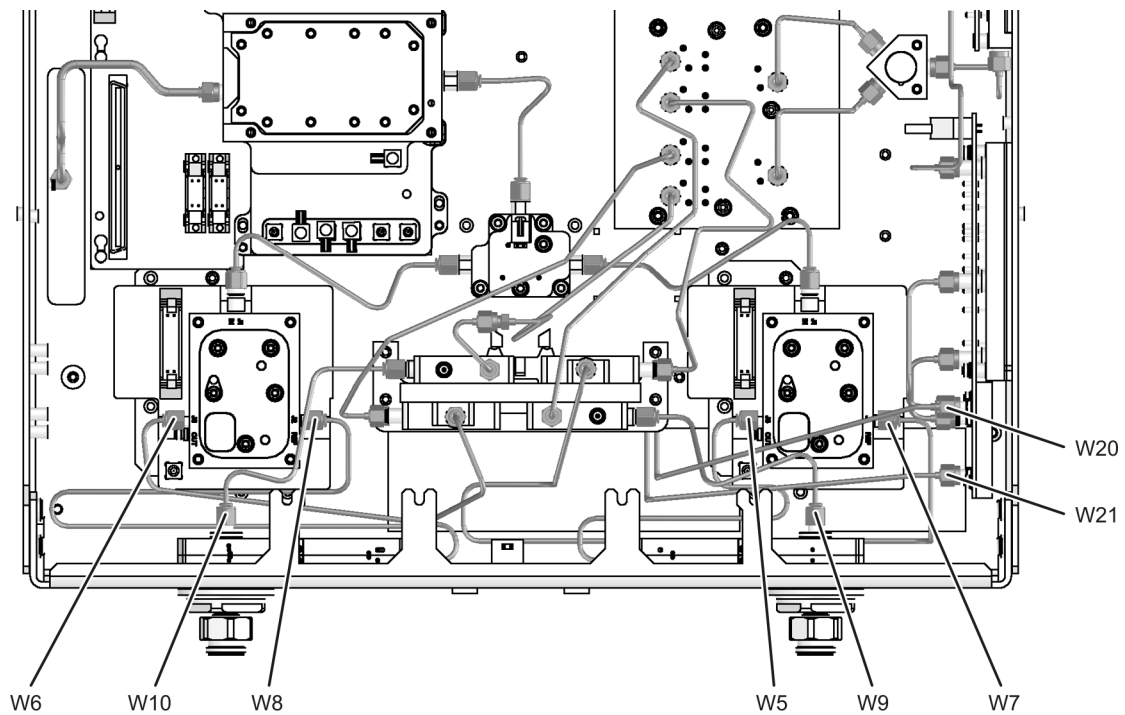
Refer to [Figure 5](#) for this procedure.

1. Remove these cables in the order listed:

- W7 A23 SOMA 70 to A28 channel R1 mixer
- W8 A24 SOMA 70 to A29 channel R2 mixer
- W9 A25 test port 1 coupler to A27 channel A mixer
- W10 A26 test port 2 coupler to A30 channel B mixer
- W5 A23 SOMA 70 to A25 test port 1 coupler
- W6 A23 SOMA 70 to A26 test port 2 coupler

2. Disconnect cables W20 and W21 from the A17 LOMA 12 to make it easier to install the new cables. It is not necessary to remove these cables completely.

**Figure 5 Cable Removal**



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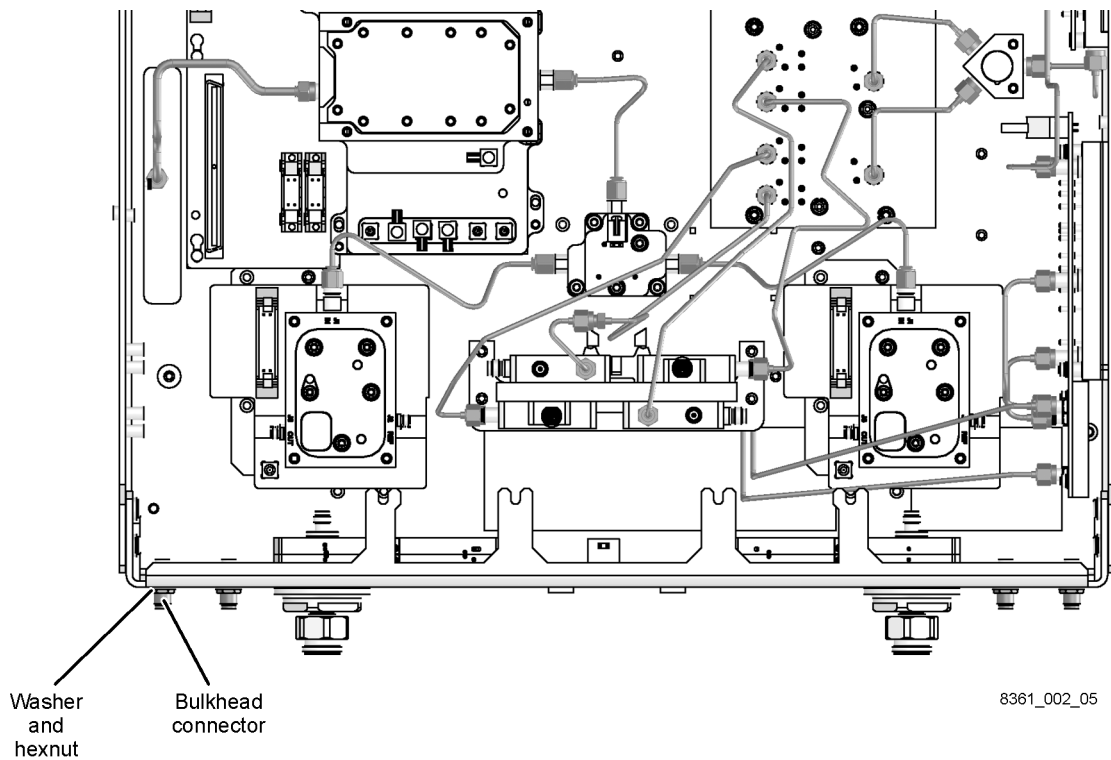
## Step 5. Install the Front-Panel Bulkhead Connectors

Refer to [Figure 6](#) for this procedure. The new parts referenced in this procedure are listed in [Table 1](#) on page 5.

Install 12 bulkhead connectors on the front panel as shown:

- Make sure that the hexagonal collar of the connector is on the inside of the front panel and that it is properly aligned with the recess in the panel.
- Place a washer and a hex nut on each bulkhead connector as shown.
- Using a 5/16-inch torque wrench, tighten the hex nuts to 21 in-lbs.

**Figure 6 Front-Panel Bulkhead Connectors Installation**



## Step 6. Install the Option 014 Cables

Refer to [Figure 7](#) for the following procedure. The new parts are listed in [Table 1 on page 5](#).

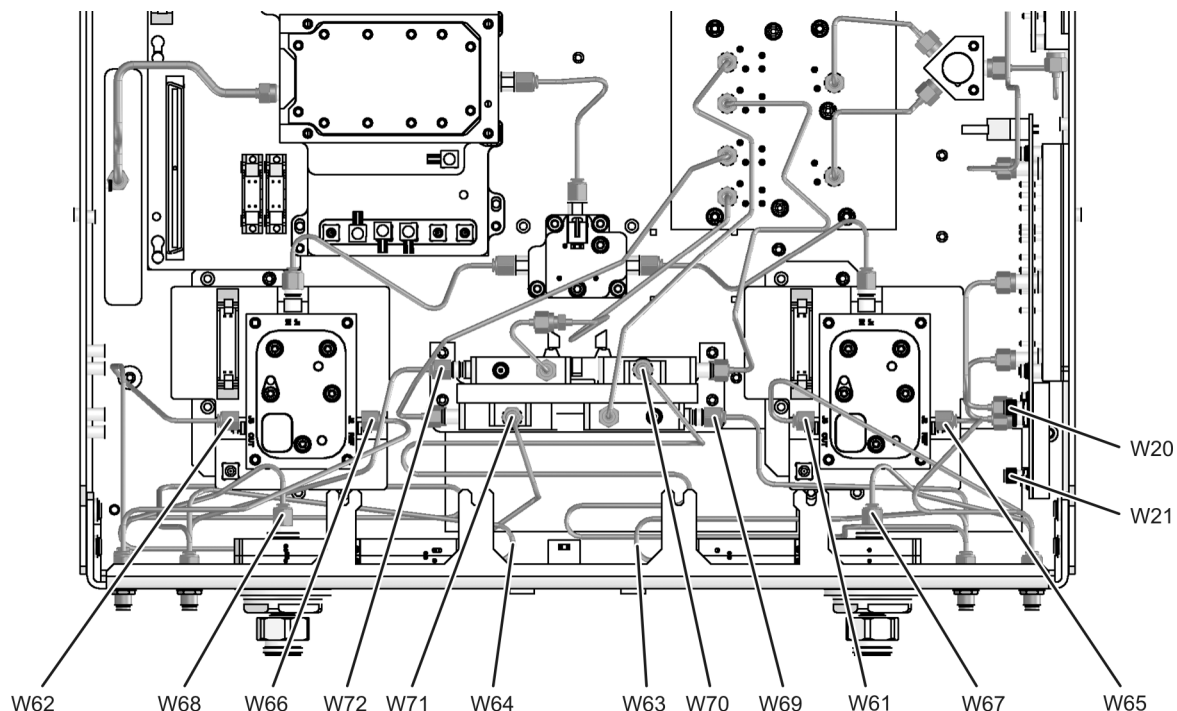
**CAUTION** Be very careful with these cables with 1.85 mm connectors. They are extremely delicate and can be easily damaged.

1. Install these cables in the order listed. Use a 5/16-inch torque wrench set to 10 in-lbs.

- W70 E8361-20049 REFERENCE 1 RCVR R1 IN to A28 channel R1 mixer
- W71 E8361-20020 REFERENCE 2 RCVR R2 IN to A29 channel R2 mixer
- W68 E8361-20018 A26 test port 2 coupler to PORT 2 CPLR ARM
- W72 E8361-20048 PORT 2 RCVR B IN to A30 channel B mixer
- W62 E8361-20022 A24 SOMA 70 to PORT 2 SOURCE OUT
- W64 E8361-20012 PORT 2 CPLR THRU to A26 test port 2 coupler
- W66 E8361-20016 A24 SOMA 70 to REFERENCE 2 SOURCE OUT
- W67 E8361-20018 A25 test port 1 coupler to PORT 1 CPLR ARM
- W69 E8361-20047 PORT 1 RCVR A IN to A27 channel A mixer
- W61 E8361-20021 A23 SOMA 70 to PORT 1 SOURCE OUT
- W63 E8361-20011 PORT 1 CPLR THRU to A25 test port 1 coupler
- W65 E8361-20015 A23 SOMA 70 to REFERENCE 1 SOURCE OUT

2. Reconnect cables W20 and W21 to the A17 LOMA 12.

**Figure 7 Cable Installation**



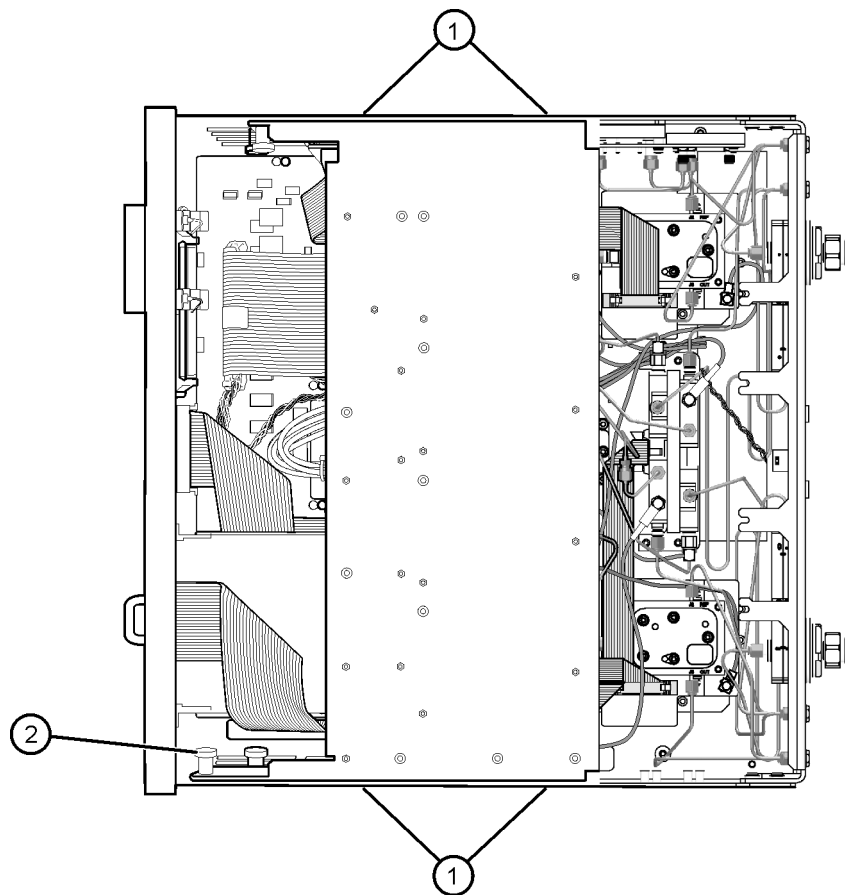
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## Step 7. Lower and Fasten the Receiver Deck

Refer to [Figure 8](#) for this procedure.

1. Pull the latch pin (item ②) toward the opposite side of the analyzer to release the receiver deck.
2. Lift the receiver deck to partially lower it, then release the latch pin (item ②). Lower the receiver deck to its fully lowered position and ensure that the latch pin latches in the lowered position.
3. With a T-10 TORX driver, install the four screws (item ①) to secure the receiver deck.

**Figure 8 Receiver Deck Lowering**



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## Step 8. Replace the Lower Front Panel Overlay

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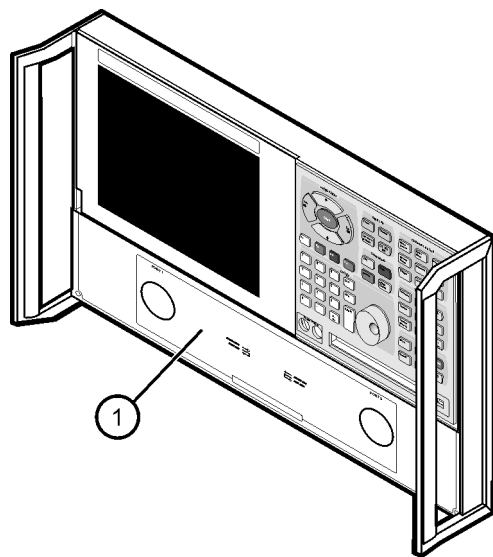
**NOTE** The new parts referenced in this procedure are listed in [Table 1 on page 5](#).

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Refer to [Figure 9](#) for this procedure.

1. From the back side of the front panel, use a blunt object in one of the cutouts in the lower frame to push the overlay (item ①) and separate it from the front panel.
2. From the front side of the front panel, pull off the overlay completely and discard it.
3. Remove any adhesive remaining on the front panel.
4. Remove the protective backing from the new front panel overlay (item ①).
5. Starting from either the left or right side, *loosely* place the overlay in the recess on the lower front panel, ensuring that it fits tightly against the recess edges.
6. Once the overlay is in place, press it firmly onto the frame to secure it.

**Figure 9 Lower Front Panel Overlay Replacement**



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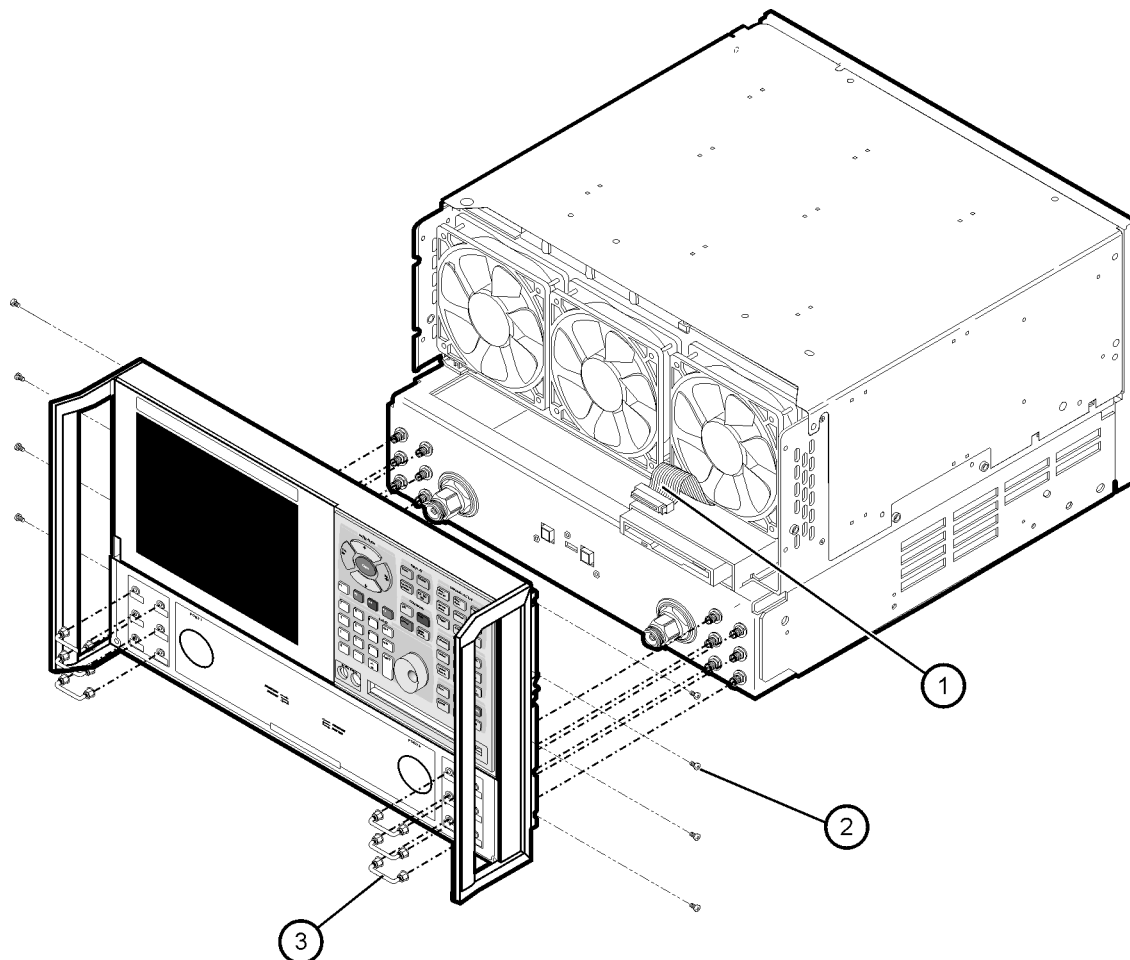
## Step 9. Reinstall the Front Panel Assembly and Install the Front Panel Jumpers

**CAUTION** Before installing the front panel assembly onto the analyzer, lift and support the front of the analyzer chassis.

Refer to [Figure 10](#) for this procedure.

1. Reconnect the ribbon cable (item ①) to the A3 front panel interface board.
2. Slide the front panel over the test port connectors being careful to align the power switch and floppy disk drive to their corresponding front panel cutouts. Ensure that the ribbon cable (item ①) is located below the fan to prevent it from being damaged by the fan blades.
3. With a T-10 TORX driver, install the eight screws (item ②) in the sides of the frame.
4. Install the six semirigid jumpers (item ③) on the front panel, and, using a 5/16-inch torque wrench, tighten the connector nuts to 10-in lbs.

**Figure 10 Front Panel Assembly Reinstallation**



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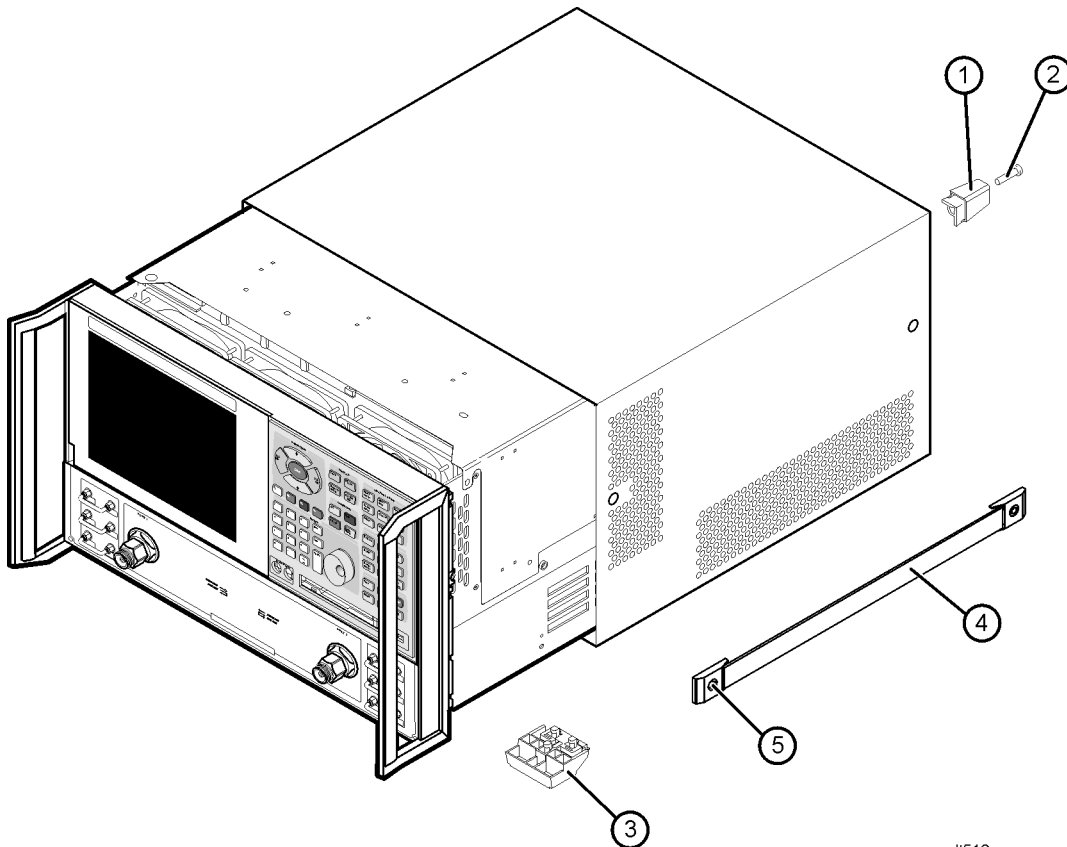
## Step 10. Reinstall the Outer Cover

**CAUTION** This procedure is best performed with the analyzer resting on its front handles in the vertical position. *Do not place the analyzer on its front panel without the handles.* This will damage the front panel assemblies.

Refer to [Figure 11](#) for this procedure.

1. Slide the cover over the analyzer frame.
2. With a T-20 TORX driver, install the four rear panel feet (item ①) by installing the center screws (item ②).
3. Slide the four bottom feet (item ③) into position on the cover.
4. With a T-20 TORX driver, install the strap handles (item ④) by installing the screws (item ⑤) on both ends of the handle.

**Figure 11 Outer Cover Reinstallation**



## Step 11. Enable Option 014

### Procedure Requirements

- The analyzer must be powered up and operating to perform this procedure.
- The Network Analyzer program must be running.
- A mouse must be connected to the analyzer for this procedure.

### Option Enable Procedure

1. On the analyzer's **System** menu, point to **Service**, and then click **Option Enable**.
2. In the **Select Desired Option** list, click **014 - Configurable Test Set**.
3. Click **Enable**.
4. Click **Yes** in answer to the displayed question in the **Restart Analyzer?** box.
5. When the installation is complete, click **Exit**.

### Option Verification Procedure

Once the analyzer has restarted and the Network Analyzer program is again running:

1. On the analyzer's **Help** menu, click **About Network Analyzer**.
2. Verify that "014" is listed after "Options:" in the display.
3. Click **OK** to close this screen.

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<b>NOTE</b>	If Options 014 has not been enabled, perform the " <a href="#">Option Enable Procedure</a> " again. If the option is still not enabled, contact Agilent Technologies. Refer to " <a href="#">Getting Assistance from Agilent</a> " on page 3.
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## Step 12. Perform Post-Upgrade Adjustments and Calibration

### Adjustments

The following adjustments must be made due to the hardware changes of the analyzer.

- receiver calibration
- phase lock IF gain
- source calibration

These adjustments are described in the PNA service guide and in the PNA on-line HELP. A list of equipment required to perform these adjustments can be found at [“Tools and Equipment Required for the Installation” on page 7](#).

### Calibration

The analyzer should now operate and phase lock over its entire frequency range.

If you experience difficulty with the basic functioning of the analyzer, contact Agilent. Refer to [“Getting Assistance from Agilent” on page 3](#).

- Although the analyzer functions, its performance relative to its specifications has not been verified.
- It is recommended that a full instrument calibration be performed using the N2721A performance test software.
- Refer to the analyzer’s service guide for information on the performance test software.