

Installation Note

Configurable Test Set Upgrade Kit

To Add Option 014

**Upgrade Kit Order Numbers: E8361AU-014 and E8361CU-014
For E8361A/C PNA Series Microwave Network Analyzers**



Agilent Kit Number: E8361-60101

Agilent Document 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.

| | |
|----------------|---|
| WARNING | 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. |
|----------------|---|

| | |
|----------------|---|
| CAUTION | 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. |
|----------------|---|

Contacting Agilent

Assistance with test and measurements needs and information on finding a local Agilent office are available on the Web at:

www.agilent.com/find/assist

If you do not have access to the Internet, please contact your Agilent field engineer.

NOTE In any correspondence or telephone conversation, refer to the Agilent product by its model number and full serial number. With this information, the Agilent representative can determine whether your product is still within its warranty period.

About Installing the Upgrade Kit

| | |
|--|---|
| Products affected | E8361A/C; 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 |

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.

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 [“Contacting Agilent” on page 3](#).

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

| Ref Desig. | Description | Qty | Part Number |
|------------|--|-----|-------------|
| | Installation note (this document) | 1 | E8361-90002 |
| | ROHS addendum | 1 | 9320-6722 |
| | Lower front panel overlay (Option 014) | 1 | E8361-80004 |
| | 1.85 mm female bulkhead connector | 12 | 5065-4673 |
| | Nut, hex (for bulkhead connectors) | 12 | 1250-3516 |
| | Washer, lock (for bulkhead connectors) | 12 | 1250-3310 |
| | Cable tie (to secure cable W71) | 2 | 1400-0249 |
| | Cable tie mount (to secure cable W71) | 2 | 1400-1551 |
| 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 | E8361-20066 |
| 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 |

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.

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.**

Electrostatic Discharge Protection

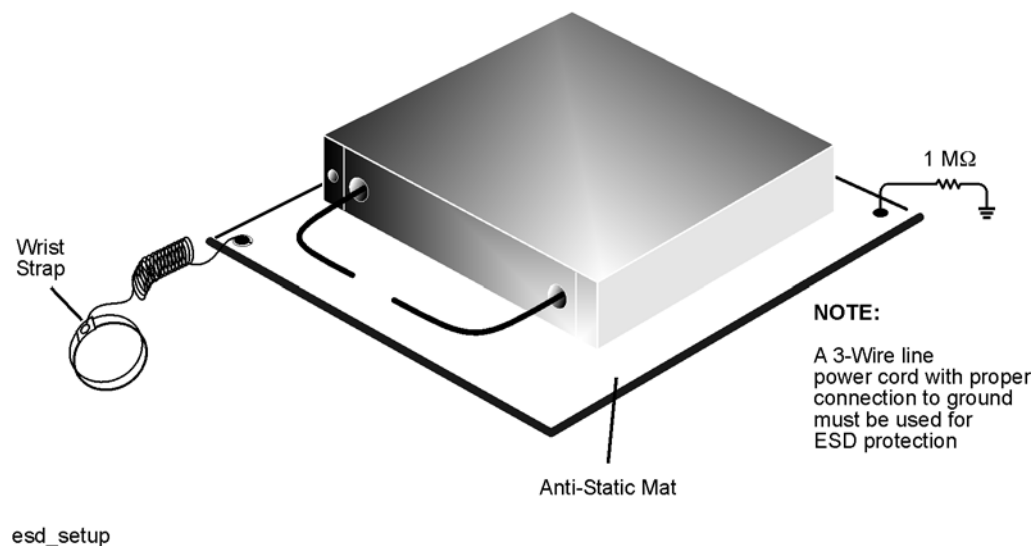
Protection against electrostatic discharge (ESD) is essential while removing or connecting cables or assemblies within the network analyzer.

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 Ω 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 12. Perform Post-Upgrade Adjustments and Calibration.

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) ^a | V8486A |
| Adapter, WR-15 to 1.85 mm (m) ^a | V281B |
| Adapter, 1.85 mm (f) to 1.85 mm (f) ^b | 85058-60114 |
| Adapter, 2.4 mm (f) to 2.4 mm (f) ^b | 11900B |
| Adapter, Type-N (f) to 2.4 mm (f) | 11903B |
| Test cable, 2.4 mm (f) to 2.4 mm (f) ^b or Test cable, 1.85 mm (f) to 1.85 mm (f) ^b | 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.

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 |

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.

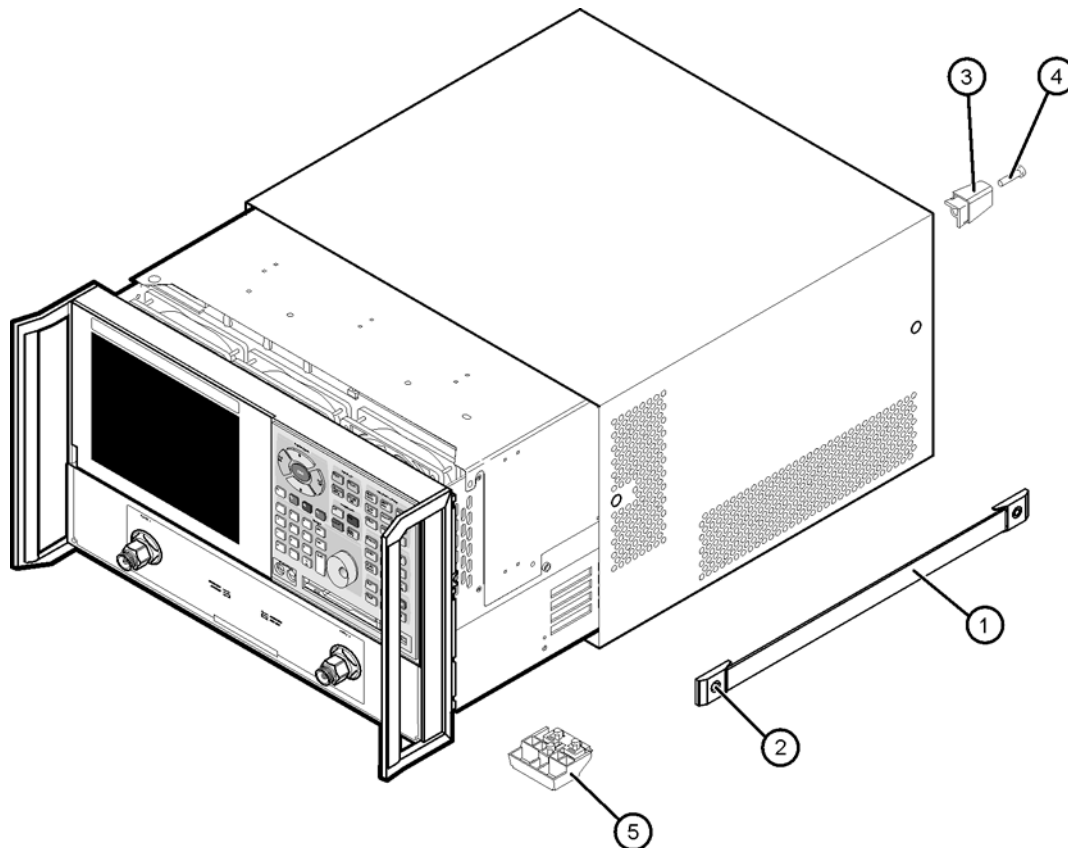
Step 1. Remove the Outer Cover

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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NOTE The figure above shows the E8361A front panel and floppy disk drive. The E8361C front panel has a slightly different appearance and does not include a floppy disk drive.

Step 2. Remove the Front Panel Assembly

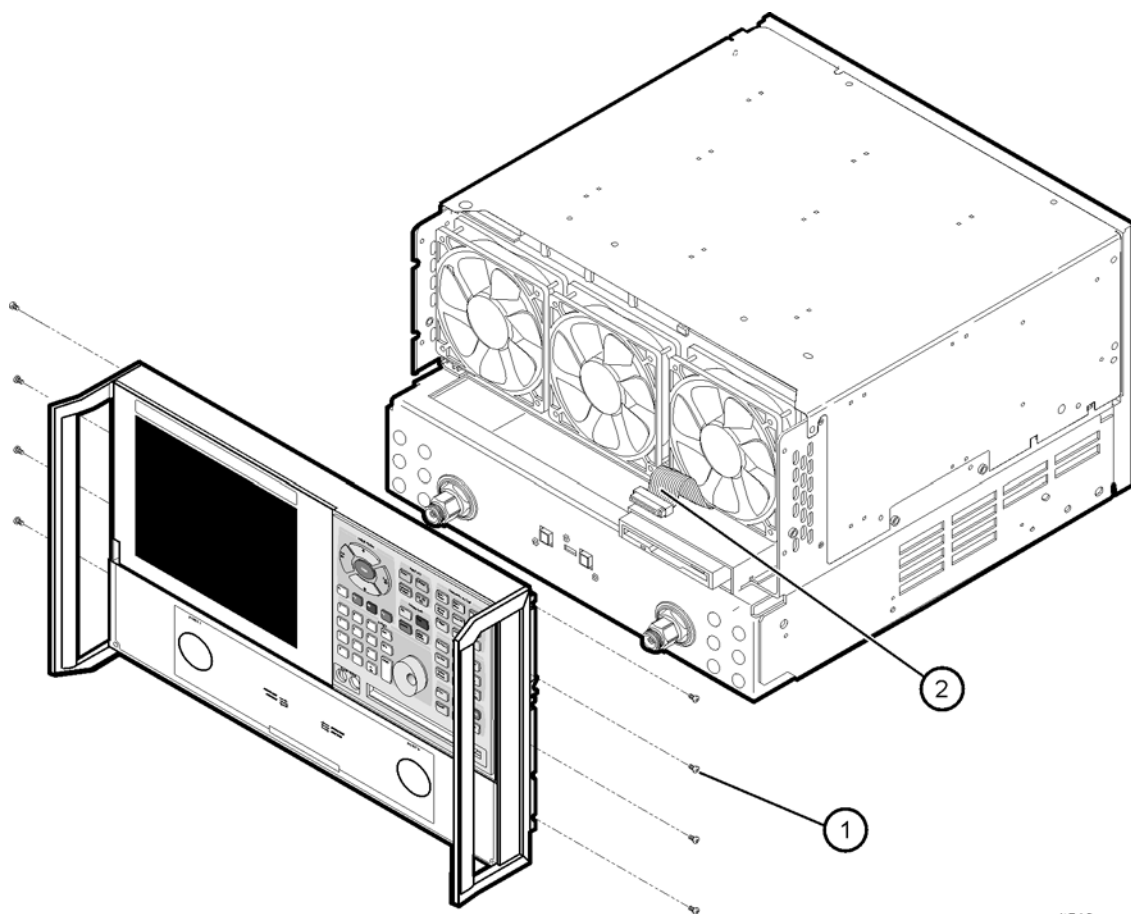
Refer to [Figure 3](#) for this procedure.

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

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

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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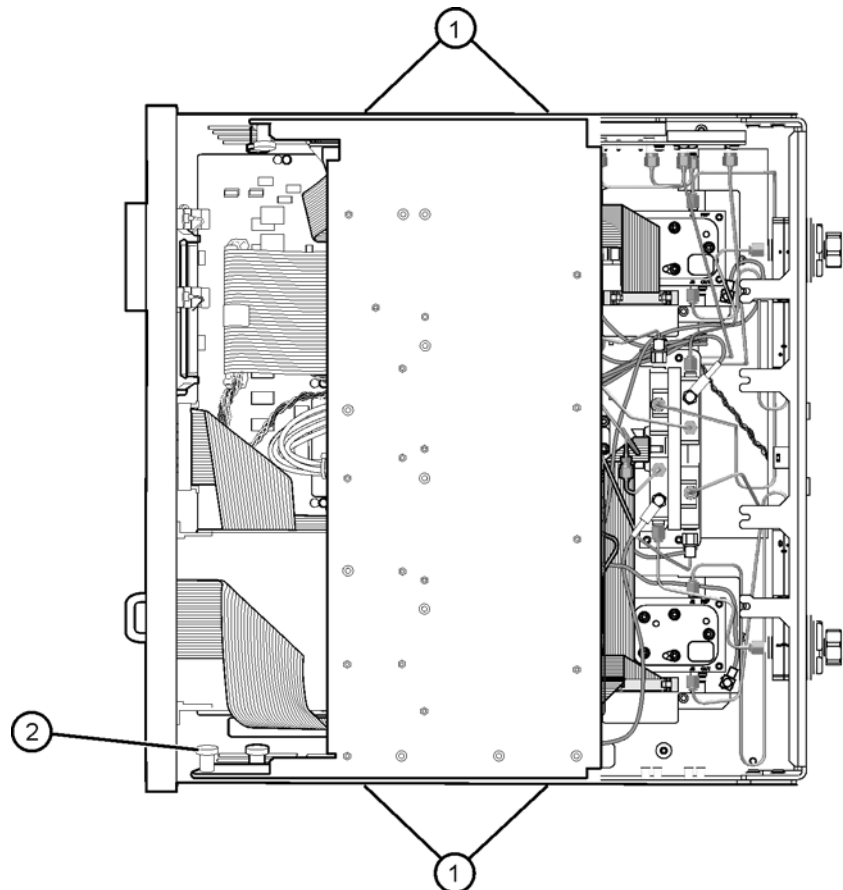
NOTE The figure above shows the E8361A front panel and floppy disk drive. The E8361C front panel has a slightly different appearance and does not include a floppy disk drive.

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

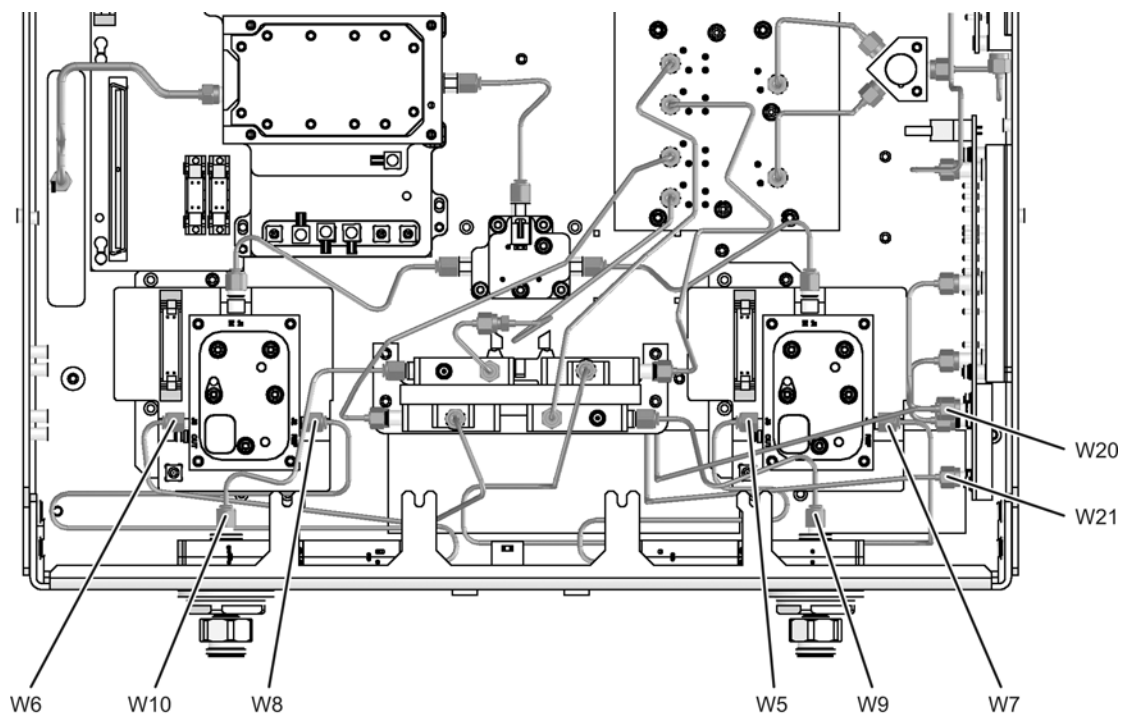
Refer to [Figure 5](#) for this procedure.

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



8361_002_02

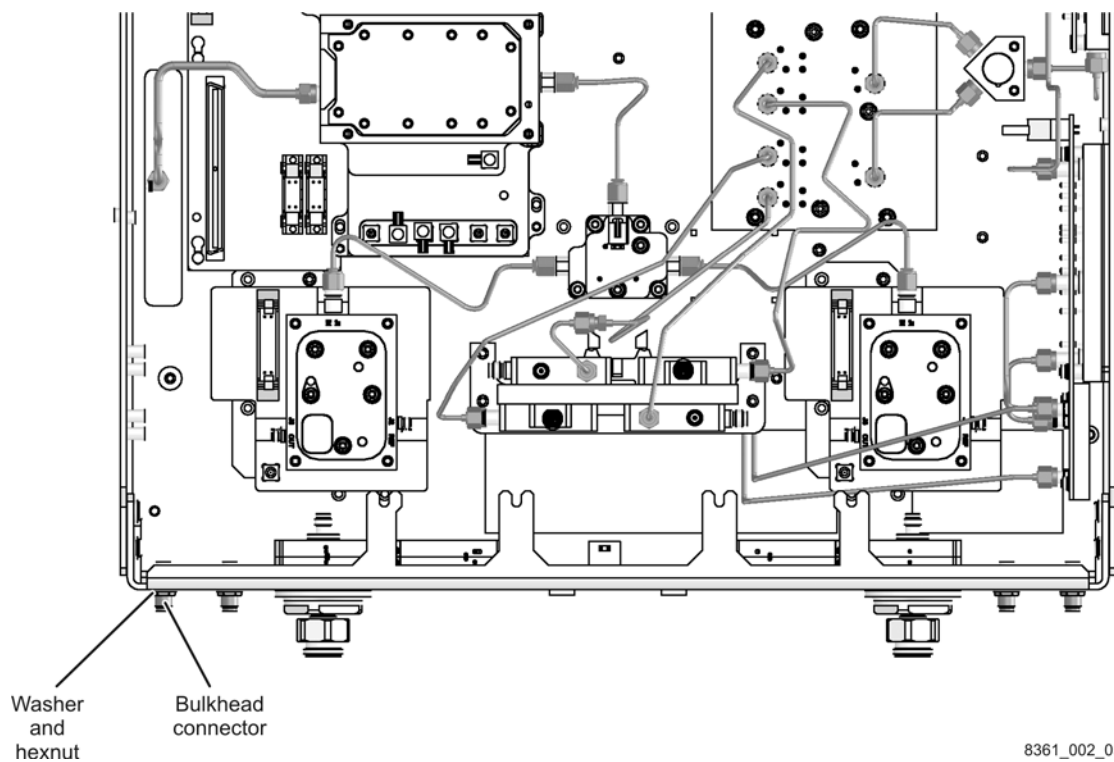
Step 5. Install the Front-Panel Bulkhead Connectors

Refer to [Figure 6](#) for this procedure. The new parts referenced in this procedure are listed in [Table 1](#) on page 4.

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



8361_002_05

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 4](#).

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. Use the new front panel overlay to determine the location of front panel connections.

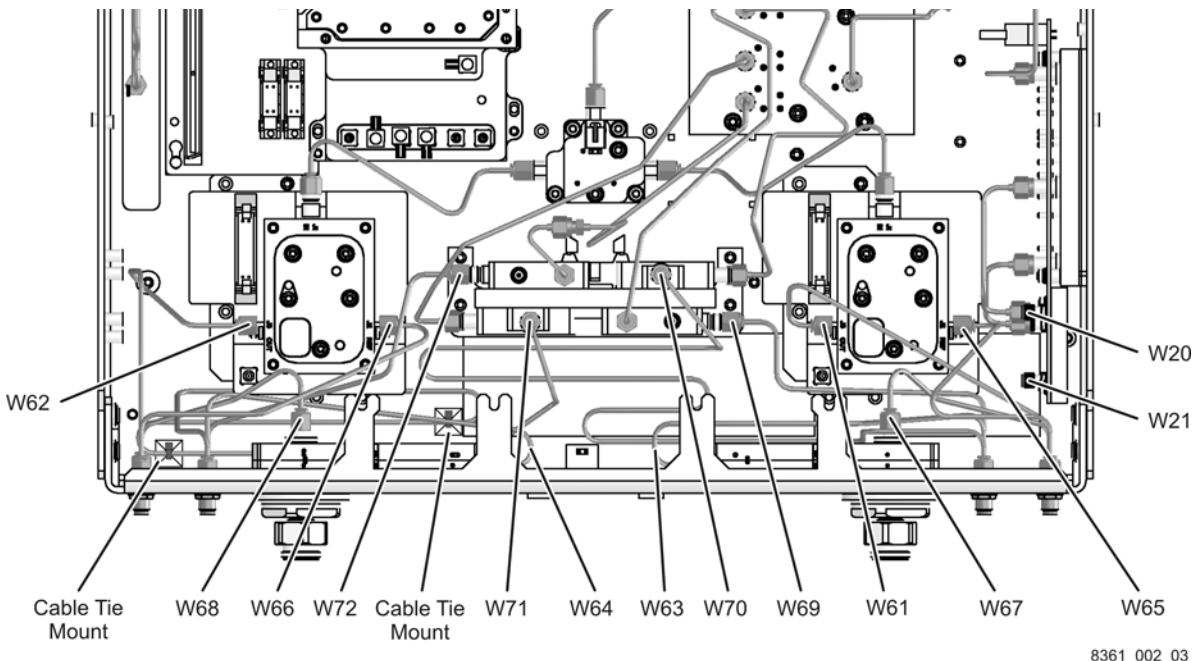
- W71 E8361-20020 REFERENCE 2 RCVR R2 IN to A29 channel R2 mixer

Before installing the remaining cables, install the two cable tie mounts in the locations shown by adhering them to the test set deck directly below cable W71 as shown. Secure cable W71 to each cable tie mount with a cable tie as shown.

- W70 E8361-20049 REFERENCE 1 RCVR R1 IN to A28 channel R1 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

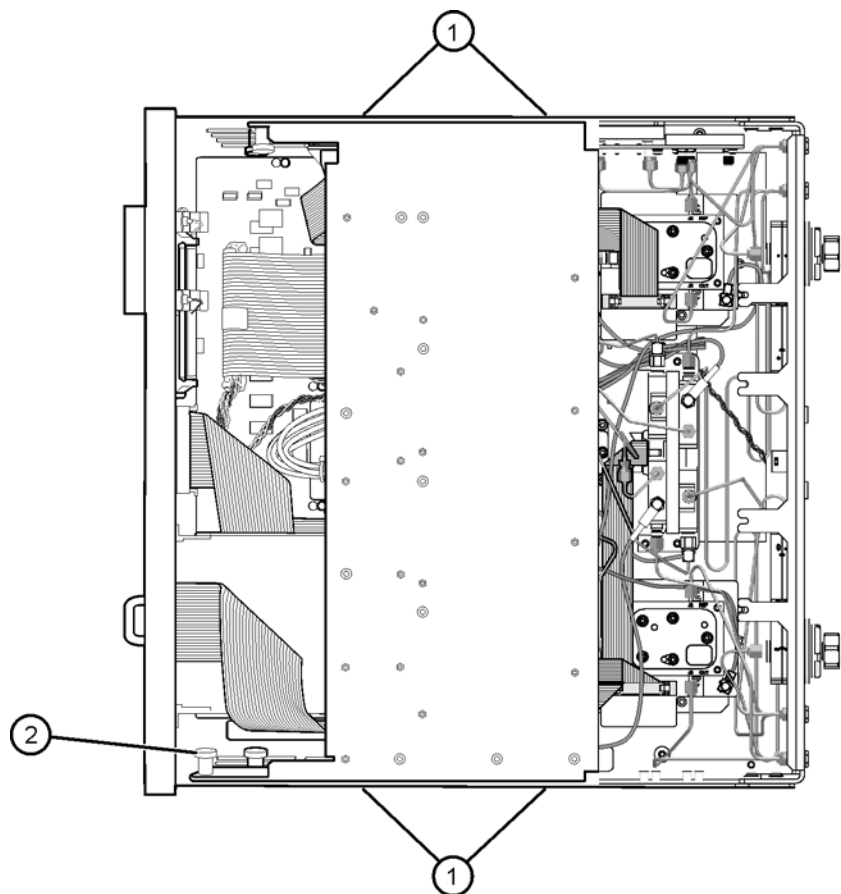


Step 7. Lower and Fasten the Receiver Deck

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



8361_002_04

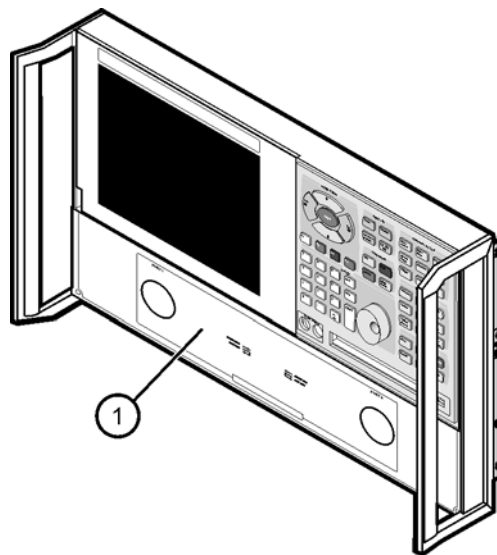
Step 8. Replace the Lower Front Panel Overlay

NOTE The new parts referenced in this procedure are listed in [Table 1 on page 4](#).

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 new 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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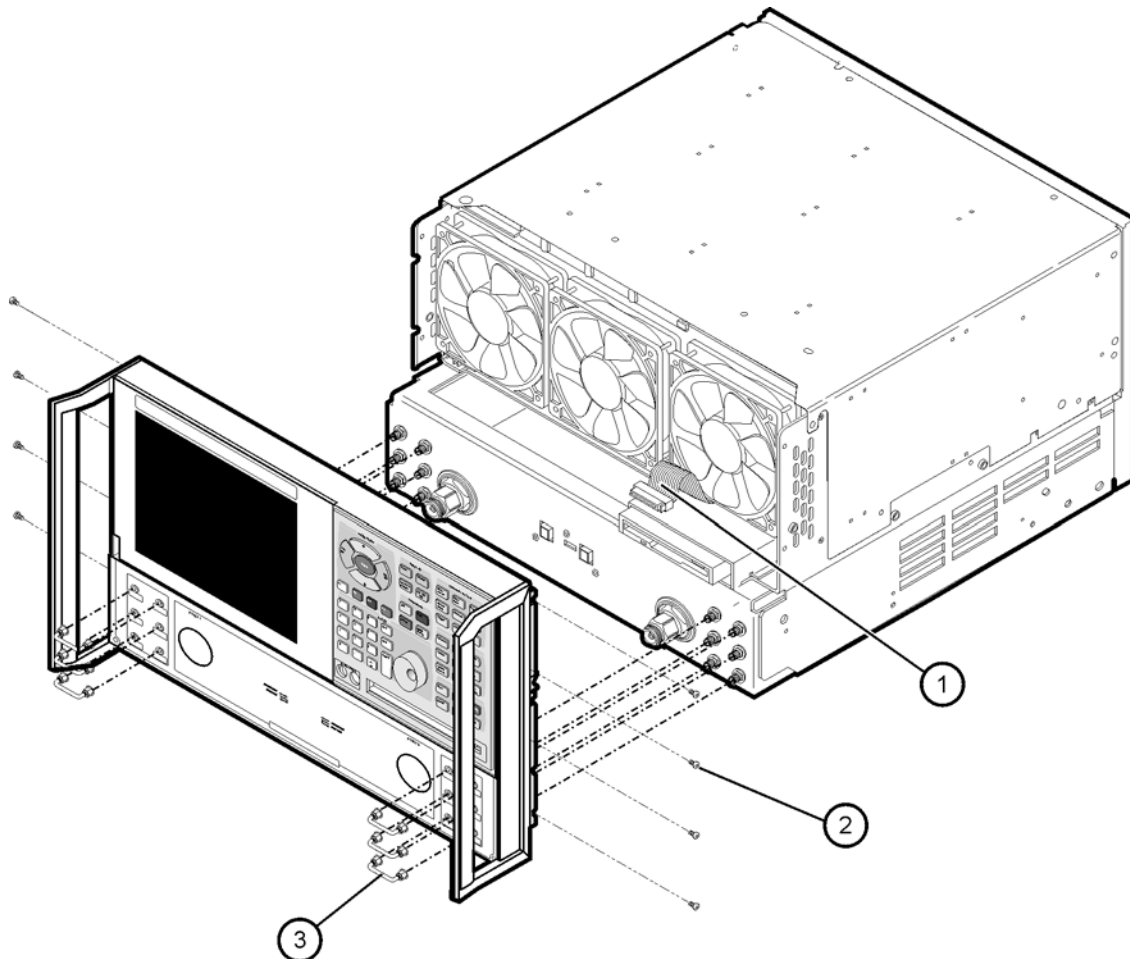
NOTE The figure above shows the E8361A front panel and floppy disk drive. The E8361C front panel has a slightly different appearance and does not include a floppy disk drive.

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

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

1. Lift and support the front of the analyzer chassis.
2. Reconnect the ribbon cable (item ①) to the A3 front panel interface board.
3. 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.
4. With a T-10 TORX driver, install the eight screws (item ②) in the sides of the frame.
5. 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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NOTE

The figure above shows the E8361A front panel and floppy disk drive. The E8361C front panel has a slightly different appearance and does not include a floppy disk drive.

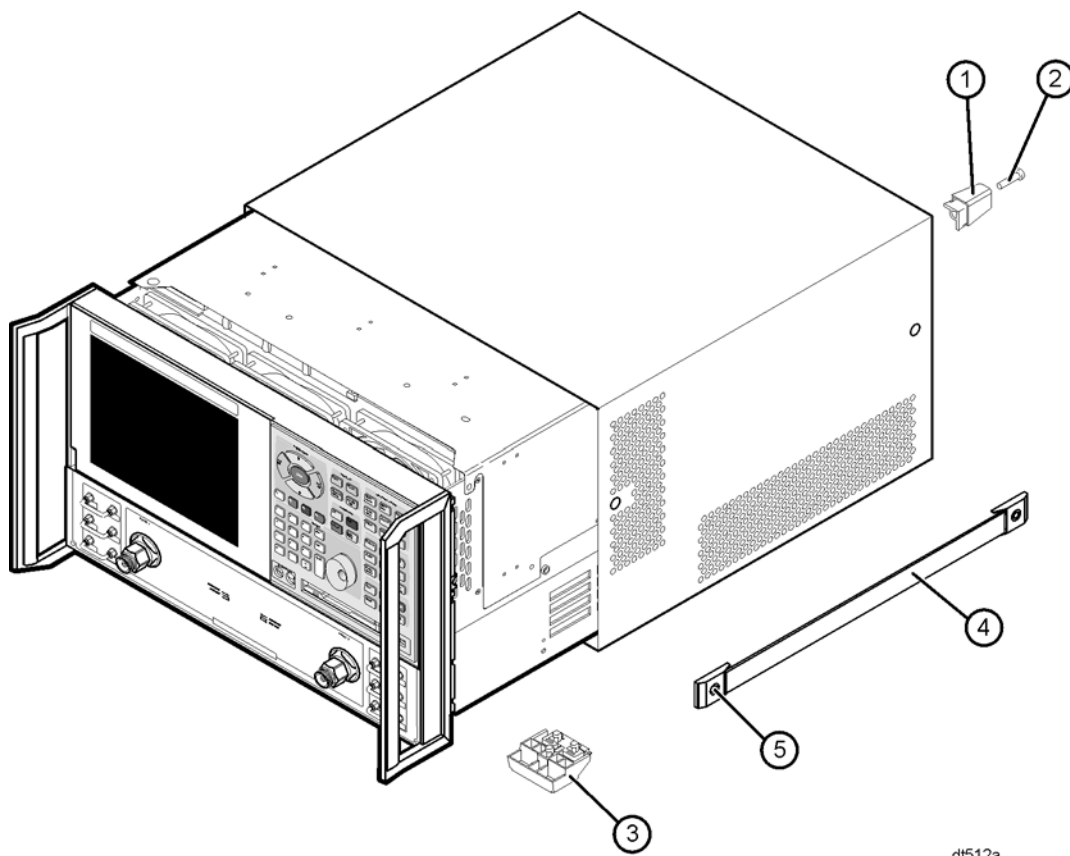
Step 10. Reinstall the Outer Cover

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



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NOTE The figure above shows the E8361A front panel and floppy disk drive. The E8361C front panel has a slightly different appearance and does not include a floppy disk drive.

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.

| | |
|-------------|--|
| NOTE | If Options 014 has not been enabled, perform the "Option Enable Procedure" again. If the option is still not enabled, contact Agilent Technologies. Refer to "Contacting Agilent" on page 3. |
|-------------|--|

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 [“Test Equipment Required for Post-Upgrade Adjustments”](#) 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 [“Contacting 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 PNA performance test software.

Refer to the analyzer’s service guide for information on the performance test software.

