

# Installation Note

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**Reference Mixer Transfer Switch Upgrade Kit  
To Add Option 081**

**Upgrade Kit Order Numbers: E8361AU-081 and E8361CU-081  
For E8361A/C PNA Series Microwave Network Analyzers**



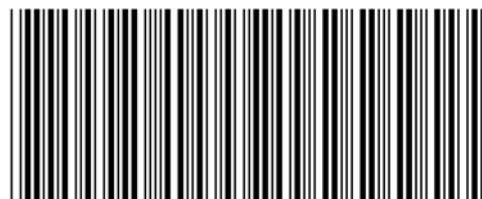
**Agilent Kit Number: E8361-60103**

**Agilent Document Number: E8361-90004**

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E8361-90004

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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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## 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](http://www.agilent.com/find/assist)

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

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**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.

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## About Installing the Upgrade Kit

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**IMPORTANT** Option 081 can only be installed on analyzers with the option combinations listed below as “Products affected”. If your analyzer does not have the proper options (as listed below), it will be necessary to install those options **BEFORE** installing this option (Option 081).

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Products affected. . . . .	E8361A/C with options 014, UNL, and 080 (with or without Option 016)
Installation to be performed by . . . . .	Agilent service center or personnel qualified by Agilent
Estimated installation time . . . . .	1 hour
Estimated adjustment time . . . . .	1 hour
Estimated full instrument calibration time . . . .	4.5 hours

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## Description of the Option 081 Reference Mixer Transfer Switch Upgrade

This upgrade adds a high-speed microwave switch in the reference (R1) channel of the PNA. This switch is used to switch a reference mixer in and out of the reference channel signal path during calibration and measurement. This allows the user to easily switch between standard S-parameter (non-frequency-offset) measurements and frequency offset measurements that require an external reference mixer.

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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 [“Contacting Agilent” on page 3](#).

**Table 1 Contents of the Upgrade Kit (E8361-60103)**

Ref. Desig.	Description	Qty	Part Number
	Installation note (this document)	1	E8361-90004
	ROHS addendum	1	9320-6722
	Machine screw, M3.0 x 8, TORX T-10 (for attaching A45 reference switch to switch bracket)	2	0515-0372
	Machine screw, M3.0 x 6, TORX T-10 (for attaching switch bracket to analyzer)	2	0515-0430
	Reference switch mounting bracket	1	E8361-00004
	Wiring harness, two conductors (for A45 switch)	1	8121-0966
	Machine screw, M3.0 x 18, pan head with crest-cup conical washer (for cable W99 cable clamp and spacer)	2	0515-0666
	Cable clamp, 0.125-in diameter, 0.38-in wide, nylon (for cable W99)	1	1400-0082
	Spacer, round, 3.4 mm-ID, 8 mm long, aluminum (for cable W99)	1	0380-1402
A45	Reference switch	1	5087-7271
W96	RF cable, A23 port 1 SOMA 70 to A45 reference switch	1	E8361-20037
W97	RF cable, A45 reference switch to REFERENCE 1 SOURCE OUT	1	E8361-20038
W98	RF cable, REFERENCE 1 RCVR R1 IN to A45 reference switch	1	E8361-20039
W99	RF cable, A45 reference switch to A28 channel R1 mixer	1	E8361-20065

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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

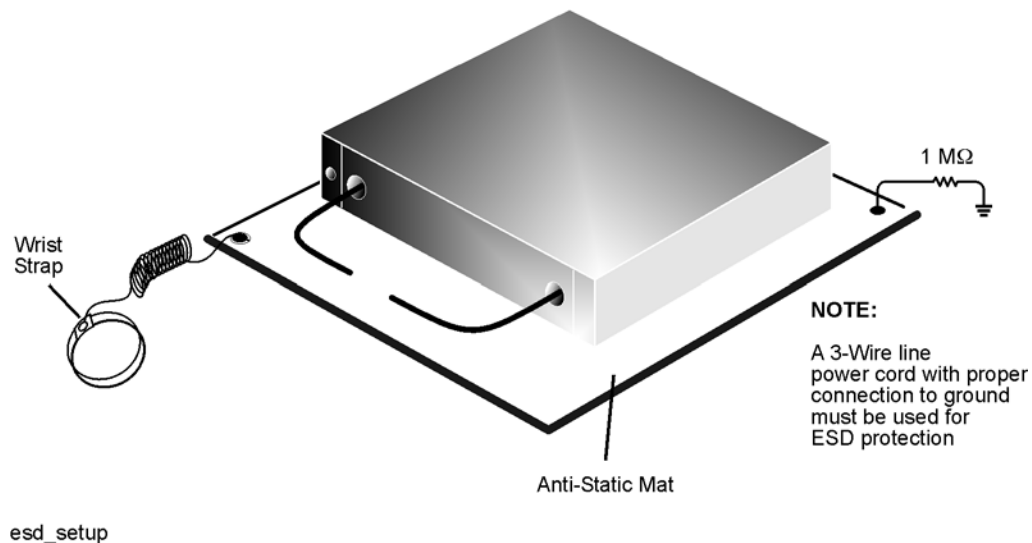
Protection against electrostatic discharge (ESD) is essential while removing or connecting cables or assemblies within the network analyzer.

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 6 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 Option 081 Reference Switch and Cables.

Step 6. Lower and Secure the Receiver Deck.

Step 7. Reinstall the Front Panel Assembly and Front Panel Jumpers.

Step 8. Reinstall the Outer Cover.

Step 9. Enable Option 081.

Step 10. Perform Post-Upgrade Adjustments.

## Tools and Equipment Required for the Installation

Description	Qty	Agilent 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 connectors to which the front-panel jumpers attach (Option 014).  
Use a 5/16-inch torque wrench set to 21 in-lbs for these connections.

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## ESD Equipment and Supplies Required for the Installation

Description	Agilent Part Number
ESD grounding wrist strap	9300-1367
5-ft grounding cord for wrist strap	9300-0980
2 x 4 ft conductive table mat and 15-ft grounding wire	9300-0797
ESD heel strap (for use with conductive floors)	9300-1308

## 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

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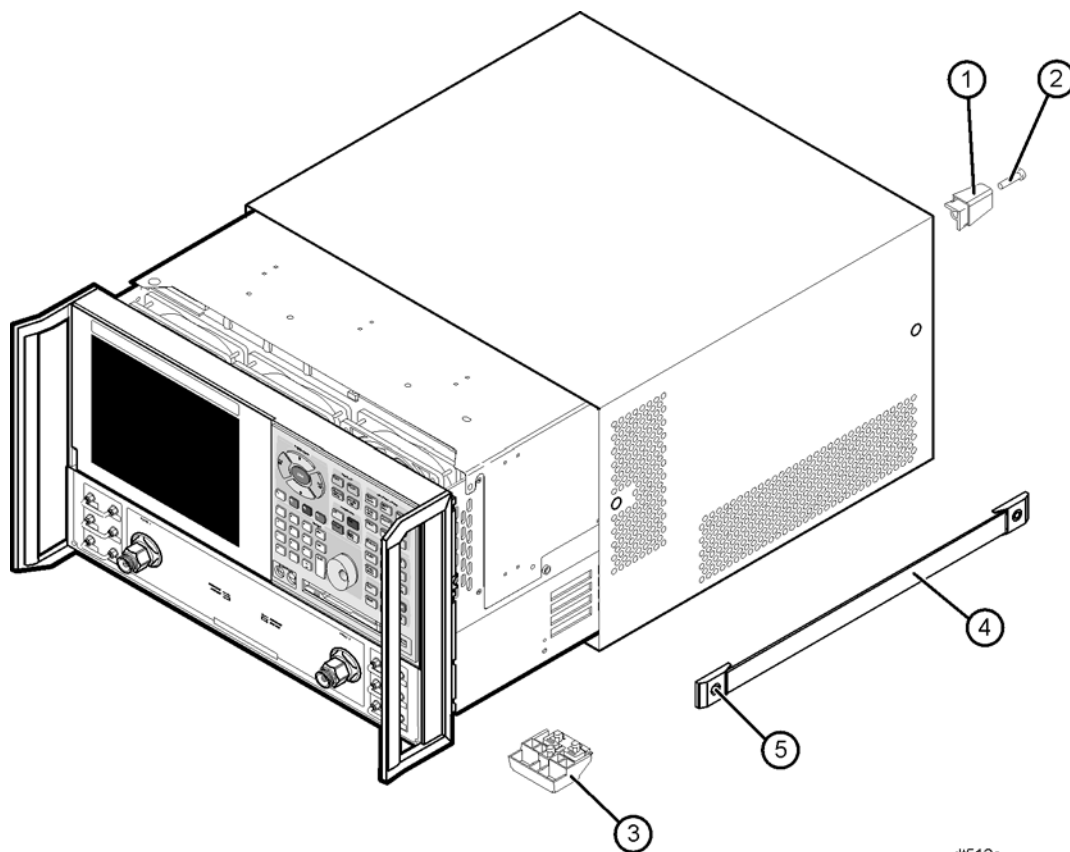
**CAUTION** This procedure is best performed with the analyzer resting on its front handles in the vertical position. *Do not place the analyzer on its front panel without the handles.* This will damage the front panel assemblies.

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Refer to [Figure 2](#).

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

**Figure 2 Outer Cover Removal**



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**NOTE** The previous figure 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.

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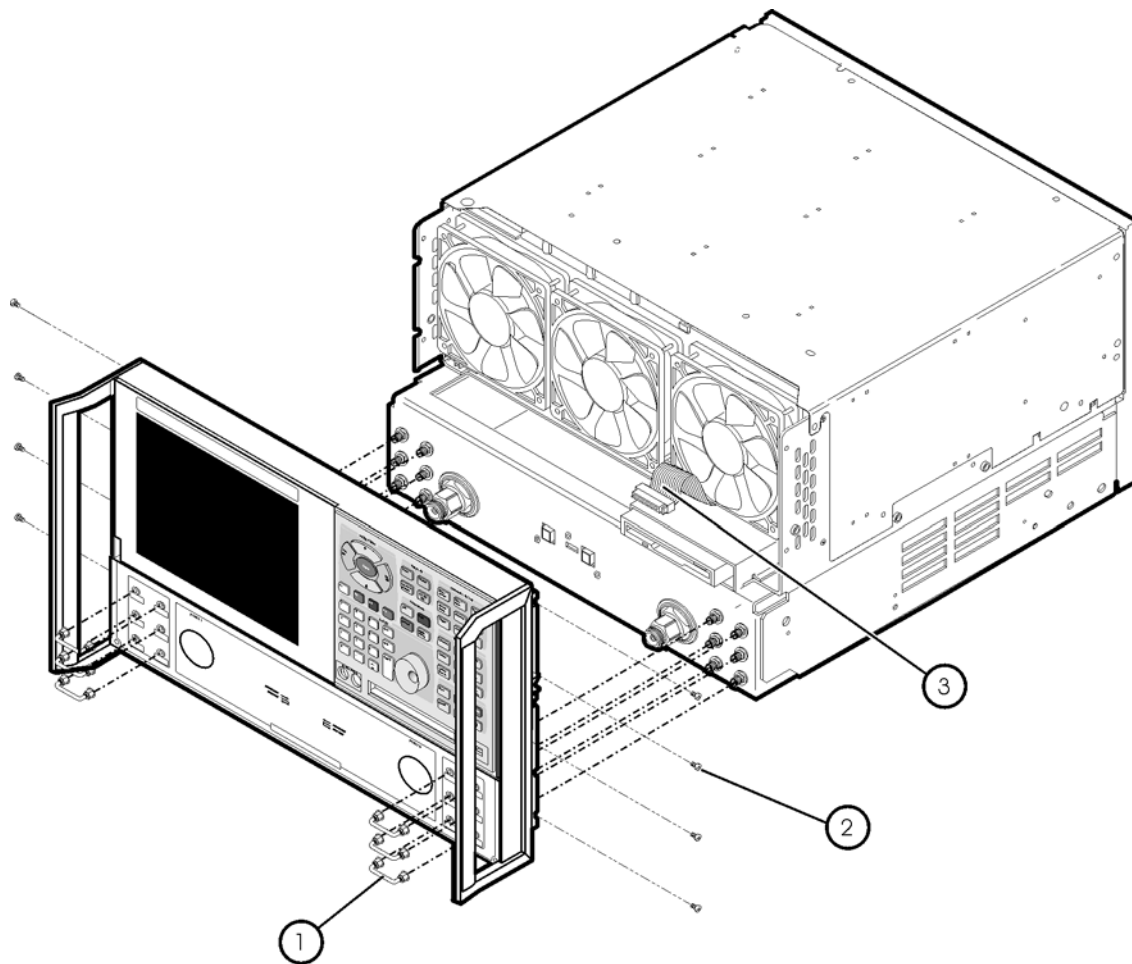


## Step 2. Remove the Front Panel Assembly

Refer to [Figure 3](#).

1. Before removing the front panel from the analyzer, lift and support the front of the analyzer chassis.
2. With a 5/16-inch wrench, remove the six front panel semirigid jumper cables (item ①).
3. With a T-10 TORX driver, remove the eight screws (item ②) from the sides of the frame.
4. Slide the front panel over the test port connectors.
5. Disconnect the front panel interface ribbon cable (item ③) from the A3 front panel interface board. The front panel is now free from the analyzer.

**Figure 3 Front Panel Assembly Removal**



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**NOTE** The previous figure 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.

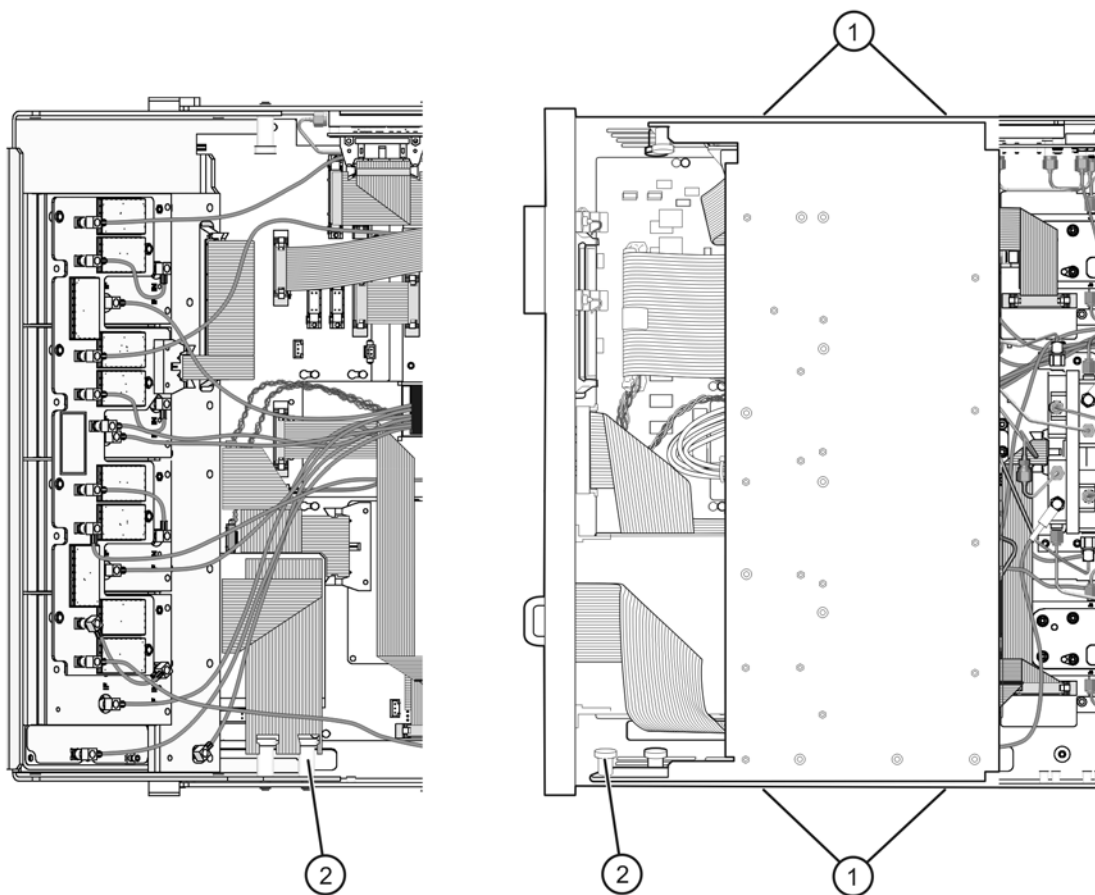
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### Step 3. Raise the Receiver Deck

Refer to [Figure 4](#).

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 other side of the analyzer to release the receiver deck.
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

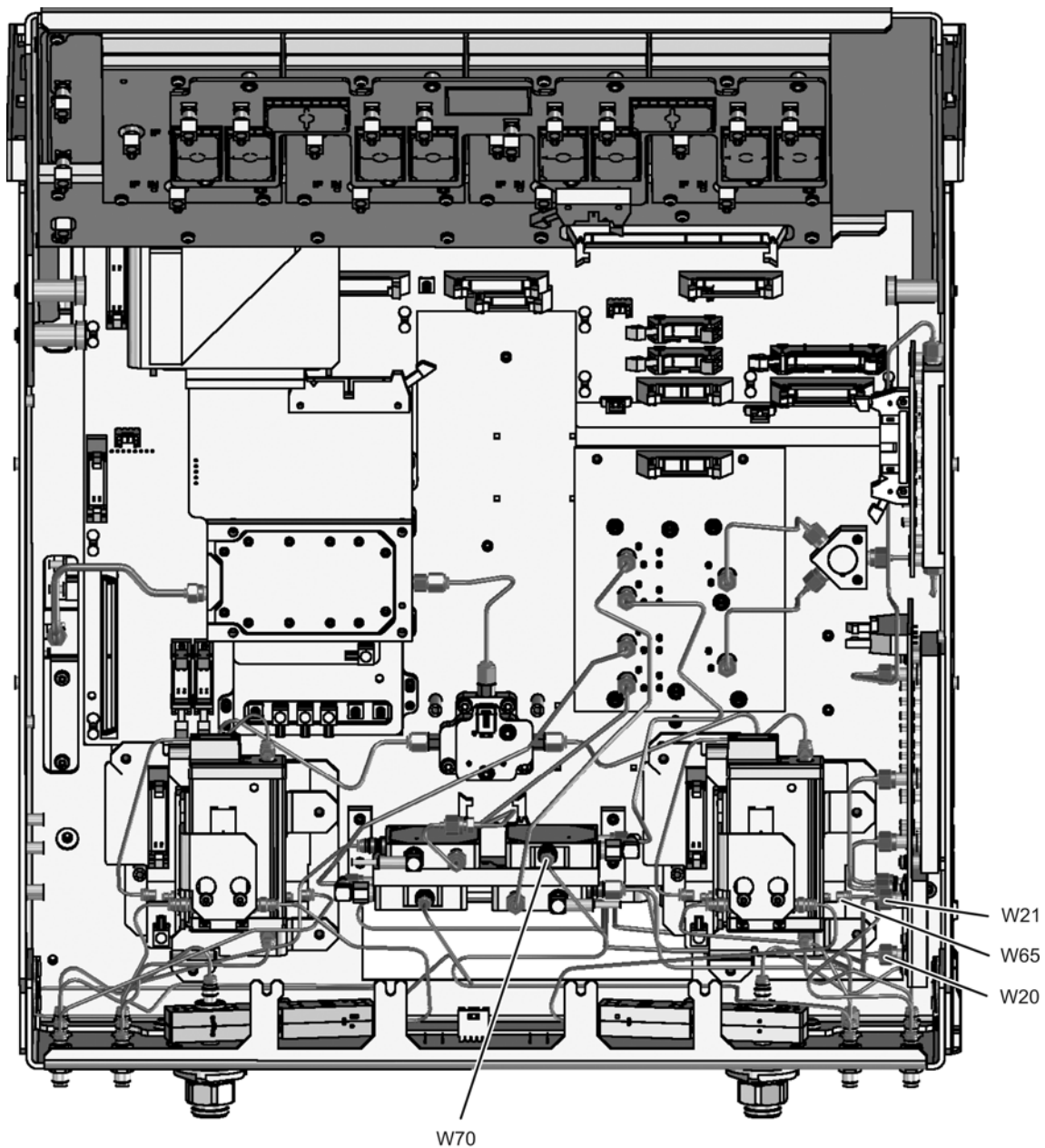
Refer to [Figure 5](#).

Remove and discard the following cables.

- W65 A23 port 1 SOMA 70 to REFERENCE 1 SOURCE OUT
- W70 REFERENCE 1 RCVR R1 IN to A28 channel R1 mixer

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 Existing Cables Removal**



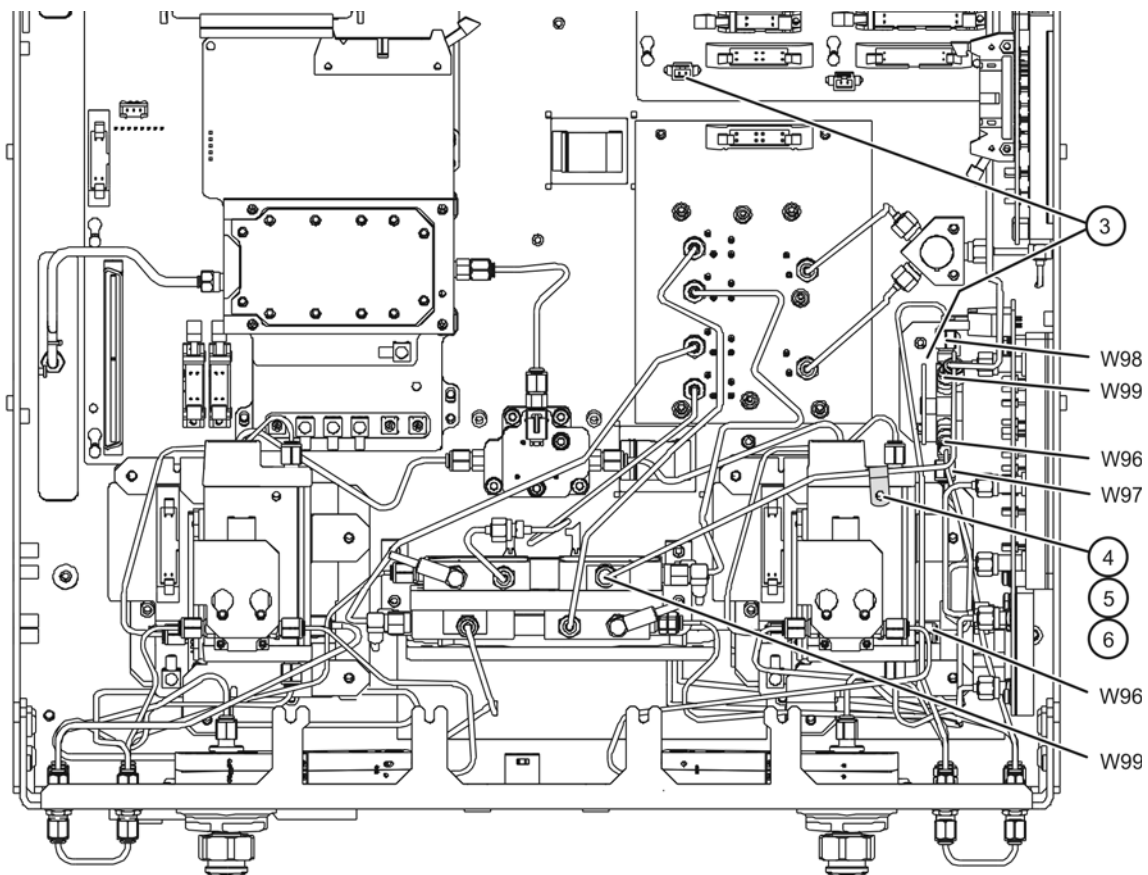
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## Step 5. Install the Option 081 Reference Switch and Cables

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

1. Attach the A45 reference switch to the mounting bracket (item ①) using two M3.0 x 8 screws (provided).
2. Insert the bracket, with the A45 reference switch attached, into the location shown.
3. With a T-10 TORX driver, install two M3.0 x 6 mounting screws (item ②, provided) in the bracket to secure it to the test set deck.
4. Install the following cables in the order listed.
  - Wire harness (item ③) 8121-0966 A45 reference switch to A16 test set motherboard J30
  - W96 E8361-20037 A23 port 1 SOMA 70 to A45 reference switch
  - W97 E8361-20038 A45 reference switch to REFERENCE 1 SOURCE OUT
  - W98 E8361-20039 REFERENCE 1 RCVR R1 IN to A45 reference switch
  - W99 E8361-20065 A45 reference switch to A28 channel R1 mixer
5. Install cable clamp, spacer, and screw (items ④, ⑤, and ⑥) to secure cable W99 as shown.
6. Reconnect cables W20 and W21 and tighten the connectors to 10 in-lbs.

**Figure 6 A45 Reference Switch and Cables Installation**



(Some parts removed for clarity.)

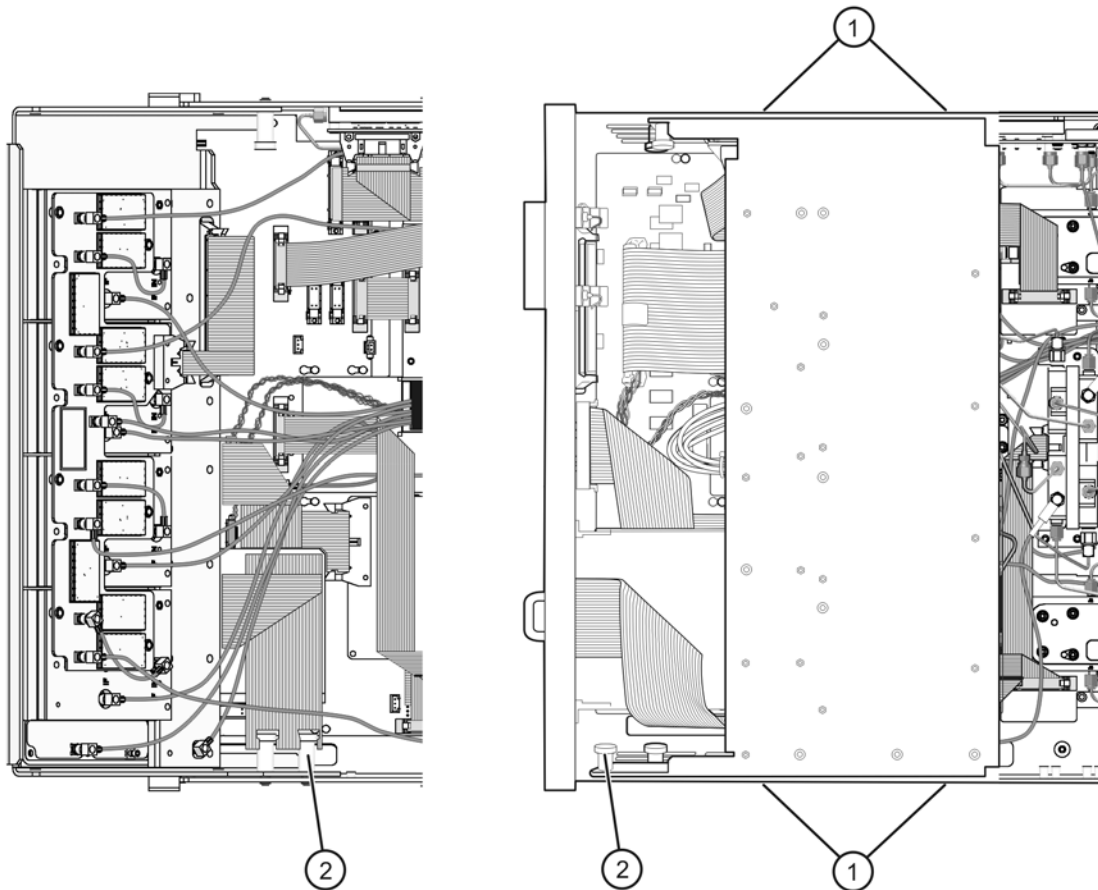
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## Step 6. Lower and Secure the Receiver Deck

Refer to [Figure 7](#).

1. Pull the latch pin (item ②) towards the other 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 7 Receiver Deck Lowering**



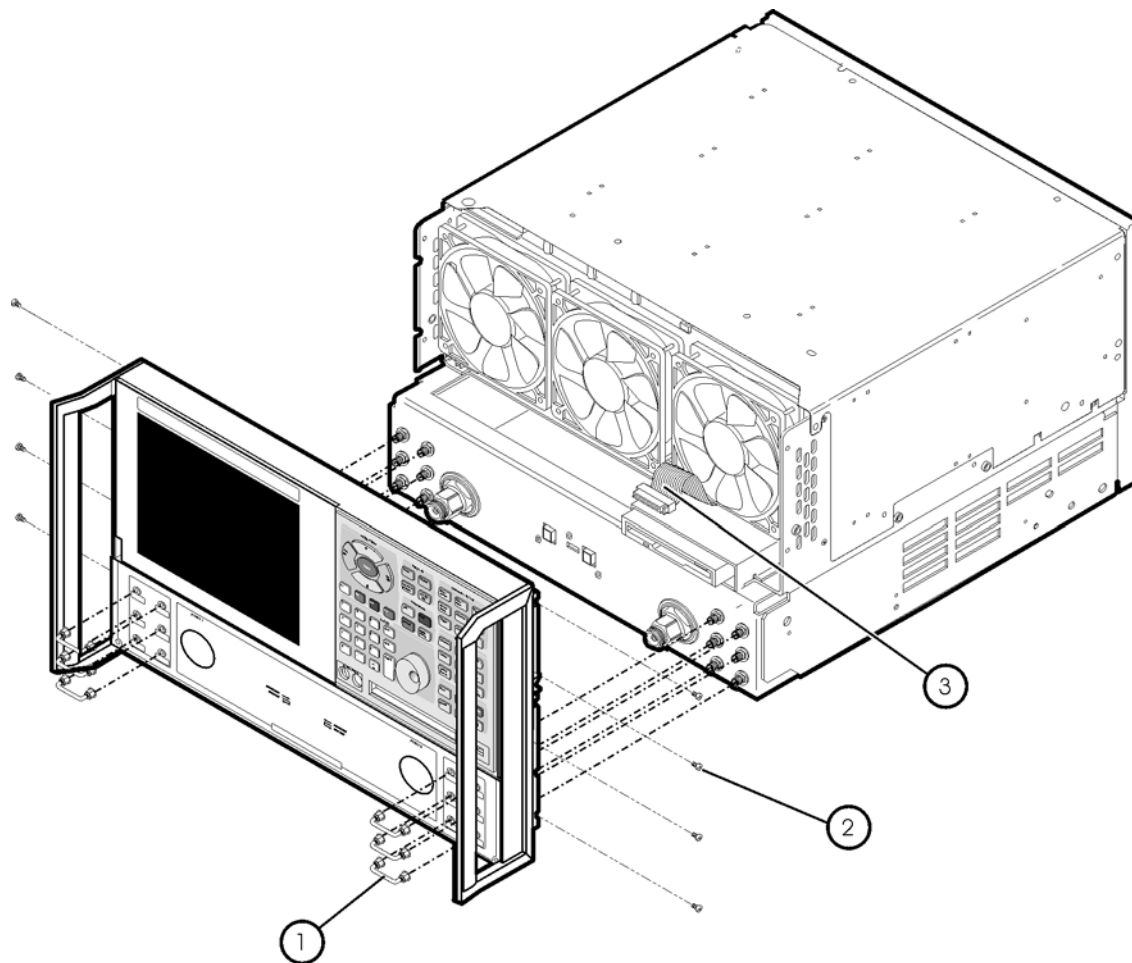
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## Step 7. Reinstall the Front Panel Assembly and Front Panel Jumpers

Refer to [Figure 8](#).

1. Before installing the front panel, lift and support the front of the analyzer chassis.
2. Tighten all 12 of the front-panel feed-through connectors using a 5/16-inch torque wrench set to 21-inch lbs.
3. Reconnect the ribbon cable (item ③) to the A3 front panel interface board.
4. 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 ③) is located below the fan to prevent it from being damaged by the fan blades.
5. With a T-10 TORX driver, install the eight screws (item ②) in the sides of the frame.
6. Install the six semirigid jumpers (item ①) on the front panel and tighten to 10-inch lbs.

**Figure 8 Front Panel Assembly Reinstallation**



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### NOTE

The previous figure 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.

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## Step 8. Reinstall the Outer Cover

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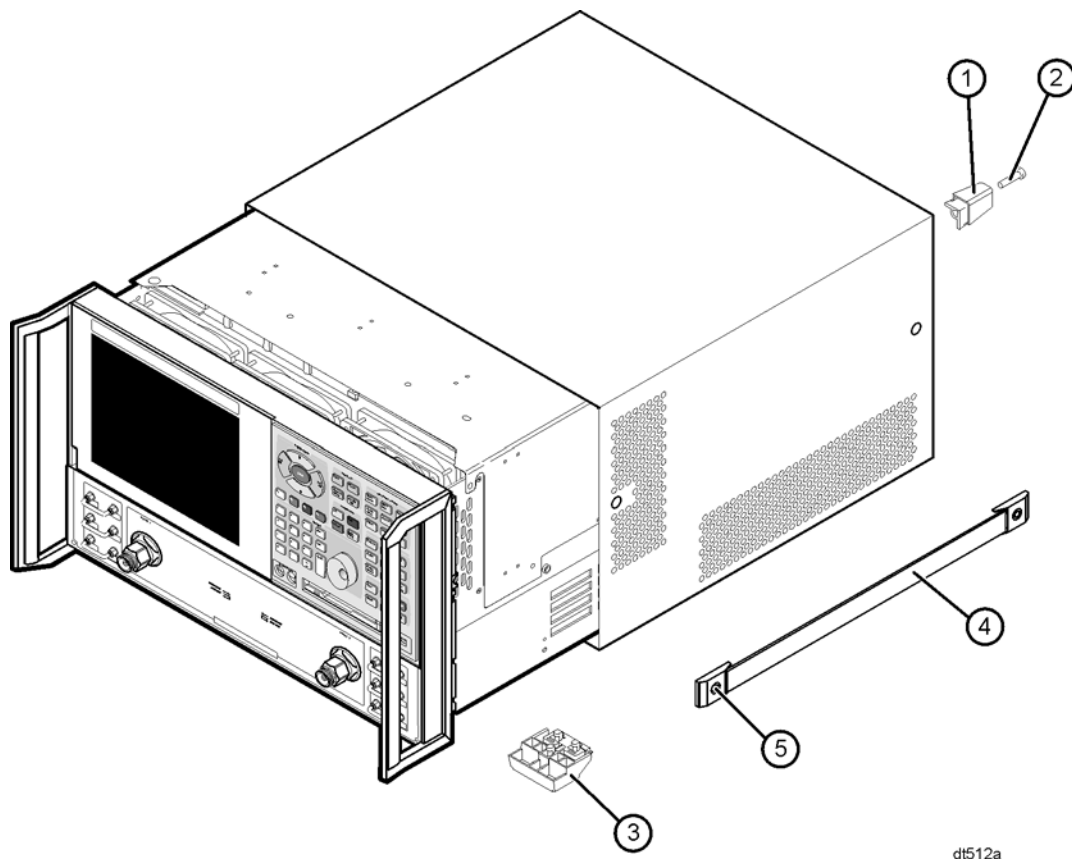
**CAUTION** This procedure is best performed with the analyzer resting on its front handles in the vertical position. *Do not place the analyzer on its front panel without the handles.* This will damage the front panel assemblies.

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Refer to [Figure 9](#).

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 screw (item ⑤) on each end of the handle.

**Figure 9 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.

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## Step 9. Enable Option 081

### 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 **081 - Reference Transfer Switch**.
3. Click **Install**.
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 "081" is listed after "Options:" in the display. Click **OK**.

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**NOTE** If Option 081 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.

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## Step 10. Perform Post-Upgrade Adjustments

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

- source calibration
- phase lock IF gain adjustment
- receiver 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.

### Performance Tests and System Verification

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.

If the testing of the analyzer’s full range of specifications is not required, a system verification can be performed.

Refer to the analyzer’s service guide for information on performance tests and system verification.