

Installation Note

Reference Mixer Transfer Switch Upgrade Kit

Upgrade Kit Number: E8361-60103

For E8361A Microwave Network Analyzers

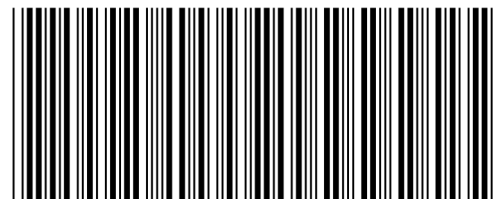


Agilent Part Number: E8361-90004

Printed in USA May 2005

Supersedes all previous printings.

© Agilent Technologies, Inc. 2003–2005



E8361- 90004

WARRANTY STATEMENT

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED “AS IS,” AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, AGILENT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. AGILENT SHALL NOT BE LIABLE FOR ERRORS OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR ANY INFORMATION CONTAINED HEREIN. SHOULD AGILENT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT WILL CONTROL.

DFARS/Restricted Rights Notice

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

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.
----------------	---

Getting Assistance from Agilent

By internet, phone, or fax, get assistance with all your test and measurement needs.

This information supersedes all prior HP contact information.			
Online assistance: www.agilent.com/find/assist			
Americas			
Brazil <i>(tel)</i> (+55) 11 3351 7012 <i>(fax)</i> (+55) 11 3351 7024	Canada <i>(tel)</i> +1 877 894 4414 <i>(alt)</i> +1 303 662 3369 <i>(fax)</i> +1 800 746 4866	Mexico <i>(tel)</i> 1 800 254 2440 <i>(fax)</i> 1 800 254 4222	United States <i>(tel)</i> 800 829 4444 <i>(alt)</i> (+1) 303 662 3998 <i>(fax)</i> 800 829 4433
Asia Pacific and Japan			
Australia <i>(tel)</i> 1 800 802 540 <i>(fax)</i> 1 800 681 776 <i>(fax)</i> 1 800 225 539	China <i>(tel)</i> 800 810 0508 <i>(fax)</i> 800 810 0507	Hong Kong <i>(tel)</i> 800 933 229 <i>(fax)</i> 800 900 701	India <i>(tel)</i> 1600 112 626 <i>(fax)</i> 1600 113 040
Japan (Bench) <i>(tel)</i> 0120 421 345 <i>(alt)</i> (+81) 426 56 7832 <i>(fax)</i> 0120 01 2144	Japan (On-Site) <i>(tel)</i> 0120 421 345 <i>(alt)</i> (+81) 426 56 7832 <i>(fax)</i> 0120 012 114	Singapore <i>(tel)</i> 1 800 275 0880 <i>(fax)</i> (+65) 6755 1214	South Korea <i>(tel)</i> 080 778 0011 <i>(fax)</i> 080 778 0013
Taiwan <i>(tel)</i> 0800 047 669 <i>(fax)</i> 0800 047 667 <i>(fax)</i> 886 3492 0779	Thailand <i>(tel)</i> 1 800 2758 5822 <i>(fax)</i> 1 800 656 336	Malaysia <i>(tel)</i> 1800 880 399 <i>(fax)</i> 1800 801 054	
Europe			
Austria <i>(tel)</i> 0820 87 44 11* <i>(fax)</i> 0820 87 44 22	Belgium <i>(tel)</i> (+32) (0)2 404 9340 <i>(fax)</i> (+32) (0)2 404 9395	Denmark <i>(tel)</i> (+45) 7013 1515 <i>(fax)</i> (+45) 7013 1555	Finland <i>(tel)</i> (+358) 10 855 2100 <i>(fax)</i> (+358) (0) 10 855 2923
France <i>(tel)</i> 0825 010 700* <i>(fax)</i> 0825 010 701*	Germany <i>(tel)</i> 01805 24 6333* <i>(fax)</i> 01805 24 6336*	Ireland <i>(tel)</i> (+353) (0)1 890 924 204 <i>(fax)</i> (+353) (0)1 890 924 024	Israel <i>(tel)</i> (+972) 3 9288 504 <i>(alt)</i> (+972) 3 9288 544 <i>(fax)</i> (+972) 3 9288 520
Italy <i>(tel)</i> (+39) (0)2 9260 8484 <i>(fax)</i> (+39) (0)2 9544 1175	Luxemburg <i>(tel)</i> (+32) (0)2 404 9340 <i>(fax)</i> (+32) (0)2 404 9395	Netherlands <i>(tel)</i> (+31) (0)20 547 2111 <i>(fax)</i> (+31) (0)20 547 2190	Russia <i>(tel)</i> (+7) 095 797 3963 <i>(alt)</i> (+7) 095 797 3900 <i>(fax)</i> (+7) 095 797 3902
Spain <i>(tel)</i> (+34) 91 631 3300 <i>(fax)</i> (+34) 91 631 3301	Sweden <i>(tel)</i> 0200 88 22 55* <i>(alt)</i> (+46) (0)8 5064 8686 <i>(fax)</i> 020 120 2266*	Switzerland (French) <i>(tel)</i> 0800 80 5353 opt. 2* <i>(fax)</i> (+41) (0)22 567 5313	Switzerland (German) <i>(tel)</i> 0800 80 5353 opt. 1* <i>(fax)</i> (+41) (0)1 272 7373
Switzerland (Italian) <i>(tel)</i> 0800 80 5353 opt. 3* <i>(fax)</i> (+41) (0)22 567 5314	United Kingdom <i>(tel)</i> (+44) (0)7004 666666 <i>(fax)</i> (+44) (0)7004 444555		
<i>(tel)</i> = primary telephone number; <i>(alt)</i> = alternate telephone number; <i>(fax)</i> = FAX number; * = in country number 5/6/05			

About Installing the Upgrade Kit

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).

Products affected.	E8361A 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

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.

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 the Upgrade Kit (E8361-60103)

Ref. Desig.	Description	Qty	Part Number
	Installation note (this document)	1	E8361-90004
	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
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	E8361-20040

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

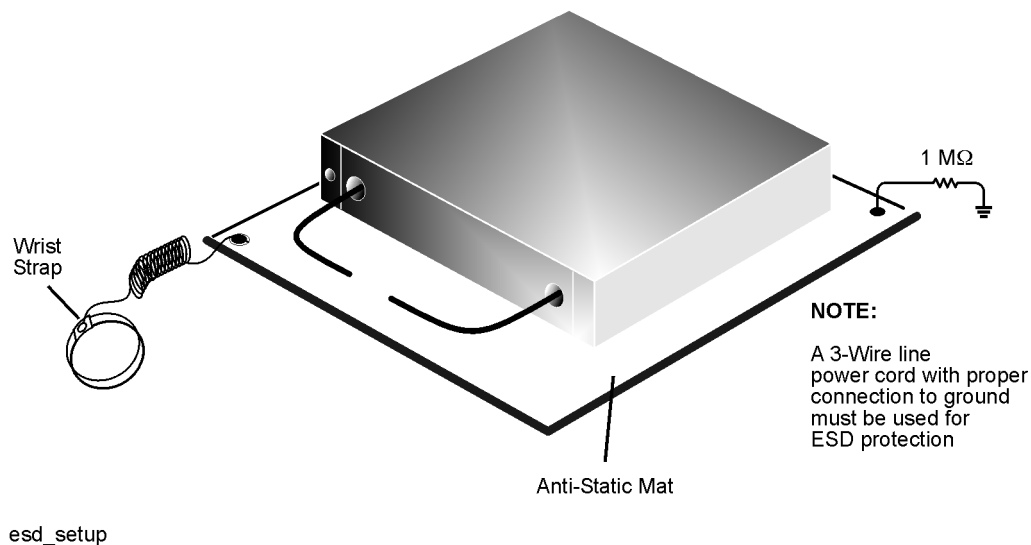
Protection against electrostatic discharge (ESD) is essential while removing or connecting cables or assemblies within the network analyzer.

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 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

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.

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) ^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.

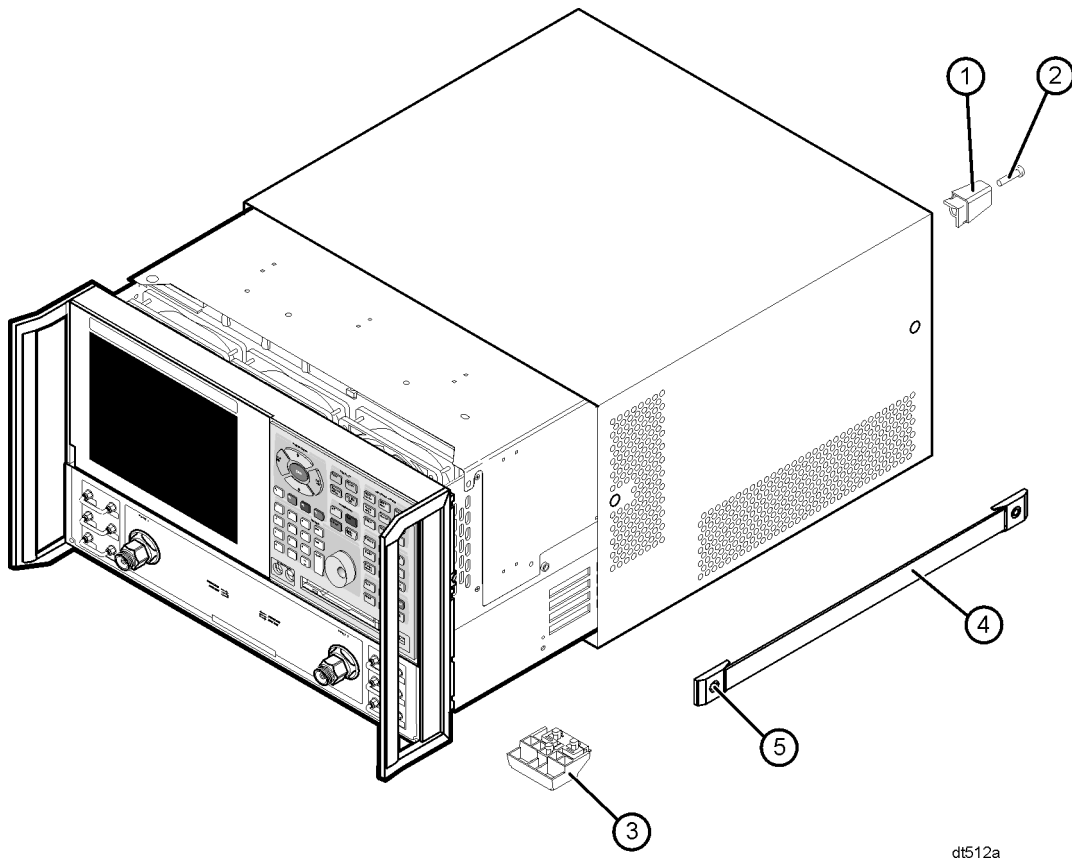
Step 1. Remove the Outer Cover

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](#).

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



dt512a

Step 2. Remove the Front Panel Assembly

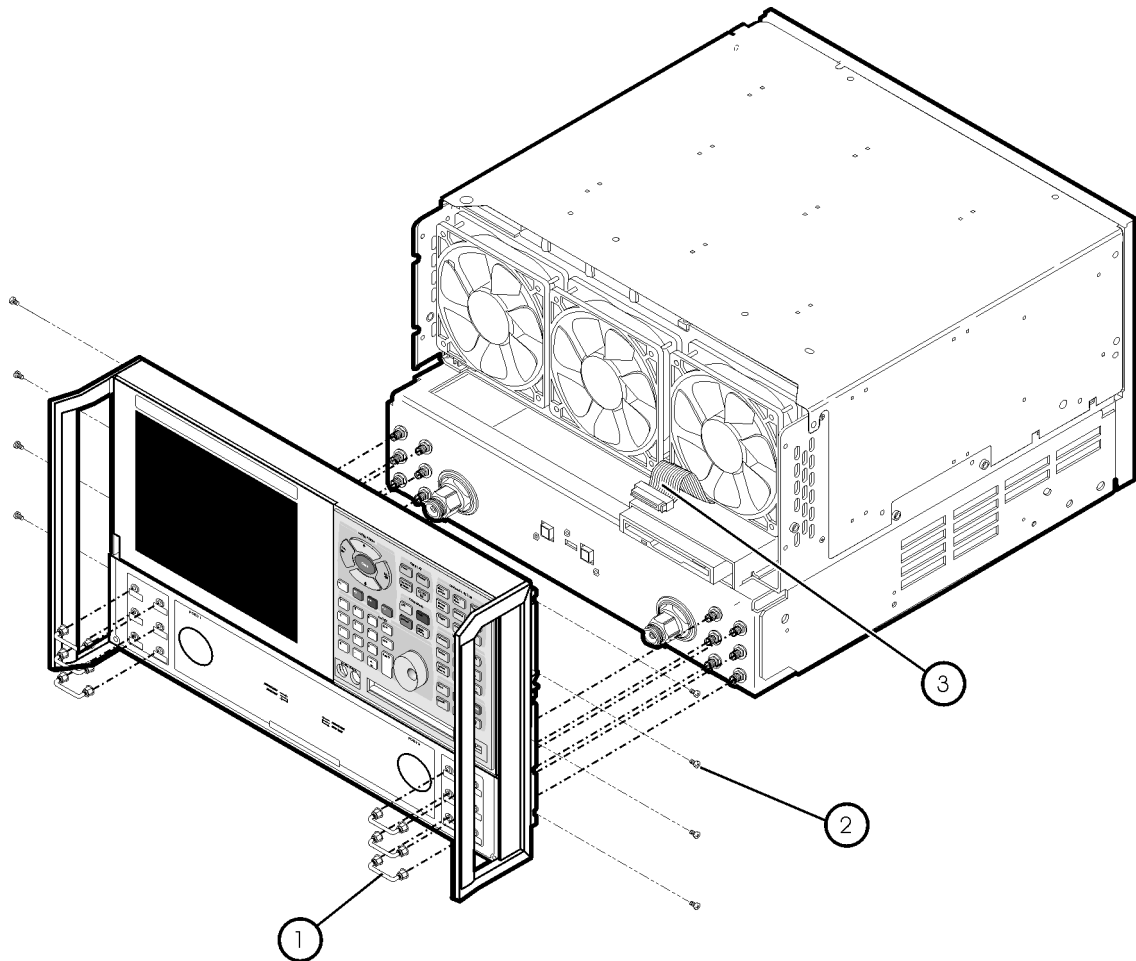
Refer to [Figure 3](#).

1. With a 5/16-inch wrench, remove the six front panel semirigid jumper cables (item ①).
2. With a T-10 TORX driver, remove the eight screws (item ②) from the sides of the frame.

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

3. Slide the front panel over the test port connectors.
4. 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



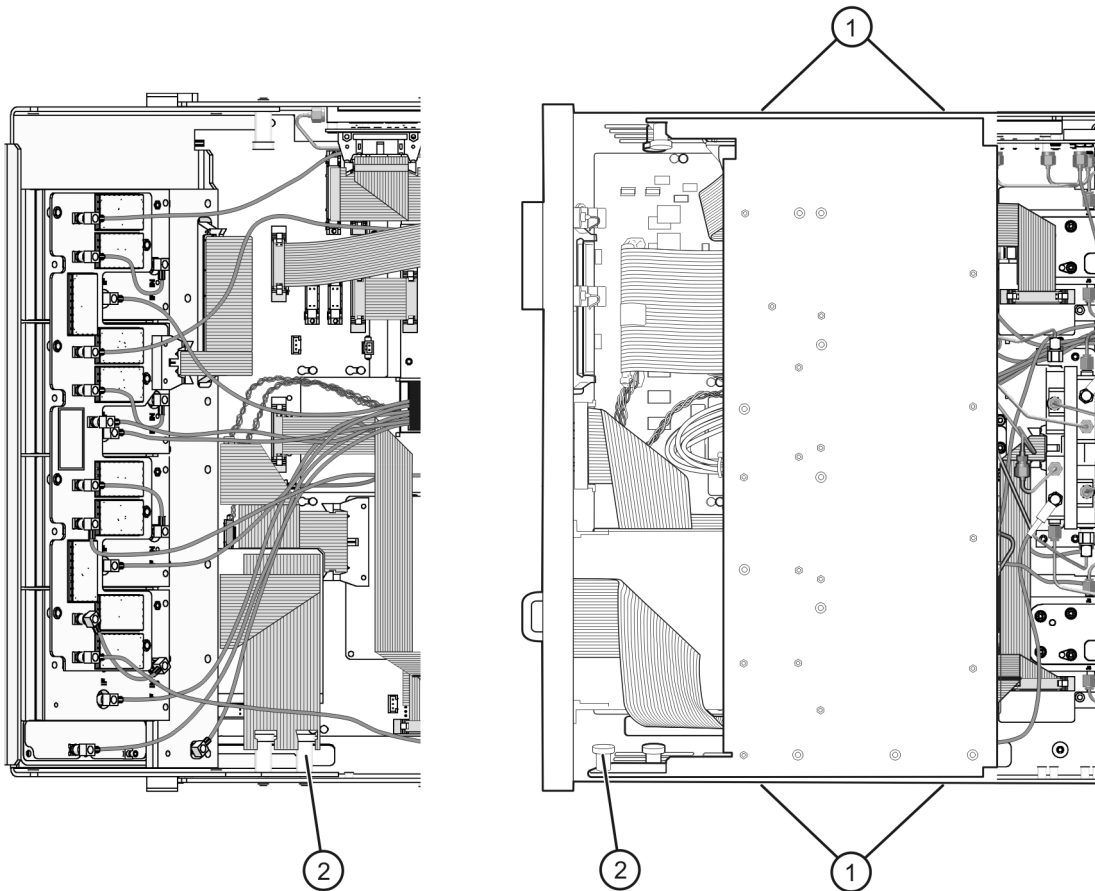
st536a

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.+
- 5.

Figure 4 Receiver Deck Raising



8364_022_16

Step 4. Remove the Existing Cables

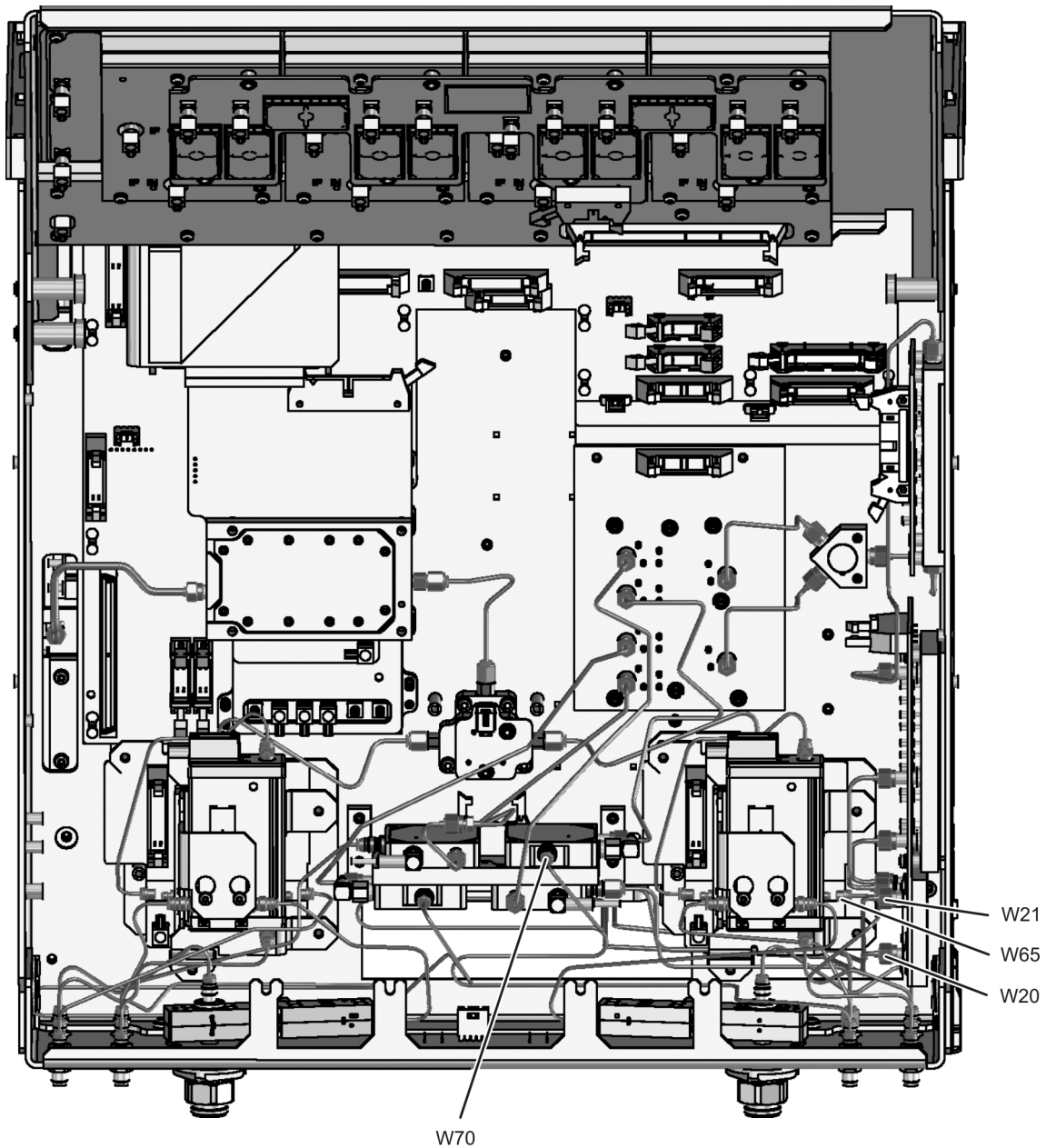
Refer to [Figure 5](#).

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



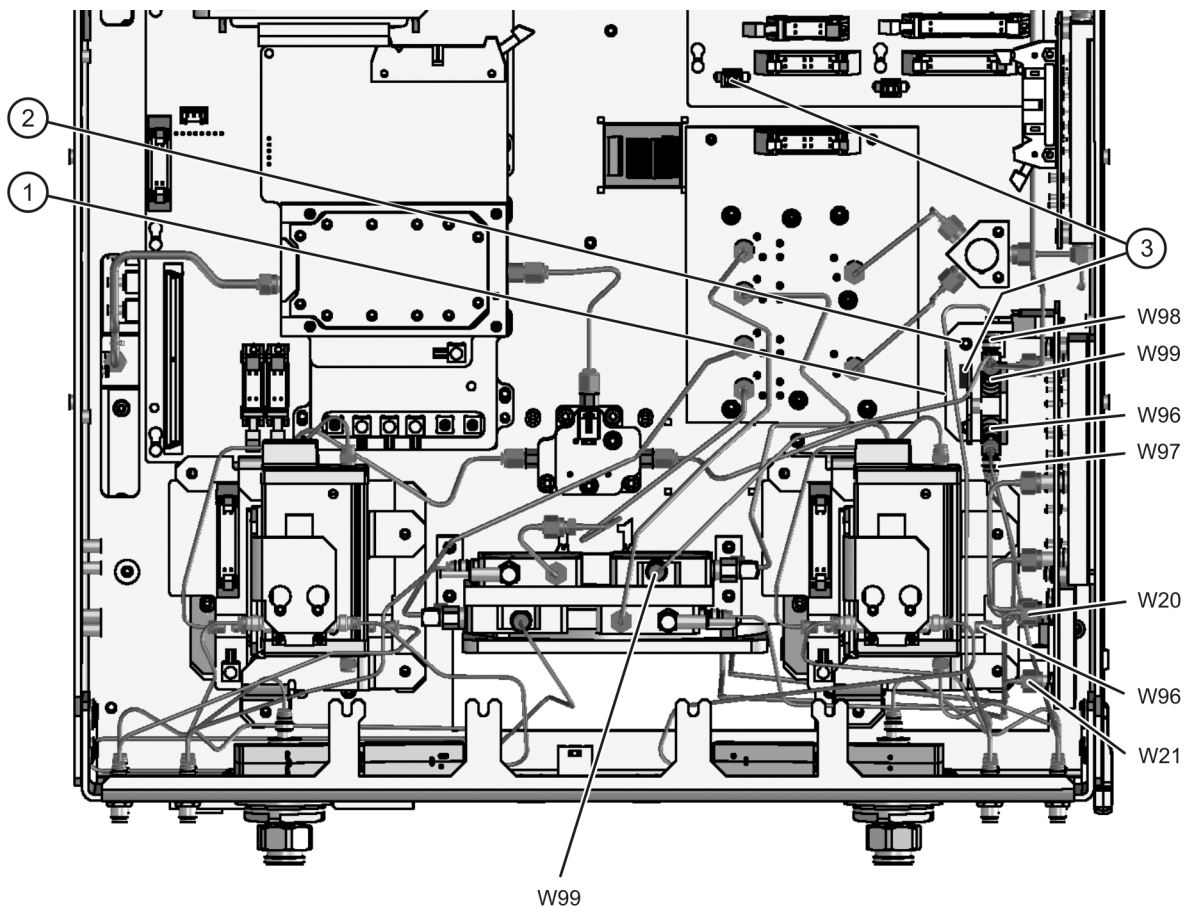
e8361_004_01

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 5](#).

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 E8361-20040 A45 reference switch to A28 channel R1 mixer
5. Reconnect cables W20 and W21 and tighten the connectors to 10 in-lbs.

Figure 6 A45 Reference Switch and Cables Installation



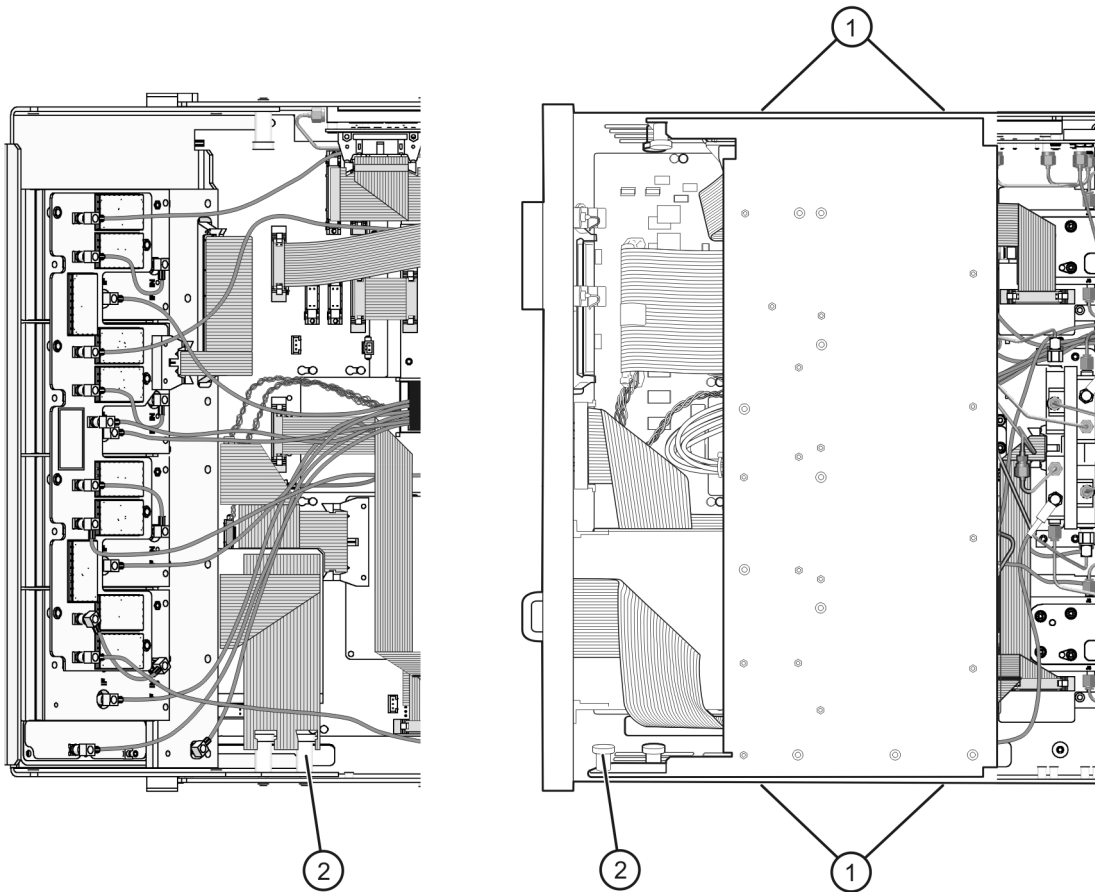
e8361_004_02

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



8364_022_16

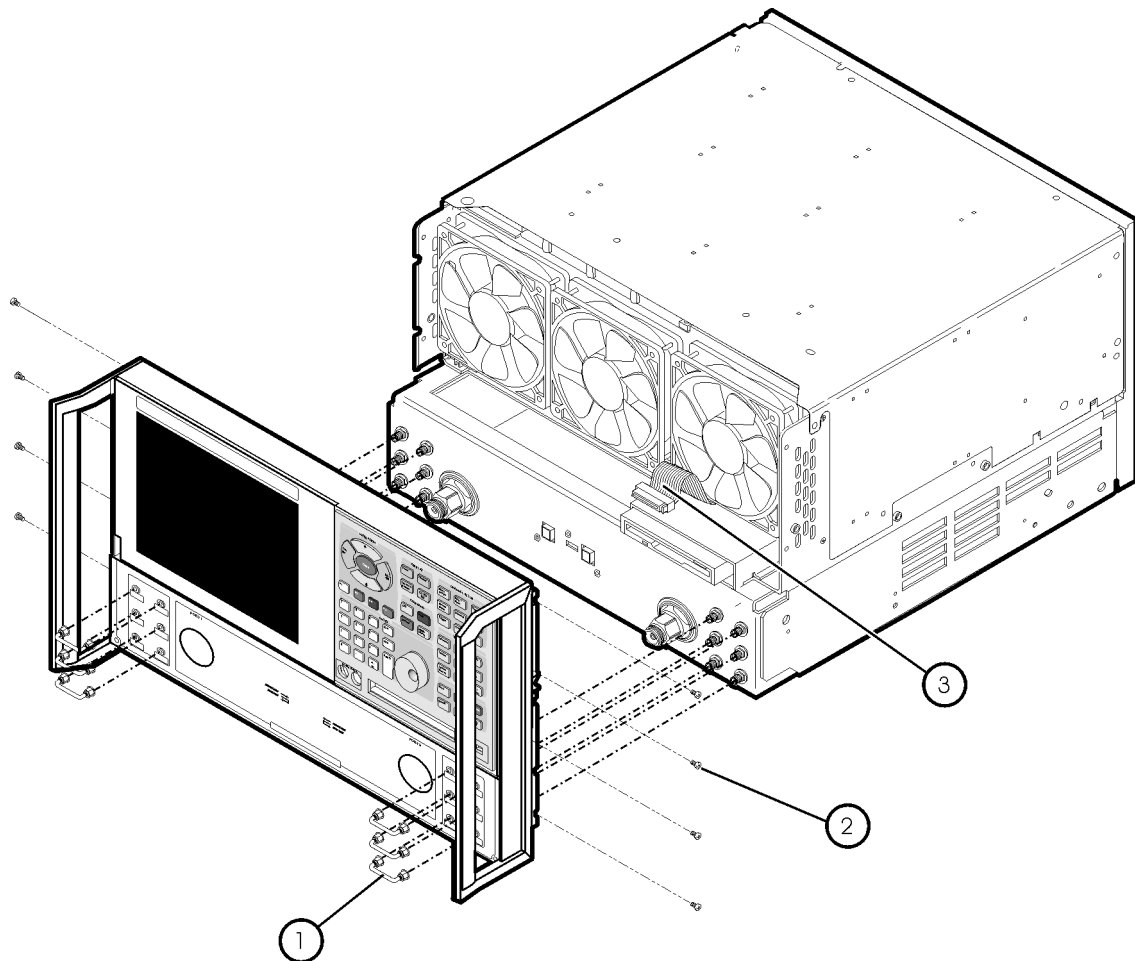
Step 7. Reinstall the Front Panel Assembly and Front Panel Jumpers

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

Refer to [Figure 8](#).

1. Tighten all 12 of the front-panel feed-through connectors using a 5/16-inch torque wrench set to 21-inch lbs.
2. Reconnect the ribbon cable (item ③) 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 ③) 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 ①) on the front panel and tighten to 10-inch lbs.

Figure 8 Front Panel Assembly Reinstallation



st536a

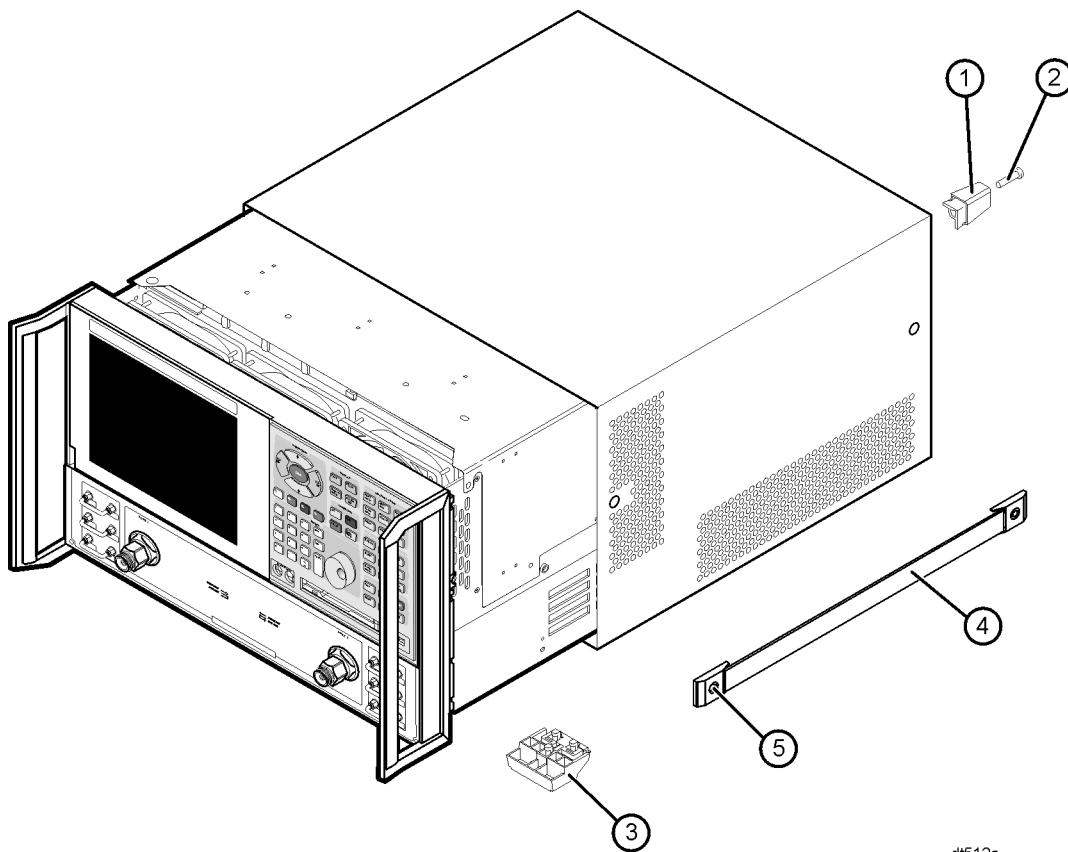
Step 8. Reinstall the Outer Cover

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 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



dt512a

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**.

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 ["Getting Assistance from Agilent"](#) on page 3.

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 8.

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 [“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.

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.