Installation Note

Configurable Test Set Upgrade Kit

For E8363A and E8364A PNA Series Microwave Network Analyzers

Network Analyzer Model Number	Upgrade Kit Part Number
E8363A, E8364A	E8364-60101

Agilent Technologies

Agilent Part Number: E8364-90012
Printed in USA January 2005
Supersedes print date: April 2004

E8364-90012

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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.**

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About Installing the Upgrade Kit

Products affected	E8363A and E8364A; all options
Installation to be performed by	Agilent service center or personnel qualified by Agilent
Estimated installation time	2.0 hours
Estimated adjustment time	0.5 hours
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 for 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 1 Watt (+30 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 moved 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 are installed on both ports allowing the user to choose a high dynamic range measurement in either the forward or reverse direction.

Items Included in the Upgrade Kit

Table 1 lists the parts included in this upgrade kit, Agilent part number E8364-60101. 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 (E8364-60101)

Ref Desig.	Description	Qty	Part Number
The following parts are required for all analyzers			
	Installation note (this document)	1	E8364-90012
	Cable clamp	1	1400-1439
W60	Front-panel jumper	6	E8364-20059
W65	RF cable, A23 detector to REFERENCE 1 SOURCE OUT	1	E8364-20047
W66	RF cable, A24 detector to REFERENCE 2 SOURCE OUT	1	E8364-20048
W67	RF cable, A25 test port 1 coupler to PORT 1 CPLR ARM	1	E8364-20043
W68	RF cable, A26 test port 2 coupler to PORT 2 CPLR ARM	1	E8364-20044
W69	RF cable, PORT 1 RCVR A IN to A27 channel A mixer	1	E8364-20045
W72	RF cable, PORT 2 RCVR B IN to A30 channel B mixer	1	E8364-20046
The following parts are required for only analyzers without Option UNL installed			
	Lower front panel overlay (Option 014)	1	E8364-80004
W61	RF cable, A22 switch splitter to PORT 1 SOURCE OUT	1	E8364-20081
W62	RF cable, A22 switch splitter to PORT 2 SOURCE OUT	1	E8364-20082
W63	RF cable, PORT 1 CPLR THRU to A25 test port 1 coupler	1	E8364-20073
W64	RF cable, PORT 2 CPLR THRU to A26 test port 2 coupler	1	E8364-20074
W70	RF cable, REFERENCE 1 RCVR R1 IN to A28 channel R1 mixer	1	E8364-20075
W71	RF cable, REFERENCE 2 RCVR R2 IN to A29 channel R2 mixer	1	E8364-20076
The following parts are required for only analyzers with Option UNL installed			
	Lower front panel overlay (Option UNL/014)	1	E8364-80011
W70	RF cable, REFERENCE 1 RCVR R1 IN to A28 channel R1 mixer	1	E8364-20049
W71	RF cable, REFERENCE 2 RCVR R2 IN to A29 channel R2 mixer	1	E8364-20050
W81	RF cable, A36 step attenuator to PORT 1 SOURCE OUT	1	E8364-20053
W82	RF cable, A37 step attenuator to PORT 2 SOURCE OUT	1	E8364-20054
W83	RF cable, PORT 1 CPLR THRU to A38 bias tee	1	E8364-20039
W84	RF cable, PORT 2 CPLR THRU to A39 bias tee	1	E8364-20040

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

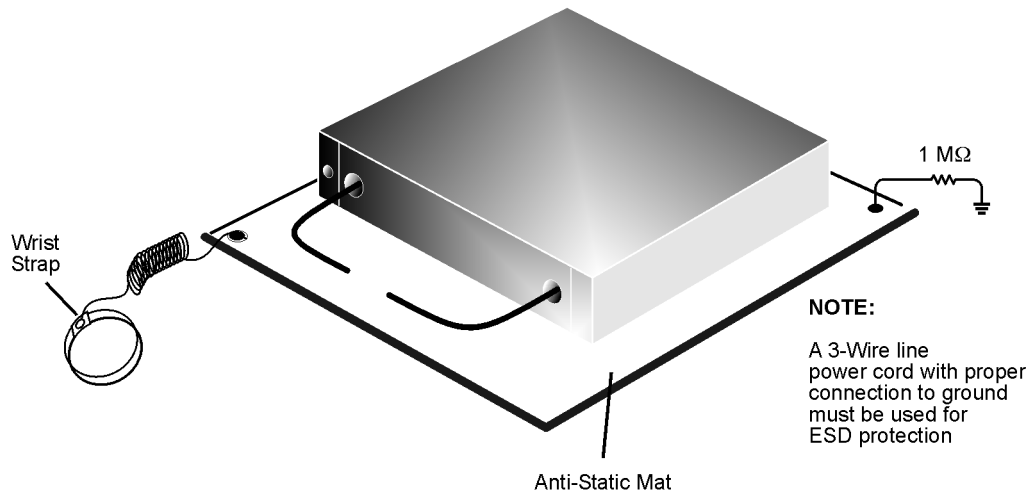
Protection against electrostatic discharge (ESD) is essential while removing or connecting cables or assemblies within the network analyzer.

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 MΩ 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



esd_setup

Overview of the Installation Procedure

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 in torque wrench (set to 10 in-lbs)	1	N/A
5/16 in 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-in torque wrench set to 10 in-lbs on all cable connections except the front-panel connectors to which the front-panel jumpers attach. Use a 5/16-in torque wrench set to 21 in-lbs for these connections.

Equipment Required for Post-Upgrade Adjustments

Equipment Type	Model or Part Number	Alternate Model or Part Number
Power meter	E4418B/E4419B	E4418A/E4419A
Power sensor, 2.4 mm	8487A	None
Adapter, 2.4 mm (f) to 2.4 mm (f)	11900B	85056-60007
RF cable, 2.4 mm (f) to 2.4 mm (f)	85133C	85133E

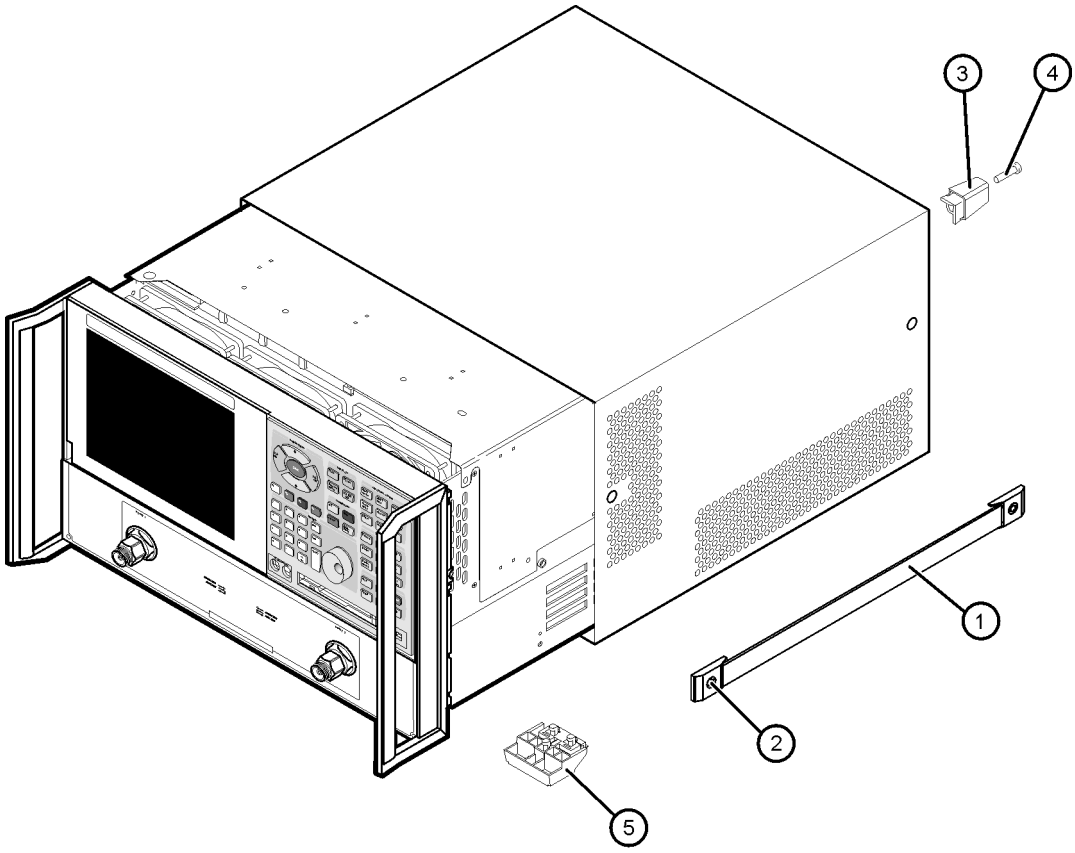
Step 1. Remove the Outer Cover

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



Step 2. Remove the Front Panel Assembly

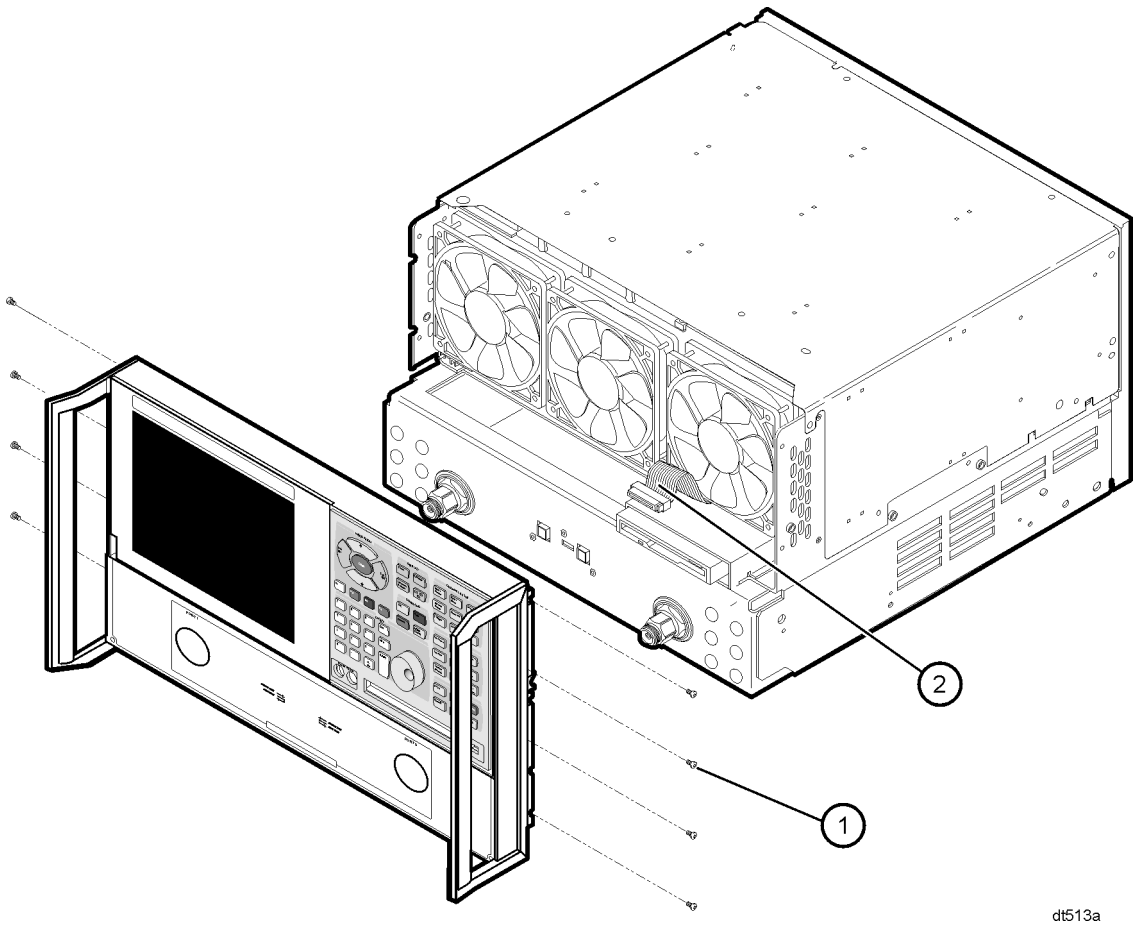
Refer to Figure 3 for this procedure.

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

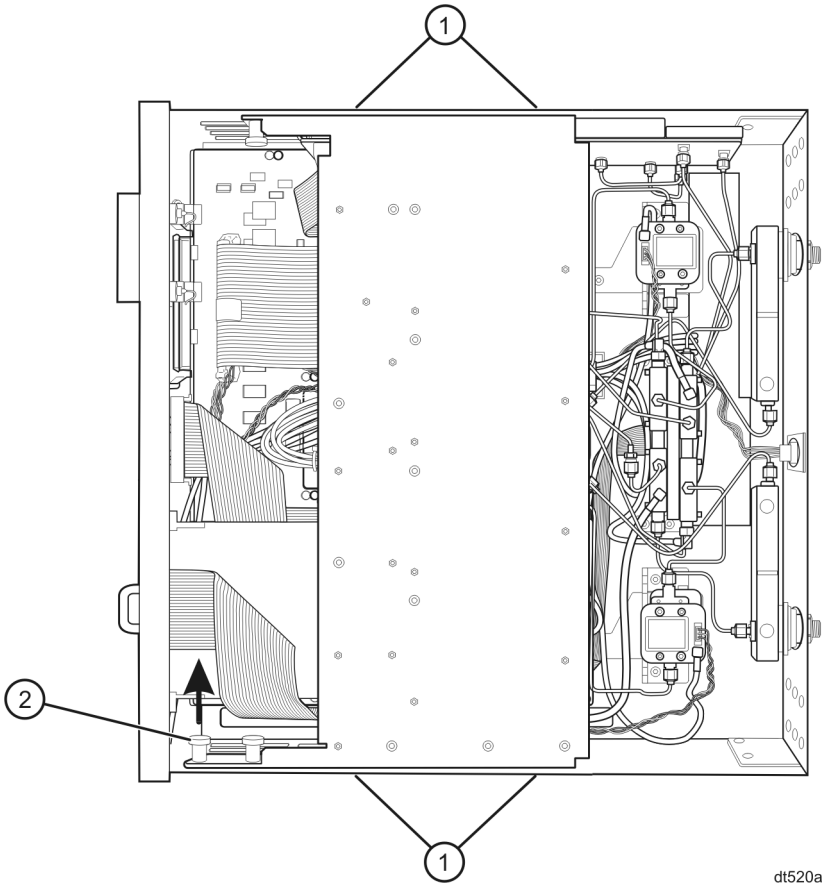


Step 3. Raise the Receiver Deck

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), securing the receiver deck.
3. Pull the latch pin (item ②) towards the center 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



Step 4. Remove the Existing Cables

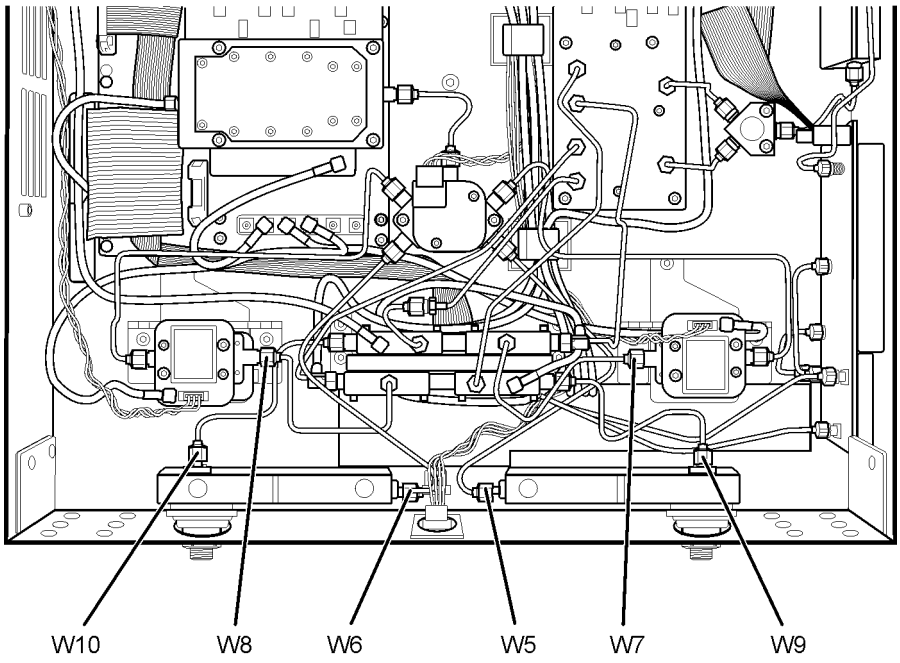
Analyzers without Option UNL

Refer to Figure 5 for the following procedure.

If you are installing Option 014 on an analyzer that does not have Option UNL installed, remove the following cables in the order listed:

- W7 E8364-20025 A23 detector to A28 channel R1 mixer
- W8 E8364-20026 A24 detector to A29 channel R2 mixer
- W9 E8364-20019 A25 test port 1 coupler to A27 channel A mixer
- W10 E8364-20020 A26 test port 2 coupler to A30 channel B mixer
- W5 E8364-20021 A22 switch splitter to A25 test port 1 coupler
- W6 E8364-20022 A22 switch splitter to A26 test port 2 coupler

Figure 5 Cable Removal, Analyzers without Option UNL



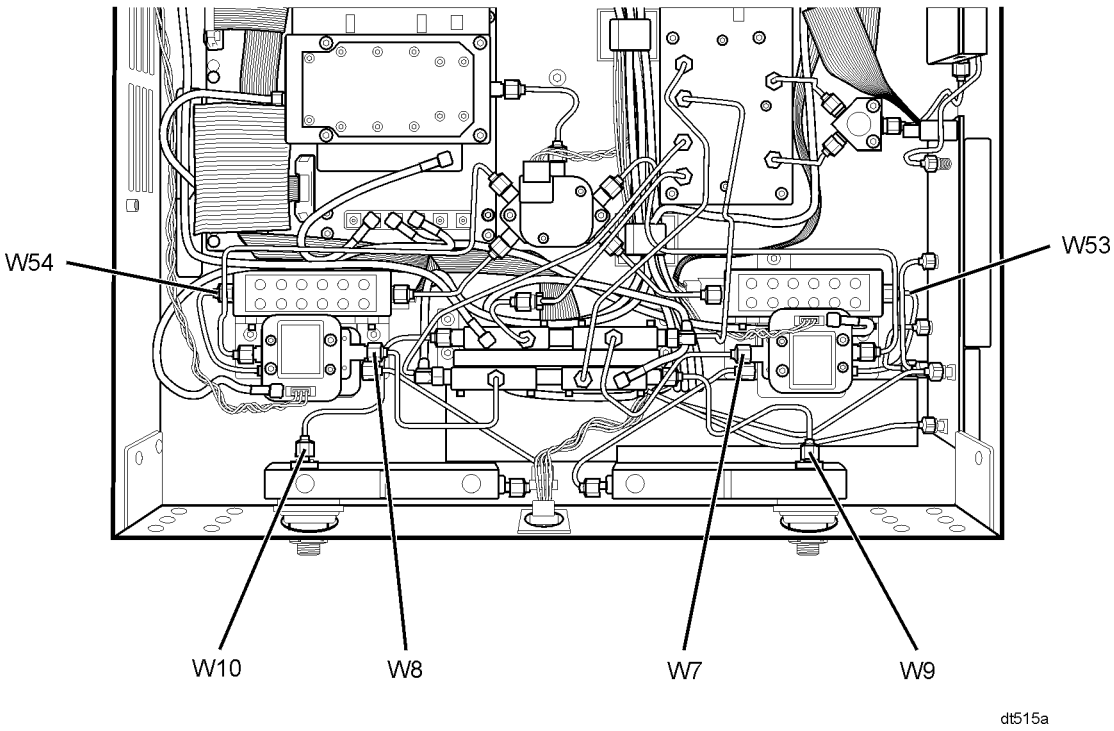
Analyzers with Option UNL

Refer to Figure 6 for the following procedure.

If you are installing Option 014 on an analyzer that has Option UNL installed, remove the following cables in the order listed:

- W8 E8364-20080 A24 detector to A29 channel R2 mixer
- W7 E8364-20079 A23 detector to A28 channel R1 mixer
- W53 E8364-20077 A36 step attenuator to A38 bias tee
- W54 E8364-20077 A37 step attenuator to A39 bias tee
- W10 E8364-20020 A26 test port 2 coupler to A30 channel B mixer
- W9 E8364-20019 A25 test port 1 coupler to A27 channel A mixer

Figure 6 Cable Removal, Analyzers with Option UNL



Step 5. Install the Option 014 Cables

CAUTION Use a 5/16-in torque wrench set to 10 in-lbs on all cable connections in this step of the procedure.

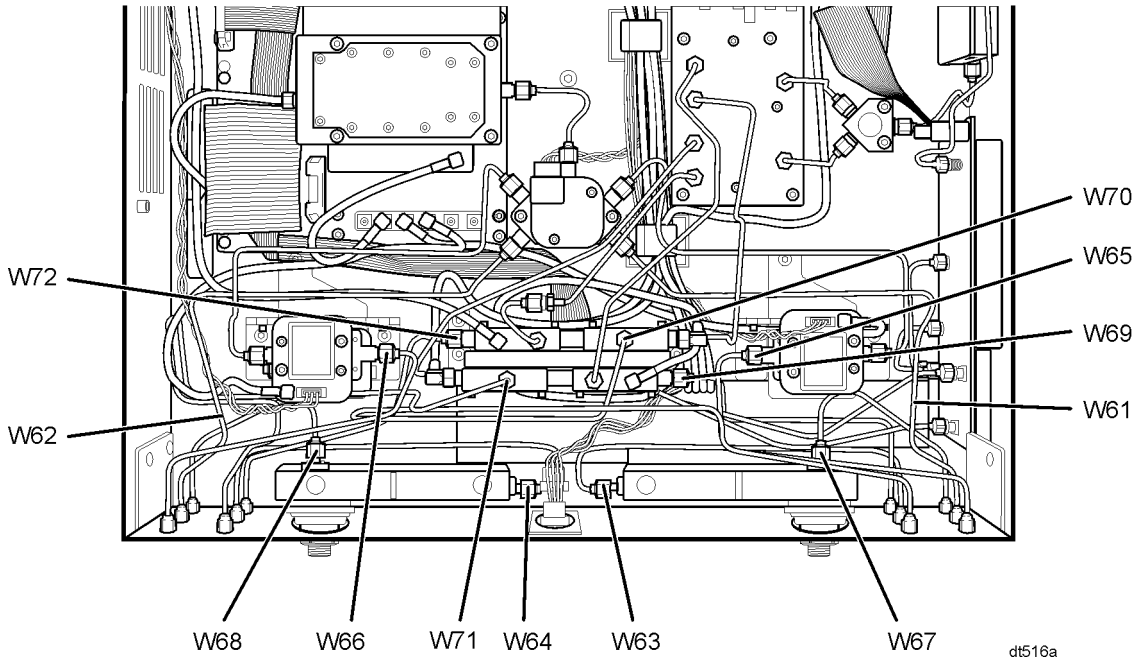
Analyzers without Option UNL

Refer to Figure 7 for the following procedure. The new parts referenced in this procedure are listed in Table 1 on page 5.

If you are installing Option 014 on an analyzer that does not have Option UNL installed, install the following cables in the order listed.:

- W70 E8364-20075 REFERENCE 1 RCVR R1 IN to A28 channel R1 mixer
- W71 E8364-20076 REFERENCE 2 RCVR R2 IN to A29 channel R2 mixer
- W68 E8364-20044 A26 test port 2 coupler to PORT 2 CPLR ARM
- W72 E8364-20046 PORT 2 RCVR B IN to A30 channel B mixer
- W62 E8364-20082 A22 switch splitter to PORT 2 SOURCE OUT
- W64 E8364-20074 PORT 2 CPLR THRU to A26 test port 2 coupler
- W66 E8364-20048 A24 detector to REFERENCE 2 SOURCE OUT
- W67 E8364-20043 A25 test port 1 coupler to PORT 1 CPLR ARM
- W69 E8364-20045 PORT 1 RCVR A IN to A27 channel A mixer
- W61 E8364-20081 A22 switch splitter to PORT 1 SOURCE OUT
- W63 E8364-20073 PORT 1 CPLR THRU to A25 test port 1 coupler
- W65 E8364-20047 A23 detector to REFERENCE 1 SOURCE OUT

Figure 7 Option 014 Cable Installation, Analyzers without Option UNL



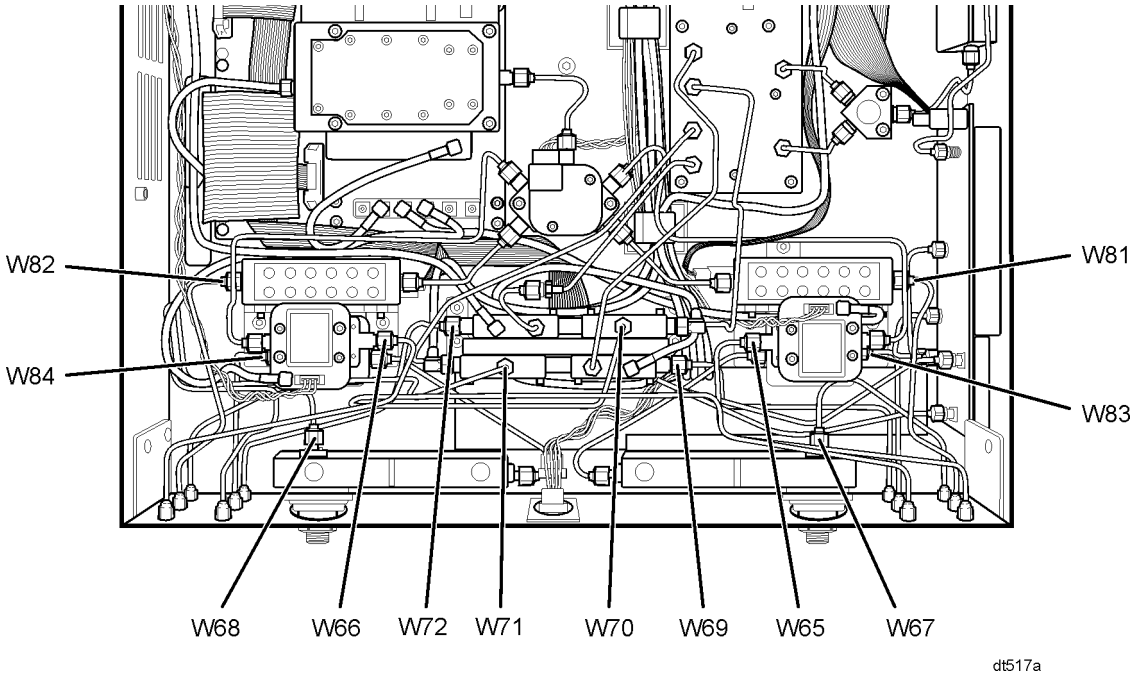
Analyzers with Option UNL

Refer to Figure 8 for the following procedure. The new parts referenced in this procedure are listed in Table 1 on page 5.

If you are installing Option 014 on an analyzer that has Option UNL installed, install the following cables in the order listed:

- W70 E8364-20049 REFERENCE 1 RCVR R1 IN to A28 channel R1 mixer
- W71 E8364-20050 REFERENCE 2 RCVR R2 IN to A29 channel R2 mixer
- W68 E8364-20044 A26 test port 1 coupler to PORT 2 CPLR ARM
- W72 E8364-20046 PORT 2 RCVR B IN to A30 channel B mixer
- W82 E8364-20054 A37 step attenuator to PORT 2 SOURCE OUT
- W84 E8364-20040 PORT 2 CPLR THRU to A39 bias tee
- W66 E8364-20048 A24 detector to REFERENCE 2 SOURCE OUT
- W67 E8364-20043 A25 test port 1 coupler to PORT 1 CPLR ARM
- W69 E8364-20045 PORT 1 RCVR A IN to A27 channel A mixer
- W81 E8364-20053 A36 step attenuator to PORT 1 SOURCE OUT
- W83 E8364-20039 PORT 1 CPLR THRU to A38 bias tee
- W65 E8364-20047 A23 detector to REFERENCE 1 SOURCE OUT

Figure 8 Option 014 Cable Installation, Analyzers with Option UNL

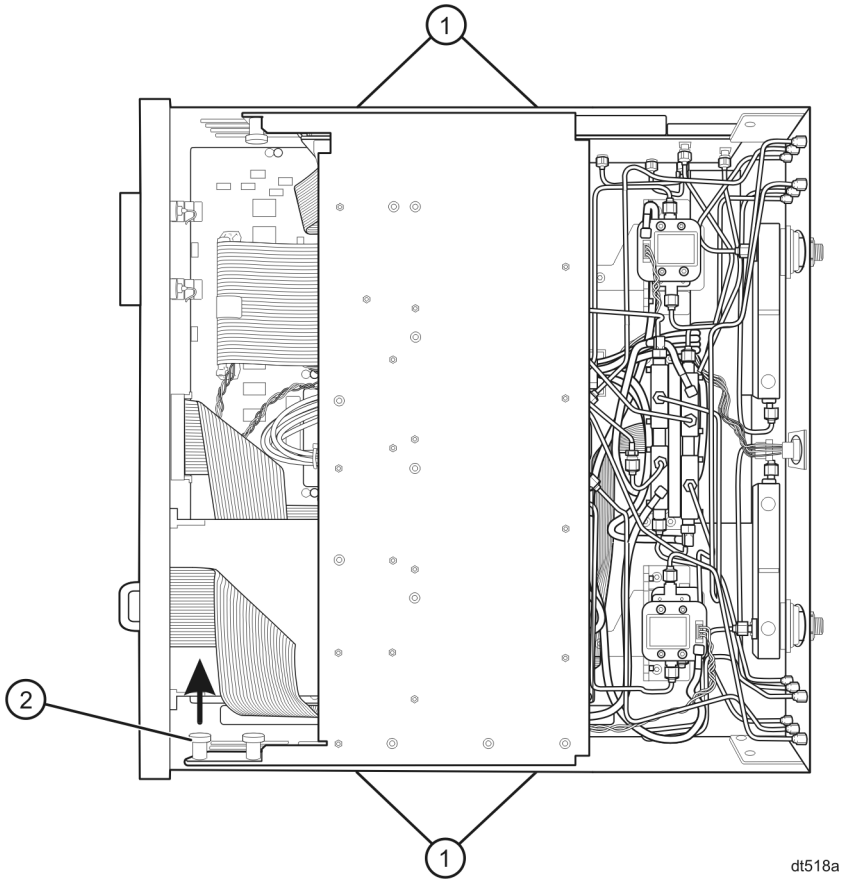


Step 6. Lower and Fasten the Receiver Deck

Refer to Figure 9 for this procedure.

1. Pull the latch pin (item ②) toward the center 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 9 Receiver Deck, Lowering



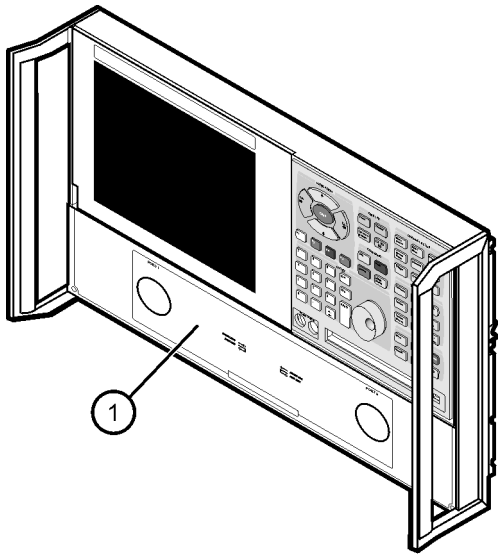
Step 7. Replace the Lower Front Panel Overlay

NOTE The new parts referenced in this procedure are listed in Table 1 on page 5.

Refer to Figure 10 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 the overlay completely off 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). Note that there are two overlays provided; one for Option 014 only and one for Option 014 in combination with Option UNL. Make sure you install the proper one for your analyzer:
   - The Port 1 and 2 SOURCE OUT labels for the Option 014 only overlay reads 40 VDC.
   - The Port 1 and 2 SOURCE OUT labels for the Option UNL/014 overlay reads 0 VDC.
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 10 Lower Front Panel Overlay Replacement



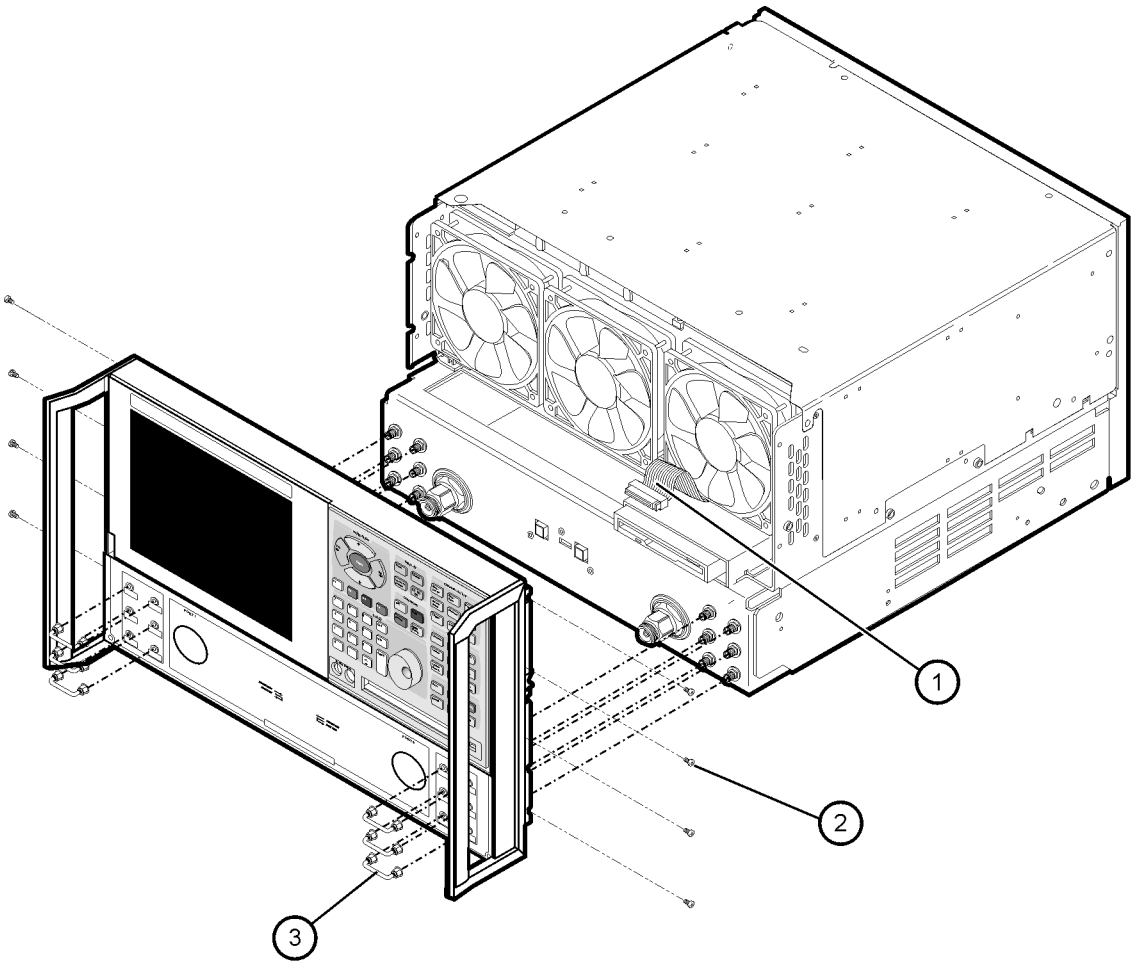
Step 8. Reinstall the Front Panel Assembly and Install the Front Panel Jumpers

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

Refer to Figure 11 for this procedure.

1. Tighten all 12 of the front-panel feed-through connectors using a 5/16-in torque wrench set to 21-in lbs.
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 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 tighten to 10-in lbs.

Figure 11 Front Panel Assembly Reinstallation



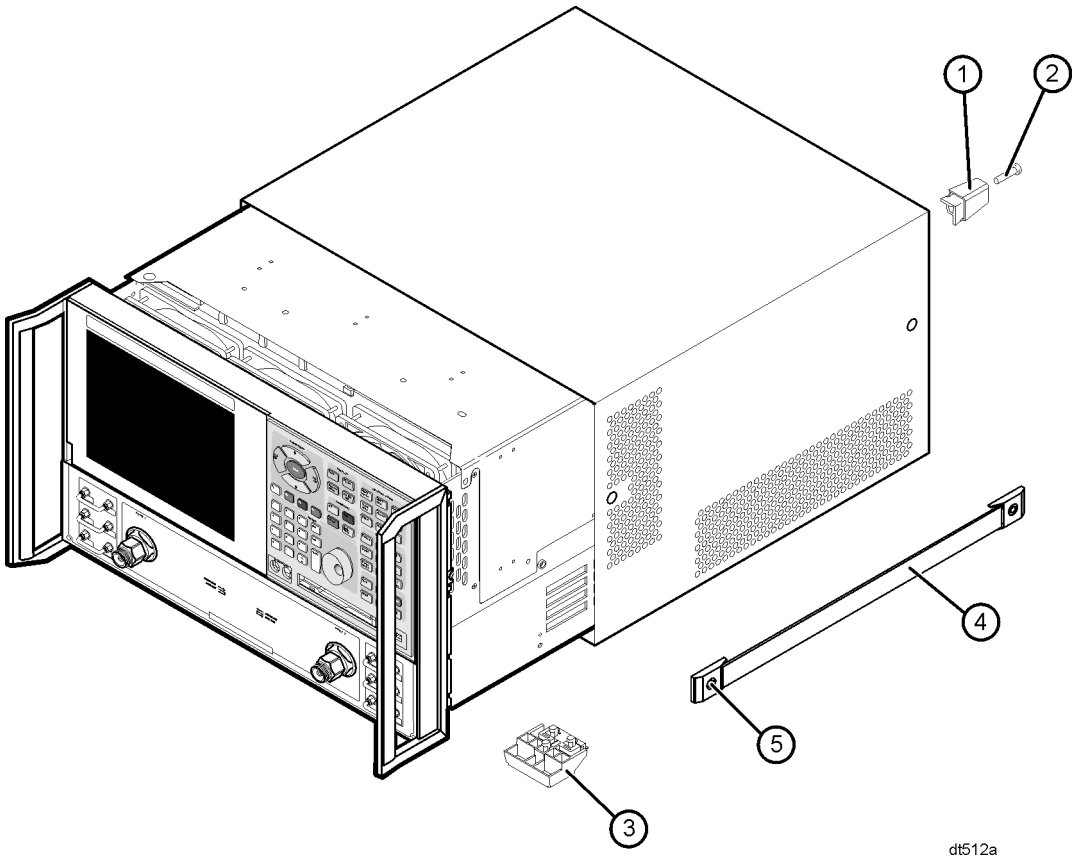
Step 9. Reinstall the Outer Cover

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 12 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 12 Outer Cover Reinstallation



Step 10. 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.

Enable Option 014

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**.

Verify that Option 014 is Enabled

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.

NOTE If Option 014 has not been enabled, perform "Enable Option 014" again. If the option is still not enabled, contact Agilent Technologies. Refer to "Getting Assistance from Agilent" on page 3.

Step 11. Perform Post-Upgrade Adjustments and Calibration

The following adjustments must be made due to the change in the full frequency range of the analyzer.

- source calibration
- 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 "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 "Getting Assistance from Agilent" on page 3.

Although the analyzer functions, its performance relative to its specifications has not been verified for the additional frequency range enabled by this upgrade.

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.