Keysight Add 4-Port Capability Upgrade Kit For Version 6, Single-Source Synthesizers

To Upgrade PNA-X N5247B Option 224 to Option 423

Upgrade Kit Order Number:
N5247BU- 623

Keysight Kit Number:
N5247-60112

This is Installation Note is for upgrading the N5247B Microwave Network Analyzers from Option 224 to Option 423.

Notices

Trademark Acknowledgments

Manual Part Number

N5247-90112

Edition

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Warranty

Technology Licenses

U.S. Government Rights

Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Keysight Add 4 - Port Capability Upgrade Kit
Upgrade Kit Number: N5247-60112
Installation Note

Description of the Upgrade

This upgrade converts your N5247B Option 224 2-port analyzer to an N5247B Option 423 4-port analyzer by adding:

— an additional mechanical switch

— an additional mixer brick

— two additional reference couplers and brackets

— two additional test port couplers

— two additional bias tees

— two additional source attenuators and brackets

— two additional receiver attenuators and brackets

— three additional braces for microcircuits

— two additional cable guards for front panel jumpers

— a splitter

— a modified front panel

— many additional new cables

Refer to .

| CAUTION | This repair must be done at a service center or a self-maintainer service center! Refer to . |

KEYSIGHT
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Getting Assistance from Keysight

Installing this upgrade kit requires special skills and experience. If you think you may not be qualified to do the work, or need advice, contact Keysight.

Contacting Keysight

Assistance with test and measurements needs and information on finding a local Keysight office are available on the Web at:
http://www.keysight.com/find/assist

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

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

If You Have Problems With the Upgrade Kit Contents

Keysight stands behind the quality of the upgrade kit contents. If you have problems with any item in the kit, refer to www.keysight.com and the **Contact**

Keysight ( ) link.

Getting Prepared

CAUTION	The PNA contains extremely sensitive components that can be ruined if mishandled. Follow instructions carefully when making cable connections, especially wire harness connections.
	The person performing the work accepts responsibility for the full cost of the repair or replacement of damaged components.

To successfully install this upgrade kit, you will need the following:

— A license key - refer to "License Key Redemption" below.

— A PDF copy or a paper copy of the PNA Service Guide - refer to "Downloading the Online PNA Service Guide" below.

— An ESD-safe work area - refer to "Protecting Your Workspace from Electrostatic Discharge" below.

— Correct tools - refer to "Tools Required for the Installation" on page 10.

— Enough time - refer to "About Installing the Upgrade" on page 10.

— Test equipment for the post-upgrade adjustments and full instrument calibration. To view the equipment list, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

License Key Redemption

NOTE	Ensure that you are connected to an external server, before attempting to download your email and license key file.
	If you are unfamiliar with the licensing process, refer to https://www.keysight.com/us/en/assets/9018-04534/installation-guides/9018-04534.pdf (N5242-90024).

NOTE	The enclosed Software Entitlement Certificate is a receipt, verifying that you have purchased a licensed option for the PNA–X of your choice. You must now use a Keysight Web page to request a license key file for the instrument that will receive the option.

To enable the option product(s), you must request license key(s) file from the Keysight Software Manager:
http://www.keysight.com/find/softwaremanager:

To complete the request, you will need to gather the following information:

— From the certificate

— Order number

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1. See "Downloading the Online PNA Service Guide" on page 9.

—   Certificate number

—   From your instrument

(Instrument information is available in the network analyzer - on the toolbar, click Help, then click About Network Analyzer.)

—   Model number

—   Serial number

A models ONLY: From the online Keysight HostID utility:

—   Part of the OEC procedure to obtain the 12-digit license key online requires you to provide the HostID number of the PNA. This HostID number is NOT the one currently shown on the PNA. To determine your new HostID, Keysight personnel should use the new model number with the utility at go to http://mktwww.srs.is.keysight.com/field/service/network/pna/upgrades.html. Non-Keysight personnel should contact Keysight at http://www.keysight.com/key/contactus.

—   Host ID

Using the information just gathered, you must request license key(s) from the Keysight Software Manager: http://www.keysight.com/find/softwaremanager.

You will need to provide an email address, to which Keysight will promptly email your license key file. Refer to "License Key Redemption" on page 7.

Verify the License Contents

Refer to the license message you received from Keysight:

If the model number, serial number, or option number do not match those on the license message you received from Keysight, you will not be able to install the license key file. If this is the case you received from Keysight, you will not be able to install the license key file. If this is the case, contact Keysight for assistance. Refer to "Getting Assistance from Keysight" on page 6.

Downloading the Online PNA Service Guide

To view the online Service Guide for your PNA model number, use the following steps:

1. Go to www.keysight.com.

2. In the Search box, enter the model number of the analyzer (e.g., N5225B) and click **Search**.

3. Click **Support** > **Keysight Product Support**.

4. In the **Search Support** area type your instrument's model number (e.g., N2225B).

5. Press **Enter**.

6. Scroll down to the **PRINT DOCUMENTATION** section and click to select **Service Manual**.

   The **Service Manual** for your instrument will be displayed near the top of the right column.

7. Click the hyperlink of the Service Guide title to download the PDF file.

8. When the PDF of the Service Guide is displayed, scroll through the Contents section bookmarks to locate the information needed.

Protecting Your Workspace from Electrostatic Discharge

For information, click on the Chapter 1 bookmark, "Electrostatic Discharge Protection" in the PDF Service Guide[1].

ESD Equipment Required for the Installation

Description	Keysight 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

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1. See "Downloading the Online PNA Service Guide" on page 9.

Tools Required for the Installation

Description	Qty	Part Number
T-6 TORX driver - set to 4 in-lbs (0.45 N.m)	1	N/A
T-8 TORX driver - set to 6 in-lbs (0.68 N.m)	1	N/A
T-10 TORX driver - set to 9 in-lbs (1.02 N.m)	1	N/A
T-20 TORX driver - set to 21 in-lbs (2.38 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench- set to 10 in-lbs (1.13 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)	1	N/A
3/16-in (5 mm) nutsetter or open end torque wrench - set to 6 in-lbs (0.68 N.m)	1	N/A
5/8-in (16 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)	1	N/A
9 mm nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)	1	N/A
1-in (25.4 mm) torque wrench - set to 72 in-lbs (8.15 N.m)	1	N/A
1/4-in (6 mm) open end wrench	1	N/A

CAUTION   Use a 5/16-in torque wrench set to 10 in-lbs on all cable connections except the bias tees and the front and rear panel bulkhead connectors. On the bias tees use a 5/16-in torque wrench set to 9 in-lbs. On the bulkhead connectors, use a 5/16 inch nutsetter or open end torque wrench set to 21 in-lb.

About Installing the Upgrade

Products affected	N5247B Option 224
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	5 hours
Estimated adjustment time	2 hours
Estimated full instrument calibration time	4.5 hours

Items Included in the Upgrade Kit

Check the contents of your kit against the following list. If any part is missing or damaged, contact Keysight Technologies. Refer to "Getting Assistance from Keysight" on page 6.

Table 1   Contents of Upgrade Kit N5247-60112

Ref Desig.	Description	Qty	Part Number
-	Installation note (this document)	1	N5247-90112
-	Software Entitlement Certificate	1	9300-0000
-	China RoHS Addendum	1	9320-6722
A28	Mixer brick (2)	1	5087-7337
A30	Test port 3 reference coupler	2	5087-7744
A31	Test port 4 reference coupler		
A34	Test port 3 coupler	2	5087-7778
A35	Test port 4 coupler		
A39	Test port 3 source attenuator	2	84905-60004
A40	Test port 4 source attenuator		
A43	Test port 3 bias tee	2	5087-7732
A44	Test port 4 bias tee		
A47	Test port 3 receiver attenuator	2	84905-60004
A48	Test port 4 receiver attenuator		
A52	Port 4 mechanical switch	1	N1811-60010
A26	Splitter	1	5067-4086
A69	3 dB pad, attached to R4 connector on A28 mixer brick	1	08490-60037
-	Front dress panel, lower 4-port	1	N5240-00009
-	Bulkhead connector, rear panel (2) and front panel (12)	14	1250-4747[a]
-	Washer for bulkhead connectors, rear panel (2) and front panel (12)	14	1250-3310
-	Nut for bulkhead connectors, rear panel (2) and front panel (12)	14	1250-3516
-	Machine screw, M2.5 x 20, pan head (2 to attach brace to 70 GHz doubler mount)	2	0515-0380
-	Machine screw, M2.5 x 20, pan head (2 to attach mechanical switch to bracket)	2	0515-0375
-	Machine screw, M2.0 x 6, flat head (8 to attach 2 reference couplers to brackets)	8	0515-0658
-	Machine screw, M3.0 x 25, pan head (3 to attach mixer brick A28 to mounting block)	3	0515-1038

Table 1   Contents of Upgrade Kit N5247-60112

Ref Desig.	Description	Qty	Part Number
-	Machine screw, M3.0 x 8, pan head (8 to attach port 3 and port 4 attenuator assemblies to deck; 8 to attach 2 src attn and 2 rcvr attn to brackets; 6 to attach reference coupler assemblies to attenuator assembly brackets; 4 to attach brace N5247-20134 to attenuator pair brackets; 4 to attach brace N5247-20133 to attenuator pair brackets	30	0515-0372
-	Machine screw, M2.5 x 16, pan head (2 to attach splitter to mixer brick)	2	0515-2007
-	Machine screw, M3.0 x 6, pan head (2 to install combiner bracket to port 1 attenuator pair bracket	2	0515-0430
-	Machine screw, M3.0 x 6, flat head (4 to attach 2 bias tees to blocks)	4	0515-1227
-	Front panel overlay, lower 4-port (Option 423)	1	N5247-80019
-	Test set front plate, 4-port	1	N5247-00009
-	Pad (between each reference coupler and the bracket for the attenuator pairs)	2	0403-0179
-	Gap pad (between each test coupler and the test set front plate)	4	E4403-20033
--	Termination, 2.4 mm 50 GHz load	1	0955-2394
-	Vibration mount (between couplers 1 & 3, and 2 & 4)	2	0460-2725
-	Mounting nuts (for port 3 & 4 test port couplers)	2	5022-1087
-	Cable guard, center jumper cables	1	N5242-00049
-	Cable guard, port 1 jumper cables	1	N5247-00024
-	Cable clamp, 1 to secure W145 (N5247-20066); 1 to secure both W137 (N5247-20097) and W138 (N5247-20098); 1 to secure W41 (N5247-20069); 1 to secure W37 (N5247-20070).	4	1400-1334
-	Cable tie wrap, 1 to secure W55 (N5247-20067); 1 to secure W37 (N5247-20070); 1 to secure W54 (N5247-20062); 2 to secure W144 (N5247-20071).	5	1400-0249
-	Bracket for reference coupler, port 3	1	N5247-00012
-	Bracket for reference coupler, port 4	1	N5247-00011
-	Bracket for receiver attenuator and source attenuator pairs	2	N5247-00005
-	Brace, bottom side of PNA	1	N5247-20133
-	Brace, bottom side of PNA	2	N5247-20134
W34	RF cable, A33 port 1 coupler to front-panel Port 1 CPLR ARM	1	N5247-20082
W37	RF cable, A30 port 3 ref coupler to front-panel REF 3 SOURCE OUT	1	N5247-20070
W38	RF cable, A34 port 3 coupler to front-panel Port 3 CPLR ARM	1	N5247-20007
W41	RF cable, A31 port 4 ref coupler to front-panel REF 4 SOURCE OUT	1	N5247-20069

Items Included in the Upgrade Kit

Table 1   Contents of Upgrade Kit N5247-60112

Ref Desig.	Description	Qty	Part Number
W42	RF cable, A35 port 4 coupler to front-panel Port 4 CPLR ARM	1	N5247-20026
W46	RF cable, A36 port 2 coupler to front-panel port 2 CPLR ARM	1	N5247-20019
W54	RF cable, REF 3 RCVR R3 IN to A28 mixer brick (R3)	1	N5247-20062
W55	RF cable, REF 4 RCVR R4 IN to A28 mixer brick (R4)	1	N5247-20067
W58	RF cable, 2.4 mm cap for A28 mixer brick	1	N5247-20138
W60	RF cable, Front panel jumper	6	N5247-20107
W62	RF cable, A25 HMA26.5 to A26 splitter	1	N5247-20111
W63	RF cable, A26 splitter to A27 mixer brick	1	N5245-20023
W64	RF cable, A26 splitter to A28 mixer brick	1	N5245-20022
W72	RF cable, A27 mixer brick (R1) to A24 IF multiplexer (P411)	1	N5242-60021
W73	RF cable, A27 mixer brick (R2) to A24 IF multiplexer (P412)	1	N5242-60022
W75	RF cable, A28 mixer brick (D) to A24 IF multiplexer (P801)	1	N5242-60024
W76	RF cable, A28 mixer brick (R4) to A24 IF multiplexer (P414)	1	N5242-60019
W77	RF cable, A28 mixer brick (R3) to A24 IF multiplexer (P413)	1	N5242-60020
W78	RF cable, A28 mixer brick (C) to A24 IF multiplexer (P601)	1	N5242-60023
W80	RF cable, A24 IF multiplexer board P203 to A16 SPAM board J2	1	N5242-60013
W82	RF cable, A24 IF multiplexer board P603 to A16 SPAM board J5	1	N5242-60015
W103	RF cable, front-panel Port 1 CPLR THRU to A42 port 1 bias tee	1	N5247-20010
W104	RF cable, A33 port 1 coupler to A42 port 1 bias tee	1	N5247-20022
W105	RF cable, A30 port 3 reference coupler to A39 port 3 source attenuator	1	N5247-20083
W106	RF cable, A39 port 3 source attenuator to front-panel Port 3 SOURCE OUT	1	N5247-20009
W107	RF cable, A43 port 3 bias tee to port 3 CPLR THRU	1	N5247-20081
W108	RF cable, A43 port 3 bias tee to A34 port 3 coupler	1	N5247-20028
W109	RF cable, A31 port 4 reference coupler to A40 port 4 source attenuator	1	N5247-20083
W110	RF cable, A40 port 4 source attenuator to front-panel Port 4 SOURCE OUT	1	N5247-20025
W111	RF cable, Port 4 CPLR THRU to A44 port 4 bias tee	1	N5247-20021
W112	RF cable, A44 port 4 bias tee to A35 port 4 coupler	1	N5247-20029
W116	RF cable, A45 port 2 bias tee to A36 port 2 coupler	1	N5247-20080
W119	RF cable, Port 3 RCVR C IN to A47 port 3 receiver attenuator	1	N5247-20008

Table 1   Contents of Upgrade Kit N5247-60112

Ref Desig.	Description	Qty	Part Number
W120	RF cable, A47 port 3 receiver attenuator to A28 mixer brick (C)	1	N5247-20064
W121	RF cable, Port 4 RCVR D IN to A48 port 4 receiver attenuator	1	N5247-20024
W122	RF cable, A48 port 4 receiver attenuator to A28 mixer brick (D)	1	N5247-20065
W127	RF cable, A50 port 1 mechanical switch to PORT 1 SW SRC OUT	1	N5247-20091
W128	RF cable, front-panel PORT 1 COMB THRU IN to A54 combiner	1	N5247-20092
W129	RF cable, front-panel PORT 3 COMB ARM IN to A54 combiner	1	N5247-20093
W130	RF cable, A50 port 1 mechanical switch to A54 combiner	1	N5247-20094
W132	RF cable, A51 port 3 mechanical switch to A30 port 3 reference coupler	1	N5247-20033
W133	RF cable, A51 port 3 mechanical switch to PORT 3 SW SRC OUT	1	N5247-20090
W135	RF cable, A52 port 4 mechanical switch to A62 port 4 70 GHz doubler	1	N5247-20030
W136	RF cable, A52 port 4 mechanical switch to A31 port 4 reference coupler	1	N5247-20031
W137	RF cable, A52 port 4 mechanical switch to PORT 4 SW SRC OUT (J4)	1	N5247-20097
W138	RF cable, A52 port 4 mechanical switch to PORT 4 SW TSET (J3)	1	N5247-20098
W143	RF cable, rear panel jumper	1	N5247-20107
W144	RF cable, A29 port 1 reference coupler to A37 reference mixer switch	1	N5247-20071
W145	RF cable, REF 2 RCVR R2 IN to A27 mixer brick (R2)	1	N5247-20066
-	Ribbon cable, A23 test set motherboard J547 to A39 port 3 source attenuator	2	N5245-60006
-	Ribbon cable, A23 test set motherboard J548 to A40 port 4 source attenuator		
-	Ribbon cable, A23 test set motherboard J206 to A47 port 3 receiver attenuator	2	N5247-60020
-	Ribbon cable, A23 test set motherboard J207 to A48 port 4 receiver attenuator		
-	Ribbon cable, A23 test set motherboard J552 to A28 mixer brick (2) J52	1	N5247-60015
-	Wire harness, A43 port 3 bias tee to A23 test set motherboard J543	2	N5247-60021
-	Wire harness, A44 port 4 bias tee to A23 test set motherboard J544		
A PNA Option 224 with Option 029A being upgraded to Option 423 with Option 029A will require the items previously listed and the following items also.			
-	Front panel overlay, lower 4-port (Option 423 with 029)	1	N5247-80023

a. This upgrade kit may contain either a bulkhead adapter part number 5065-4673 or 1250-4747.

NOTE	Extra quantities of items such as protective plastic caps, screws, cable ties, and cable clamps may be included in this upgrade kit. It is normal for some of these items to remain unused after the upgrade is completed.

Installation Procedure for the Upgrade

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.

Overview of the Installation Procedure

"Step 1. Obtain a Keyword and Verify the Information."

"Step 2. Remove the Outer Cover."

"Step 3. Remove the Inner Cover."

"Step 4. Remove the Front Panel Jumper Cables and Cable Guards."

"Step 5. Remove the Front Panel Assembly."

"Step 6. Remove the Braces on the Bottom Side of the PNA."

"Step 7. Remove the A23 Test Set Motherboard."

"Step 8. Remove the A24 IF Multiplexer Board."

"Step 9. Install Two New Bulkhead Connectors and a Termination on the Rear Panel."

"Step 10. Remove Some Bottom-Side (Test Set) Cables."

"Step 11. Remove the A27 Mixer Brick Assembly."

"Step 12. Assemble the A28 Mixer Brick Assembly."

"Step 13. Install the A27/A28 Mixer Brick Assemblies."

"Step 14. Assemble the Port 3 and Port 4 Attenuator Assemblies."

"Step 15. Install the Port 3 and Port 4 Attenuator Assemblies on the Test Set Deck."

"Step 16. Assemble the A30 and A31 Reference Coupler Assemblies."

"Step 17. Install the A30 and A31 Reference Coupler Assemblies."

"Step 18. Relocate the A54 Combiner Assembly."

"Step 19. Remove the Bias Tee Blocks From the Test Set Deck."

"Step 20. Install the A43 and A44 Bias Tees on the Bias Tee Blocks."

"Step 21. Reinstall the Bias Tee Blocks."

"Step 22. Remove the A53 Mechanical Switch/Bracket Assembly from the Test Set Deck."

"Step 23. Install the A52 Mechanical Switch on the Bracket."

"Step 24. Reinstall the A52/A53 Mechanical Switch Assembly On the Test Set Deck."

"Step 25. Assemble the A33 – A36 Test Port Coupler Assemblies."

"Step 26. Remove and Disassemble the 2-Port Test Set Front Plate."

"Step 27. Install the LED Boards, Bulkhead Connectors, and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate."

"Step 28. Install the 4-Port Coupler Plate Assembly to the Deck."

"Step 29. Install Some Bottom-Side (Test Set) Cables."

"Step 30. Reinstall the A24 IF Multiplexer Board."

"Step 31. Install Cables on IF Multiplexer Board."

"Step 32. Reinstall the A23 Test Set Motherboard."

"Step 33. Install Cables on the A23 Test Set Motherboard."

"Step 34. Install the Braces on the Bottom Side of the PNA."

"Step 35. Replace the Front Panel's Lower Dress Panel."

"Step 36. Reinstall Front Panel Assembly."

"Step 37. Install the Overlay."

"Step 38. Install the Jumper Cables."

"Step 39. Position the Cables and Wires to Prevent Pinching."

"Step 40. Reinstall the Inner Cover."

"Step 41. Reinstall the Outer Cover."

"Step 42. Remove Option 224."

"Step 43. Enable Option 423."

"Step 44. Perform Post-Upgrade Adjustments and Calibration."

"Step 45. Prepare the PNA for the User."

Step 1.Obtain a Keyword and Verify the Information

Follow the instructions on the Software Entitlement Certificate supplied to obtain a license key for installation of this upgrade. Refer to "License Key Redemption" on page 7.

Verify that the model number, serial number, and option number information on the license key match those of the instrument on which this upgrade will be installed.

Once the license key file has been received and the information verified, you can proceed with the installation at step 2.

NOTE	If the model number, serial number, or option number do not match those on your license key file, you will not be able to install the option. If this is the case, contact Keysight for assistance before beginning the installation of this upgrade. Refer to "Contacting Keysight" on page 6.

Step 2. Remove the Outer Cover

For instructions, click the Chapter 7 bookmark "Removing the Covers" in the PDF Service Guide.

Step 3.Remove the Inner Cover

For instructions, click the Chapter 7 bookmark "Removing the Covers" in the PDF Service Guide[1].

Step 4. Remove the Front Panel Jumper Cables and Cable Guards

1. Pull the two cable guards off of the front panel jumper cables. Save them for reinstallation later.

2. Remove all front panel jumper cables. Keep for reinstallation later.
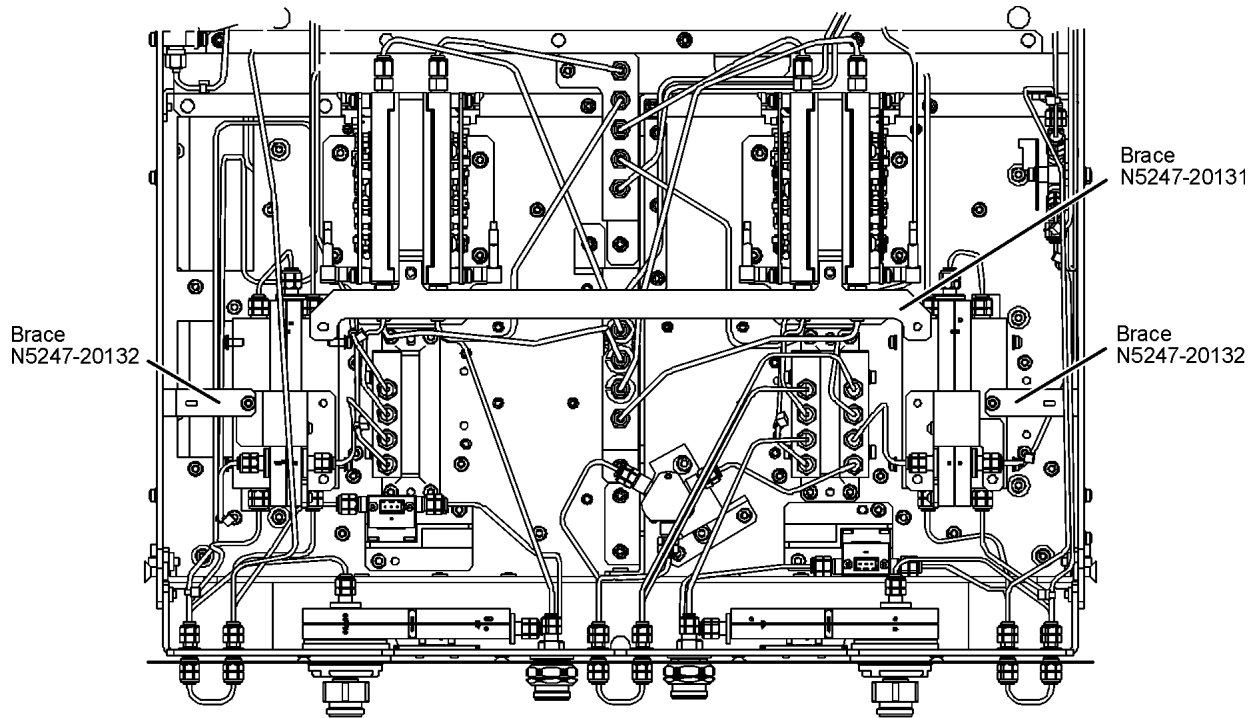
Step 5. Remove the Front Panel Assembly

For instructions, click the Chapter 7 bookmark "Removing and Replacing the Front Panel Assembly" in the PDF Service Guide[1].

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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 6. Remove the Braces on the Bottom Side of the PNA

1. Remove the three braces shown in Figure 1.

2. Discard brace N5247-20131 and the screws that secure it.

3. Keep both of the N5247-20132 braces and their screws for reinstallation later.

Figure 1   Braces on Bottom Side of Option 224 PNA-X

n5247_107_33

Step 7. Remove the A23 Test Set Motherboard

For instructions, click the Chapter 7 bookmark "Removing and Replacing the A23 Test Set Motherboard" in the PDF Service Guide[1].

Step 8. Remove the A24 IF Multiplexer Board

For instructions, click the Chapter 7 bookmark "Removing and Replacing the A24 IF Multiplexer Board" in the PDF Service Guide[1].

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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 9. Install Two New Bulkhead Connectors and a Termination on the Rear Panel

1. Install a new bulkhead connector, nut and washer into the rear panel holes labeled:

   – SW SRC OUT (J4)

   – SW TSET IN (J3)

2. Torque both connectors to 21 in-lbs.

3. Install the 2.4 mm 50 GHz termination (0955-2394) on J7, port 3.

4. Torque the termination to 10 in-lbs

Step 10. Remove Some Bottom-Side (Test Set) Cables

CAUTION	Be careful not to damage the center pins of the semi-rigid cables. Some flexing of the cables may be necessary but do not over-bend them.

NOTE	When removing a cable, also remove the plastic cable clamp, if present. It is normal for some of the cable clamp's adhesive to remain.

1. Place the analyzer bottom-side up on a flat surface.

2. Remove all bottom-side cables (gray flexible and silver semi-rigid) except for those in the following table. Do not discard the cables that are removed because some will be reused later in the procedure.
   To see an image showing the location of cables W11, W13, W15, W17, W19, W21, W23, W25, W61, W65 and W67 click the Chapter 6 bookmark "Top Cables, All Cables - All Options" in the PDF Service Guide[1]. To see an image showing the location of the other cables, click the Chapter 6 bookmark "Bottom RF Cables, 2-Port, Option 224 (S/N Prefixes <6021)" in the PDF Service Guide[1].

Do Not Remove These Bottom-Side Cables				
Reference Designator	Type[a]	Part Number	Qty	Description
W11	SR	N5247-20114	1	A7 port 1 40 GHz doubler P6 to W12
W13	SR	N5247-20086	1	A7 port 1 40 GHz doubler P2 to W14
W15	SR	N5247-20114	1	A12 port 3 40 GHz doubler P6 to W16. (On 2-port models, W15 is included only with Option 224.)
W17	SR	N5247-20086	1	A12 port 3 doubler P2 to W18 (On 2-port models, W17 is included only with Option 224.)

1. See "Downloading the Online PNA Service Guide" on page 9.

Do Not Remove These Bottom-Side Cables

Reference Designator	Type[a]	Part Number	Qty	Description
W19	SR	N5247-20114	1	A13 port 4 40 GHz doubler P6 to W20 (On 2-port models, W19 is included only with Option 224.)
W21	SR	N5247-20086	1	A13 port 4 40 GHz doubler P2 to W22 (On 2-port models, W21 is included only with Option 224.)
W23	SR	N5247-20114	1	A8 port 2 40 GHz doubler P6 to W24
W25	SR	N5247-20086	1	A8 port 2 40 GHz doubler P2 to W26
W61	SR	N5247-20110	1	A15 13.5 GHz (LO) synthesizer board J1207 to A25 HMA26.5
W65	SR	N5247-20113	1	A7 port 1 40 GHz doubler P5 to W66
W66	SR	N5247-20109	1	W65 to rear-panel EXT TSET DRIVE RF OUT (J6)
W67	SR	N5247-20096	1	A12 port 3 40 GHz doubler P5 to W68 (On 2-port models, W67 is included only with Option 224.)
W68	SR	N5247-20088	1	Rear-panel port RF2 OUT (J12) to W67
W69	SR	N5247-20112	1	A27 mixer brick to rear-panel EXT TSET DRIVE LO OUT (J5)
W91	SR	N5247-60006	1	A60 port 1 70 GHz doubler J2 to A7 40 GHz doubler J401
W92	SR	N5247-60007	1	A60 port 1 70 GHz doubler J4 to A7 40 GHz doubler J500
W93	SR	N5247-60010	1	A51 port SRC 2 OUT 1 70 GHz dblr J2 to A12 40 GHz dblr J401
W94	SR	N5247-60011	1	A51 port SRC 2 OUT 1 70 GHz dblr J4 to A12 40 GHz dblr J500
W95	SR	N5247-60012	1	A62 port SRC 2 OUT 2 70 GHz dblr J2 to A13 40 GHz dblr J401
W96	SR	N5247-60013	1	A62 port SRC 2 OUT 2 70 GHz dblr J4 to A13 40 GHz dblr J500
W97	SR	N5247-60008	1	A63 port 2 70 GHz dblr J2 to A8 40 GHz dblr J401
W98	SR	N5247-60009	1	A63 port 2 70 GHz dblr J4 to A8 40 GHz dblr J500
W134	SR	N5247-20095	1	Rear-panel PORT 3 SW TSET IN (J7) to A51 SRC2 OUT1 m. switch
W141	SR	N5247-20099	1	A53 port 2 mechanical switch to PORT 2 SW SRC OUT (J2)

a. SR = semi-rigid coaxial cable.

3. Remove and discard the following gray flexible cables that have a top-side connection:

   — W149 (N5247-60023) A16 SPAM board (J2) to A24 IF multiplexer (P603)

   — W150 (N5247-60024) A16 SPAM board (J5) to A24 IF multiplexer (P203)

4. Leave the remaining gray flexible cables, the wire harnesses, and the ribbon cables connected where possible. Any that are removed should be labeled for reconnection later.
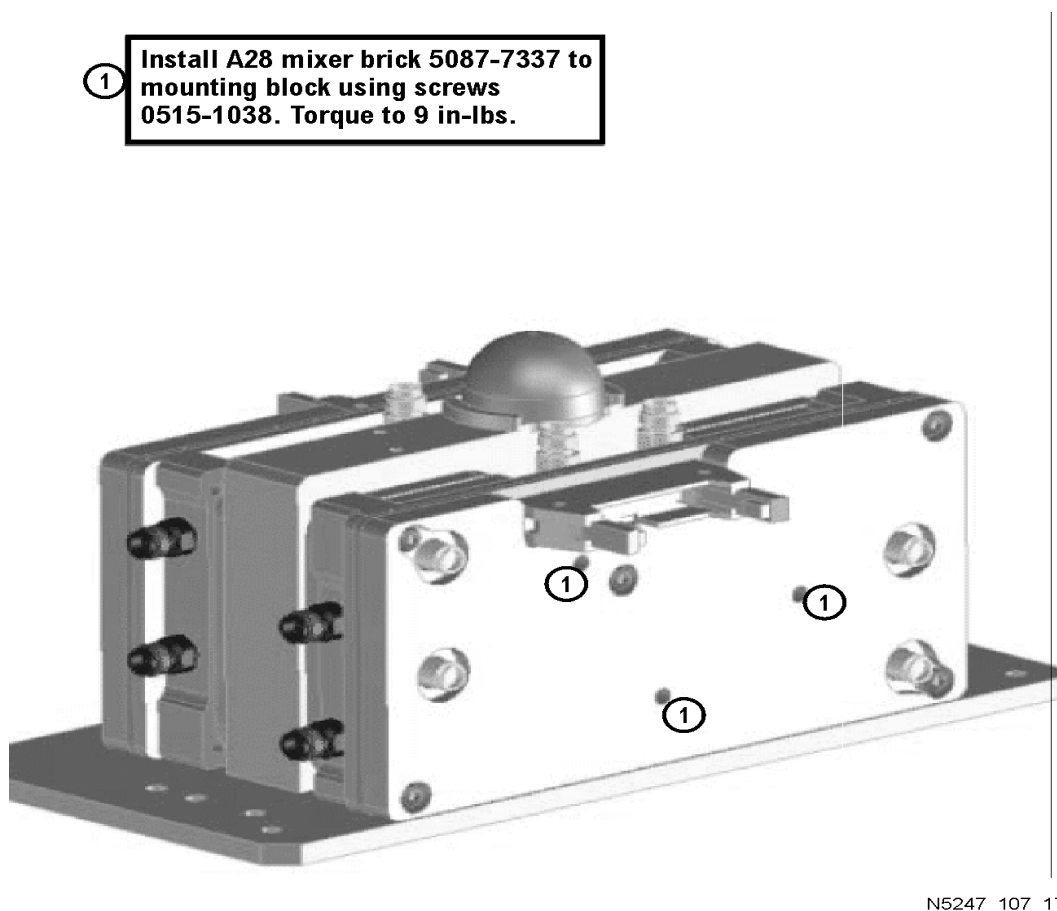
Step 11. Remove the A27 Mixer Brick Assembly

Remove the A27 mixer brick assembly from the PNA. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A27 and A28 Mixer Bricks" in the PDF Service Guide[1].

Step 12. Assemble the A28 Mixer Brick Assembly

1. Follow the instruction shown in Figure 2. New parts are listed in Table 1 on page 11 of this document.

Figure 2   A28 Mixer Brick Assembly (0515-1038, 5087-7337)

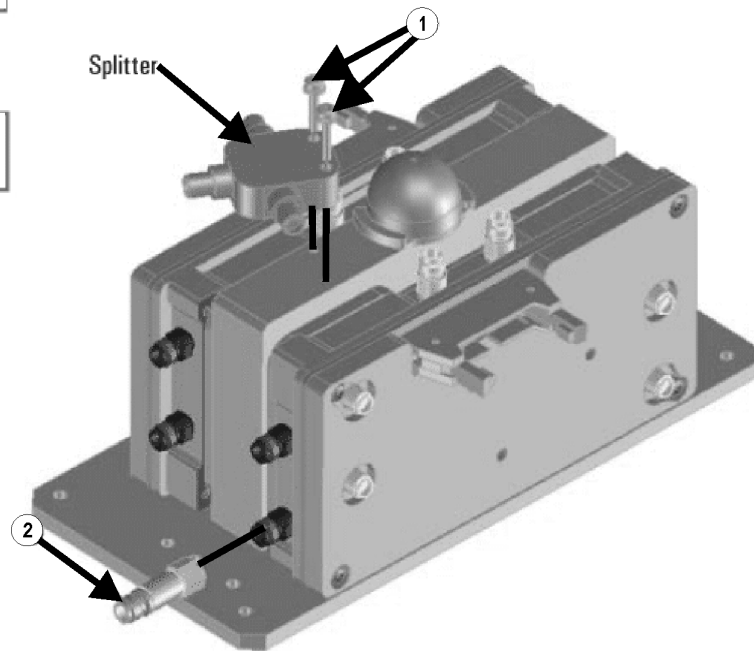
① Install A28 mixer brick 5087-7337 to mounting block using screws 0515-1038. Torque to 9 in-lbs.

N5247_107_17

2. Follow the two instructions shown in Figure 3.

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1. See "Downloading the Online PNA Service Guide" on page 9.

Figure 3   A26 Splitter and A69 3 dB Pad Installation (0515–2007, 5067–4086, 08490–60037)

1. Install splitter 5067-4086 (label facing up), secure with screws 0515-2007 X2. Leave loose for now.

2. Install 3dB pad 08490-60037 X1 only on R4 connector of A28 mixer brick. Torque to 10 in-lbs.

Splitter

N5247-197-18

3. Connect the gray flexible cables to the A28 mixer in the order shown in Figure 4. The other ends of the cables will be connected when the IF board is reinstalled later.

Figure 4   A28 Mixer Brick Cable Installation (N5242-60019, N5242-60020, N5242-60023, N5242-60024)

① Install Cable N5242-60024,

② Install Cable N5242-60019,

③ Install Cable N5242-60020,

④ Install Cable N5242-60023,

⑤ Torque SMA nuts to 10 in-lbs.
Note: Orientation of Gray Cable SMA connector on **mixer brick**.

N5247_107_19

Step 13. Install the A27/A28 Mixer Brick Assemblies

Reinstall the A27 mixer brick cables, and then install the A27/A28 mixer brick assembly, reusing the 10 existing screws. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A27 and A28 Mixer Bricks" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 11 of this document.
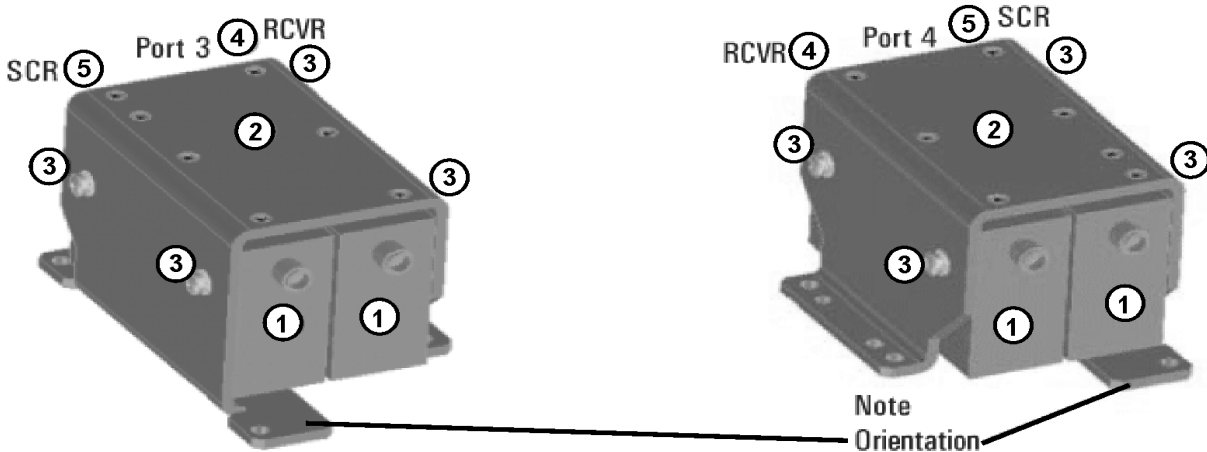
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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 14. Assemble the Port 3 and Port 4 Attenuator Assemblies

Follow the instruction shown in **Figure 5**. New parts are listed in **Table 1 on page 11** of this document.

Figure 5   Port 3 and Port 4 Attenuator Assemblies (84905-90004, 0515-0372, N5247-60020, N5247-00005, N5245-60006)

① Gather Attenuator **84905-60004** X4. Note orientation of attenuators

② Install Attenuators into Brackets N5247-00005 X2.

③ Secure with screws 0515-0372 X8. Torque to 9 in-lbs.

④ Install Ribbon Cables N5247-60020 X2 on RCVR attenuators.

⑤ Install Ribbon Cables N5245-60006 X2 on SCR attenuators.

N5247_107_22

Step 15. Install the Port 3 and Port 4 Attenuator Assemblies on the Test Set Deck

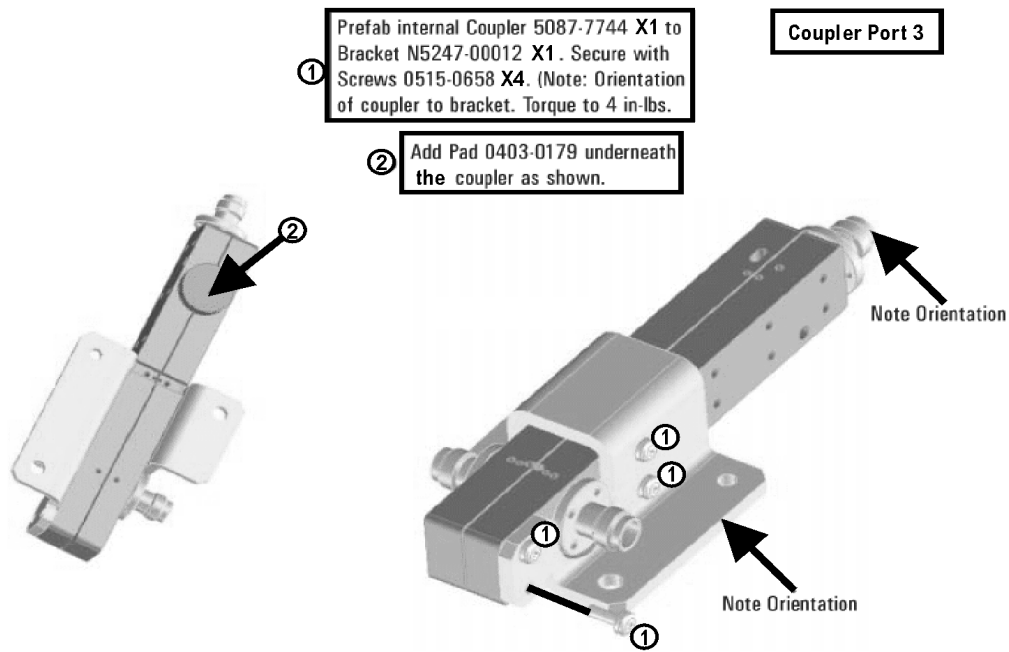Install the Port 3 and Port 4 attenuator assemblies using four 0515-0372 screws to secure each bracket. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A38–A41 Source Attenuators and the A46–A49 Receiver Attenuators" in the PDF Service Guide[1]. New parts are listed in **Table 1 on page 11** of this document.

Refer to **Figure 8 on page 27** for the location of the attenuator assemblies.

Step 16. Assemble the A30 and A31 Reference Coupler Assemblies
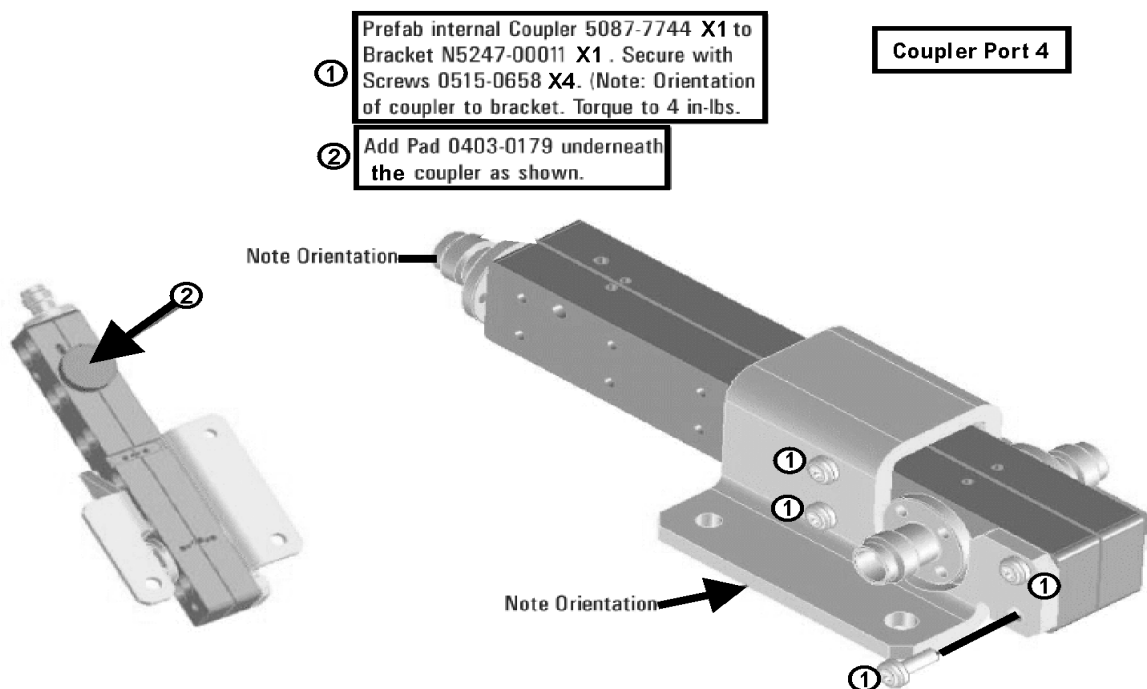
Follow the instructions shown in **Figure 6** and **Figure 7**. New parts are listed in **Table 1 on page 11** of this document.

Figure 6   A30 Reference Coupler Assembly (0403-0179, 0515-0658, 5087-7744, N5247-00012)

Figure 7   A31 Reference Coupler Assembly (0403-0179, 0515-0658, 5087-7744, N5247-00011)

Step 17. Install the A30 and A31 Reference Coupler Assemblies

Install the A30 and A31 reference coupler assemblies using three 0515-0372 screws to secure each bracket. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A29–A32 Reference Couplers and Reference Coupler Mounting Brackets" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 11 of this document.

Refer to Figure 8 below for the location of the reference coupler assemblies.

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1. See "Downloading the Online PNA Service Guide" on page 9.

Figure 8   Location of Attenuator Assemblies and Reference Coupler Assemblies

Step 18. Relocate the A54 Combiner Assembly

1. Remove the A54 combiner/bracket assembly from the test set deck, leaving the A54 combiner connected to the bracket. Discard the three screws.
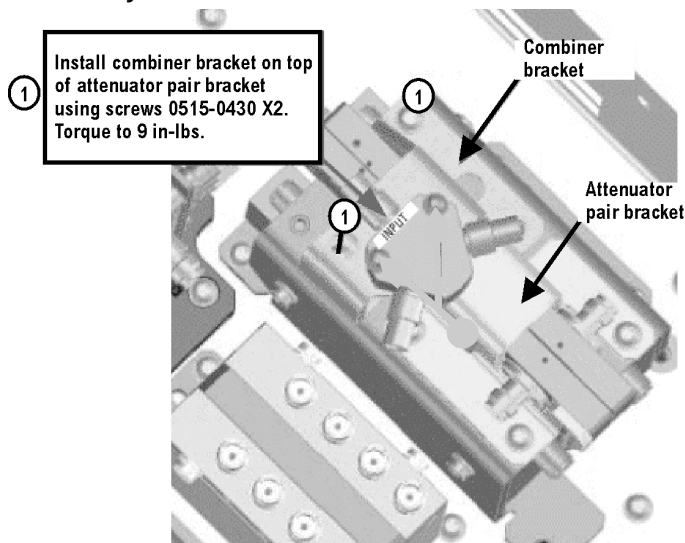
2. Follow the instruction in Figure 9 to install the combiner assembly on top of the port 1 attenuator assembly bracket.

Figure 9   Installing A54 Combiner/Bracket Assembly on Top of Port 1 Attenuator
                  Assembly Bracket (0515-0430)

Step 19. Remove the Bias Tee Blocks From the Test Set Deck

Remove the two bias tee blocks from the test set deck. For instructions, click
the Chapter 7 bookmark, "Removing and Replacing the A42–A45 Bias Tees" in
the PDF Service Guide. Keep all parts for reinstallation later.

Step 20. Install the A43 and A44 Bias Tees on the Bias Tee Blocks

Follow the instruction in Figure 10 to install the A43 and A44 bias tees on the
bias tee blocks. New parts are listed in Table 1 on page 11 of this document.

Figure 10   Installing A43 and A44 Bias Tees on the Bias Tee Blocks (5087-7732, 0515-1227)

Step 21. Reinstall the Bias Tee Blocks

Reinstall the two bias tee blocks on the test set deck, reusing the existing screws. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A42-A45 Bias Tees" in the PDF Service Guide[1].

NOTE   As shown in "Removing and Replacing the A42-A45 Bias Tees" in the PDF Service Guide, the slot on the bias tee block should be oriented toward the back of the PNA.

Step 22. Remove the A53 Mechanical Switch/Bracket Assembly from the Test Set Deck

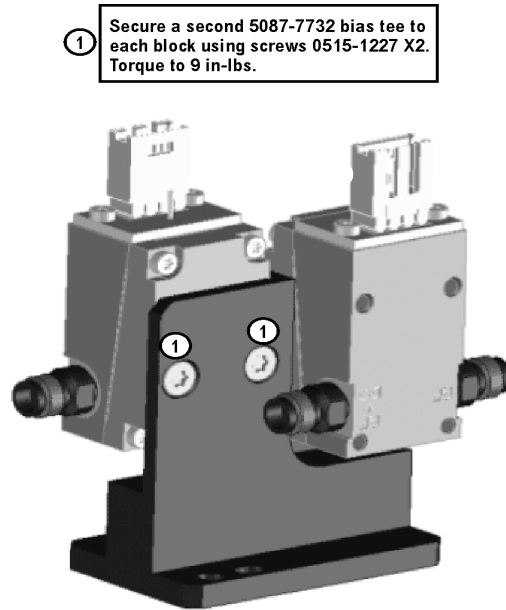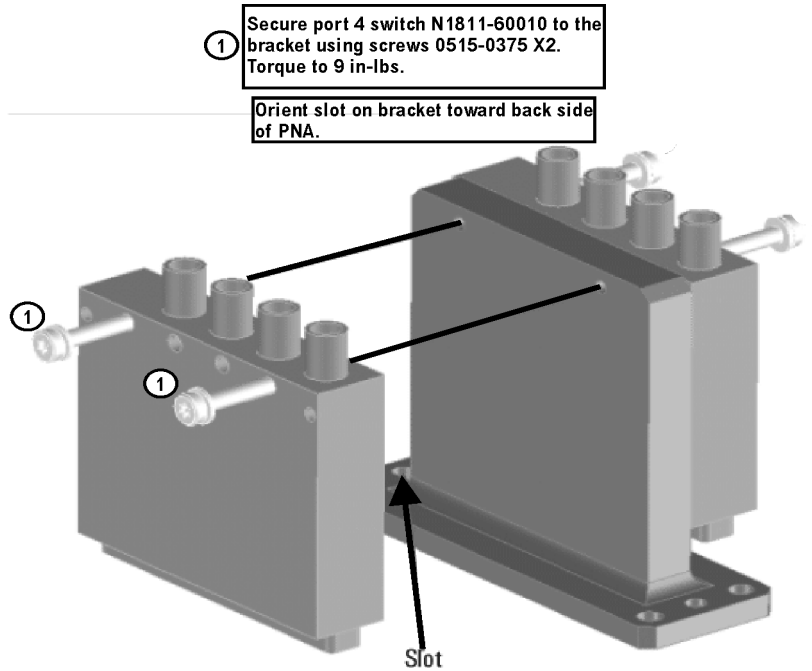1. Remove the A53 mechanical switch/bracket assembly from the test set deck. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A50-A53 Bypass Switches and the A54 Combiner" in the PDF Service Guide[1]. Keep all parts for reinstallation later.

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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 23. Install the A52 Mechanical Switch on the Bracket

Follow the instruction in Figure 11 to install the A52 mechanical switch on the bracket. New parts are listed in Table 1 on page 11 of this document.

Figure 11   Installing the A52 Mechanical Switch on the Bracket (0515-0375, N1811-60010)

> 1 Secure port 4 switch N1811-60010 to the bracket using screws 0515-0375 X2. Torque to 9 in-lbs.
>
> Orient slot on bracket toward back side of PNA.

Slot

N5247_107_03

Step 24. Reinstall the A52/A53 Mechanical Switch Assembly On the Test Set Deck

Reinstall the mechanical switch assembly on the test set deck, reusing the existing screws. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A50-A53 Bypass Switches and the A54 Combiner" in the PDF Service Guide[1].

NOTE   As shown in the graphic above, the slot on the mechanical switch bracket should be oriented toward the back of the PNA.

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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 25. Assemble the A33 – A36 Test Port Coupler Assemblies

1. Remove the A33 test port 1 coupler and A36 test port 2 coupler from the PNA. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A33 – A36 Test Port Couplers" in the PDF Service Guide.

2. Using pliers, remove the adhesive bumper on the A33 test port 1 coupler and on the A36 test port 2 coupler.

3. Follow the two instructions shown in Figure 12. New parts are listed in Table 1 on page 11 of this document.

Figure 12   A33 – A36 Test Port Coupler Assembly (0460-2725, 5087-7778, E4403-20033)

Step 26. Remove and Disassemble the 2-Port Test Set Front Plate

1. Remove two screws from each LED board and remove the boards from the 2-port test set front plate of the PNA. Keep the screws for reinstallation later.

2. Remove the 2-port test set front plate from the test set deck. Keep the screws to reuse later.

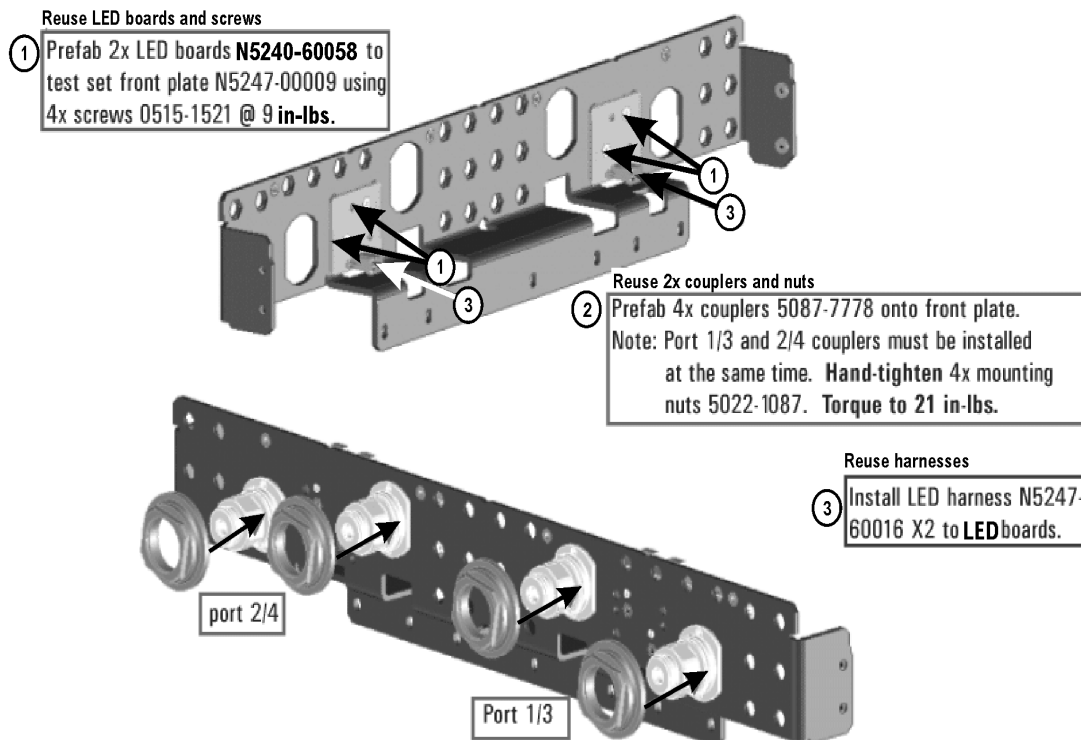3. Remove the 16 bulkhead connectors, nuts and washers from the 2-port front plate to reuse later.

Step 27. Install the LED Boards, Bulkhead Connectors, and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate

1. Follow the three instructions shown in Figure 13.

Figure 13   LED Board Assemblies and Test Port Coupler Assemblies Installation(0515-1521, 5022-1087, 5087-7778, N5240-60058, N5247-60016)

Reuse LED boards and screws

① Prefab 2x LED boards **N5240-60058** to test set front plate N5247-00009 using 4x screws 0515-1521 @ 9 **in-lbs**.

Reuse 2x couplers and nuts

② Prefab 4x couplers 5087-7778 onto front plate.
Note: Port 1/3 and 2/4 couplers must be installed at the same time. **Hand-tighten** 4x mounting nuts 5022-1087. **Torque to 21 in-lbs.**

Reuse harnesses

③ Install LED harness N5247-60016 X2 to **LED** boards.

port 2/4

Port 1/3

N5247_107_12

2. Reinstall the 16 bulkhead connectors, nuts and washers taken from the 2-port front plate into the 4-port front plate. Torque to 21 in-lbs.

3. Install 12 new bulkhead connectors, nuts and washers into the 4-port front plate. Torque to 21 in-lbs.

Step 28. Install the 4-Port Coupler Plate Assembly to the Deck

Follow the three instructions shown in Figure 14.

Figure 14   Coupler Plate Assembly Installation (0515-0372, 0515-0664, 0515-1227)

Reuse screws

① Install coupler plate assy to deck. Install 6x screws 0515-0372 and 1X 0515-0664. **Do not torque.**

③ Torque the 7x screws in step 1 to 9 **in-lbs.**

② Install 4x screws 0515-1227 @ 9 **in-lbs.** Alternate sides in torque sequence as shown in the **alphabetic circles.**

Reuse screws

0515-0664 1X

Step 29. Install Some Bottom-Side (Test Set) Cables

CAUTION	Use a 5/16-in torque wrench set to 10 in-lbs on all cable connections except the front and rear panel cable connectors. Torque these connections to 21 in-lb.

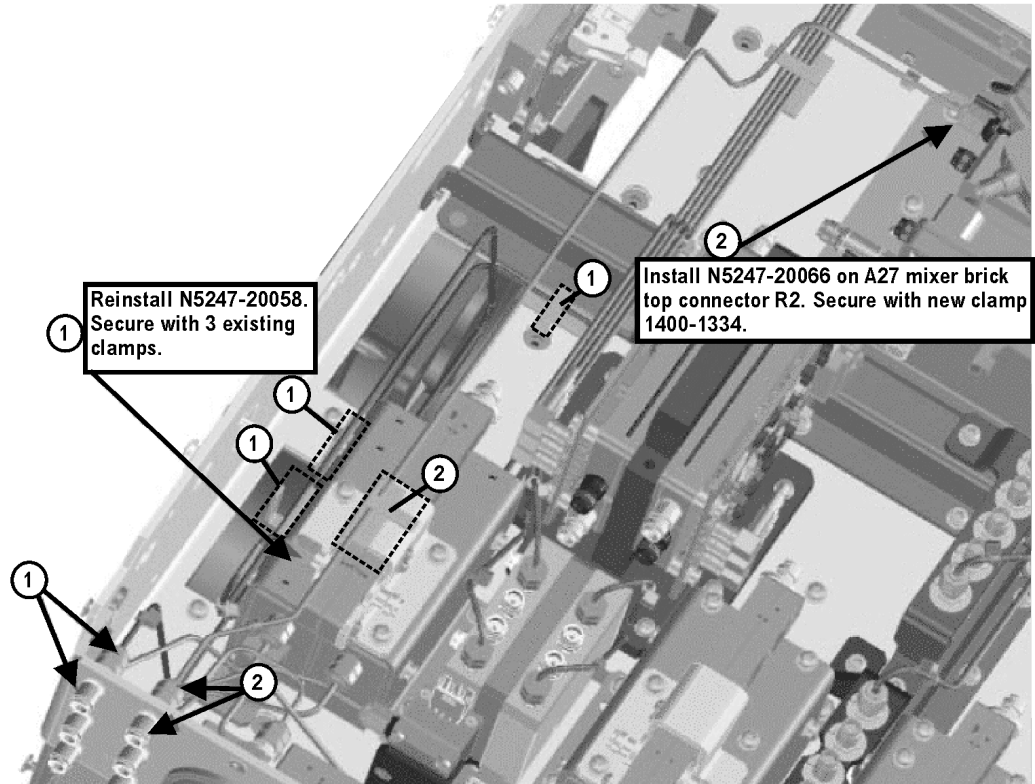|	
CAUTION	Be careful not to damage the center pins of the semi-rigid cables. Some flexing of the cables may be necessary but do not over-bend them.

semi-rigid Cables Required for Upgrading to an Option 423 PNA

Install the following semi-rigid cables in the order listed. To see images showing the location of these cables, click the Chapter 6 bookmark "Bottom RF Cables, 4-Port, Option 423, S/N Prefixes <6021" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 11.

— W115 (reuse) (N5247-20027) A45 port 2 bias tee to port 2 CPLR THRU

— W116 (N5247-20080) A45 port 2 bias tee to A36 port 2 coupler

— W112 (N5247-20029) A44 port 4 bias tee to A35 port 4 coupler

— W111 (N5247-20021) A44 port 4 bias tee to port 4 CPLR THRU

— W104 (N5247-20022) A42 port 1 bias tee to A33 port 1 coupler

— W103 (N5247-20010) A42 port 1 bias tee to port 1 CPLR THRU

— W107 (reuse) (N5247-20081) A43 port 3 bias tee to port 3 CPLR THRU

— W108 (N5247-20028) A43 port 3 bias tee to A34 port 3 coupler

— W142 (reuse) (N5247-20089) A53 port 2 mechanical switch to PORT 2 TSET IN (J1)

— W138 (N5247-20098) A52 port 4 mechanical switch to PORT 4 SW TSET (J3)

— W137 (N5247-20097) A52 port 4 mechanical switch to PORT 4 SW SRC OUT (J4)

   * Install clamp part number 1400-1334 to secure W137 and W138. Position it next to the existing clamp that secures W141 and W142.

— W67 (reuse6) (N5247-20088) Rear-panel port RF2 OUT (J12) to W67

— W46 (N5247-20019) A36 port 2 coupler to port 2 CPLR ARM

— W123 (reuse) (N5247-20020) A49 port 2 receiver attenuator to port 2 RCVR B IN

— W114 (reuse) (N5247-20034) A41 port 2 source attenuator to port 2 SOURCE OUT

— W146 (reuse) (N5247-20058) A32 port 2 reference coupler to REF 2 SOURCE OUT

— W145 (N5247-20066) A27 mixer brick (R2) to REF 2 RCVR R2 IN

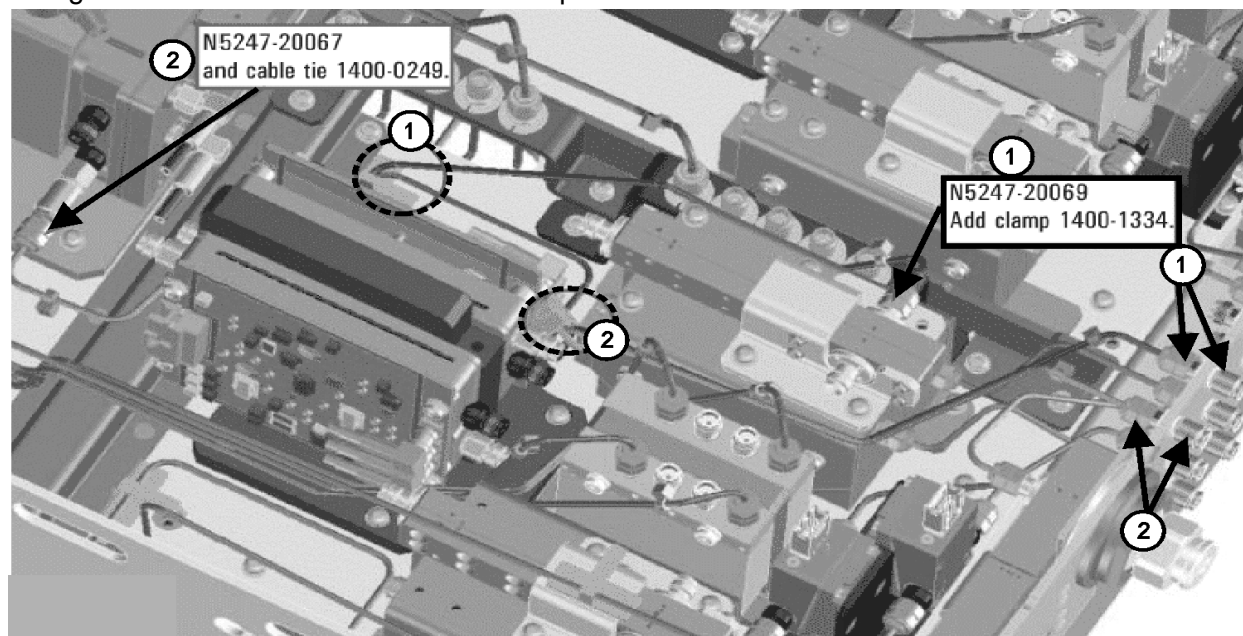 * As shown in Figure 15, install clamp part number 1400-1334 to secure W145.

Figure 15   Location of W145 and W146 Cables and Securing Clamps (1400-1334, N5247-20058, N5247-20066)

Reinstall N5247-20058. Secure with 3 existing clamps.

Install N5247-20066 on A27 mixer brick top connector R2. Secure with new clamp 1400-1334.

N5247_107_04

— W121 (N5247-20024) A48 port 4 receiver attenuator to port 4 RCVR D IN

— W42 (N5247-20026) A35 port 4 coupler to port 4 CPLR ARM

— W110 (N5247-20025) A40 port 4 source attenuator to port 4 SOURCE OUT

— W41 (N5247-20069) A31 port 4 reference coupler to REF 4 SOURCE OUT

— W55 (N5247-20067) A28 mixer brick (R4) to REF 4 RCVR R4 IN

  * As shown in Figure 16, install clamp part number 1400-1334 to secure W41, and install cable tie part number 1400-0249 to secure W55.

Figure 16   Location of Cable Clamp to Secure W41 and Cable Tie to Secure W55

N5247_197_05

- W119 (N5247-20008) Port 3 RCVR C IN to A47 port 3 receiver attenuator

- W38 (N5247-20007) Port 3 CPLR ARM to A34 port 3 coupler

- W106 (N5247-20009) Port 3 SOURCE OUT to A39 port 3 source attenuator

- W37 (N5247-20070) A30 port 3 reference coupler to front panel REF 3 SOURCE OUT

- W54 (N5247-20062) REF 3 RECEIVER R3 IN to A28 mixer brick (R3)

  * As shown in Figure 17, install clamp part number 1400-1334 to secure W37, and install two cable ties, part number 1400-0249, to secure W37 and W54.

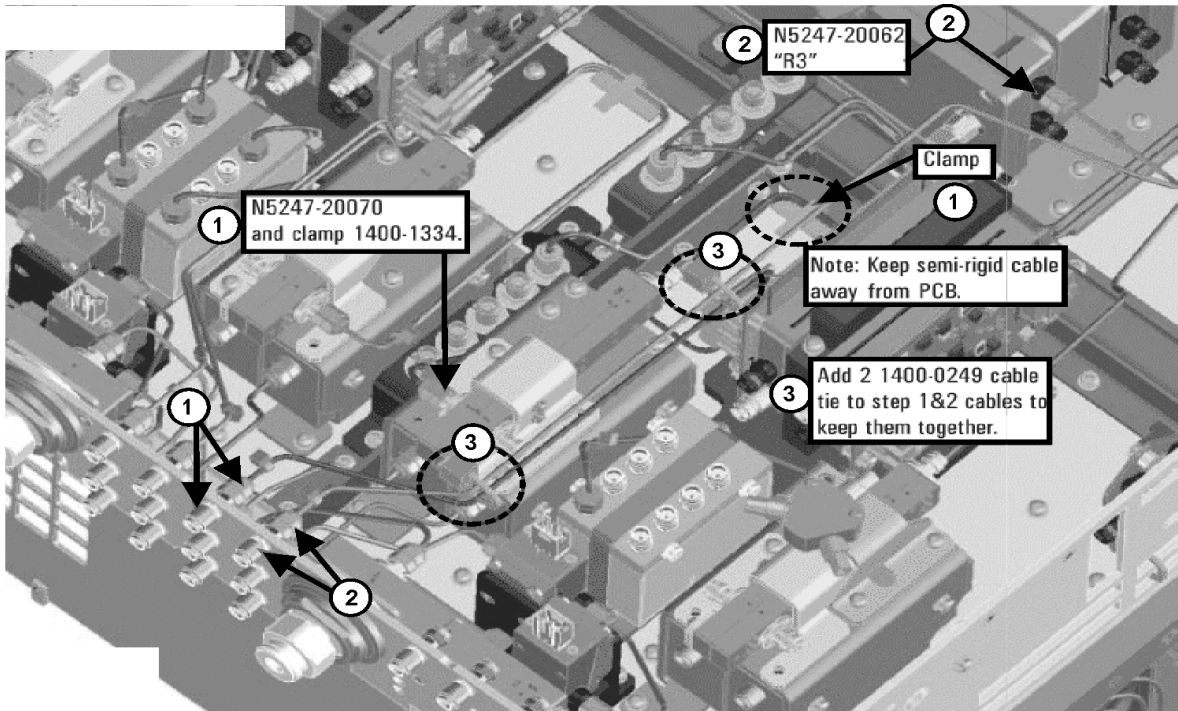Figure 17   Location of Cable Clamp to Secure W37 and Cable Ties to Secure W37/W54

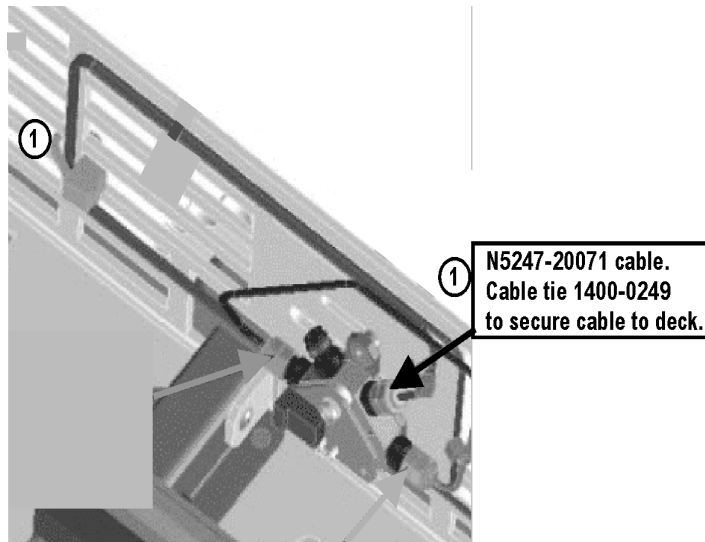N5247_107_06

— W117 (reuse) (N5247-20013) A46 port 1 receiver attenuator to port 1 RCVR A IN

— W34 (N5247-20082) A33 port 1 coupler to port 1 CPLR ARM

— W102 (reuse) (N5247-20014) A38 port 1 source attenuator to port 1 SOURCE OUT

— W144 (N5247-20071) A29 port 1 reference coupler to A37 reference mixer switch

* As shown in Figure 18, install cable tie, part number 1400-0249, to secure W144.

Figure 18   Location of Cable Ties to Secure W144

N5247-20071 cable.
Cable tie 1400-0249
to secure cable to deck.

— W51 (reuse) (N5247-20011) A37 reference mixer switch to REF 1 SOURCE OUT

— W52 (reuse) (N5247-20012) A37 reference mixer switch to REF 1 RCVR R1 IN

— W53 (reuse) (N5247-20048) A37 reference mixer switch to A27 mixer brick (R1)

— W120 (N5247-20064) A47 port 3 receiver attenuator to A28 mixer brick (C)

— W118 (reuse) (N5247-20047) A46 port 1 receiver attenuator to A27 mixer brick (A)

— W140 (reuse) (N5247-20033) A53 port 2 mechanical switch to A32 port 2 reference coupler

— W132 (N5247-20033) A51 port 3 mechanical switch to A30 port 3 reference coupler

— W136 (N5247-20031) A52 port 4 mechanical switch to A31 port 4 reference coupler

— W126 (reuse) (N5247-20031) A50 port 1 mechanical switch to A29 port 1 reference coupler

— W101 (reuse) (N5247-20083) A29 port 1 reference coupler to A38 port 1 source attenuator

— W113 (reuse) (N5247-20083) A32 port 2 reference coupler to A41 port 2 source attenuator

— W105 (N5247-20083) A30 port 3 ref coupler to A39 port 3 source attenuator

— W109 (N5247-20083) A31 port 4 ref coupler to A40 port 4 source attenuator

— W22 (reuse) (N5247-20068) A62 port 4 70 GHz doubler to W21

— W26 (reuse) (N5247-20051) A63 port 2 70 GHz doubler to W25

— W24 (reuse) (N5247-20061) A63 port 2 70 GHz doubler to W23

— W122 (N5247-20065) A48 port 4 receiver attenuator to A28 mixer brick (D)

— W124 (reuse) (N5247-20046) A49 port 2 receiver attenuator to A27 mixer brick (B)

— W18 (reuse) (N5247-20084) A61 port 3 70 GHz doubler to W17

— W14 (reuse) (N5247-20072) A60 port 1 70 GHz doubler to W13

— W16 (reuse) (N5247-20060) A61 port 3 70 GHz doubler to W15

— W125 (reuse) (N5247-20030) A50 port 1 mechanical switch to A60 port 1 70 GHz doubler

— W135 (N5247-20030) A52 port 4 mechanical switch to A62 port 4 70 GHz doubler

— W12 (reuse) (N5247-20059) A60 port 1 70 GHz doubler to W11

— W139 (reuse) (N5247-20032) A53 port 2 mechanical switch to A63 port 2 70 GHz doubler

— W131 (reuse) (N5247-20032) A51 port 3 mechanical switch to A61 port 3 70 GHz doubler

— W20 (reuse) (N5247-20015) A62 port 4 70 GHz doubler to W19

— W133 (N5247-20090) A51 port 3 mechanical switch to front panel PORT 3 SW SRC OUT

— W130 (N5247-20094) A50 port 1 mechanical switch to A54 combiner

— W127 (N5247-20091) A50 port 1 mechanical switch to front panel PORT 1 SW SRC OUT

— W129 (N5247-20093) A54 combiner to front panel PORT 3 COMB ARM IN

— W128 (N5247-20092) A54 combiner to front panel PORT 1 COMB THRU IN

— W64 (N5245-20022) A26 splitter to A28 mixer brick

— W63 (N5245-20023) A26 splitter to A27 mixer brick

— W62 (N5247-20111) A26 splitter to A25 HMA26.5

* Tighten the screws that secure the A26 splitter to the mixer mounting block.

— W58 (N5247-20138) 2.4 mm cap for A28 mixer brick

Step 30. Reinstall the A24 IF Multiplexer Board

For instructions, click the Chapter 7 bookmark "Removing and Replacing the A24 IF Multiplexer Board" in the PDF Service Guide[1].

Step 31. Install Cables on IF Multiplexer Board

Install the following gray flexible cables in the order listed. Mixer brick cables were connected to the mixer bricks earlier in this procedure, but the other ends of these cables still require a connection. To see images showing the location of these cables, click either of the Chapter 6 bookmarks "Bottom RF Cables, 4-Port, Option 423, S/N Prefixes <6021" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 11.

— W80 (N5242-60013) A24 IF multiplexer board P203 to A16 SPAM board J2

— W82 (N5242-60015) A24 IF multiplexer board P603 to A16 SPAM board J5

— W71 (reuse) (N5242-60017) A27 mixer brick (A) to A24 IF multiplexer (P1)

— W72 (N5242-60021) A27 mixer brick (R1) to A24 IF multiplexer (P411)

— W73 (N5242-60022) A27 mixer brick (R2) to A24 IF multiplexer (P412)

— W74 (reuse) (N5242-60018) A27 mixer brick (B) to A24 IF multiplexer (P201)

— W75 (N5242-60024) A28 mixer brick (D) to A24 IF multiplexer (P801)

— W76 (N5242-60019) A28 mixer brick (R4) to A24 IF multiplexer (P414)

— W77 (N5242-60020) A28 mixer brick (R3) to A24 IF multiplexer (P413)

— W78 (N5242-60023) A28 mixer brick (C) to A24 IF multiplexer (P601)

— W79 (reuse) (N5242-60012) A24 IF multiplexer board P3 to A16 SPAM board J1

— W81 (reuse) (N5242-60014) A24 IF multiplexer board P403 to A16 SPAM board J4

— W83 (reuse) (N5242-60016) A24 IF multiplexer board P803 to A16 SPAM board J6

Step 32. Reinstall the A23 Test Set Motherboard

1. For instructions on reinstalling the board, click the Chapter 7 bookmark "Removing and Replacing the A23 test set motherboard" in the PDF Service Guide[1].

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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 33. Install Cables on the A23 Test Set Motherboard

CAUTION   Follow instructions carefully when making cable connections, especially wire harness connections. Incorrect connections can destroy components, resulting in additional customer costs.

If not already done in a previous step, install the following new ribbon cables and wire harness in the order listed. To see an image showing their locations, click the Chapter 6 bookmark "Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 423 (S/N Prefixes <6021)" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 11.

— Ribbon cable (N5247-60015) from A23 test set motherboard J552 to A28 mixer brick (2) J52

— Ribbon cable (N5247-60021), port 3 bias tee to A23 test set motherboard J543

— Ribbon cable (N5247-60021), port 4 bias tee to A23 test set motherboard J544

— Ribbon cable (N5247-60020), A23 test set motherboard J206 to A47 port 3 receiver attenuator

— Ribbon cable (N5247-60020), A23 test set motherboard J207 to A48 port 4 receiver attenuator

— Ribbon cable (N5245-60006), A23 test set motherboard J547 to A39 port 3 source attenuator

— Ribbon cable (N5245-60006), A23 test set motherboard J548 to A40 port 4 source attenuator

— Wire harness (part of mechanical switch assembly), A23 test set motherboard J103 to A52 port 4 mechanical switch
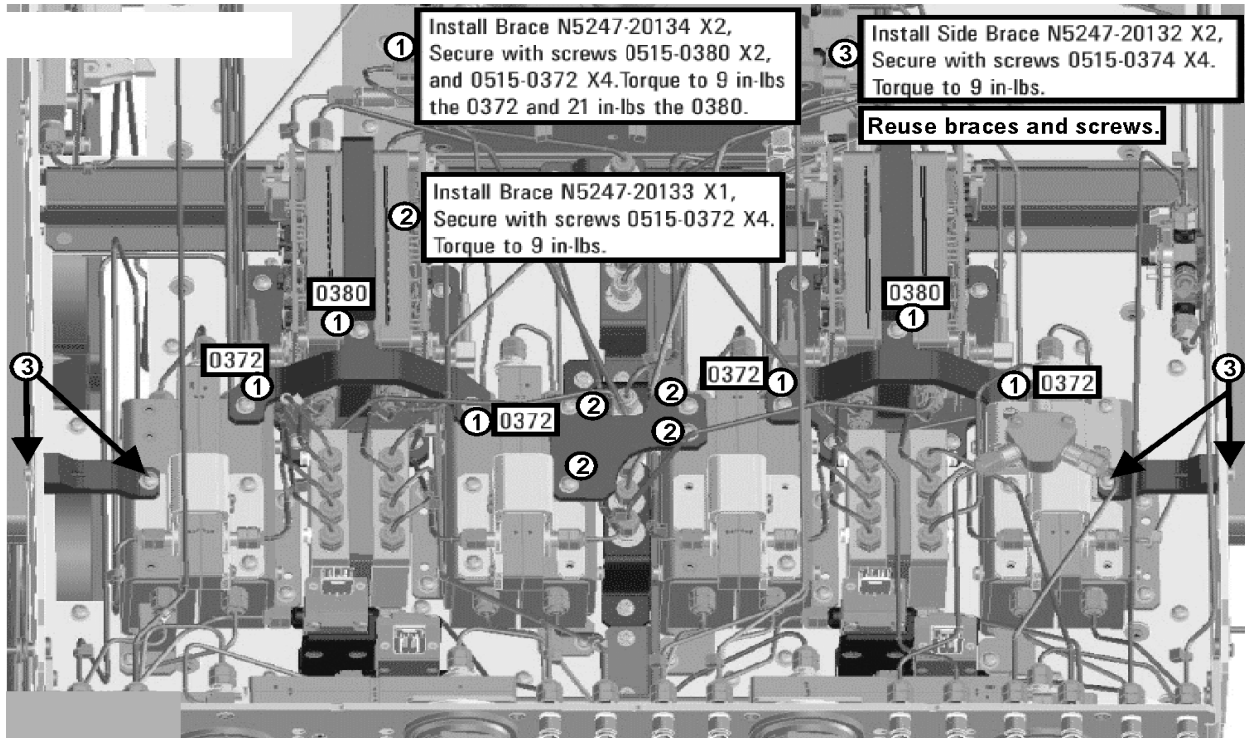
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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 34. Install the Braces on the Bottom Side of the PNA

Follow the three instructions shown in **Figure 19**.

Figure 19   Location of Braces on the Bottom Side of the PNA (0515-0372, 0515-0374, 0515-0380, N5247-20032, N5247-20033, N5247-20134)

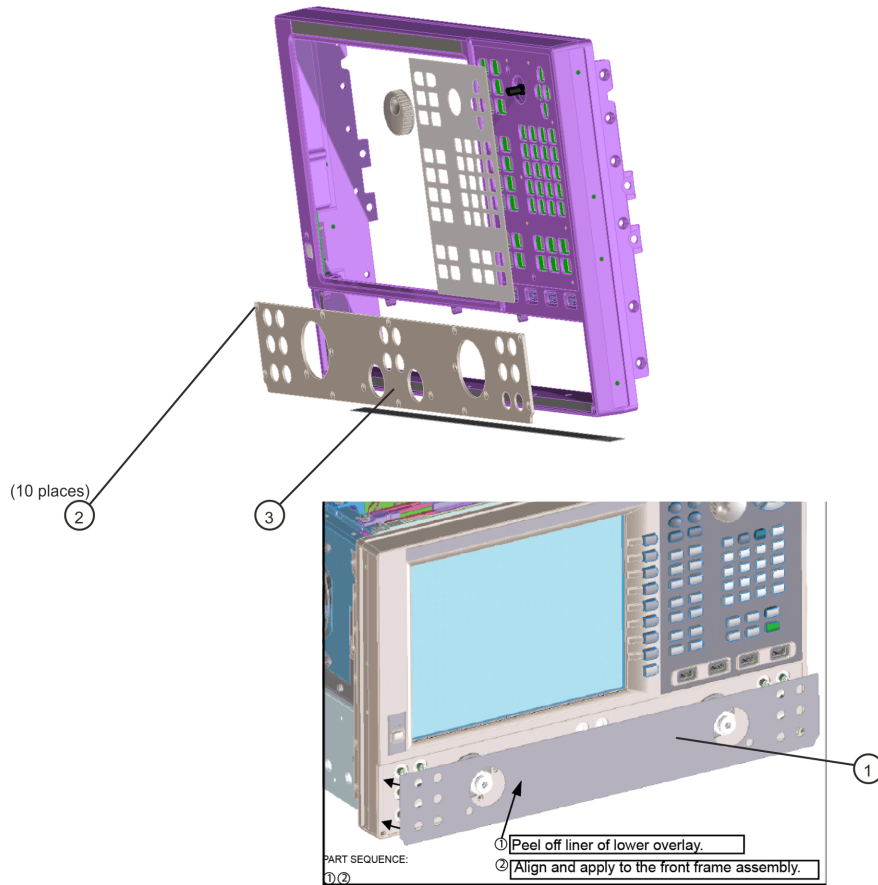## Step 35. Replace the Front Panel's Lower Dress Panel

Before the front panel's lower dress panel can be replaced, the 2-port lower dress panel and the lower front panel label must be removed from the front panel assembly. Refer to **Figure 20 on page 43**. New parts are listed in **Table 1 on page 11**.

1. Remove the 2-Port lower front panel label (item ①).

2. Remove the 10 screws (save the screws for reuse) from the 2-port dress panel and remove the dress panel (item ② and ③ respectively).

3. Reassemble the front panel's lower dress panel assembly with the new 4-port lower dress panel (N5240-00009) by reversing the order of step 2 in the instructions previously followed.

> **NOTE**
>
> **IMPORTANT!** To avoid possible damage to the lower front panel overlay, do not attempt to attach the lower front panel overlay until "Step 37. Install the Overlay" on page 43.

Figure 20   Replacing the Front Panel's Lower Dress Panel and label

Step 36. Reinstall Front Panel Assembly

For instructions on reinstalling the front panel assembly, click the Chapter 7 bookmark "Removing and Replacing the Front Panel Assembly" in the PDF Service Guide[1].

— Be sure to install the two new screws (0515-1946) in the front panel, next to test ports 3 and 4. Torque these screws to 9 in-lbs.

Step 37. Install the Overlay

To see an image of the front panel overlay (N5247-80019 or N5247-80023), click the Chapter 6 bookmark "Front Panel Assembly, Front Side, All Options" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 11.

1. Remove the protective backing from the new front panel overlay (N5247-80019 or N5247-80023).

2. Loosely place the overlay in the recess on the lower front panel.

1. See "Downloading the Online PNA Service Guide" on page 9.

3. Placing two fingers at the middle, press the overlay firmly onto the frame while sliding your fingers in opposite directions towards the ends of the overlay. Repeat on all areas of the overlay.

Step 38. Install the Jumper Cables

1. Install fourteen W60 front panel jumper cables (N5247-20107) – use 8 new jumpers and reuse 6 old jumpers. To see an image of the front panel jumper cables, click the Chapter 7 bookmark "Removing and Replacing the Front Panel Assembly" in the PDF Service Guide[1].

2. Install new W143 rear panel jumper cable (N5247-20107) from SW SRC OUT (J4) to SW TSET IN (J3). To see an image showing the location of this rear panel jumper, click on the Chapter 6 bookmark "Rear Panel Assembly, All Options" in the PDF Service Guide[1].

Step 39. Position the Cables and Wires to Prevent Pinching

On the top side of the PNA-X, carefully position the gray flex cables so they can't be pinched between the covers and the rails.

On the bottom side of the PNA-X, carefully fold or push down the ribbon cables and wires so they can't be pinched between the hardware and the outer cover. Ribbon cables and wires must never be positioned on top of hardware.

Step 40. Reinstall the Inner Cover

For instructions, click the Chapter 7 bookmark "Removing the Covers" in the PDF Service Guide[1].

Step 41. Reinstall the Outer Cover

For instructions, click the Chapter 7 bookmark "Removing the Covers" in the PDF Service Guide[1].

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1. See "Downloading the Online PNA Service Guide" on page 9.

Step 42. Remove Option 224

Procedure Requirements

— The analyzer must be powered up and operating to perform this procedure.

— The Network Analyzer program must **not** be running.

— A keyboard and mouse must be connected to the network analyzer.

Option 224 License Removal Procedure

1. To start the Keysight License Manager, press Start > Keysight License Manager > Keysight License Manager. A Keysight License Manager dialog box will appear.

2. Right click the on the desired option and click **Delete**.

3. A message displays stating that the option removal was successful.

4. Restart the PNA Analyzer application: Press **File** > **Exit**.

Step 43. Enable Option 423

| NOTE | For this step, you will need a USB flash drive. |

Procedure Requirements

— The analyzer must be powered up and operating to perform this procedure.

— The Network Analyzer program must **not** be running.

— A keyboard and mouse must be connected to the network analyzer.

— Refer to the license message you received from Keysight: Verify that the analyzer's model and serial numbers match those on the license message you received from Keysight.

Option Enable Procedure

1. Locate the email(s) from Keysight which contain license file attachments. These emails are a result of "Step 1. Obtain a Keyword and Verify the Information" on page 17.

2. Copy the license file(s) from the email(s) to the **root directory** of the USB flash drive.
   More than one license file may be copied to the USB flash drive.

NOTE	A single license file may contain licenses for more than one instrument.

3. Insert the USB flash drive to the PNA's USB drive slot. Within 5 seconds, the PNA should display a small "New licenses installed" message.

   Else, load the license key file(s), manually move your license file(s) to `C:\Program Files\Agilent\licensing`. It may take Keysight License Manager an extra ~5 seconds to enable the licenses.
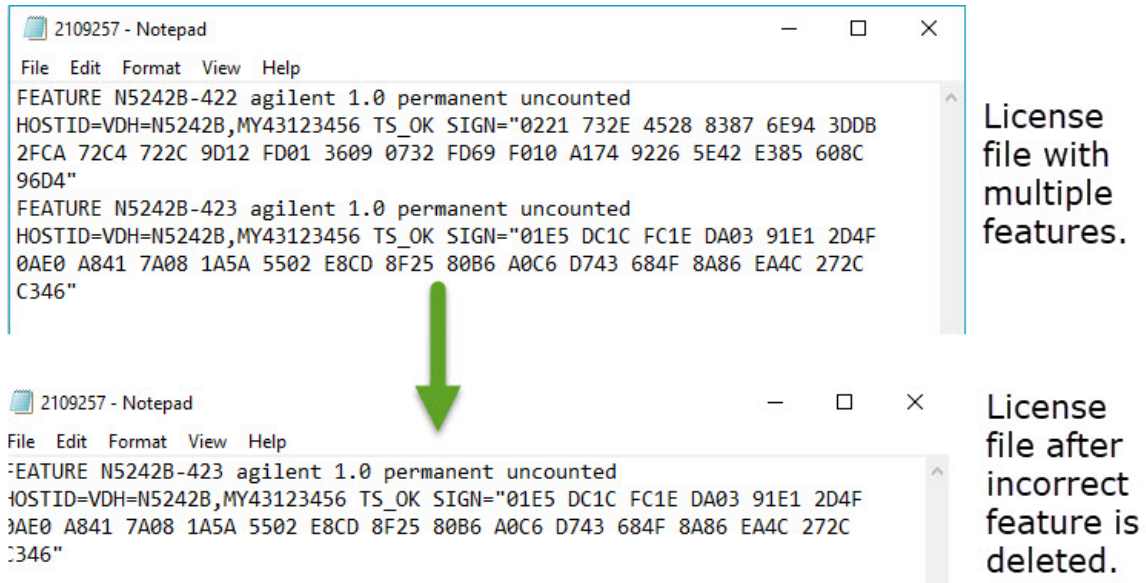
NOTE	Attempting to re-install a license file that is already installed may generate a "Corrupt Media" error message. Ignore this message.

4. Verifying and editing the license file:

   For these steps, refer to the example in Figure 21 on page 47.

5. Verify your USB flash drive is connected to a PC.

6. Open your license file using a text read/write program similar to Notepad.

7. If you have more than one licensed feature, delete the feature that is **not** required for this upgrade. (e.g., in this case N5242B-423 is the correct upgrade. So, N5242B-422 is to be deleted from the text file.)

Figure 21   Editing a Keysight License File Using a Text Editor.
Note: This figure may not contain your specific features and is an example only. In this example N5242B-422 is the incorrect feature. N5242B-423 is the correct feature.

8. Re-save the text license file to the root directory of your USB flash drive.

9. Verify that only the single correctly edited text license file is in the root directory of your USB drive.

10. Disconnect the USB flash drive from the PNA.

11. On the analyzer, click or press to open the KLM software from your PNA's Windows taskbar by pressing **Start** > **More Programs** > **Keysight License Manager folder** > **Keysight License Manager** and verify the options are correct.

Option Verification Procedure

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

1. On the analyzer's Help menu, press About Network Analyzer.

2. Verify that "423" is listed, but "224" is not listed after "Options:" in the display. Click OK.

| NOTE | If the options have not been enabled or if the option 224 license has not been removed, contact Keysight Technologies. Refer to "Getting Assistance from Keysight" on page 6. |

3. After successful installation of all upgrades, some features require some adjustments to ensure the instrument meets its specified performance. Refer to the Adjustments (i.e., Diagnostic Tools, Utilities, and Adjustments) topic in the PNA Online Help: https://rfmw.em.keysight.com/wireless/helpfiles/N52xxB/help.htm.

Step 44. Perform Post-Upgrade Adjustments and Calibration

Adjustments

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

NOTE	**IMPORTANT!** The 10 MHz reference crystal oscillator is the most accurate after running for three hours. The 10 MHz Frequency Reference Adjustment can be run after the PNA has warmed up for 90 minutes, and the other adjustments can be completed in the order presented, but then the 10 MHz Frequency Reference Adjustment should be repeated after the PNA has been able to warm up for three hours.

— 10 MHz frequency reference adjustment

— EE default adjustment: Src 2 Synth Only

— synthesizer bandwidth adj. (only run when EE default adjust is not sufficient)

— Source Adjustment

— IF gain adjustment

— receiver characterization

— receiver adjustment

— IF response adjustment (Option S93090xA/B, S93092A/B, S93093A/B, or S93094A/B Only)

— Noise figure adjustment (Option 029 with S93029A/B Only)

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 is also found in the service guide.

To view this service guide information, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

After the specified adjustments have been performed, the analyzer should operate and phase lock over its entire frequency range.

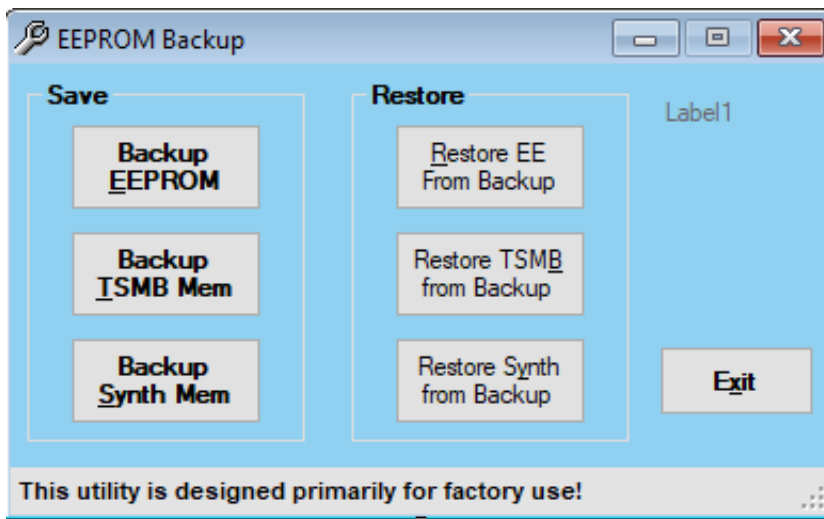1. See "Downloading the Online PNA Service Guide" on page 9.

EEPROM Backup

The analyzer uses arrays of correction constants to enable the analyzer to produce accurate, leveled source signals and receive clean test signals. These constants are stored in non-volatile EEPROM memory and in flash memory files.

The adjustments listed here generate new correction constants. The analyzer must have a backup of this new data in case any of the data becomes corrupted.

To store the backup data, perform these steps:

— Navigate to the EEPROM Backup Utility, located at:

— Windows 7 -- `C:\Program Files (x86)\Keysight\Network Analyzer\Service\eebackup.exe`

— Windows 10 -- `C:\Program Files\Keysight\Network Analyzer\Service\eebackup.exe`

— Run the program.

— Click Backup EEPROM.

— Click Backup TSMB Mem.

— Click Backup Synth Mem. (Applies to Version 7 Synthesizers Only)

— Click Exit when the program has finished.

Figure 22   EEPROM Backup Menu

Operator's Check

Perform the Operator's Check to check the basic functionality of the analyzer. For instructions, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

If you experience difficulty with the basic functioning of the analyzer, contact Keysight. Refer to "Contacting Keysight" on page 6.

Calibration

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 analyzer's internal performance test software. To view information on the performance test software, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

Step 45. Prepare the PNA for the User

1. If necessary, reinstall front jumper cables.

2. If necessary, reinstall the cable guards, pushing them over the front jumper cables until the cushioning material touches the front panel of the PNA.

3. Install the dust caps on the test ports.

4. Clean the analyzer, as needed, using a damp cloth.

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