
Keysight - N5241/2/9A&B Add 4-Port Capabilities - Upgrade Kit (For Version 6 Single Source Synthesizers) - Installation Guide

To Upgrade N5241/2/9A&B Series
Option 201 to Option 401 -

For Analyzers with Serial Numbers
Prefixed MY/SG/US5201 and Above

Upgrade Kit Order Number:
N5241BU- 601, N5242BU- 601, and
N5249BU- 601

Keysight Kit Number: N5242-60115

This is the Installation Guide for the N5241/2/9A&B Series Microwave Network Analyzers.

Notices

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CAUTION

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NOTICE: This document contains references to Agilent Technologies. Agilent's former Test and Measurement business has become Keysight Technologies. For more information, go to **www.keysight.com**.



Installation Note

Description of the Upgrade

NOTE

The following may apply to your “B” model PNA: In June 2013, the N5241A/AS and N5242A/AS analyzers underwent significant hardware changes. Some components that have 2.4 mm connectors (bias tees, couplers, and some semi-rigid cables) were replaced with components that have 3.5 mm connectors.

If your analyzer’s serial number prefix is MY/SG/US5310 and below: Your analyzer was originally shipped with 2.4 mm components. The 2.4 mm couplers and connecting cables in your analyzer must be replaced with the new 3.5 mm items included in this kit.

If your analyzer’s serial number prefix is MY/SG/US5321 and above: Your analyzer was shipped with 3.5 mm components, so it is not necessary to replace the couplers and connecting cables. These items are included in this kit, but will not be used for your upgrade. Set them aside for possible use in the future.

Be very careful to use the appropriate hardware in your analyzer. Using the wrong hardware can ruin analyzer components, resulting in additional customer costs

This upgrade adds the following items to your N5241B or N5242B or N5249B Option 201 2-port analyzer:

- an additional 26.5 GHZ source board
- an additional 13.5 GHZ source synthesizer board
- an additional mixer brick
- two additional bridges
- four couplers
- a splitter
- a modified front panel, including 2 new test ports
- many new cables

After installation of this upgrade, your analyzer will be an N5241B Option 401 or N5242B Option 401 or N5249B Option 401 4-port analyzer.

Refer to **“Overview of the Installation Procedure” on page 13.**

CAUTION

This repair must be done at a service center or a self-maintainer service center! Refer to **“Getting Assistance from Keysight” on page 6.**

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 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 9.
- Enough time - refer to [“About Installing the Upgrade”](#) on page 10.
- Test equipment for the post-upgrade adjustments. To view the equipment list, click the Chapter 3 bookmark “Tests and Adjustments” in the PDF Service Guide¹.

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 the <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 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
 - Certificate number

1. See [“Downloading the Online PNA Service Guide”](#) on page 8.

- 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

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., N5232B) and click **Search**.
3. Click **Support** > **Keysight Product Support**.
4. In the **Search Support** area type your instrument’s model number (e.g., N2222B).
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 Guide¹.

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

Tools Required for the Installation

Description	Qty	Part Number
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
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 front and rear panel bulkhead connectors. Torque these connections to 21 in-lb.

1. See “[Downloading the Online PNA Service Guide](#)” on page 8.

Description of the Upgrade
Items Included in the Upgrade Kit

About Installing the Upgrade

Products affected	N5241B, N5242B and N5249B Option 201
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	4 hours
Estimated adjustment time	1 hours
Estimated full instrument calibration time	4 hours

Items Included in the Upgrade Kit¹

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 N5242-60115

Ref Desig.	Description	Qty	Part Number
--	Installation note (this document)	1	N5242-90115
--	Software Entitlement Certificate	1	5964-5145
--	China RoHS Addendum	1	9320-6722
A8	26.5 GHz source (2) board	1	5087-7837
A13	13.5 GHz source 2 synthesizer board	1	N5240-60074
A22	Splitter	1	5087-7139
A24	Mixer brick (2)	1	5087-7829
A26	Test port 3 bridge	2	5087-7757
A27	Test port 4 bridge		
A30	Test port 3 coupler	2	5087-7813
A31	Test port 4 coupler		
--	Machine screw, M3.0 x 20, pan head (3 to attach mixer brick 2 to mounting block; 4 to attach 2 bridges to brackets)	7	0515-1410
--	Machine screw, M3.0 x 8, pan head (2 to attach mixer brick 2 to mounting block)	4	0515-0372
--	Machine screw, M3.0 x 6, pan head (4 to attach 2 bridges to deck)	4	0515-0430

1. In addition to the upgrade kit, the shipment includes an Software Entitlement Certificate. Refer to **“License Key Redemption” on page 7** for important information about this certificate.

Description of the Upgrade
Items Included in the Upgrade Kit

Table 1 **Contents of Upgrade Kit N5242-60115**

Ref Desig.	Description	Qty	Part Number
--	Machine screw, M3.0 x 6, 90-DEG flat head (Machine screw, 90-DEG-flat-HD, M4.0 x 10, pan head (attach dress panel near ports 3 and 4 to coupler plate)	2	0515-1946
--	Machine screw, M3.0 x 14, pan head (2 to attach splitter to mixer brick mounting block	2	0515-2994
--	Machine screw, M4 x 10, pan head (to attach A8 source 2 assy. to A19 motherboard)	4	0515-0380
--	Termination, 50-ohm load	1	1250-4261
--	Bulkhead connector assembly for test set front plate	12	1250-3805
--	Front panel overlay, 4-port	1	N5222-80013
--	Guard, jumper cables, center 4-port	1	N5242-00049
--	Test set front plate, 4-port	1	N5221-00007
--	Gap pad (between each coupler and test set front plate)	4	E4403-20033
--	Vibration mount (between couplers 1 & 3, and 2 & 4)	2	0460-2725
--	Mounting nuts (for ports 3 & 4 test port couplers)	2	5022-1087
--	Short (for Mixer Brick A24)	1	0960-0055
--	Lower Dress Panel, 4-port	1	N5240-00009
--	Bracket for test port bridge	2	N5242-00006
--	Guard, jumper cables, center 4-Port	1	N5242-00049
--	Dust caps for test ports	4	1401-0214
--	Tie wrap, to secure cables to side of deck	7	1400-0249
W2	A13 13.5 GHz (source 2) synth board J1207 to A8 26.5 GHz source (2) board P1	1	N5222-20090
W5	A8 source (2) to W6	1	N5222-20062
W6	W5 to A26 port 3 bridge	1	N5222-20041
W7	A8 source (2) to W8	1	N5222-20063
W8	W7 to A27 port 4 bridge	1	N5222-20042
W12	A29 port 1 coupler to front-panel Port 1 CPLR THRU	1	N5222-20045
W14	A29 port 1 coupler to front-panel Port 1 CPLR ARM	1	N5222-20030
W15	A26 port 3 bridge to front-panel Port 3 SOURCE OUT	1	N5222-20047
W16	A30 port 3 coupler to front-panel Port 3 CPLR THRU	1	N5222-20049
W17	A26 port 3 bridge to front-panel REF 3 SOURCE OUT	1	N5222-20023
W18	A30 port 3 coupler to front-panel Port 3 CPLR ARM	1	N5222-20015

Description of the Upgrade
Items Included in the Upgrade Kit

Table 1 **Contents of Upgrade Kit N5242-60115**

Ref Desig.	Description	Qty	Part Number
W19	A27 port 4 bridge to front-panel Port 4 SOURCE OUT	1	N5222-20050
W20	A31 port 4 coupler to front-panel Port 4 CPLR THRU	1	N5222-20054
W21	A27 port 4 bridge to front-panel REF 4 SOURCE OUT	1	N5222-20025
W22	A31 port 4 coupler to front-panel Port 4 CPLR ARM	1	N5222-20018
W24	A32 port 2 coupler to front-panel Port 2 CPLR THRU	1	N5222-20053
W26	A32 port 2 coupler to front-panel Port 2 CPLR ARM	1	N5222-20034
W30	Front panel jumpers	6	N5222-20091
W32	Port 3 RCVR C IN to A24 mixer brick (C)	1	N5222-20048
W33	Port 4 RCVR D IN to A24 mixer brick (D)	1	N5222-20055
W42	A21 HMA26.5 to A22 splitter	1	N5222-20009
W43	A22 splitter to A23 mixer brick	1	N5222-20007
W44	A22 splitter to A24 mixer brick	1	N5222-20008
W38	REF 3 RCVR R3 IN to A24 mixer brick (R3)	1	N5222-20057
W39	REF 4 RCVR R4 IN to A24 mixer brick (R4)	1	N5222-20058
W52	A23 mixer brick (R1) to A20 IF multiplexer (P411)	1	N5242-60021
W53	A23 mixer brick (R2) to A20 IF multiplexer (P412)	1	N5242-60022
W55	A24 mixer brick (D) to A20 IF multiplexer (P801)	1	N5242-60024
W56	A24 mixer brick (R4) to A20 IF multiplexer (P414)	1	N5242-60019
W57	A24 mixer brick (R3) to A20 IF multiplexer (P413)	1	N5242-60020
W58	A24 mixer brick (C) to A20 IF multiplexer (P601)	1	N5242-60023
W60	A20 IF multiplexer (P203) to A12 SPAM (J2)	1	N5242-60013
W62	A20 IF multiplexer (P603) to A12 SPAM (J5)	1	N5242-60015
W67	A10 frequency reference board J7 to A13 13.5 GHz (source 2) synth board J5	1	N5242-60030
--	Ribbon cable, A19 test set motherboard J213 to A24 mixer brick (2)	1	N5242-60006

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 and Inner Cover."
- "Step 3. Remove the Front Panel Assembly."
- "Step 4. Remove the A19 Test Set Motherboard."
- "Step 5. Remove Some Existing Semi-rigid Test Set Cables."
- "Step 6. Remove the A23 Mixer Brick Assembly."
- "Step 7. Assemble the A24 Mixer Brick and A22 Splitter."
- "Step 9. Assemble the A26 and A27 Test Port Bridges."
- "Step 10. Install the Mixer Bricks Assembly and Test Port Bridge Assemblies."
- "Step 11. Assemble the A29 - A32 Test Port Coupler Assemblies."
- "Step 12. Install the LED Boards and Test Port Coupler Assemblies to the Test Set Front Plate."
- "Step 13. Install the Bulkhead Connectors in the Test Set Front Plate."
- "Step 14. Install the Coupler Plate Assembly to the Deck."
- "Step 15. Install the Second Source Board."
- "Step 16. Install the Semi-rigid Test Set Cables."
- "Step 17. Reinstall the A19 Test Set Motherboard."
- "Step 18. Replace the Front Panel's Lower Dress Panel."
- "Step 19. Reinstall the Front Panel Assembly."
- "Step 20. Install the Front Panel Overlay."
- "Step 21. Install the Front Panel Jumper Cables."
- "Step 22. Position the Cables and Wires to Prevent Pinching."
- "Step 23. Reinstall the Inner Cover."

“Step 24. Reinstall the Outer Cover.”

“Step 25. Remove Option 201 License.”

“Step 26. Enable Option 401.”

“Step 27. Perform Post-Upgrade Adjustments and Calibration.”

“Step 28. 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 file 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 and Inner Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide¹.

Step 3. Remove the Front Panel Assembly

For instructions, click the Chapter 7 bookmark “Removing and Replacing the Front Panel Assembly” in the PDF Service Guide¹.

Step 4. Remove the A19 Test Set Motherboard

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A19 Test Set Motherboard” in the PDF Service Guide¹.

1. See **“Downloading the Online PNA Service Guide” on page 8**.

Step 5. Remove Some Existing Semi-rigid Test Set Cables

NOTE

Leave the gray flexible cables, the wire harnesses, and the ribbon cables connected where possible. Any that are removed should be labeled for reconnection later.

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.

1. Place the analyzer bottom-side up on a flat surface.
2. Remove all bottom-side semi-rigid cables except for those in the table below. To see an image showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, Standard 2-Port Configuration, Option 201 (S/N Prefixes <6021)” in the PDF Service Guide¹. Do not discard the cables because some will be reused later in the procedure.

Reference Designator	Type ^a	Qty	Description
W3	SR	1	A5 source (1) to W4
W9	SR	1	A5 source (1) to W10
W45	SR	1	A5 source (1) to W46
W46	SR	1	W46 to rear-panel EXT TSET DRIVE RF OUT (J6)
W47	SR	1	A23 mixer brick to EXT TSET DRIVE LO OUT (J5)

a. SR = semirigid coaxial cable.

3. Leave the gray flexible cables, the wire harnesses, and the ribbon cables connected where possible. Any that are removed should be labeled for reconnection later.

Step 6. Remove the A23 Mixer Brick Assembly

Remove the A23 mixer brick assembly from the PNA. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A23 and A24 Mixer Bricks” in the PDF Service Guide¹.

1. See [“Downloading the Online PNA Service Guide” on page 8](#).

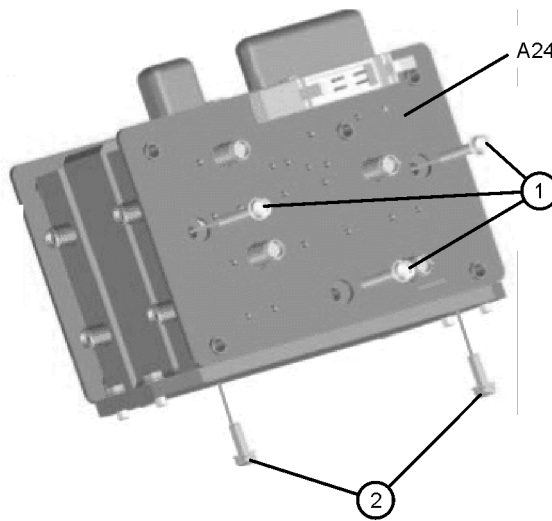
Step 7. Assemble the A24 Mixer Brick and A22 Splitter

Refer to **Figure 1** in this document for this step. New parts are listed in **Table 1 on page 10** of this document.

1. Install the A24 mixer brick (5087-7829) to the mounting block by hand-starting three screws (item ①; 0515-1410). Do not tighten.
2. Install two screws (item ②; 0515-0372) and torque to 9 in-lbs.
3. Go back and torque the three screws (item ①; 0515-1410) to 9 in-lbs.

Figure 1

A24 Mixer Brick Assembly



N5242_015_05

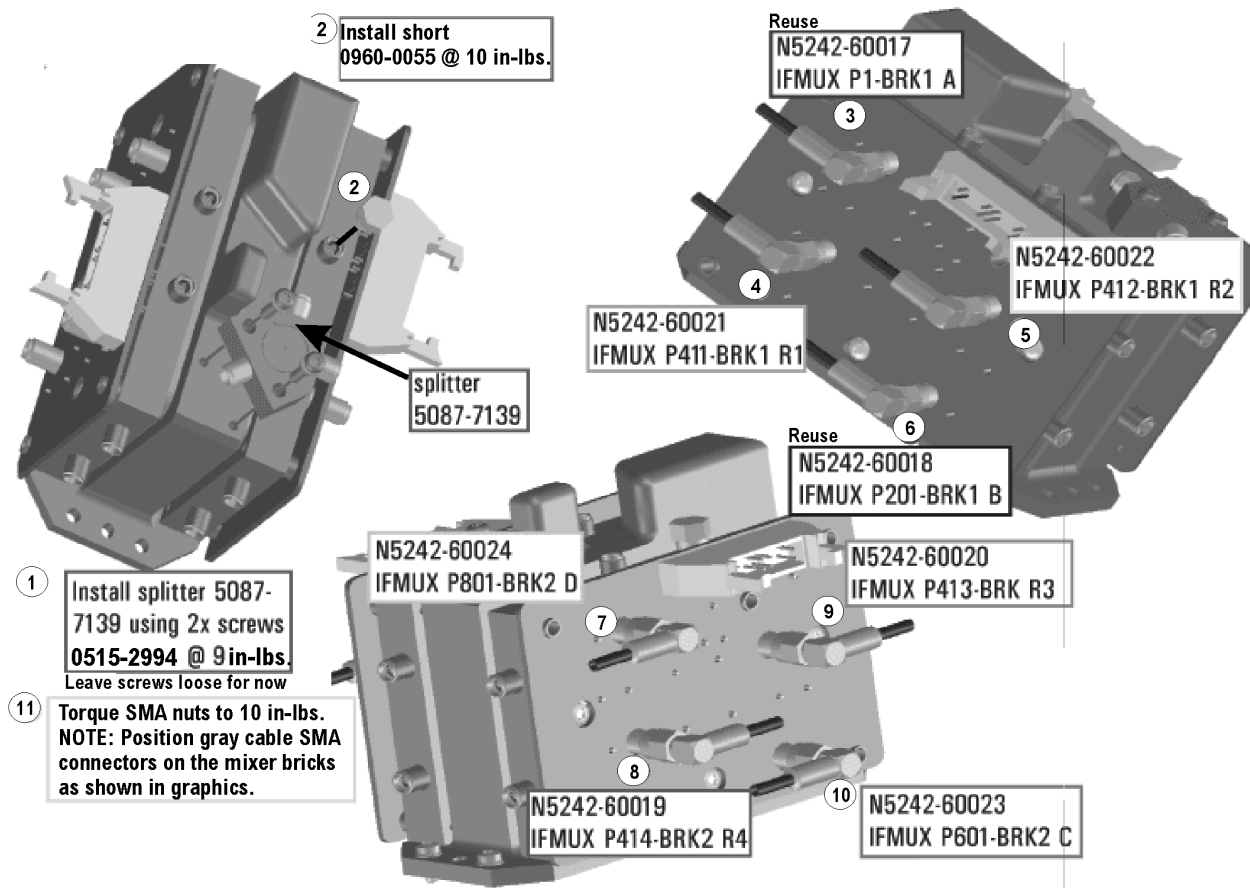
Refer to **Figure 2** in this document for the remainder of this step.

4. Follow the eleven instructions shown in **Figure 2**. New parts are listed in **Table 1 on page 10** of this document.

NOTE

Graphics in this document such as **Figure 2** use very brief text to instruct where to connect a cable. For example, text that reads “N5242-60018 IFMUX P201 - BRK1 B” means to connect the N5242-60018 gray flexible cable at the A20 IF MUX board connector P201 and at A23 Mixer Brick 1 connector B.

Figure 2 A23 and A24 Mixer Brick Assembly (0960-0055, 5087-7139, N5242-60017, N5242-60018, N5242-60019, N5242-60020, N5242-60021, N5242-60022, N5242-60023, N5242-60024)



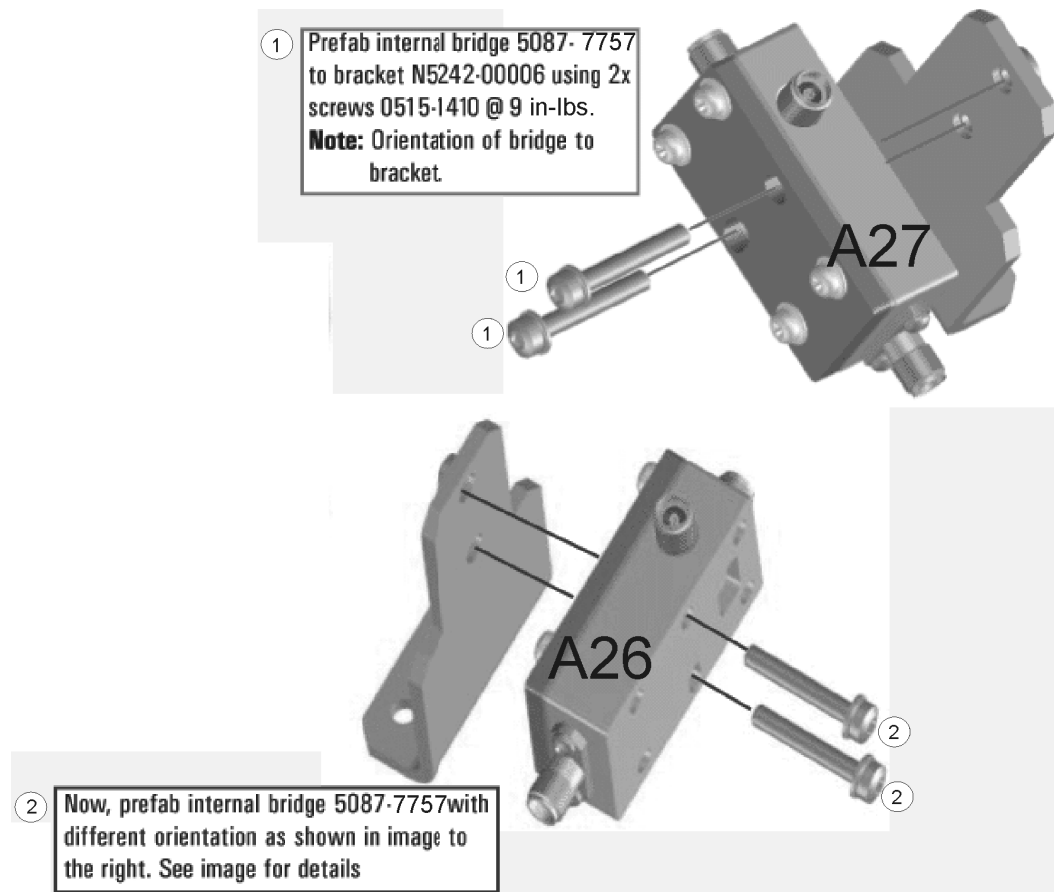
N5242_015_01

Step 9. Assemble the A26 and A27 Test Port Bridges

Follow the two instructions shown in **Figure 3** in this document. New parts are listed in **Table 1 on page 10** of this document.

Figure 3

A26 and A27 Test Port Bridge Assembly (0515-1410, 5087-7757, N5242-00006)

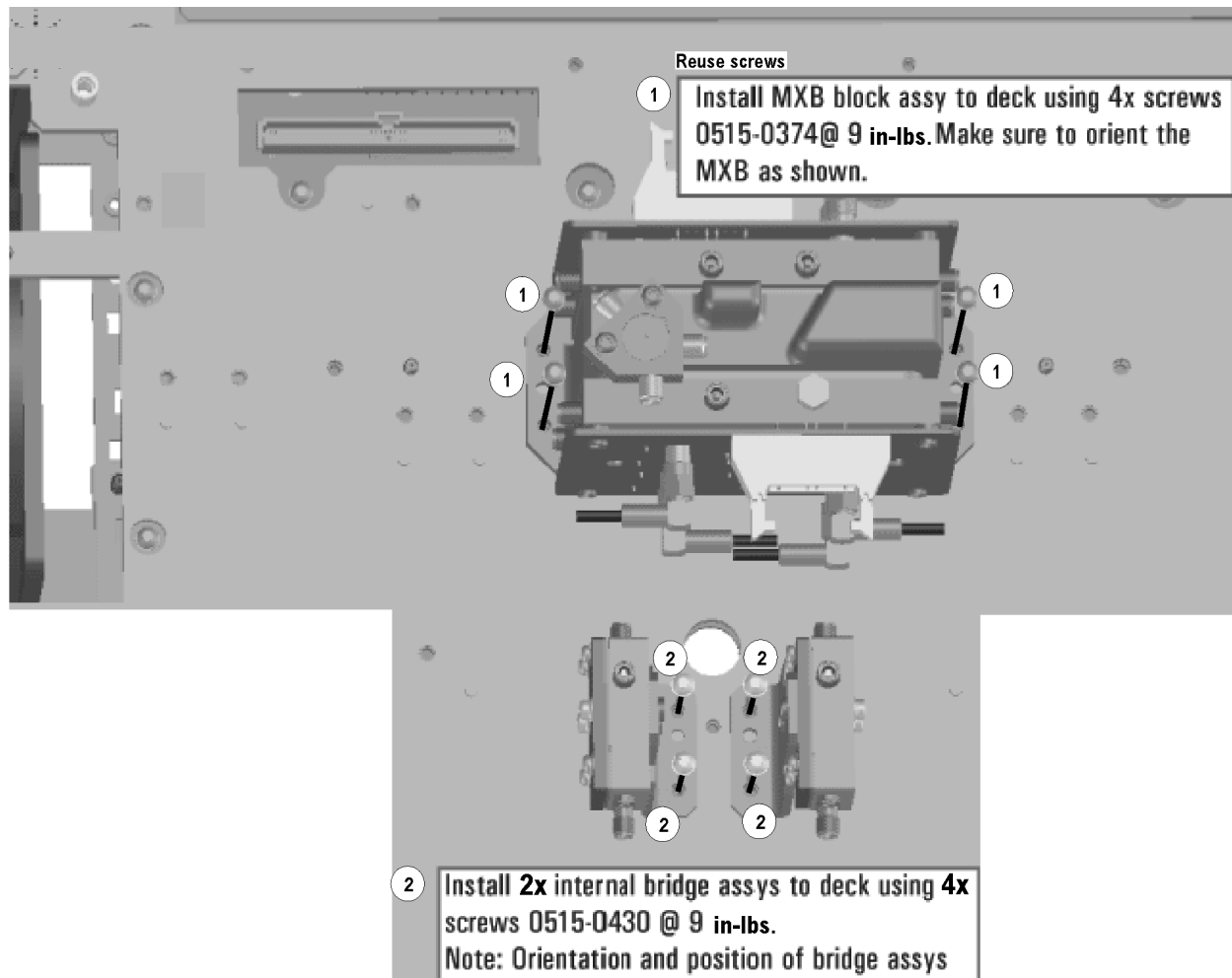


N5242_015_07

Step 10. Install the Mixer Bricks Assembly and Test Port Bridge Assemblies

Follow the two instructions shown in **Figure 4** in this document. New parts are listed in **Table 1 on page 10** of this document.

Figure 4 A23, A24 Mixer Bricks Installation and A26, A27 Test Port Bridges Installation (0515-0374)



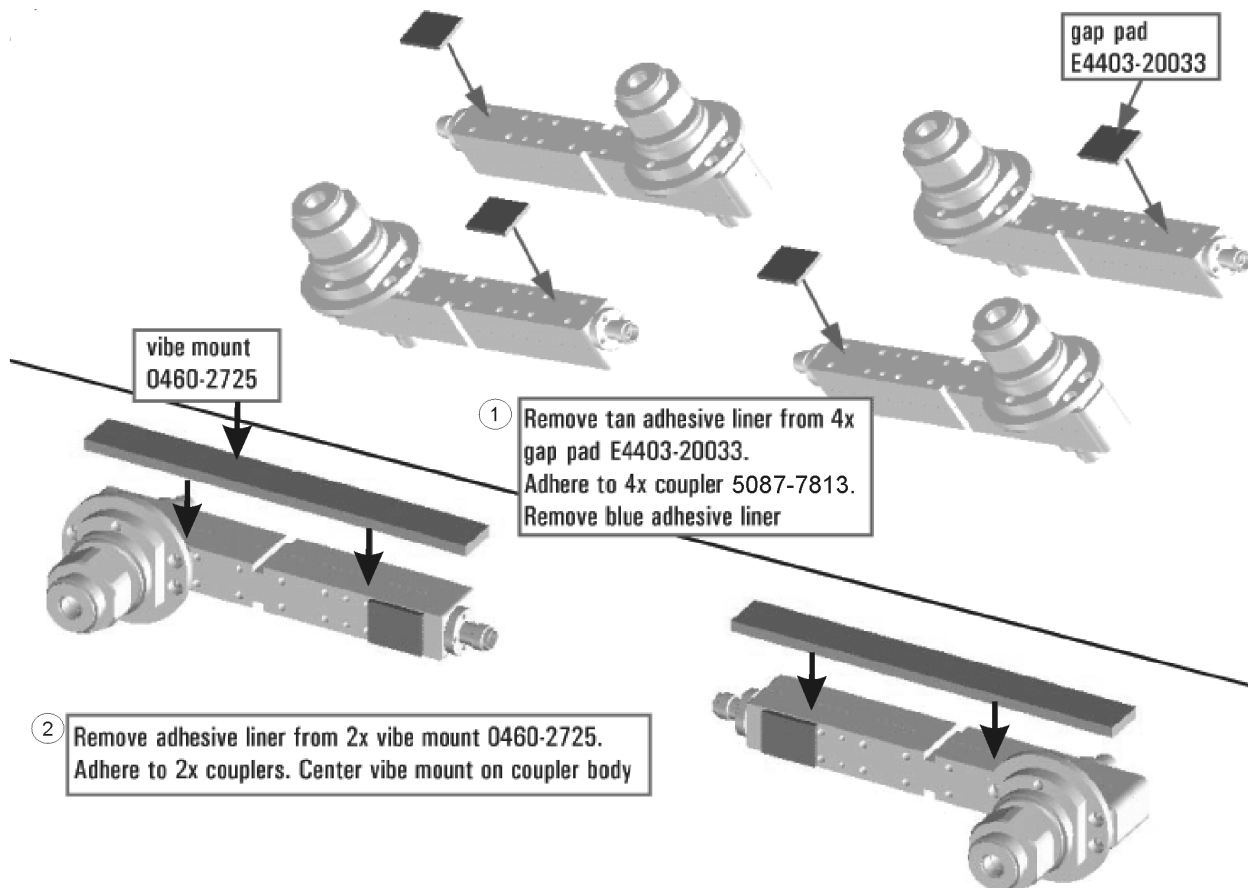
N5242_015_08

Step 11. Assemble the A29 - A32 Test Port Coupler Assemblies

1. Remove the A29 test port 1 coupler and A32 test port 2 coupler from the PNA. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A29 - A32 Test Port Couplers” in the PDF Service Guide¹.
2. If your analyzer’s serial number prefix is MY/SG/US5321 and above: Using pliers, remove the adhesive bumper on the A29 test port 1 coupler and on the A32 test port 2 coupler.
3. If your analyzer’s serial number prefix is MY/SG/US5310 and below: Discard the test port couplers you just removed from the PNA. These old couplers have 2.4 mm connectors and must be replaced with the new couplers (3.5 mm connectors) included in the kit.
4. Follow the two instructions shown in **Figure 5**. New parts are listed in **Table 1 on page 10** of this document.

Figure 5

A29 - A32 Test Port Coupler Assembly (0460-2725, 5087-7813, E4403-20033)



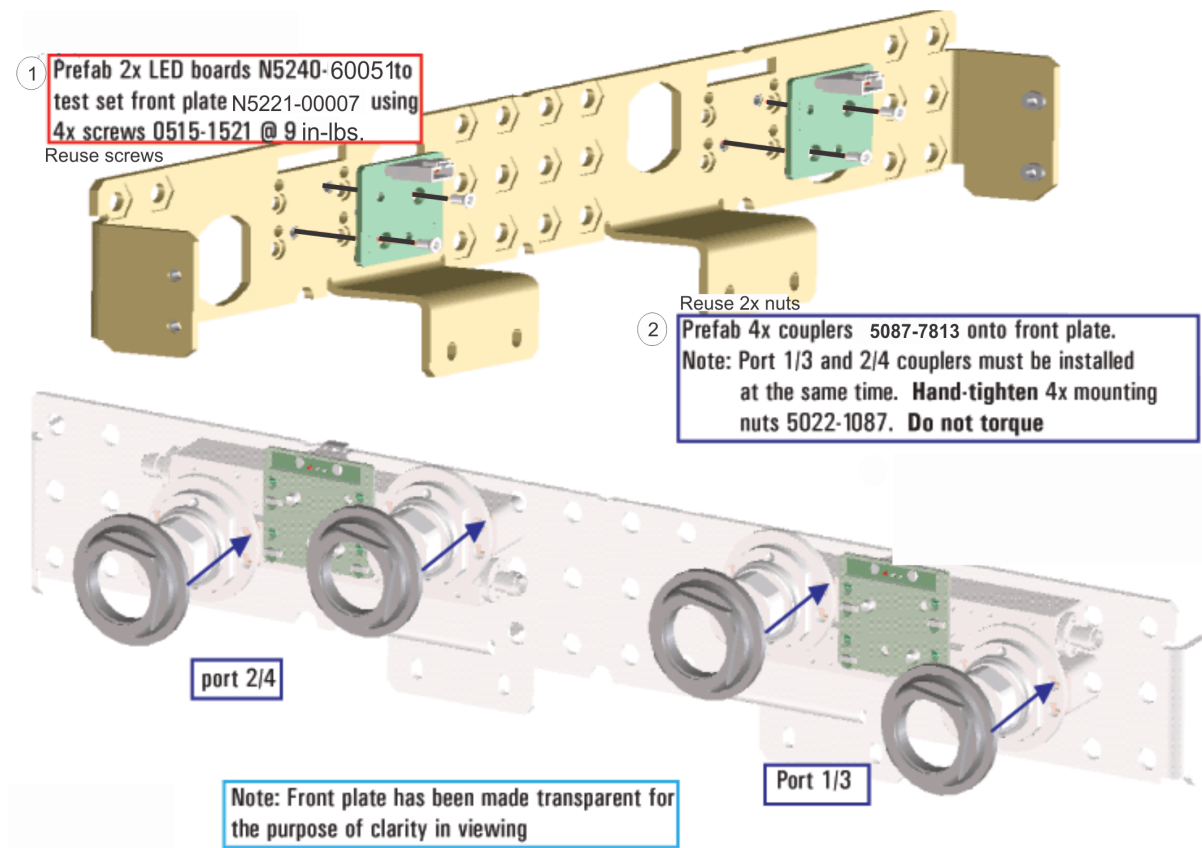
N5242_015_11

1. See [“Downloading the Online PNA Service Guide” on page 8](#).

Step 12 Install the LED Boards and Test Port Coupler Assemblies to the 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.
2. If your analyzer's serial number is MY/SG/US5321 and above:
Remove the bulkhead connectors from the 2-port test set front plate of the PNA. They will be installed later in the 4-port test set front plate.
3. Remove the 2-port test set front plate from the test set deck.
4. Follow the two instructions shown in **Figure 6** of this document. New parts are listed in **Table 1 on page 10** of this document.

Figure 6 LED Board Assemblies and Test Port Coupler Assemblies Installation (5022-1087, 5087-7813, N5221-00007)



N5242_015_12

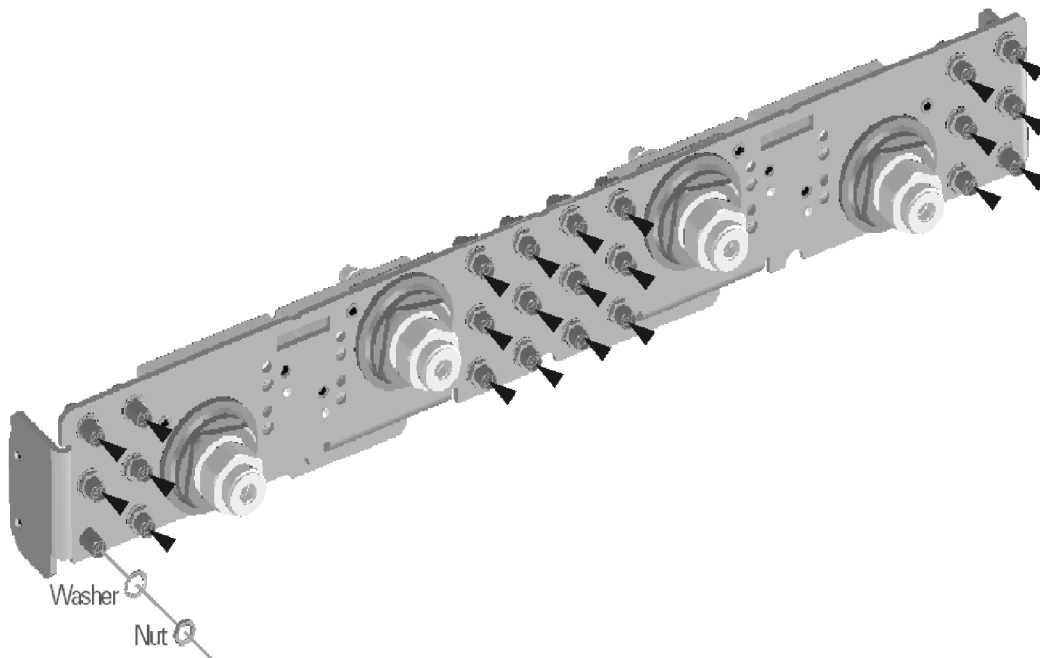
Step 13. Install the Bulkhead Connectors in the Test Set Front Plate

Refer to **Figure 7** for this procedure. New parts are listed in **Table 1 on page 10**.

1. If your analyzer's serial number is MY/SG/US5321 and above:
Locate the bulkhead connectors you removed earlier from the 2-port test set front plate of the PNA. Use these and the new bulkhead connectors included in the kit for the remainder of this step.
2. From the back side of the test set front plate, insert a bulkhead connector into a hole in the plate.
3. Install 1x washer and 1x nut. Hand tighten nut and ensure bulkhead connector hexagon nut, on the back side of test set front plate, is aligned to the test set subpanel hexagon indent.
4. Repeat previous two steps for the remaining bulkhead connectors.
5. Torque nuts, on the front side of test set front plate, to 21 in-lbs.

Figure 7

Bulkhead Connectors Installation



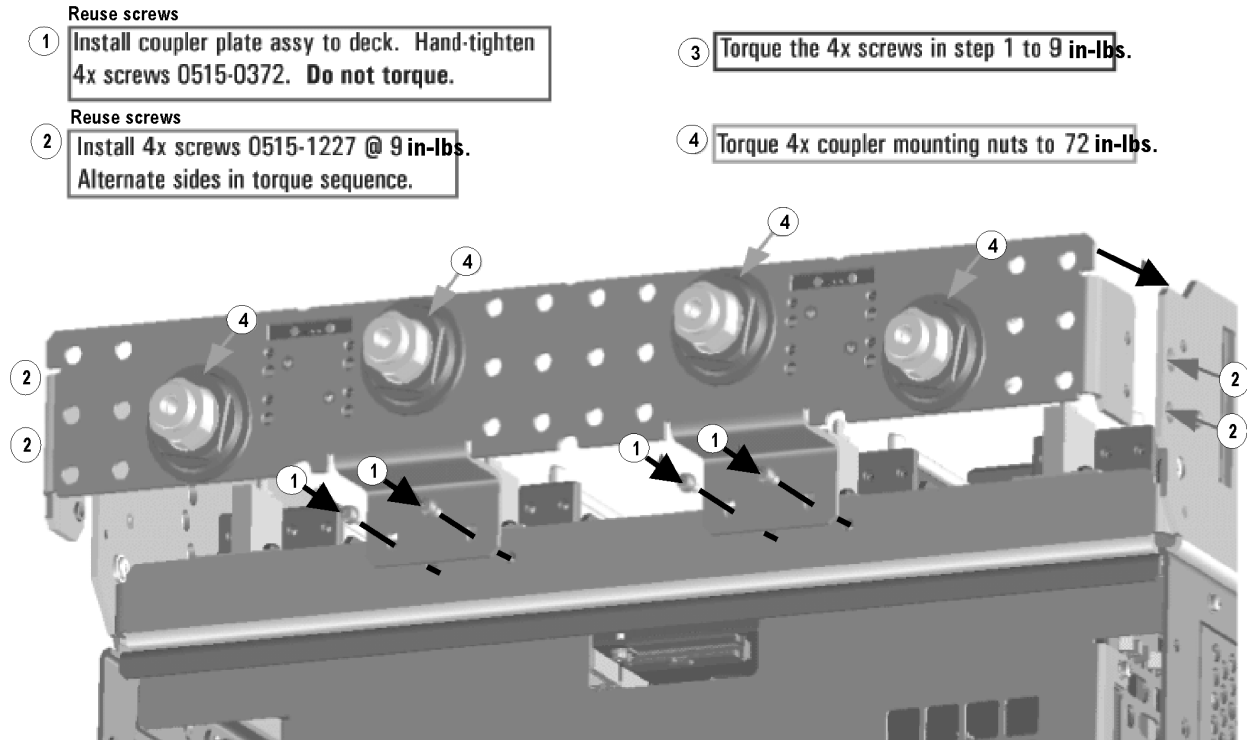
N5242_004_09

Step 14. Install the Coupler Plate Assembly to the Deck

Follow the four instructions shown in **Figure 8**.

Figure 8

Coupler Plate Assembly Installation (0515-0372, 0515-1227)



N5242_015_13

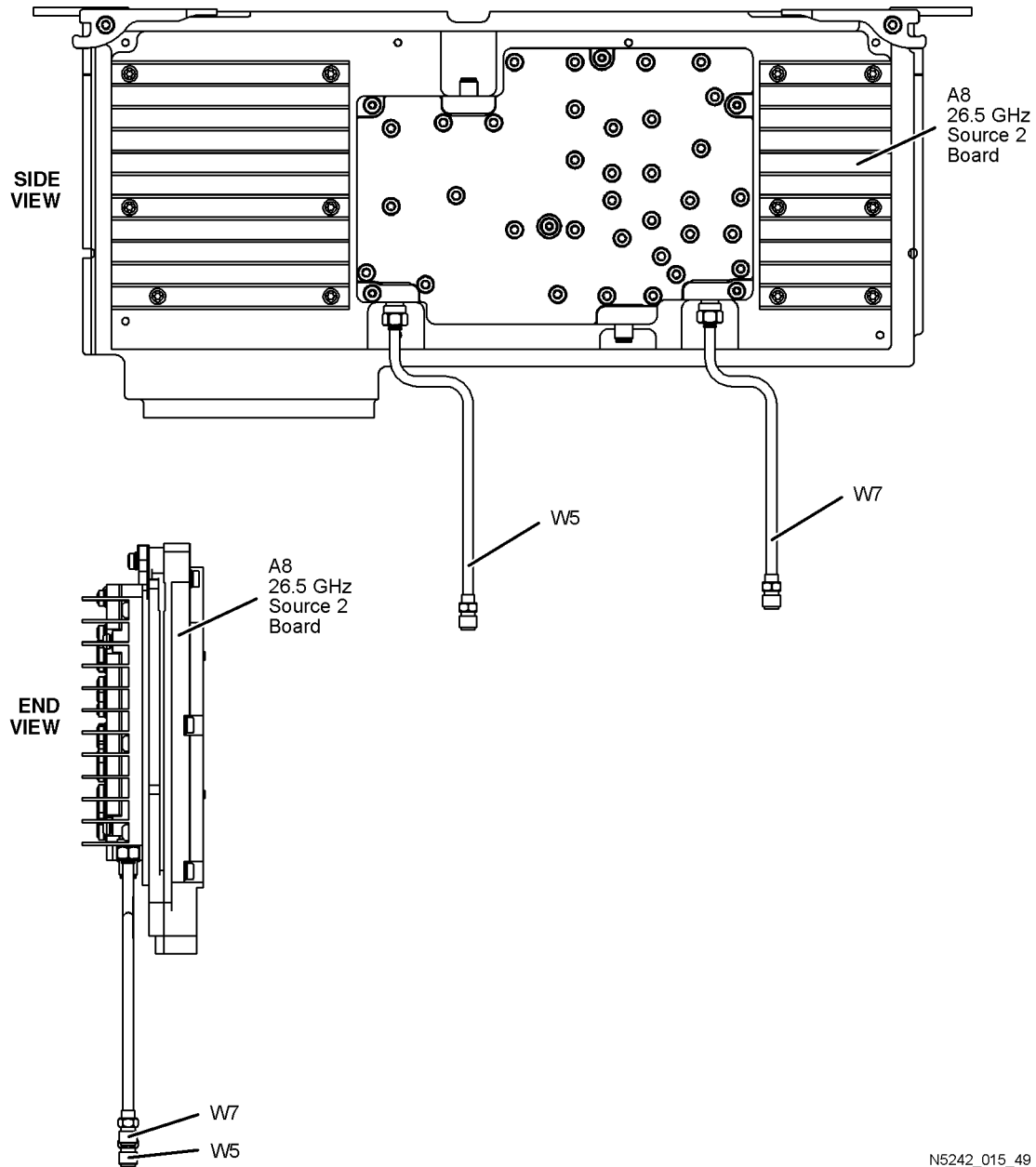
Step 15. Install the Second Source Board

Install Cables on Source 2 Board

Refer to **Figure 9** of this document for this part of this step. New parts are listed in **Table 1 on page 10** of this document.

1. Attach new cables W5 (N5222-20062) and W7 (N5222-20063) to the A8 26.5 GHz source 2 board as shown. Make sure that both cables are parallel to the A8 26.5 GHz source board as shown in the END VIEW. Cable W5 is the longer of the two cables.
2. Use a 5/16-in torque wrench set to 10 in-lbs to tighten the cable connectors.

Figure 9 Second Source Boards Installation, Part 1



N5242_015_49

Install Cable on Source 2 Synthesizer Board

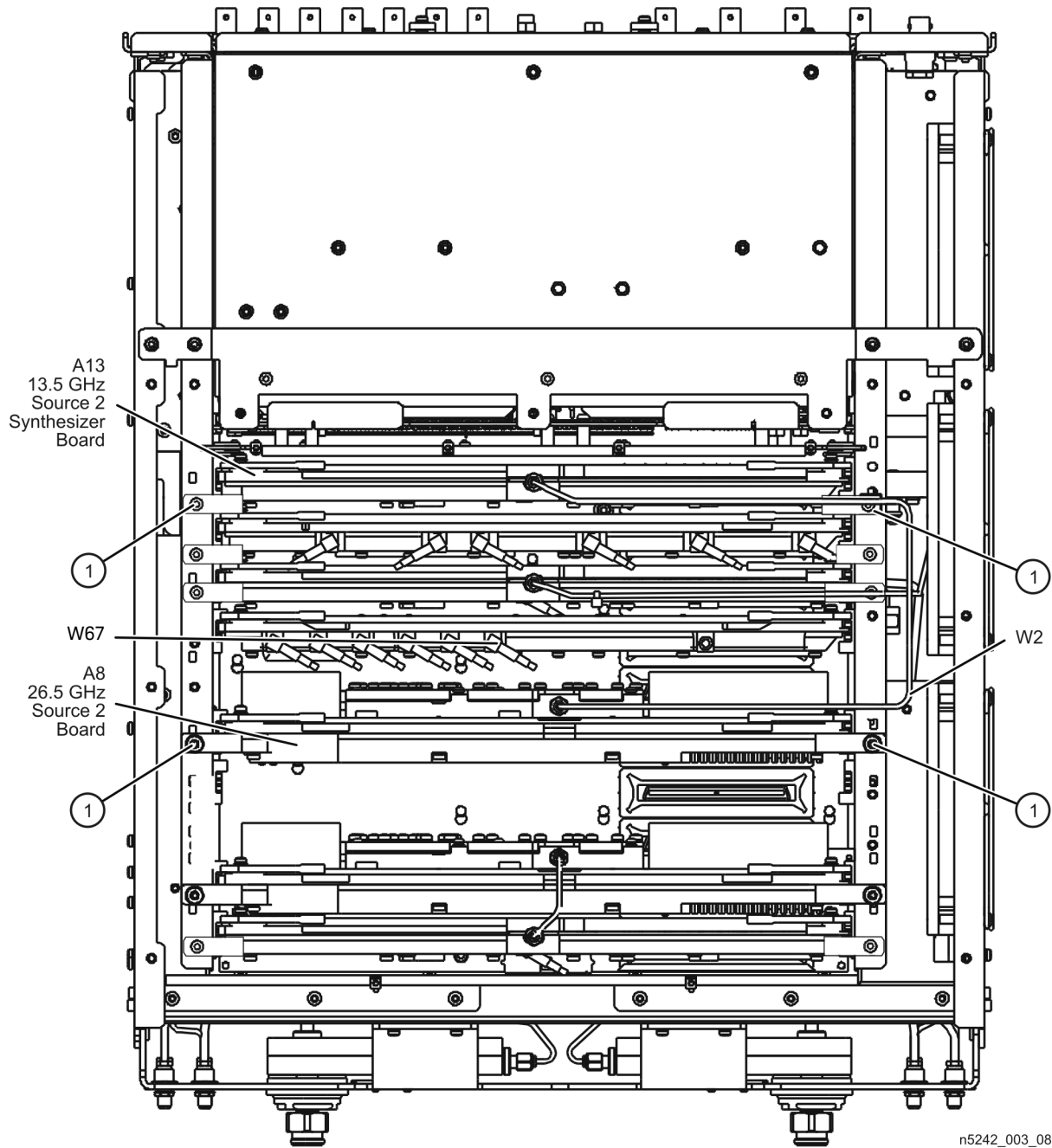
Install gray cable W67 (N5242-60030) to connector J5 of the Source 2 Synthesizer board. The loose end of the cable will be connected on the A10 frequency reference board (J7) after the Source 2 Synthesizer board has been installed in the analyzer.

Install the Second Source Boards into the Analyzer

Refer to **Figure 10** for this part of this step of the procedure. New parts are listed in **Table 1 on page 10**.

1. Install the A8 26.5 GHz source 2 board (5087-7837) and the A13 13.5 GHz source 2 synthesizer board (N5240-60074) in the analyzer as shown. Secure both boards with two screws (item ①; 0515-0380) and torque to 21 in-lbs.
2. Connect cable W2 (N5222-20090) between the A8 26.5 GHz source 2 board and the A13 13.5 GHz source 2 synthesizer board as shown. Be sure to position the cable in the wire looms as shown. Tighten the cable connectors to 10 in-lbs using a 5/16-in torque wrench.
3. Connect the loose end of new gray flex cable W22 (N5242-60030) on the A10 frequency reference board (J7). (The other end of this cable was previously connected to J5 of the source 2 synthesizer board.)

Figure 10 Second Source Boards Installation



Step 16. Install the Semi-rigid Test Set Cables

CAUTION

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

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

CAUTION

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

NOTE

Cables that are to be reinstalled are designated with “reuse.” Part numbers in a normal weight font are for analyzers with serial numbers MY/SG/US5310 and below. Part numbers in a bold font are for analyzers with serial numbers MY/SG/US5321 and above

To see an image showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, Standard 4-Port Configuration, Option 401 (S/N Prefixes <6021)” in the PDF Service Guide¹.

4. Install the following semi-rigid cables in the order listed. New parts are listed in [Table 1 on page 10](#).

- W39 (N5222-20058) REF 4 RCVR R4 IN to A24 mixer brick (R4)
- W38 (N5222-20057) REF 3 RCVR R3 IN to A24 mixer brick (R3)
- W34 (reuse) (N5242-20062 or **N5222-20052**) Port 2 RCVR B IN to A23 mixer brick (B)
- W26 (N5222-20034) A32 port 2 coupler to front-panel Port 2 CPLR ARM
- W33 (N5222-20025) Port 4 RCVR D IN to A24 mixer brick (D)
- W22 (N5242-20028) A31 port 4 coupler to front-panel Port 4 CPLR ARM
- W24 (N5242-20063) A32 port 2 coupler to front-panel Port 2 CPLR THRU
- W20 (N5222-20054) A31 port 4 coupler to front-panel Port 4 CPLR THRU
- W19 (N5222-20050) A27 port 4 bridge to front-panel Port 4 SOURCE OUT

1. See [“Downloading the Online PNA Service Guide” on page 8](#).

- W23 (reuse) (N5242-20061 or **N5222-20051**) A28 port 2 bridge to front-panel Port 2 SOURCE OUT
- W25 (reuse) (N5242-20079 or **N5222-20059**) A28 port 2 bridge to front-panel REF 2 SOURCE OUT
 - * Secure W25 (N5242-20079) to side of deck with 2x tie wraps (1400-0249)
- W21 (N5222-20025) A27 port 4 bridge to front-panel REF 4 SOURCE OUT
- W32 (N5222-20048) Port 3 RCVR C IN to A24 mixer brick (C)
- W18 (N5222-20023) A30 port 3 coupler to front-panel Port 3 CPLR ARM
- W31 (reuse) (N5242-20056 or **N5222-20046**) Port 1 RCVR A IN to A23 mixer brick (A)
- W14 (N5222-20030) A29 port 1 coupler to front-panel Port 1 CPLR ARM
- W12 (N5222-20045) A29 port 1 coupler to front-panel Port 1 CPLR THRU
- W16 (N5222-20049) A30 port 3 coupler to front-panel Port 3 CPLR THRU
- W15 (N5222-20047) A26 port 3 bridge to front-panel Port 3 SOURCE OUT
- W17 (N5222-20023) A26 port 3 bridge to front-panel REF 3 SOURCE OUT
- W11 (reuse) (N5242-20054 or **N5222-20044**) A25 port 1 bridge to front-panel Port 1 SOURCE OUT
- * Loosen 3x screws on A33 Reference Mixer Switch board, then slide the board to the rear of the instrument to connect the following two cables (N5242-20042 and **N5242-20043**).
- W36 (reuse) (N5242-20042 or N5222-20032) REF 1 RCVR R1 IN to A33 reference mixer switch
- W35 (reuse) (N5242-20043 or **N5222-20033**) A33 reference mixer switch to front-panel REF 1 SOURCE OUT
 - * Torque 3x screws on A33 Reference Mixer Switch board to 9 in-lbs.
- * Use 1/4" wrench to hold source cable connectors when tightening mating semi-rigid cables.
- W10 (reuse) (N5242-20053 or **N5222-20043**) W9 to A28 port 2 bridge
- W6 (N5222-20041) W5 to A26 port 3 bridge

- W8 (N5222-20042) W7 to A27 port 4 bridge
- W4 (reuse) (N5242-20050 or **N5222-20040**) W3 to A25 port 1 bridge
- W37 (reuse) (N5242-20076 or **N5222-20056**) A33 reference mixer switch to A23 mixer brick (R1)
 - * Secure W37 (N5242-20076) to side of deck with 3x tie wraps (1400-0249).
- W13 (reuse) (N5242-20011 or **N5222-20005**) A25 port 1 bridge to A33 reference mixer switch
- W40 (reuse) (N5242-20049 or **N5222-20039**) REF 2 RCVR R2 IN to A23 mixer brick (R2)
- W43 (N5222-20007) A22 splitter to A23 mixer brick
 - * Leave the W43 loose for now.
- W44 (N5222-20008) A22 splitter to A24 mixer brick
 - * Leave the W44 loose for now.
- W42 (N5222-20009) A21 HMA26.5 to A22 splitter
 - * Leave the W42 loose for now.
- * Tighten 2x screws on A22 splitter to 9 in-lbs.
 - * Tighten cable nuts on W42, W43, and W44 to 10 in-lbs.
- W41 (reuse) (N5242-20110 or **N5222-20067**) A11 13.5 GHz synthesizer to A21 HMA26.5
 - * Route cable through deck cutout to A11 synthesizer board.

Step 17. Reinstall the A19 Test Set Motherboard

1. For instructions, click the Chapter 7 bookmark “Removing and Replacing the A19 Test Set Motherboard” in the PDF Service Guide¹.
2. Connect new ribbon cable N5242-60006 from J213 to A24 mixer brick (2). To see an image showing the location of the cable, click the Chapter 6 bookmark “Bottom Ribbon Cables and Wire Harnesses, Standard 4-Port Configuration, Option 401 (S/N Prefixes <6021)” or “Bottom Ribbon Cables and Wire Harnesses, Standard 4-Port Configuration, Option 401 (S/N Prefixes ≥6021)” in the PDF Service Guide¹.

Step 18. 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 11 on page 30**. New parts are listed in **Table 1 on page 10**.

1. See **“Downloading the Online PNA Service Guide” on page 8**.

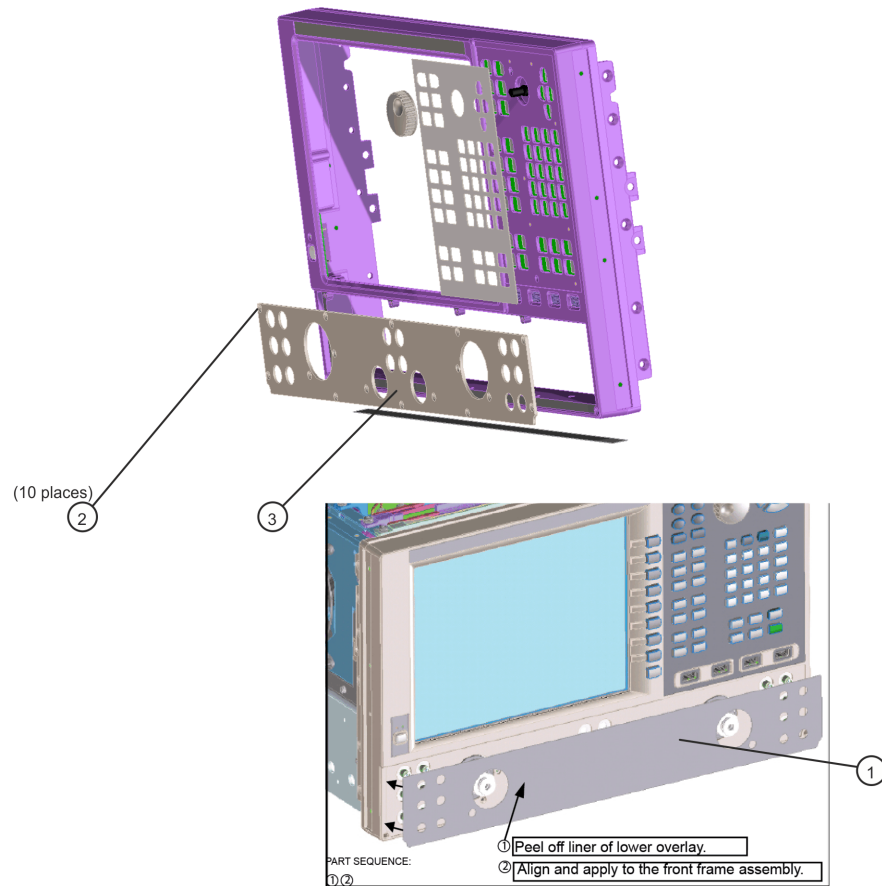
1. Remove the 2-Port lower front panel label (item ①).
2. Remove the 10 screws (save the screws for reuse) from the 2-port dress panel and remove the dress panel (item ② and ③ respectively).
3. Reassemble the front panel's lower dress panel assembly with the new 4-port lower dress panel (N5240-00009) 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 label until **“Step 20. Install the Front Panel Overlay” on page 31.**

Figure 11

Replacing the Front Panel's Lower Dress Panel and Overlay (N5240-00009)



Step 19. Reinstall the 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 Guide¹.

- 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 20. Install the Front Panel Overlay

To see an image of the front panel overlay, keypad overlay, and power button overlay, click the Chapter 6 bookmark “Front Panel Assembly, Front Side, All Options” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 10**.

- 1. Remove the protective backing from the new front panel overlay (N5222-80013).**
- 2. Loosely place the overlay in the recess on the front panel.**
- 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 21. Install the Front Panel Jumper Cables

For instructions on installing the W30 front panel jumpers (N5222-20091), click the Chapter 7 bookmark “Removing and Replacing the Front Panel Assembly” in the PDF Service Guide¹.

Step 22. Position the Cables and Wires to Prevent Pinching

On the top side of the PNA, 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, 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 23. Reinstall the Inner Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide¹.

Step 24. Reinstall the Outer Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide¹.

1. See **“Downloading the Online PNA Service Guide” on page 8**.

Step 25. Remove Option 201 License

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 201 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. In the Keysight License Manager dialog box that appears, press or click **Yes** to confirm delete.
4. A message displays stating that the option removal was successful.

Step 26. Enable Option 401

Procedure Requirements

NOTE

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

A single license file may contain more than one feature.

-
- The analyzer must be powered up and operating to perform this procedure.
 - The Network Analyzer program must **not** be running.
 - 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.
 - A keyboard must be connected to the network analyzer.

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 14.**

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 more than one feature.

-
3. Insert the USB flash drive to the PNA-X's USB drive slot. Within 5 seconds, the PNA-X 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.

4. Disconnect the USB flash drive from the PNA.

NOTE

Attempting to re-install a license file that is already installed may generate a "Corrupt Media" error message. Ignore this message.

-
5. 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. Start the Network Analyzer program.
2. Once the Network Analyzer is running:
 - Press **Help > About NA** and verify that Option **401** is listed in the PNA application.

NOTE

If the option is still not enabled or if the old option 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 27. Perform Post-Upgrade Adjustments and Calibration

Adjustments

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.

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

- 10 MHz frequency reference adjustment
- EE default adjustment: Synth LO only (Version 6 synthesizers)
- synthesizer bandwidth adjustment (only if EE default adjustment is insufficient)
- source adjustment
- IF gain adjustment
- receiver characterization
- receiver adjustment
- IF response adjustment (Option S93090xA/B, S93093A/B, or S93094A/B Only)
- noise 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 Guide¹.

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

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.

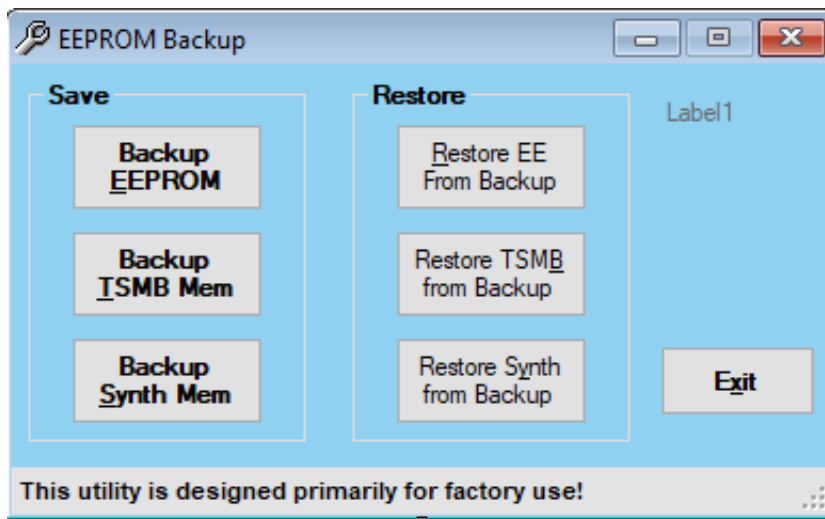
1. See [“Downloading the Online PNA Service Guide” on page 8](#).

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 Mme.
- Click Backup Synth Mem. (Applies to Version 7 Synthesizers Only)
- Click Exit when the program has finished.

Figure 12 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 Guide¹.

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 Guide¹.

Step 28. Prepare the PNA for the User

- 1. If necessary, reinstall front jumper cables.**
- 2. Install 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.**

1. See ["Downloading the Online PNA Service Guide" on page 8.](#)



This information is subject to change
without notice.

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