
Keysight - N5241/2/9A&B Add 4-Port Capabilities - Upgrade Kit (For Version 6 and Version 7 Synthesizers) - Installation Guide

To Upgrade N5241/2/9A&B Series
Option 224 to Option 423 -

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

Upgrade Kit Order Number:
N5241BU- 623, N5242BU- 623, and
N5249BU- 623

Keysight Kit Number: N5242-60118

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

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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.



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. Bias tees with 2.4 mm connectors are no longer available, so the bias tees and connecting cables included in this kit have 3.5 mm connectors. Since they are interconnected, 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.

NOTE

If you had an A model PNA-X with Option 219/419 with Option H85 that was upgraded to a B model, please refer to Options 217/417. If you had an A model PNA-X with Option 224/423 with Option H85 that was upgraded to a B model then refer to Option 222/422.

Keysight Option 224 to 423 4-Port Capability Upgrade Kit
Upgrade Kit Number: N5242-60118
Installation Note

This upgrade converts your N5241B, N5242B, or N5249B Option 224 2-port analyzer to a N5241B, N5242B, or N5249B Option 423 4-port analyzer by adding:

- an additional source bypass switch
- an additional mixer brick
- two additional bridges
- four couplers
- four bias tees
- two additional source attenuators
- two additional receiver attenuators
- a splitter
- a modified front panel, including 2 new test ports
- many new cables

Refer to **“Overview of the Installation Procedure” on page 16.**

CAUTION

This repair must be done at a service center or a self-maintainer service center! Refer to **“Getting Assistance from Keysight” on page 7.**

Getting Assistance from Keysight

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

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>

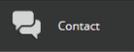
If you do not have access to the Internet, please contact your Keysight field engineer.

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.

NOTE

IMPORTANT! Before you begin this upgrade:

- This document contains references to legacy and new A21 HMA26.5 Multiplier/Amplifier assemblies. Your model instrument may have either legacy assemblies or the new parts installed.
 - To verify your instrument's A21 HMA26.5 Multiplier/Amplifier, refer to [“Verify the Model/Version of HMA26.5 Installed” on page 10](#).
 - See also your instrument's PDF Service Guide ^a.
-

a. See [“Downloading the Online PNA Service Guide” on page 11](#).

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 12](#).
- Enough time - refer to [“About Installing the Upgrade” on page 12](#).
- 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.

1. See [“Downloading the Online PNA Service Guide” on page 11](#).

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
- 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 9**.

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 7**.

Verify the Model/Version of HMA26.5 Installed

NOTE

Depending on the type of Option upgrade that was purchased, your parts kit may or may not include the following cable part numbers.

This upgrade kit contains components for use with PNA-X models using the legacy HMA26.5 part number 5086-7765. If your PNA-X has the newer HMA26.5 part number N5240-60101 installed you may discard these parts:

- A22 splitter 5067-7139
- W42 N5245-20009
- W43 N5245-20007
- W44 N5245-20008

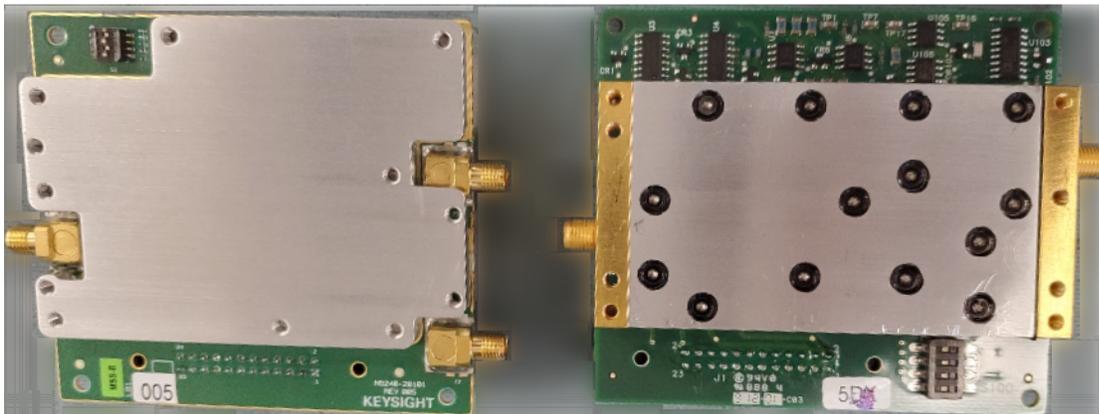
(If you have the legacy 5087-7765 HMA26.5, please discard the N5222-20126 semi-rigid cables. Refer to [Figure 1 on page 10.](#))

The new N5240-60101 HMA26.5 has the splitter integrated into the assembly. Refer to [Figure 1 on page 10.](#)

Figure 1 Comparison of Legacy HMA26.5 (5087-7765) and New HMA26.5 (N5240-60101)

New HMA26.5 -- N5240-60101
Requires (x1) Cable.

Legacy HMA26.5 -- 5087-7765
Requires A22 Splitter and (x3) Cables.



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.

1. See "[Downloading the Online PNA Service Guide](#)" on page 11.

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

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 and the bias tees. The bias tees should be torqued to 9 in-lbs. And, on the front and rear bulkhead connectors, use a 5/16 inch nutsetter or open end torque wrench set to 21 in-lb.

About Installing the Upgrade

Products affected ^a	N5241B, N5242B, and N5249B Option 224
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	5 hours
Estimated adjustment time	0.5 hours
Estimated full instrument calibration time	4.5 hours

- a. This upgrade is for models with Version 6 or Version 7 synthesizers. Version 7 dual-digital synthesizers (DDS) instruments have a s/n prefix 6201 and greater or instruments upgraded with N52xxBU-xS7.

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 7**.

Table 1 Contents of Upgrade Kit N5242-60118

Ref Desig.	Description	Qty	Part Number
-	Installation note (this document)	1	N5242-90118
-	Software Entitlement Certificate	1	5964-5145
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		
A35	Test port 3 source attenuator	2	33321-60077
A36	Test port 4 source attenuator		
A39	Test port 3 bias tee (includes wire harness)	2	5067-4865
A40	Test port 4 bias tee (includes wire harness)		
A43	Test port 3 receiver attenuator	2	33321-60078
A44	Test port 4 receiver attenuator		
A48	Port 4 source bypass switch	1	N1811-60028
-	Bulkhead connector assembly for test set front plate	14	1250-3805
-	Machine screw, M2.0 x 20, pan head (to attach bypass switch to bracket)	2	0515-1992
-	Machine screw, M3.0 x 20, pan head (to attach mixer brick 2 to mounting block; to attach 2 bridges to brackets)	7	0515-1410
-	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 8, pan head (to attach mixer brick 2 to mounting block; to attach 2 source attenuators and 2 receiver attenuators to brackets)	10	0515-0372
-	Machine screw, M3.0 x 6, pan head (to attach 2 bridges to deck; to attach 2 attenuator brackets to deck)	12	0515-0430
-	Machine screw, M3.0 x 14, pan head (x4 to attach 2 bias tees to brackets and x2 to attach splitter to mixer brick mounting block)	6	0515-2994
-	4-Port Dress Panel	1	N5240-00009
-	Lower front panel overlay, 4-port - (Option 423)	1	N5222-80013

1. In addition to the upgrade kit, the shipment includes an Software Entitlement Certificate. Refer to **“License Key Redemption” on page 9** for important information about this certificate.

Items Included in the Upgrade Kit

Table 1 Contents of Upgrade Kit N5242-60118

Ref Desig.	Description	Qty	Part Number
-	Test set front sub panel, 4-port	1	N5221-00007
-	Gap pad (between each coupler and test set front sub panel)	4	E4403-20033
-	Vibration mount (between couplers 1 & 3, and 2 & 4)	2	0460-2725
-	Mounting nut (for port 3 & 4 test port couplers)	2	5022-1087
-	Short (for Mixer Brick A24) (NOT for option 029A)	1	0960-0055
-	Cable guard	1	N5242-00049
-	Tie wrap, 1 to secure cables to side of deck	6	1400-0249
-	Bracket for source bypass switch	1	N5242-00009
-	Bracket for test port bridge	2	N5242-00006
-	Bracket for source or receiver attenuator	2	N5242-00007
-	Dust cap for test port	4	1401-0214
W14	A29 port 1 coupler to front-panel Port 1 CPLR ARM	1	N5222-20030
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
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
W26	A32 port 2 coupler to front-panel Port 2 CPLR ARM	1	N5222-20034
W30	Front panel jumpers	6	N5222-20091
W38	Front-panel REF 3 RCVR R3 IN to A24 mixer brick (R3)	1	N5242-20270
W39	Front-panel REF 4 RCVR R4 IN to A24 mixer brick (R4)	1	N5242-20271
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
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
W74	A38 port 1 bias tee to A29 port 1 coupler	1	N5222-20012
W75	A26 port 3 bridge to A35 port 3 source attenuator	1	N5222-20002

Table 1 Contents of Upgrade Kit N5242-60118

Ref Desig.	Description	Qty	Part Number
W76	A35 port 3 source attenuator to front-panel Port 3 SOURCE OUT	1	N5222-20019
W77	Front-panel port 3 CPLR THRU to A39 port 3 bias tee	1	N5222-20016
W78	A39 port 3 bias tee to A30 port 3 coupler	1	N5222-20011
W79	A27 port 4 bridge to A36 port 4 source attenuator	1	N5222-20001
W80	A36 port 4 source attenuator to front-panel Port 4 SOURCE OUT	1	N5222-20020
W81	Front-panel port 4 CPLR THRU to A40 port 4 bias tee	1	N5222-20017
W82	A40 port 4 bias tee to A31 port 4 coupler	1	N5222-20014
W86	A41 port 2 bias tee to A32 port 2 coupler	1	N5222-20013
W89	Front-panel port 3 RCVR C IN to A43 port 3 receiver attenuator	1	N5222-20021
W90	A43 port 3 receiver attenuator to A24 mixer brick (C)	1	N5242-20306
W91	Front-panel port 4 RCVR D IN to A44 port 4 receiver attenuator	1	N5222-20022
W92	A44 port 4 receiver attenuator to A24 mixer brick (D)	1	N5242-20307
W102	A47 port 3 bypass switch to A26 port 3 bridge	1	N5242-20263
W105	W7 to A48 port 4 bypass switch	1	N5242-20267
W106	A87 port 4 source bypass switch to A27 port 4 bridge	1	N5242-20261
W107	A48 port 4 source bypass switch to rear panel PORT 4 SW SRC OUT (J4)	1	N5242-20283
W108	A48 port 4 source bypass switch to rear panel PORT 4 SW TSET IN (J3)	1	N5242-20284
W113	Rear panel jumper	1	N5222-20091
-	Ribbon cable, A19 test set motherboard J202 to A35 port 3 source attenuator	2	N5242-60008
-	Ribbon cable, A19 test set motherboard J203 to A36 port 4 source attenuator		
-	Ribbon cable, A19 test set motherboard J206 to A43 port 3 receiver attenuator	2	8121-0982
-	Ribbon cable, A19 test set motherboard J207 to A44 port 4 receiver attenuator		
-	Ribbon cable, A19 test set motherboard J213 to A24 mixer brick 2	1	N5242-60006
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.			
-	Lower front panel overlay, 4-port (all instruments with Option 029A)	1	N5242-80028
W140	A24 mixer brick to A55 noise downconverter	1	N5242-20294

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 Assembly.
- Step 5. Remove the A19 Test Set Motherboard.
- Step 6. Remove the A20 IF Multiplexer Board.
- Step 7. Remove Some Cables.
- Step 8. Remove the A23 Mixer Brick Assembly.
- Step 9. Assemble the A24 Mixer Brick and A22 Splitter.
- Step 10. Assemble the A26 and A27 Test Port Bridges.
- Step 11. Install the Mixer Bricks Assembly and Test Port Bridge Assemblies.
- Step 12. Assemble the A35, A36 Source Attenuators and the A43, A44 Receiver Attenuators.
- Step 13. Install the Bias Tees and the Attenuator Assemblies.
- Step 14. Assemble the Port 4 Source Bypass Switch Assembly.
- Step 15. Install the Port 4 Source Bypass Switch Assembly.
- Step 16. Assemble the A29 - A32 Test Port Coupler Assemblies.
- Step 17. Install the LED Boards and Test Port Coupler Assemblies to the Test Set Front Plate.
- Step 18. Install the Bulkhead Connectors in the Test Set Front Plate.
- Step 19. Install the Coupler Plate Assembly to the Deck.
- Step 20. Install the Bulkhead Connectors and Jumper on the Rear Panel.
- Step 21. Install the Test Set Cables.
- Step 22. Reinstall the A20 IF Multiplexer Board.
- Step 23. Reinstall the A19 Test Set Motherboard.
- Step 24. Remove the Front Panel's Lower Dress Panel.

Step 25. Reinstall the Front Panel Assembly.

Step 26. Install the Front Panel Overlay.

Step 27. Install the Jumper Cables.

Step 28. Position the Cables and Wires to Prevent Pinching.

Step 29. Reinstall the Inner Cover.

Step 30. Reinstall the Outer Cover.

Step 31. Install the Cable Guard.

Step 32. Remove Option 224 License.

Step 33. Enable Option 423.

Step 34. Verify the PNA Analyzer Program is Running with the Correct Options.

Step 35. Perform Post-Upgrade Adjustments and Calibration.

Step 36. 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 9**.

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 7**.

Step 2. Remove the Outer Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide¹. **Step 24. Remove the Front Panel’s Lower Dress Panel.**

Step 3. Remove the Inner 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 11**.

Step 4. 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 5. 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.

Step 6. Remove the A20 IF Multiplexer Board

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A20 IF Multiplexer Board” in the PDF Service Guide¹.

Step 7. Remove Some 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

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.

1. Place the analyzer bottom-side up on a flat surface.
2. Remove and discard the following gray flexible cables:
 - W150 A20 IF multiplexer (P203) to A12 SPAM (J5)
 - W149 A20 IF multiplexer (P603) to A12 SPAM (J2)
3. Remove all bottom-side (test set) 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, 2-Port, Option 224 (S/N Prefixes <6021)” or “Bottom RF Cables, 2-Port, Option 224 (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)
Option 029A only:			

Reference Designator	Type ^a	Qty	Description
W131	SR	1	Adapter, coax, straight, m-m, 50 ohm
W141	SR	1	A55 noise downconverter to A7 noise receiver board LO
W143	SR	1	A55 noise downconverter to A7 noise receiver board RF

a. SR = semi-rigid coaxial cable.

4. Remove the following gray flexible cables:

- W64 (N5242-60025) A23 mixer brick (R1) to A20 IF multiplexer (P601)
- W65 (N5242-60026) A23 mixer brick (R2) to A20 IF multiplexer (P801)

5. 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 8. 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.

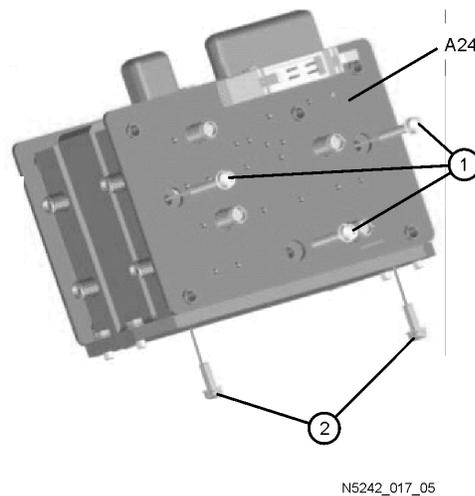
1. See [“Downloading the Online PNA Service Guide” on page 11](#).

Figure 2 Step 9. Assemble the A24 Mixer Brick and A22 Splitter¹

Refer to **Figure 1** in this document for this step. New parts are listed in **Table 1 on page 13** 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 (0515-0372, 0515-1410, 5087-7829)



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

4. If the PNA does not include Option 029A, follow all eleven instructions shown in **Figure 2**. If the PNA does include Option 029A, omit instruction 2 and the unnumbered instruction to install a splitter - it is already installed.

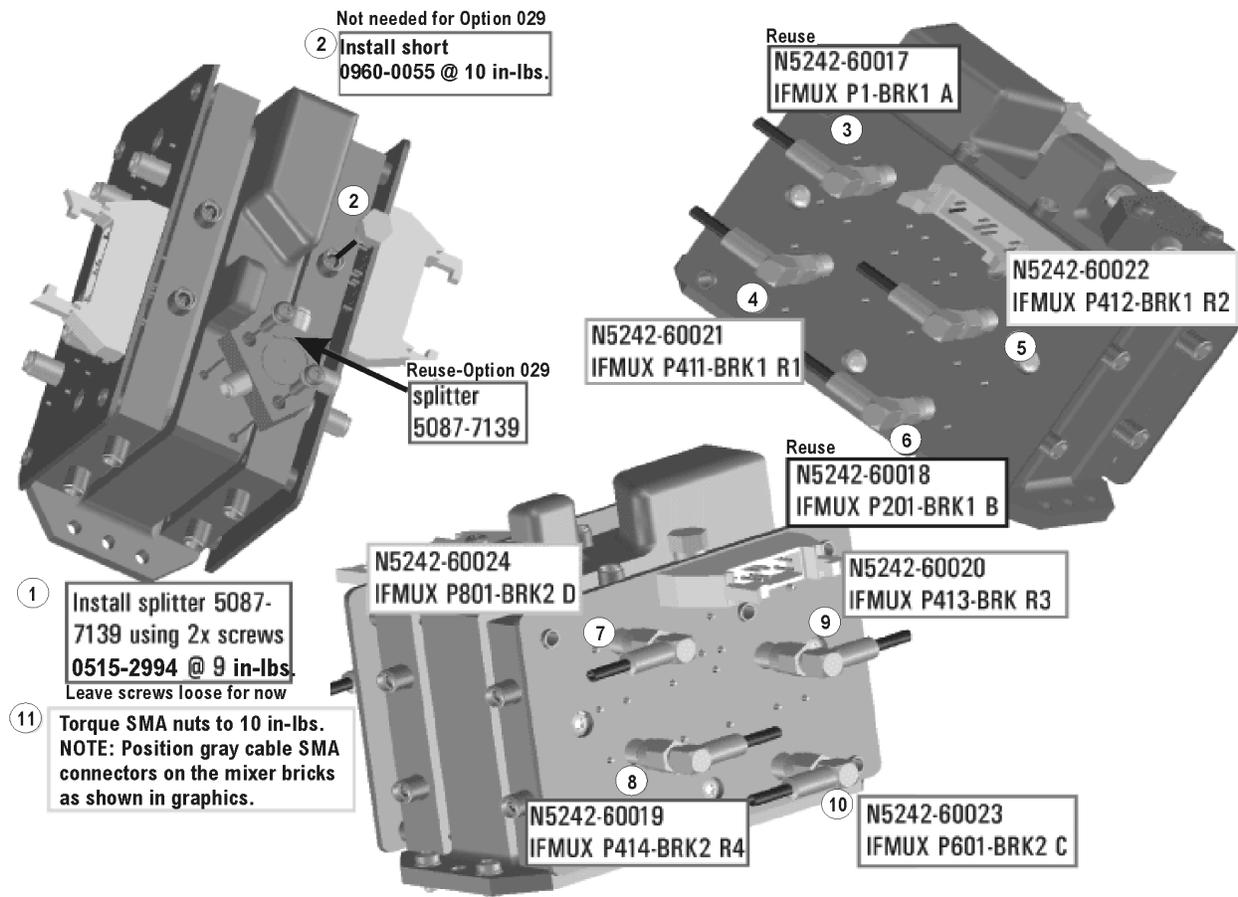
NOTE

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.

1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs with the older HMA26.5 or discard. If you are unclear which HMA26.5 assembly your PNA has installed, refer to **Figure 1 on page 10**.

Figure 2

A23 and A24 Mixer Brick Assembly – (5087-7139, 0960-0055, 0515-2994, N5242-60017, N5242-60018, N5242-60019, N5242-60020, N5242-60021, N5242-60022, N5242-60023, N5242-60024)¹



N5242_017_06

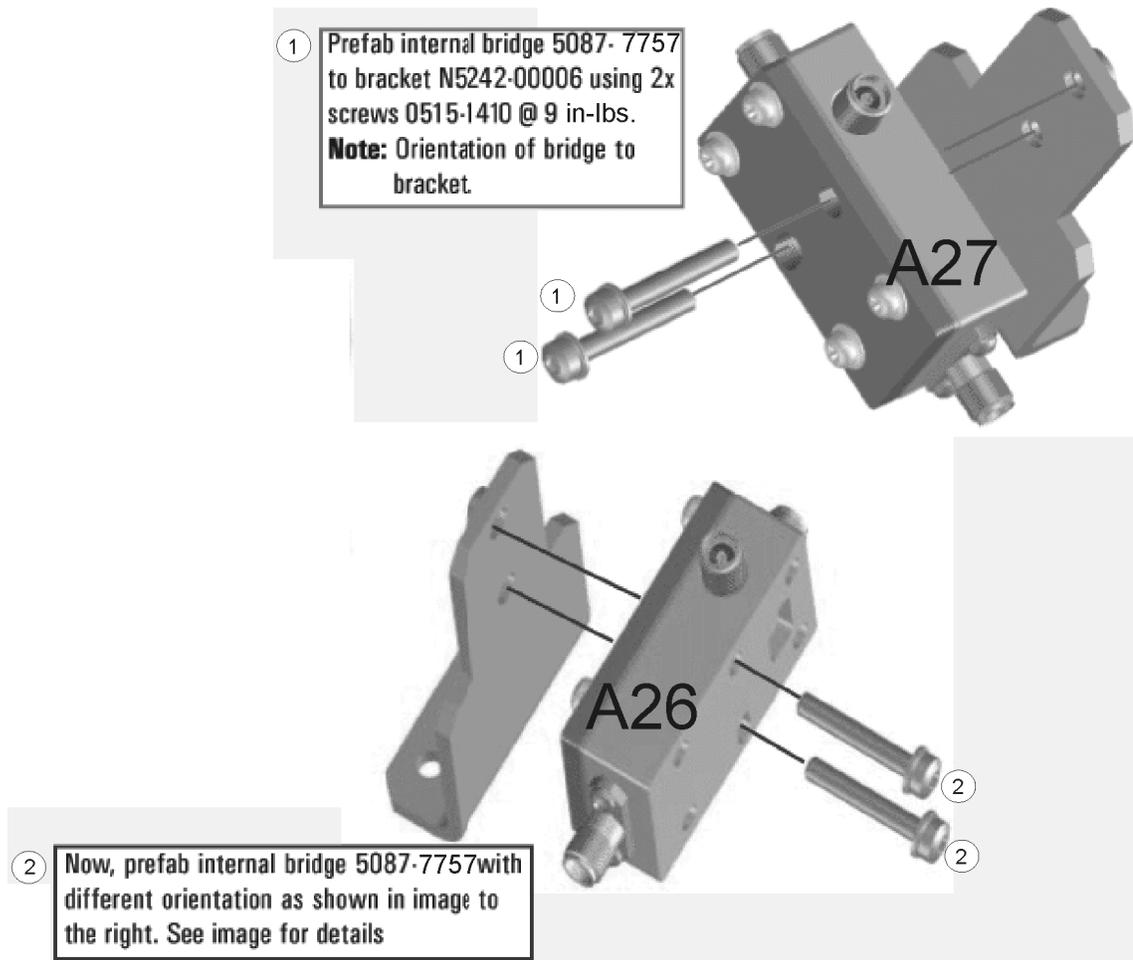
1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs with the older HMA26.5 or discard. If you are unclear which HMA26.5 assembly your PNA has installed, refer to [Figure 1 on page 10](#).

Installation Procedure for the Upgrade

Step 10. Assemble the A26 and A27 Test Port Bridges

Follow the two instructions shown in **Figure 3**.

Figure 3 A26 and A27 Test Port Bridge Assembly (0515-1410, 5087-7757, N5242-00006)

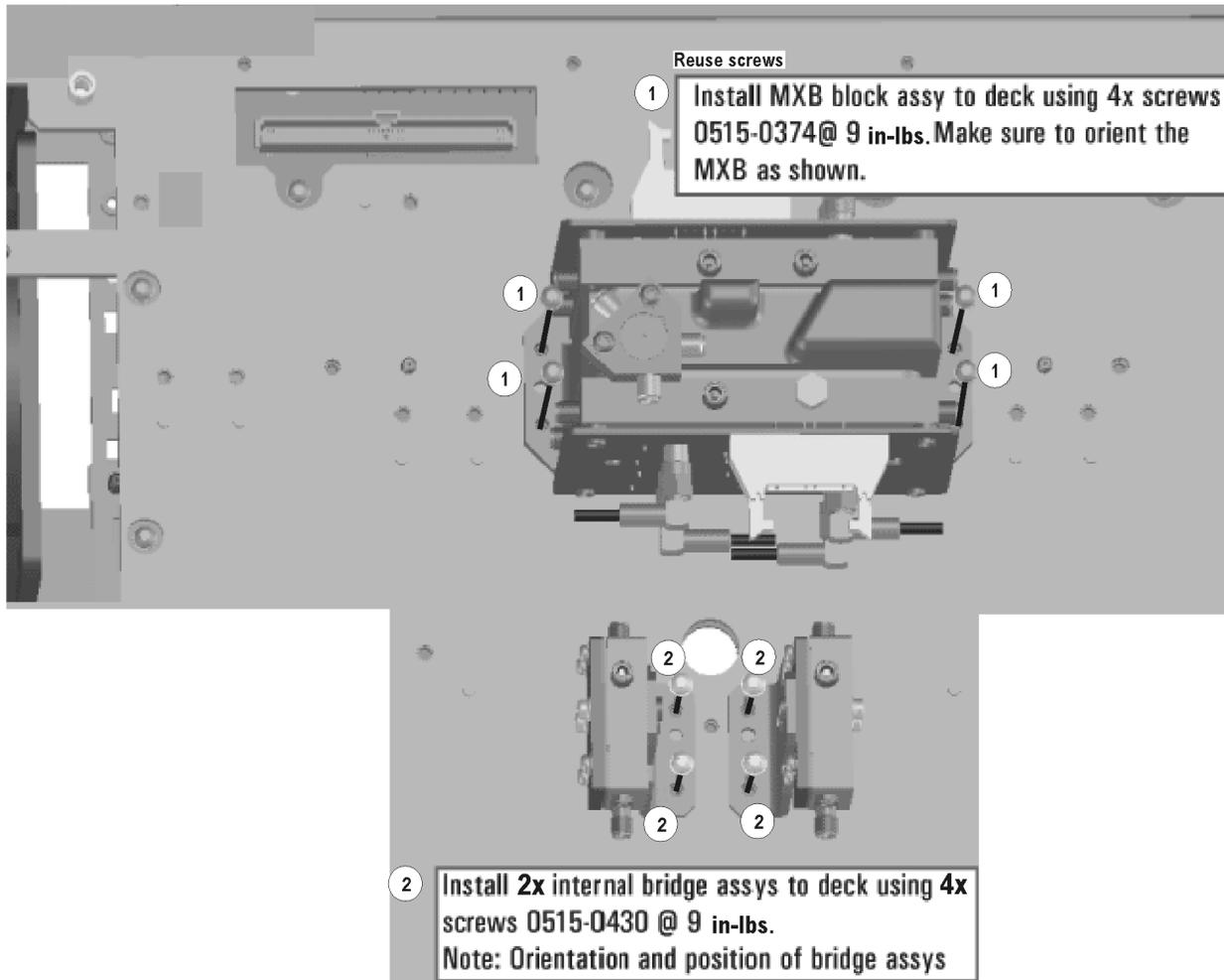


N5242_017_07

Step 11. Install the Mixer Bricks Assembly and Test Port Bridge Assemblies

Follow the two instructions shown in **Figure 4**.

Figure 4 A23, A24 Mixer Bricks Installation and A26, A27 Test Port Bridges Installation¹ (0515-0374, 0515-0430)



N5242_017_08

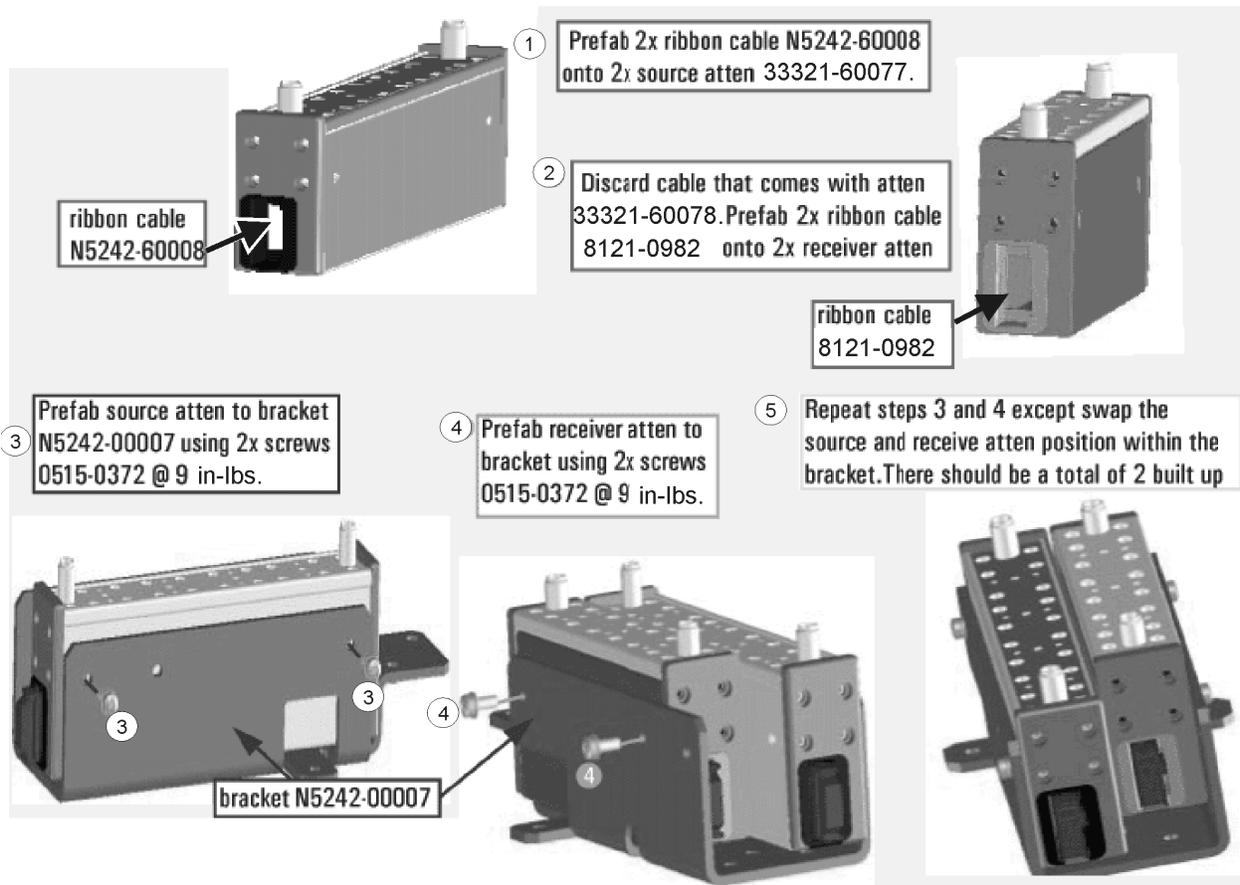
1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs with the older HMA26.5 or discard. If you are unclear which HMA26.5 assembly your PNA has installed, refer to **Figure 1** on page 10.

Installation Procedure for the Upgrade

Step 12. Assemble the A35, A36 Source Attenuators and the A43, A44 Receiver Attenuators

Follow the five instructions shown in **Figure 5**.

Figure 5 A35, A36 Source Attenuators Assembly and A43, A44 Receiver Attenuators Assembly (0515-1372, 8121-0982, 33321-60077, 33321-60078, N5242-00007, N5242-60008)



N5242_017_09

Step 13. Install the Bias Tees and the Attenuator Assemblies

CAUTION

Installing these bias tees backwards will cause damage to the analyzer source modules.

If your analyzer's serial number prefix is MY/SG/US5321 and above: Follow the two instructions shown in [Figure 7](#). New parts are listed in [Table 1 on page 13](#) of this document.

If your analyzer's serial number prefix is MY/SG/US5310 and below: Remove the old A38 bias tee and A41 bias tee from the PNA. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A38 - A41 Bias Tees" in the PDF Service Guide¹.

Discard the bias tees you just removed from the PNA. These old bias tees have 2.4 mm connectors and must be replaced with the new bias tees (3.5 mm connectors) included in the kit.

1. As shown in [Figure 6](#), position the new A38 bias tee and A41 bias tee on the attenuator brackets so that the port 1 and port 2 bias tees capacitors face each other.
2. Secure each bias tee to the attenuator brackets reusing two screws (item ① - 0515-2994) for each. Make sure that the attenuators are oriented as shown.
3. Follow the two instructions shown in [Figure 7](#). New parts are listed in [Table 1 on page 13](#) of this document.

1. See "[Downloading the Online PNA Service Guide](#)" on page 11.

Figure 6 Step Attenuators and Bias Tees Assembly (0515-0430, 5067-4865, 0515-0665)

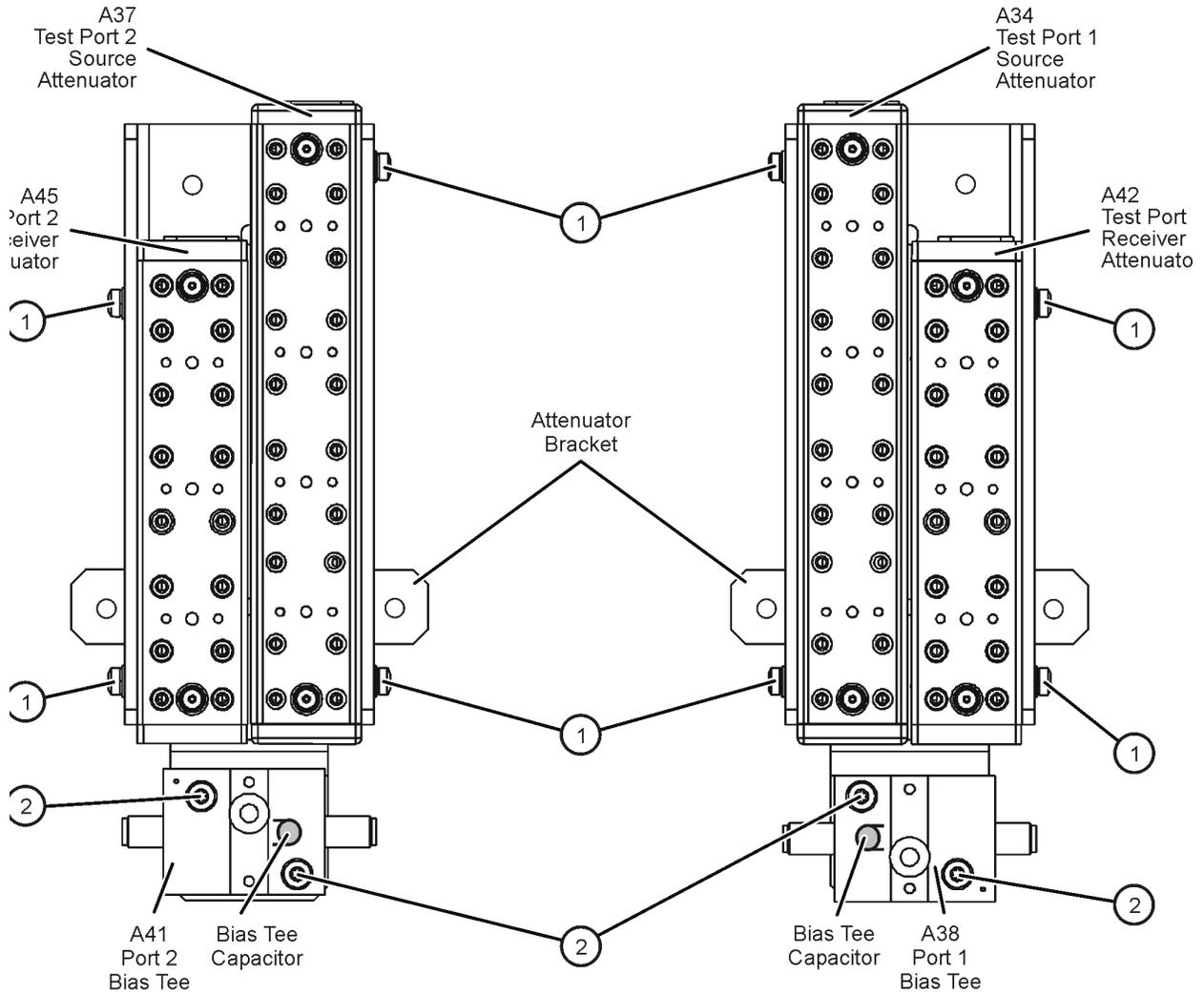
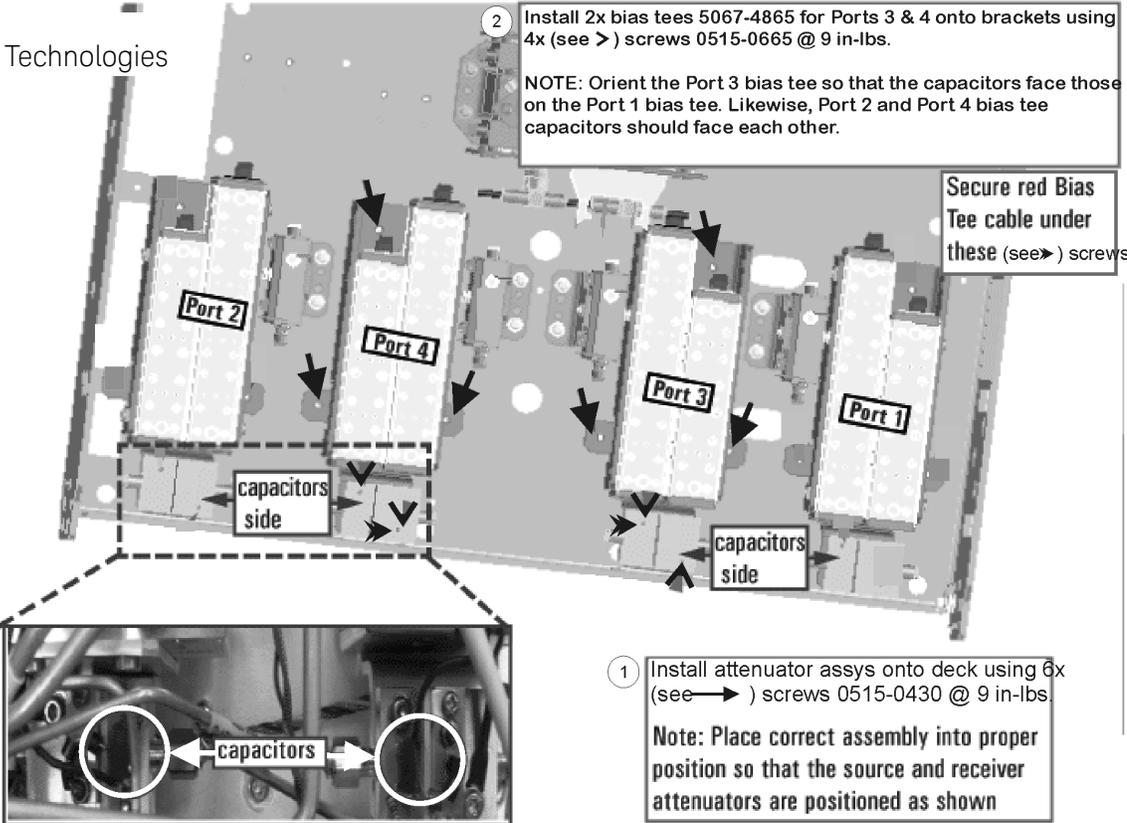


Figure 7 Bias Tees and Attenuators Installation (0515-0430, 5067-4865, 0515-0665)

Keysight Technologies



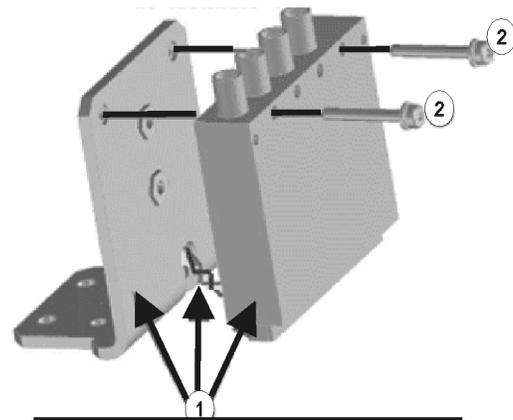
N5242_017_10

Installation Procedure for the Upgrade

Step 14. Assemble the Port 4 Source Bypass Switch Assembly

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

Figure 8 Port 4 Source Bypass Switch Assembly (0515-1992, N1811-60006, N5242-00009)



① Gather switch N1811-60006, and route cable through hole on bracket N5242-00009 as shown.

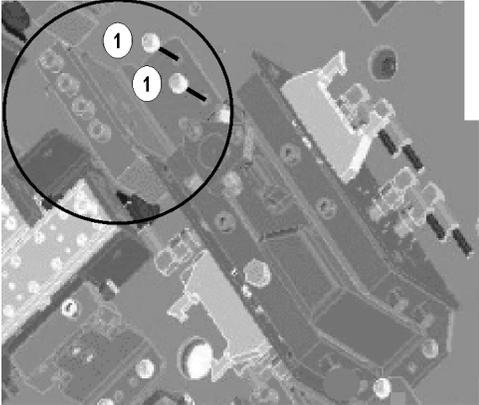
② Prefab switch N1811-60006 to bracket N5242-00009 using 2x screws 0515-1992 @ 6 in-lbs.

N5242_017_49

Step 15. Install the Port 4 Source Bypass Switch Assembly

Follow the instruction shown in **Figure 9**.

Figure 9 Port 4 Source Bypass Switch Installation (0515-0430)



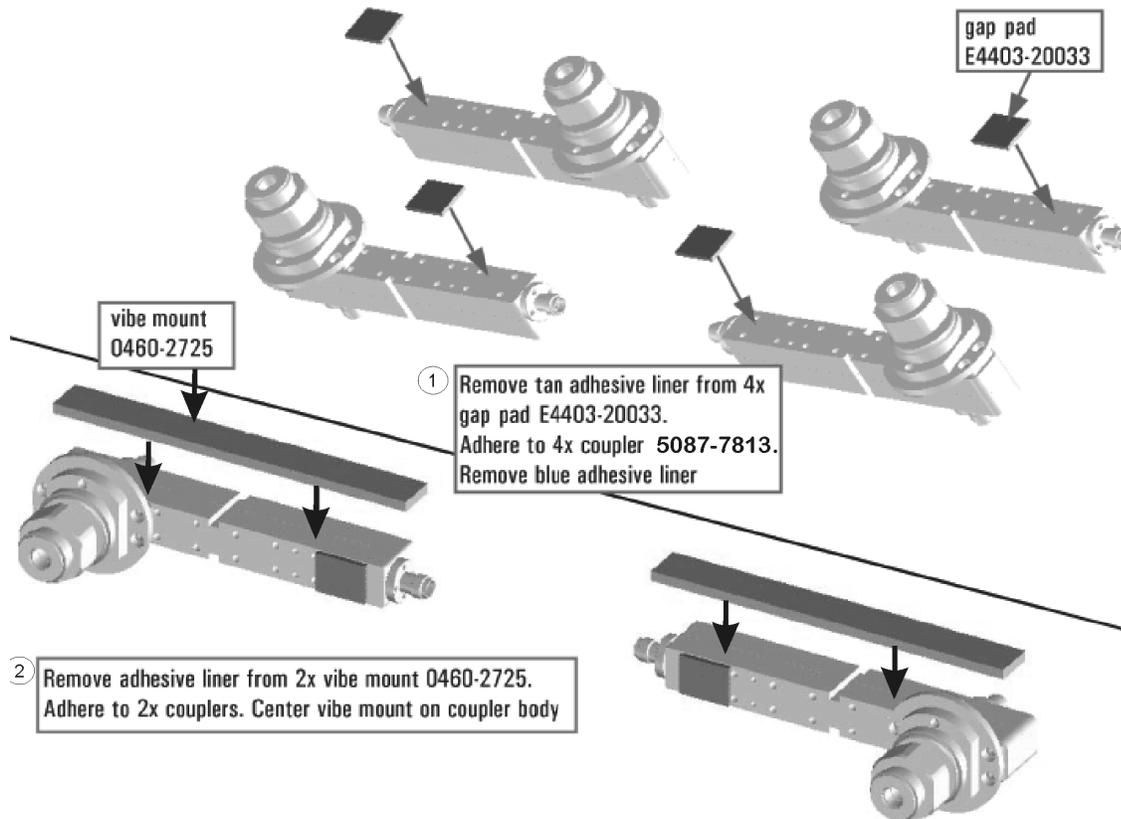
① Install switch assy onto deck using 2x screws (0515-0430) @ 9 in-lbs.

N5242_017_50

Step 16. 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 10**. New parts are listed in **Table 1 on page 13** of this document.

Figure 10 A29 - A32 Test Port Coupler Assembly (0460-2725, 5087-7813, E4403-20033)



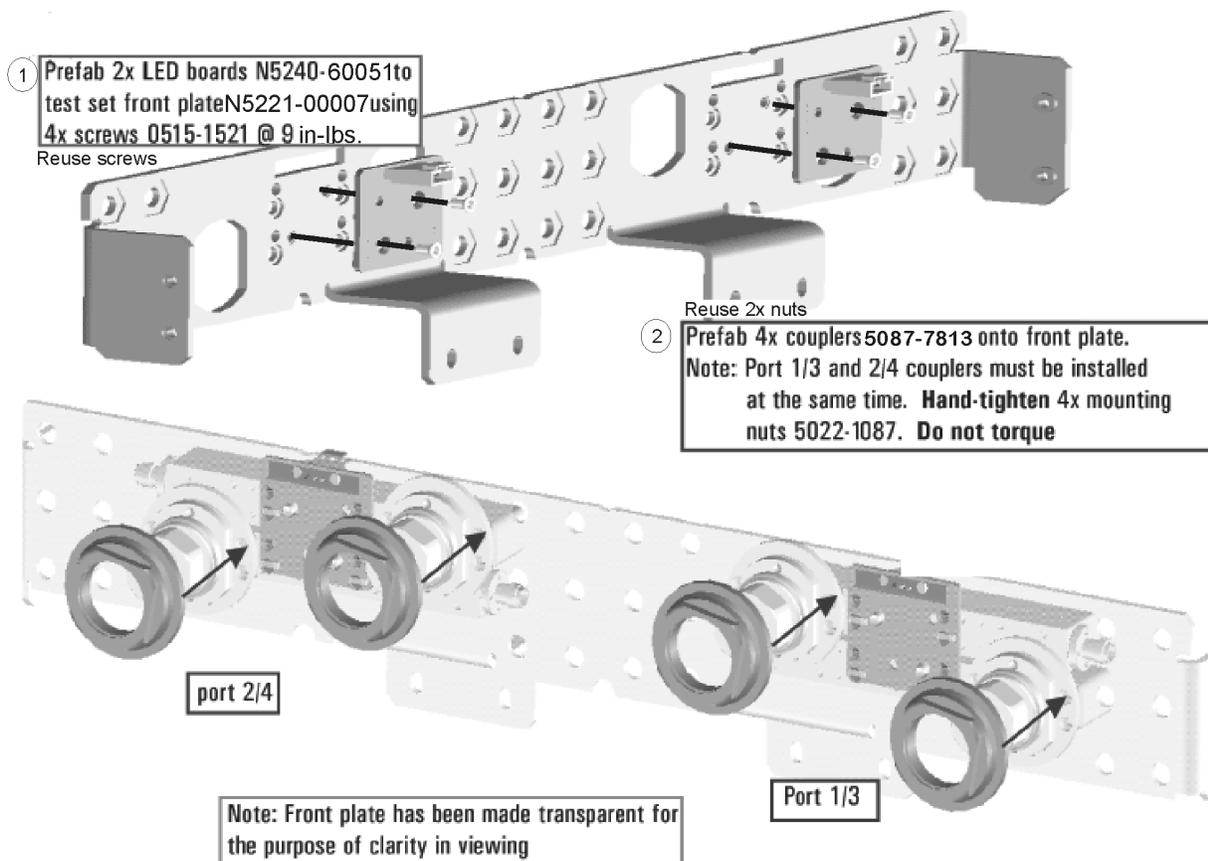
N5242_017_11

1. See "Downloading the Online PNA Service Guide" on page 11.

Step 17. 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. The bulkhead connectors may be discarded since they are not used in a 4-port configuration.
4. Follow the two instructions shown in **Figure 11**.

Figure 11 LED Board Assemblies and Test Port Coupler Assemblies Installation (0515-1521, 5022-1087, 5087-7813, N5221-00007)



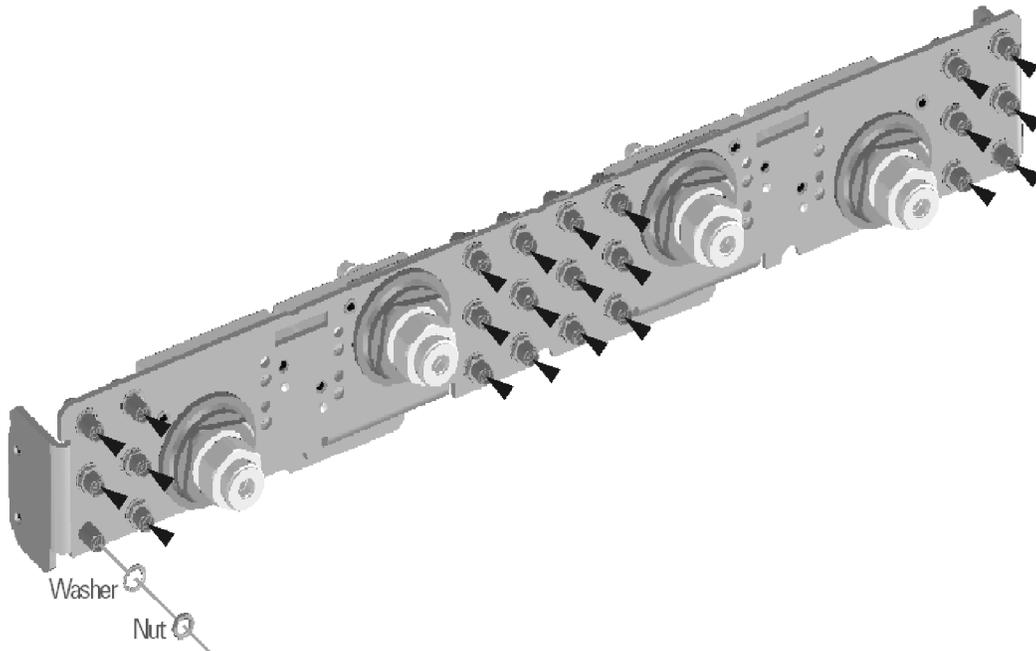
N5242_017_12

Step 18. Install the Bulkhead Connectors in the Test Set Front Plate

Refer to **Figure 12** for this procedure. New parts are listed in **Table 1 on page 13**.

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 12 Bulkhead Connectors Installation

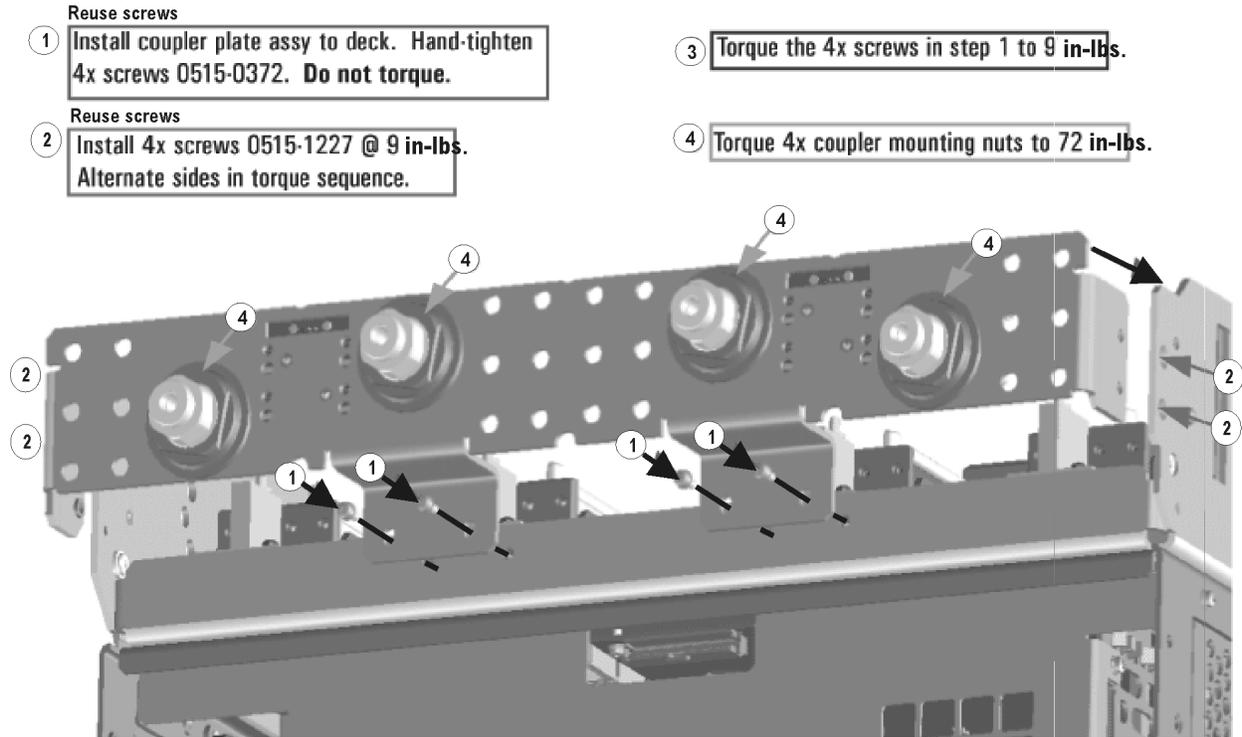


N5242_004_09

Step 19. Install the Coupler Plate Assembly to the Deck

Follow the four instructions shown in **Figure 13**.

Figure 13 Coupler Plate Assembly Installation (0515-0372, 0515-1227)



N5242_017_13

Step 20. Install the Bulkhead Connectors and Jumper on the Rear Panel

1. Remove hole plugs from the following rear panel connector openings:

- PORT 4–SW TSET IN (J3)
- PORT 4–SW SRC OUT (J4)

New parts are listed in [Table 1 on page 13](#) for this step of the procedure.

- 2.** Where the hole plugs had been, install bulkhead connector assemblies for the two new rear panel cables. These cables will be installed later.
- 3.** Using a 5/16-in torque wrench set to 21 in-lbs, tighten the hex nuts on the bulkhead connectors.
- 4.** Install the rear panel jumper, W113, on the bulkhead connectors and torque the jumper connectors to 10 in-lbs.

Step 21. Install the 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. On these, use a 9 mm nutsetter or open end torque wrench set 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 weight font are for analyzers with serial numbers MY/SG/US5321 and above.

Flexible Cables Required for Upgrading to an Option 423 PNA With or Without Option 029A

Install the following flexible cables in the order listed. 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)” or “Bottom RF Cables, 4-Port, Option 423 (S/N Prefixes ≥6021).” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 13**.

- W56 (N5242-60019) A24 mixer brick (R4) to A20 IF multiplexer (P414)
- W57 (N5242-60020) A24 mixer brick (R3) to A20 IF multiplexer (P413)
- W52 (N5242-60021) A23 mixer brick (R1) to A20 IF multiplexer (P411)
- W53 (N5242-60022) A23 mixer brick (R2) to A20 IF multiplexer (P412)
- W58 (N5242-60023) A24 mixer brick (C) to A20 IF multiplexer (P601)
- W55 (N5242-60024) A24 mixer brick (D) to A20 IF multiplexer (P801)

Semi-rigid Cables Required for Upgrading to an Option 423 PNA With Option 029A

If Option 029A is not installed, proceed to **page 39**.

Install the following semi-rigid cables in the order listed if upgrading to a PNA Option 423 with Option 029A. To see images showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 423 with Option 029 (S/N Prefixes <6021)” or “Bottom RF Cables, 4-Port, Option 423 with Option 029 (S/N Prefixes ≥6021)” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 13**.

1. See “**Downloading the Online PNA Service Guide**” on page 11.

Installation Procedure for the Upgrade

- W26 (N5222-20034) A32 port 2 coupler to front-panel Port 2 CPLR ARM
 - W135 (reuse) (N5242-20073 or N5242-20278) Front-panel Port 2 RCVR B IN to A45 port 2 receiver attenuator
 - W85 (N5222-20035) Port 2 CPLR THRU to A41 port 2 bias tee
 - W128 (reuse) (N5242-20134 or N5242-20303) A53 port 2 bypass switch to front-panel Port 2 SOURCE OUT
 - W127 (reuse) (N5242-20116 or N5242-20292) A37 port 2 source attenuator to A53 port 2 bypass switch
 - W129 (reuse) (N5242-20117 or N5242-20293) A53 port 2 bypass switch to A54 port 2 bridge
 - W130 (reuse) (N5242-20133) A53 port 2 bypass switch to A54 port 2 bridge
 - W86 (N5222-20013) A41 port 2 bias tee to A32 port 2 coupler
 - W91 (N5222-20022) Port 4 RCVR D IN to A44 port 4 receiver attenuator
 - W82 (N5222-20014) A40 port 4 bias tee to A31 port 4 coupler
 - W81 (N5222-20017) Port 4 CPLR THRU to A40 port 4 bias tee
 - W22 (N5222-20018) A31 port 4 coupler to front-panel Port 4 CPLR ARM
 - W80 (N5222-20020) A36 port 4 source attenuator to front-panel Port 4 SOURCE OUT
 - W89 (N5222-20021) Port 3 RCVR C IN to A43 port 3 receiver attenuator
 - W74 (N5222-20012) A38 port 1 bias tee to A29 port 1 coupler
 - W73 (N5222-20029) Front-panel Port 1 CPLR THRU to A38 port 1 bias tee
 - W77 (N5222-20016) Port 3 CPLR THRU to A39 port 3 bias tee
 - W18 (N5222-20015) A30 port 3 coupler to front-panel Port 3 CPLR ARM
 - W76 (N5222-20019) A35 port 3 source attenuator to front-panel Port 3 SOURCE OUT
 - W14 (N5222-20030) A29 port 1 coupler to front-panel Port 1 CPLR ARM
 - W132 (reuse) (N5242-20072 or N5242-20277) Front-panel Port 1 RCVR A IN to A42 port 1 receiver attenuator
 - W124 (reuse) (N5242-20125 or N5242-20295) Front-panel Port 1 CPLR THRU to A52 port 1 bypass switch
 - W123 (reuse) (N5242-20127 or N5242-20297) A52 port 1 bypass switch to front-panel Port 1 SOURCE OUT
 - W78 (N5222-20011) A39 port 3 bias tee to A30 port 3 coupler
 - W122 (reuse) (N5242-20128) A34 port 1 source attenuator to A52 port 1 bypass switch
- * 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) Front-panel 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 Reference Mixer Switch board screws 0515-0372 to 9 in-lbs.

- W126 (reuse) (N5242-20066 or N5242-20272) A28 port 2 bridge to A37 port 2 source attenuator
- W137 (reuse) (N5242-20074 or N5242-20279) A28 port 2 bridge to front-panel REF 2 SOURCE OUT
- W110 (reuse) (N5242-20004 or N5242-20262) A49 port 2 source bypass switch to A28 port 2 bridge

* Use 1/4" wrench to hold source cable connectors when tightening mating semi-rigid cables.

- W109 (reuse) (N5242-20019 or N5242-20268) W9 to A49 port 2 source bypass switch
- W79 (N5222-20001) A27 port 4 bridge to A36 port 4 source attenuator
- W106 (N5242-20261) A48 port 4 source bypass switch to A27 port 4 bridge
- W105 (N5242-20267) W7 to A48 port 4 source bypass switch
- W75 (N5222-20002) A26 port 3 bridge to A35 port 3 source attenuator
- W102 (N5242-20263) A47 port 3 source bypass switch to A26 port 3 bridge
- W17 (N5222-20023) A26 port 3 bridge to front-panel REF 3 SOURCE OUT
- W21 (N5222-20025) A27 port 4 bridge to front-panel REF 4 SOURCE OUT
- W136 (reuse) (N5242-20068 or N5242-20274) A33 reference mixer switch to A23 mixer brick (R1)
- W133 (reuse) (N5242-20069 or N5242-20275) A42 port 1 receiver attenuator to A23 mixer brick (A)
- W121 (reuse) (N5242-20067 or N5242-20273) A25 port 1 bridge to A34 port 1 source attenuator
- W90 (N5242-20306) A43 port 3 receiver attenuator to A24 mixer brick (C)
- W100 (reuse) (N5242-20008 or N5242-20265) A50 combiner to A46 port 1 source bypass switch
- W96 (reuse) (N5242-20007 or N5242-20264) A46 port 1 source bypass switch to A25 port 1 bridge
- W13 (reuse) (N5242-20011 or N5222-20005) A25 port 1 bridge to A33 reference mixer switch
- W101 (reuse) (N5242-20017 or N5242-20266) W5 to A47 port 3 source bypass switch
- W38 (N5222-20270) REF 3 RCVR R3 IN to A24 mixer brick (R3)
- W95 (reuse) (N5242-20020 or N5242-20269) W3 to A46 port 1 source bypass switch

Installation Procedure for the Upgrade

- W94 (reuse) (N5242-20016 or N5222-20010) A45 port 2 receiver attenuator to A23 mixer brick (B)

Install New Cable(s) – A21 HMA26.5 to A23/A24 Mixer Brick

If your instrument has a new HMA26.5 (N5240-60101) installed:

If you have a legacy HMA26.5 (5087-7765) installed, you can discard this cable.

- W202 (N5222-20126) RF cable, A24 mixer brick (top connector) to A21 HMA25.6 A24 mixer brick (top connector)

NOTE

- You will need to remove the cap that is installed on the HMA26.5 top connector, before connecting the other end of the W202 cable. You can discard the cap.
- When a A22 splitter is not mounted on the A23/A24 mixer bricks, W202 replaces W42 and W44.

See also, [“Verify the Model/Version of HMA26.5 Installed” on page 10.](#)

If your instrument has a legacy HMA26.5 (5087-7765) installed:

If you have a new HMA26.5 (N5240-60101) installed, you can discard these cables.

- W42 (N5222-20009) A21 HMA26.5 to A22 splitter
 - * Leave the W43 loose for now
 - NOTE: Tighten both screws on the splitter to 9 in-lbs.
- W44 (N5222-20008) A22 splitter to A24 mixer brick
 - * Leave the W43 loose for now
- W43 (N5222-20007) A22 splitter to A23 mixer brick
 - * Leave the W43 loose for now
- * Tighten 2x screws on A22 splitter @ 9 in-lbs.
- * Tighten cable nuts on W42, W43, and W44 to 10 in-lbs.

- W134 (reuse) (N5242-20070 or N5242-20276) A45 port 2 receiver attenuator to A23 mixer brick (B)
- W138 (reuse) (N5242-20075 or N5242-20280) Front-panel REF 2 RCVR R2 IN to A23 mixer brick (R2)
- W107 (N5242-20283) A48 port 4 source bypass switch to PORT 4 SW SRC OUT (J4)
- W92 (N5242-20307) A44 port 4 receiver attenuator to A24 mixer brick (D)
- W39 (N5222-20271) REF 4 RCVR R4 IN to A24 mixer brick (R4)

- W140 (N5242-20294) A24 mixer brick to A55 noise downconverter
- W112 (reuse) (N5242-20085 or N5242-20286) Rear panel PORT 2 SW TSET IN (J1) to A49 port 2 source bypass switch
- W111 (reuse) (N5242-20084 or N5242-20285) A49 port 2 source bypass switch to PORT 2 SW SRC OUT (J2)
- W108 (N5242-20284) Rear panel PORT 4 SW TSET IN (J3) to A48 port 4 source bypass switch.
- 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.
- W104 (reuse) (N5242-20080 or N5242-20281) Rear panel PORT 3 SW TSET IN (J7) to A47 port 3 src bypass switch
- W103 (reuse) (N5242-20081 or N5242-20282) A47 port 3 source bypass switch to PORT 3 SW SRC OUT (J8)
- W99 (reuse) (N5242-20088 or N5242-20289) Rear panel PORT 1 COMB ARM IN (J9) to A50 combiner
- W98 (reuse) (N5242-20087 or N5242-20288) Rear panel PORT 1 COMB THRU IN (J10) to A50 combiner
- W97 (reuse) (N5242-20086 or N5242-20287) A46 port 1 source bypass switch to PORT 1 SW SRC OUT (J1)
- W113 (N5222-20091) Rear panel jumper: SW SRC OUT (J8) to COMB ARM IN (J9)
- W2 (reuse) (N5242-20124 or N5222-20090) A13 13.5 GHz source 2 synthesizer board J1207 to A8 26.5 GHz source 2 board P1
- W30 (reuse 6) (E8356-20072 or N5222-20091) 12 front panel jumpers

Semi-rigid Cables Required for Upgrading to an Option 423 PNA Without Option 029A

Install the following semi-rigid cables in the order listed if upgrading to a PNA Option 423 without Option 029A. To see images showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 423 without Option 029A” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 13**.

- W7 (reuse) (N5242-20092 or N5222-20063) A8 source 2 to W105
- W26 (N5222-20034) A32 port 2 coupler to front-panel Port 2 CPLR ARM
- W93 (reuse) (N5242-20047 or N5222-20037) Port 2 RCVR B IN to A45 port 2 receiver attenuator
- W85 (N5222-20035) Port 2 CPLR THRU to A41 port 2 bias tee
- W84 (reuse) (N5242-20046 or N5222-20036) A37 port 2 source attenuator to front-panel Port 2 SOURCE OUT
- W86 (N5222-20013) A41 port 2 bias tee to A32 port 2 coupler

1. See **“Downloading the Online PNA Service Guide” on page 11**.

Installation Procedure for the Upgrade

- W91 (N5222-20022) Port 4 RCVR D IN to A44 port 4 receiver attenuator
- W82 (N5222-20014) A40 port 4 bias tee to A31 port 4 coupler
- W81 (N5222-20017) Port 4 CPLR THRU to A40 port 4 bias tee
- W22 (N5222-20018) A31 port 4 coupler to front-panel Port 4 CPLR ARM
- W80 (N5222-20020) A36 port 4 source attenuator to front-panel Port 4 SOURCE OUT
- W89 (N5222-20021) Port 3 RCVR C IN to A43 port 3 receiver attenuator
- W74 (N5222-20012) A38 port 1 bias tee to A29 port 1 coupler
- W77 (N5222-20016) Port 3 CPLR THRU to A39 port 3 bias tee
- W18 (N5222-20015) A30 port 3 coupler to front-panel Port 3 CPLR ARM
- W76 (N5222-20019) A35 port 3 source attenuator to front-panel Port 3 SOURCE OUT
- W14 (N5222-20030) A29 port 1 coupler to front-panel Port 1 CPLR ARM
- W87 (reuse) (N5242-20041 or N5222-20031) Front-panel Port 1 RCVR A IN to A42 port 1 receiver attenuator
- W73 (N5222-20029) Front-panel Port 1 CPLR THRU to A38 port 1 bias tee
- W72 (reuse) (N5242-20038 or N5222-20028) A34 port 1 source attenuator to front-panel Port 1 SOURCE OUT
- W78 (N5222-20011) A39 port 3 bias tee to A30 port 3 coupler
- * 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) Front-panel 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 Reference Mixer Switch board screws 0515-0372 to 9 in-lbs.
- W83 (reuse) (N5242-20002 or N5222-20001) A28 port 2 bridge to A37 port 2 source attenuator
- W25 (reuse) (N5242-20048 or N5222-20038) A28 port 2 bridge to front-panel REF 2 SOURCE OUT
- * Secure W25 (N5242-20048) to side of deck with 1x tie wrap (1400-0249)
- W110 (reuse) (N5242-20004 or N5242-20262) A49 port 2 source bypass switch to A28 port 2 bridge
- * Use 1/4" wrench to hold source cable connectors when tightening mating semi-rigid cables
- W109 (reuse) (N5242-20019 or N5242-20268) W9 to A49 port 2 source bypass switch
- W79 (N5242-20002) A27 port 4 bridge to A36 port 4 source attenuator
- W106 (N5242-20261) A48 port 4 source bypass switch to A27 port 4 bridge

- W105 (N5242-20267) W7 to A48 port 4 source bypass switch
- W75 (N5222-20002) A26 port 3 bridge to A35 port 3 source attenuator
- W102 (N5242-20263) A47 port 3 source bypass switch to A26 port 3 bridge
- W17 (N5222-20023) A26 port 3 bridge to front-panel REF 3 SOURCE OUT
- W21 (N5222-20025) A27 port 4 bridge to front-panel REF 4 SOURCE OUT
- W90 (N5242-20306) A43 port 3 receiver attenuator to A24 mixer brick (C)
- W37 (reuse) (N5242-20009 or N5222-20003) A33 reference mixer switch to A23 mixer brick (R1)
* Secure W37 (N5242-20009) to side of deck with 3x tie wrap (1400-0249)
- W88 (reuse) (N5242-20010 or N5222-20004) A42 port 1 receiver attenuator to A23 mixer brick (A)
- W71 (reuse) (N5242-20005 or N5222-20002) A25 port 1 bridge to A34 port 1 source attenuator
- W100 (reuse) (N5242-20008 or N5242-20265) A50 combiner to A46 port 1 source bypass switch
- W96 (reuse) (N5242-20007 or N5242-20264) A46 port 1 source bypass switch to A25 port 1 bridge
- W13 (reuse) (N5242-20011 or N5222-20005) A25 port 1 bridge to A33 reference mixer switch
- W101 (reuse) (N5242-20017 or N5242-20266) W5 to A47 port 3 source bypass switch
- W95 (reuse) (N5242-20020 or N5242-20269) W3 to A46 port 1 source bypass switch
- W94 (reuse) (N5242-20016 or N5222-20010) A45 port 2 receiver attenuator to A23 mixer brick (B)

Install New Cable(s) – A21 HMA26.5 to A23/A24 Mixer Brick

If your instrument has a new HMA26.5 (N5240-60101) installed:

If you have a legacy HMA26.5 (5087-7765) installed, you can discard this cable.

- W202 (N5222-20126) RF cable, A24 mixer brick (top connector) to A21 HMA25.6 A24 mixer brick (top connector)

NOTE

– You will need to remove the cap that is installed on the HMA26.5 top connector, before connecting the other end of the W202 cable. You can discard the cap.

– When a A22 splitter is not mounted on the A23/A24 mixer bricks, W202 replaces W42 and W44.

See also, [“Verify the Model/Version of HMA26.5 Installed” on page 10.](#)

If your instrument has a legacy HMA26.5 (5087-7765) installed:

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If you have a new HMA26.5 (N5240-60101) installed, you can discard these cables.

- W42 (N5222-20009) A21 HMA26.5 to A22 splitter
 - * Leave the W43 loose for now
 - NOTE: Tighten both screws on the splitter to 9 in-lbs.
- W44 (N5222-20008) A22 splitter to A24 mixer brick
 - * Leave the W43 loose for now
- W43 (N5222-20007) A22 splitter to A23 mixer brick
 - * Leave the W43 loose for now
- * Tighten 2x screws on A22 splitter @ 9 in-lbs.
- * Tighten cable nuts on W42, W43, and W44 to 10 in-lbs.

- W107 (N5242-20283) A48 port 4 source bypass switch to PORT 4 SW SRC OUT (J4).
- W92 (N5242-20307) A44 port 4 receiver attenuator to A24 mixer brick (D)
- W39 (N5222-20271) REF 4 RCVR R4 IN to A24 mixer brick (R4)
- W38 (N5222-20270) REF 3 RCVR R3 IN to A24 mixer brick (R3)
- W112 (reuse) (N5242-20085 or N5242-20286) Rear panel PORT 2 SW TSET IN (J1) to A49 port 2 source bypass switch
- W111 (reuse) (N5242-20084 or N5242-20285) A49 port 2 source bypass switch to PORT 2 SW SRC OUT (J2)
- W108 (N5242-20284) Rear panel PORT 4 SW TSET IN (J3) to A48 port 4 source bypass switch
- 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.
- W104 (reuse) (N5242-20080 or N5242-20281) Rear panel PORT 3 SW TSET IN (J7) to A47 port 3 source bypass switch
- W103 (reuse) (N5242-20081 or N5242-20282) A47 port 3 source bypass switch to PORT 3 SW SRC OUT (J8)
- W99 (reuse) (N5242-20088 or N5242-20289) Rear panel PORT 1 COMB ARM IN (J9) to A50 combiner
- W98 (reuse) (N5242-20087 or N5242-20288) Rear panel PORT 1 COMB THRU IN (J10) to A50 combiner
- W97 (reuse) (N5242-20086 or N5242-20287) A46 port 1 source bypass switch to PORT 1 SW SRC OUT (J1)
- W113 (N5222-20091) Rear panel jumper: SW SRC OUT (J8) to COMB ARM IN (J9)
- W2 (reuse) (N5242-20124 or N5222-20290) A13 13.5 GHz source 2 synthesizer board J1207 to A8 26.5 GHz source 2 board P1
- W60 (N5242-60013) A20 IF multiplexer (P203) to A12 SPAM (J2)

- W62 (N5242-60015) A20 IF multiplexer (P603) to A12 SPAM (J5)
- W30 (reuse 6) (E8356-20072 or N5222-20091) 12 front panel jumpers

Step 22.Reinstall the A20 IF Multiplexer Board

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A20 IF Multiplexer Board” in the PDF Service Guide¹.

Step 23.Reinstall the A19 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.

1. For instructions on reinstalling the board, click the Chapter 7 bookmark “Removing and Replacing the A19 Test Set Motherboard” in the PDF Service Guide¹.
2. 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 (including Option 029A) (S/N Prefixes <6021)” or “Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 423 (including Option 029A) (S/N Prefixes ≥6021)”in the PDF Service Guide¹. New parts are listed in [Table 1 on page 13](#).
 - Ribbon cable, N5242-60006 from J213 to A24 mixer brick 2
 - Ribbon cable (part of bias tee assembly), port 3 bias tee to A19 test set motherboard J543
 - Ribbon cable (part of bias tee assembly), port 4 bias tee to A19 test set motherboard J544
 - Ribbon cable (8121-0982), A19 test set motherboard J206 to A43 port 3 receiver attenuator
 - Ribbon cable (8121-0982), A19 test set motherboard J207 to A44 port 4 receiver attenuator
 - Ribbon cable (N5242-60008), A19 test set motherboard J202 to A35 port 3 source attenuator
 - Ribbon cable (N5242-60008), A19 test set motherboard J203 to A36 port 4 source attenuator
 - Wire harness (part of the switch assembly), A19 test set motherboard J103 to A48 port 4 source bypass switch

1. See [“Downloading the Online PNA Service Guide” on page 11](#).

Step 24. Remove the Front Panel's Lower Dress Panel

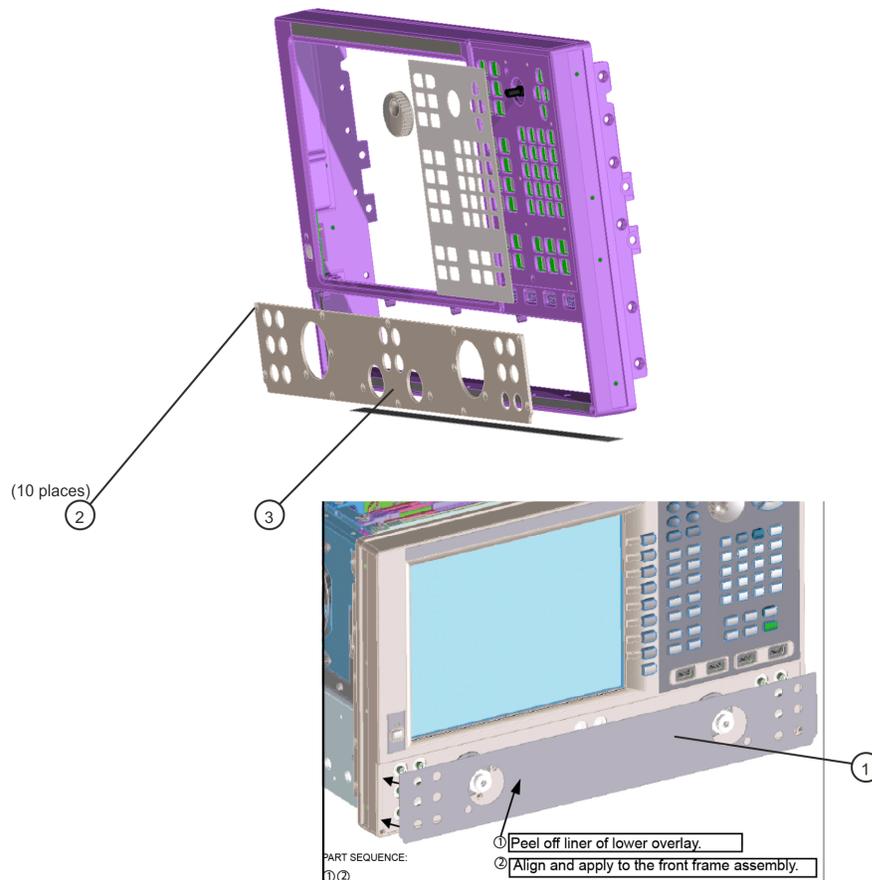
Before the front panel's lower dress panel can be replaced, the 2-port lower dress panel and the lower front panel label must be removed from the front panel assembly. Refer to [Figure 14 on page 44](#). New parts are listed in [Table 1 on page 13](#).

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 26. Install the Front Panel Overlay” on page 45**.

Figure 14 Replacing the Front Panel's Lower Dress Panel and Overlay



Step 25. 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.

Step 26. Install the Front Panel Overlay

To see an image of the front panel overlay (N5222-80013 or N5242-80028), 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 13**.

- 1. Remove the protective backing from the new front panel overlay.**
- 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 27. Install the Jumper Cables

- Install twelve W30 front panel jumper cables (E8356-20072 or N5222-20091) - 6 that were removed previously and 6 new jumpers provided. 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 Guide¹.
- Install new W113 rear panel jumper cable (N5222-20091) 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 Guide¹.

Step 28. 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 29. Reinstall the Inner Cover

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

Step 30. Reinstall the Outer Cover

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

1. ¹ See “[Downloading the Online PNA Service Guide](#)” on page 11.

Installation Procedure for the Upgrade

Step 31. Install the Cable Guard

Push the cable guard over the new front jumper cables until its cushioning material touches the front panel of the PNA.

Step 32. Remove Option 224 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 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. 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 33.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 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

NOTE

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

A single license file may contain more than one feature.

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.
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.

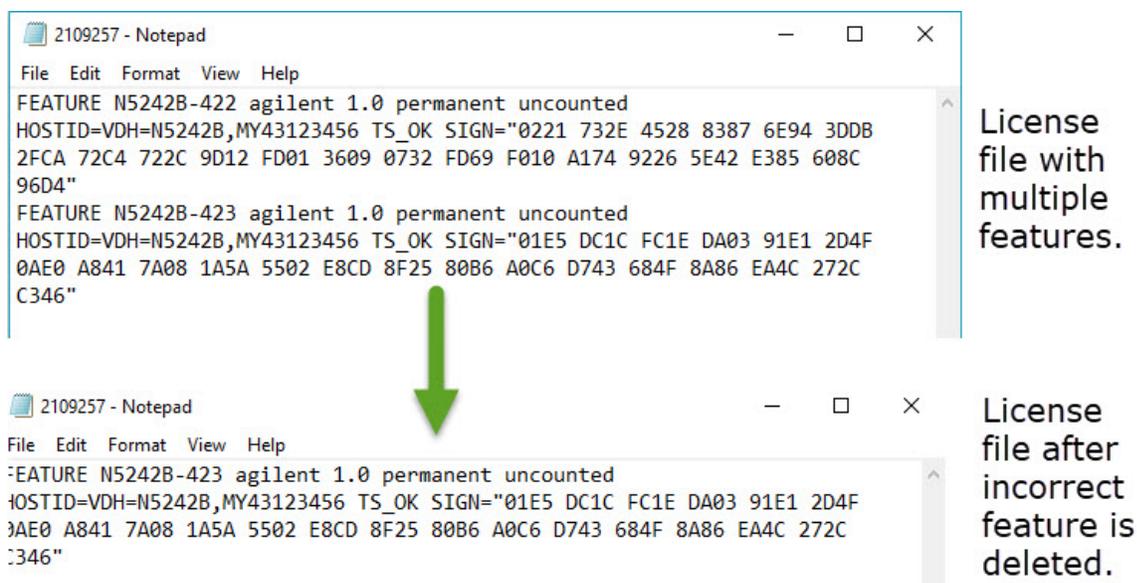
4. Verifying and editing the license file:

For these steps, refer to the example in **Figure 15 on page 48.**

- a. Verify your USB flash drive is connected to a PC.
- b. Open your license file using a text read/write program similar to Notepad.
- c. 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 15 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.



- d. Re-save the text license file to the root directory of your USB flash drive.
- e. Verify that only the single correctly edited text license file is in the root directory of your USB drive.
- f. Eject your USB flash drive and remove the USB flash drive from your PC.

NOTE

A single license file may contain more than one feature.

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.

Step 34. Verify the PNA Analyzer Program is Running with the Correct Options

Verify that the Options Correct and are Enabled

1. Start the Network Analyzer program.
2. Once the Network Analyzer is running:
 - Press **Help** > **About NA** and verify that Option **425** is listed in the PNA application.

NOTE

If the option(s) have not been enabled, contact Keysight Technologies. Refer to [“Getting Assistance from Keysight” on page 7](#).

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 35. 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) or All Synthesizers (Version 7 synthesizers)
- synthesizer bandwidth Adjustment (only run if the 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)

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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.

Operator’s Check

Perform the Operator’s Check to test 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 7**.

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.

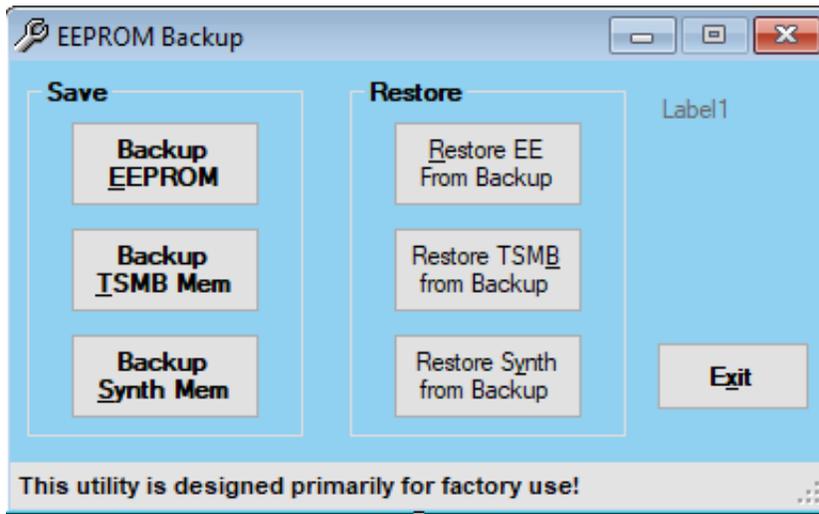
The adjustments listed here generate new correction constants. The analyzer must have a backup of this new data in case any of the data becomes corrupted.

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

1. See **“Downloading the Online PNA Service Guide” on page 11**.

Figure 16 EEPROM Backup Menu



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 36. 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 cloth²⁶

1. See ["Downloading the Online PNA Service Guide" on page 11.](#)

Installation Procedure for the Upgrade



This information is subject to change without notice.

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