

Installation Note

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

To Upgrade PNA N5224B or N5225B Option 217 to
Option 417

Upgrade Kit Order Numbers: N5224BU- 617 and
N5225BU- 617

Keysight Kit Number: N5225-60118

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**.



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CAUTION

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

Keysight Add 4-Port Capability Upgrade Kit
Upgrade Kit Number: N5225-60118
Installation Note

Description of the Upgrade

This upgrade converts your N5224B or N5225B Option 217 2-port analyzer to an N5224B or N5225B Option 417 4-port analyzer by adding:

- an additional 26.5 GHz source board
- an additional 13.5 GHz source synthesizer board
- two additional 40 GHz doublers
- an additional mixer brick
- two additional receiver couplers and brackets
- two additional test port couplers
- two additional source attenuators and brackets
- two additional receiver attenuators and brackets
- an additional cable guard for front panel jumpers
- a splitter
- a 3 dB pad
- a modified front panel
- new cables

Refer to **“Overview of the Installation Procedure” on page 14.**

CAUTION

This repair must be done at a service center or a self-maintainer service center! Refer to **“Getting Assistance from Keysight” on page 4.**

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.

NOTE

IMPORTANT!

- This document contains references to legacy and new A25 HMA26.5 Multiplier/Amplifier and A27/A28 mixer brick assemblies. Your model instrument may have either legacy assemblies or the new parts installed.
 - To verify your instrument's A25 HMA26.5 Multiplier/Amplifier, refer to [“Verify the Model/Version of HMA26.5 Installed” on page 7](#).
 - The A27/A28 mixer bricks might be a legacy part number 5087-7323 (with (x2) discrete 3dB attenuators, 08490-60039) or new part number 5087-7417 (with integrated 3 dB attenuators).
 - See also your instrument's PDF Service Guide ^a.
-

a. See [“Downloading the Online PNA Service Guide” on page 7](#).

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

1. See [“Downloading the Online PNA Service Guide” on page 7](#).

License Key Redemption

NOTE

If you are unfamiliar with the licensing process, refer to <https://www.keysight.com/us/en/assets/9018-04534/installation-guides/9018-04534.pdf> (N5242-90024).

NOTE

Ensure that you are connected to an external server, before attempting to download your email and license key file.

– Refer to

<https://www.keysight.com/us/en/assets/9018-04534/installation-guides/9018-04534.pdf> (N5242-90024).

NOTE

The enclosed Software Entitlement Certificate is a receipt, verifying that you have purchased a licensed option for the PNA 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 6**.

Verify the License Contents

Refer to the license message you received from Keysight:

Getting Prepared

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 4.**

Verify the Model/Version of HMA26.5 Installed

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

- A26 splitter 5067-4086
- W52 N5245-20013
- W53 N5245-20023
- W54 N5245-20022

(If you have the legacy 5086-7765 HMA26.5, please discard the N5245-20195 semi-rigid cables. Refer to **Figure 1 on page 7.**)

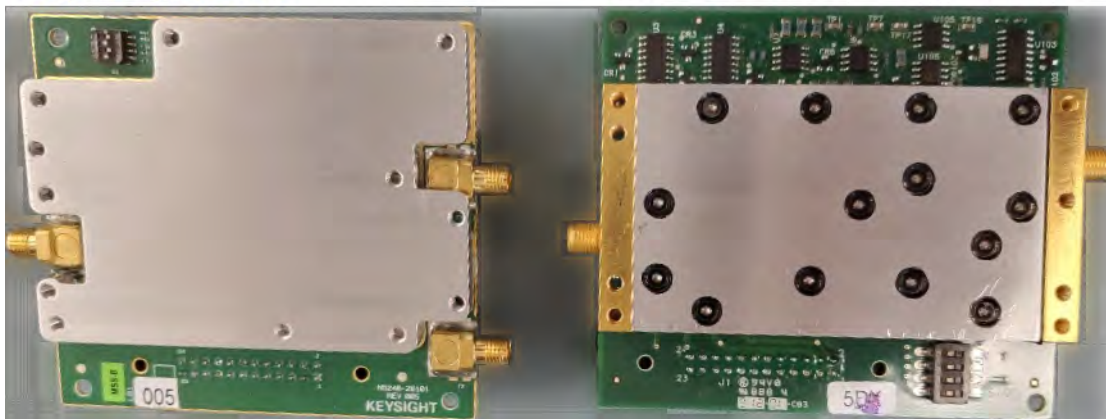
The new N5240-60101 HMA26.5 has the splitter integrated into the assembly. Refer to **Figure 1 on page 7.**

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 A26 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., N5225B) and click **Search**.
3. Click **Support** > **Keysight Product Support**.
4. In the **Search Support** area type your instrument's model number (e.g., N2225B).
5. Press **Enter**.
6. Scroll down to the **PRINT DOCUMENTATION** section and click to select **Service Manual**.

The **Service Manual** for your instrument will be displayed near the top of the right column.
7. Click the hyperlink of the Service Guide title to download the PDF file.
8. When the PDF of the Service Guide is displayed, scroll through the Contents section bookmarks to locate the information needed.

Protecting Your Workspace from Electrostatic Discharge

For information, click on the Chapter 1 bookmark, "Electrostatic Discharge Protection" in the PDF Service Guide¹.

1. "Downloading the Online PNA Service Guide" on page 7.

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

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 5/16 inch nutsetter or open end torque wrench set to 21 in-lb.

About Installing the Upgrade

Products affected	N5224B or N5225B Option 217
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

Items Included in the Upgrade Kit

Check the contents of your kit against the following list. If any part is missing or damaged, contact Keysight Technologies. Refer to **“Getting Assistance from Keysight” on page 4.**

Table 1 Contents of Upgrade Kit N5225-60118

Ref Desig.	Description	Qty	Part Number
-	Installation note (this document)	1	N5225-90118
-	Software Entitlement Certificate	1	5964-5145
-	China RoHS Addendum for kits	1	9320-6722
A10	26.5 GHz source (2) board	1	5087-7342
A12	40 GHz doubler assembly port 3	2	5087-7349
A13	40 GHz doubler assembly port 4		
A17	13.5 GHz (source 2) synthesizer board	1	N5240-60074
A26 ^a	Splitter	1	5067-4086
A28	Mixer brick (2)	1	5087-7417
A30	Test port 3 reference coupler	2	5087-7760
A31	Test port 4 reference coupler		
A34	Test port 3 coupler	2	5087-7793
A35	Test port 4 coupler		
A39	Test port 3 source attenuator	2	33325-60022
A40	Test port 4 source attenuator		
A47	Test port 3 receiver attenuator	2	33325-60023
A48	Test port 4 receiver attenuator		
-	Machine screw, M3.0 x 6, flat head (to attach front frame to coupler plate)	2	0515-1946
-	Machine screw, M2.0 x 6, flat head (8 to attach two reference couplers to brackets)	8	0515-1602
-	Machine screw, M2.5 x 20, pan head (4 to attach A34 and A35 reference coupler assemblies to test set deck)	4	0515-0374
-	Machine screw, M4.0 x 10, pan head (2 each to attach the following boards to the analyzer chassis: A17 13.5 GHz synthesizer board, A10 26.5 GHz source board, A12 40 GHz doubler assembly port 3, and A13 40 GHz doubler assembly port 4.)	7	0515-0380
-	Machine screw, M3.0 x 6, pan head (4 to attach A47 and A48 receiver attenuator assembly to test set deck; 4 to attach A39 and A40 source attenuator assembly to test set deck.	8	0515-0430

Items Included in the Upgrade Kit

Table 1 **Contents of Upgrade Kit N5225-60118**

Ref Desig.	Description	Qty	Part Number
-	Machine screw, M3.0 x 12, pan head (1 to attach cable bracket to test set deck.	2	0515-0664
-	Machine screw, M3.0 x 8, pan head (3 to attach shield to A28 mixer brick; 8 to attach two src attn and two rcvr attn to brackets)	12	0515-0372
-	Machine screw, M2.5 x 16, pan head (2 to attach splitter to mixer brick)	2	0515-2007
-	Machine screw, M3.0 x 25, pan head (3 to attach A28 mixer brick to block)	2	0515-0667
-	Machine screw, M3.0 x 20, flat head (2 to attach bracket to A10 26.5 GHz source)	2	0515-2078
-	Machine screw, M3.0 x 18, pan head (1 to attach bracket to A10 26.5 GHz source)	1	0515-0666
-	Cable tie	5	1400-0249
-	Cable clamp	10	1400-1334
-	Dust caps for test ports	2	1401-0214
-	Test set front plate, 4-port	1	N5224-00005
-	Front panel overlay (label), 4-port	1	N5225-80006
-	Dress panel, lower 4-port	1	N5240-00009
-	2.4 mm dust cap for A28 mixer brick	1	N5247-20138
-	Gap pad (between mixer brick A28 and shield)	4	N5245-20125
-	Gap pad (between each test coupler and the test set front plate)	4	E4403-20033
-	Shield, mixer brick	1	N5245-00023
A69	3 dB pad, attached to R4 connector on A28 mixer brick	1	08490-60039
-	50 ohm load, attached to A13 40 GHz doubler	1	1250-4261
-	Vibration mount (between couplers 1 & 3, and 2 & 4)	2	0460-2725
-	Mounting nuts (for port 3 & 4 test port couplers)	2	5022-1087
-	Cable guard, center jumper cables	1	N5242-00049
-	Cable clamp, 1 to secure W25 (N5245-20116); 1 to secure W29 (N5245-20117).	6	1400-1334
-	Cable tie wrap, 1 to secure W44 (N5245-20020); 1 to secure W21 (N5245-20008).	6	1400-0249
-	Bracket for reference coupler	2	N5245-00017
-	Bracket for cables	1	N5245-00022
-	Bracket for receiver attenuator and source attenuator	4	N5245-00015
-	Bracket for A10 26.5 GHz source (2) board	1	N5247-20136
W2	RF cable, A10 source (2) P1 to A17 13.5 GHz source (2) synthesizer J1207 (4-port)	1	N5245-20100

Items Included in the Upgrade Kit

Table 1 Contents of Upgrade Kit N5225-60118

Ref Desig.	Description	Qty	Part Number
W7	RF cable, A10 source (2) P5 to A12 port 3 doubler	1	N5245-20034
W8	RF cable, A10 source (2) P3 to A13 port 4 doubler	1	N5245-20035
W9	RF cable, A10 source (2) P4 to A12 port 3 doubler	1	N5245-20032
W10	RF cable, A12 port 3 doubler to A13 port 4 doubler	1	N5245-20033
W13	RF cable, A12 port 3 doubler to W14	1	N5245-20036
W14	RF cable, A30 port 3 receiver coupler to W13	1	N5245-20043
W15	RF cable, A13 port 4 doubler to W16	1	N5245-20036
W16	RF cable, A31 port 4 receiver coupler to W15	1	N5245-20044
W20	RF cable, Front panel port 1 CPLR THRU to A33 port 1 coupler	1	N5245-20099
W21	RF cable, A29 port 1 receiver coupler to A37 reference mixer switch	1	N5245-20008
W22	RF cable, A33 port 1 coupler to front-panel Port 1 CPLR ARM	1	N5245-20014
W24	RF cable, Front panel port 3 CPLR THRU to A34 port 3 coupler	1	N5245-20098
W25	RF cable, A30 port 3 receiver coupler to front-panel REF 3 SOURCE	1	N5245-20116
W26	RF cable, A34 port 3 coupler to front-panel Port 3 CPLR ARM	1	N5245-20015
W28	RF cable, Front panel port 4 CPLR THRU to A35 port 4 coupler	1	N5245-20096
W29	RF cable, A31 port 4 receiver coupler to front-panel REF 4 SOURCE	1	N5245-20117
W30	RF cable, A35 port 4 coupler to front-panel Port 4 CPLR ARM	1	N5245-20018
W32	RF cable, Front panel port 2 CPLR THRU to A36 port 2 coupler	1	N5245-20097
W34	RF cable, A36 port 2 coupler to front-panel Port 2 CPLR ARM	1	N5245-20019
W36	RF cable, Front panel jumper	6	N5245-20155
W44	RF cable, REF 3 RCVR R3 IN to A28 mixer brick (R3)	1	N5245-20020
W45	RF cable, REF 4 RCVR R4 IN to A28 mixer brick (R4)	1	N5245-20191
W46	RF cable, REF 2 RCVR R2 IN to A27 mixer brick (R2) – (4-port only)	1	N5245-20115
W52 ^a	RF cable, A25 HMA26.5 to A26 splitter	1	N5245-20013
W53 ^a	RF cable, A26 splitter to A27 mixer brick	1	N5245-20023
W54 ^a	RF cable, A26 splitter to A28 mixer brick	1	N5245-20022
W62	RF cable, A27 mixer brick (R1) to A24 IF multiplexer (P411)	1	N5242-60021
W63	RF cable, A27 mixer brick (R2) to A24 IF multiplexer (P412)	1	N5242-60022
W65	RF cable, A28 mixer brick (D) to A24 IF multiplexer (P801)	1	N5242-60024

Table 1 Contents of Upgrade Kit N5225-60118

Ref Desig.	Description	Qty	Part Number
W66	RF cable, A28 mixer brick (R4) to A24 IF multiplexer (P414)	1	N5242-60019
W67	RF cable, A28 mixer brick (R3) to A24 IF multiplexer (P413)	1	N5242-60020
W68	RF cable, A28 mixer brick (C) to A24 IF multiplexer (P601)	1	N5242-60023
W70	RF cable, A24 IF multiplexer board P203 to A16 SPAM board J2	1	N5242-60013
W72	RF cable, A24 IF multiplexer board P603 to A16 SPAM board J5	1	N5242-60015
W77	RF cable, A14 frequency reference board J7 to A17 13.5 GHz (source 2) synthesizer board J5 (Located on bottom of board.)	1	N5242-60030
W85	RF cable, A30 port 3 receiver coupler to A39 port 3 source attenuator	1	N5245-20026
W86	RF cable, A39 port 3 source attenuator to front-panel Port 3 SOURCE OUT	1	N5245-20027
W89	RF cable, A31 port 4 receiver coupler to A40 port 4 source attenuator	1	N5245-20026
W90	RF cable, A40 port 4 source attenuator to front-panel Port 4 SOURCE OUT	1	N5245-20028
W99	RF cable, Port 3 RCVR C IN to A47 port 3 receiver attenuator	1	N5245-20073
W100	RF cable, A47 port 3 receiver attenuator to A28 mixer brick (C)	1	N5245-20066
W101	RF cable, Port 4 RCVR D IN to A48 port 4 receiver attenuator	1	N5245-20074
W102	RF cable, A48 port 4 receiver attenuator to A28 mixer brick (D)	1	N5245-20075
W203 ^b	RF cable, A25 HMA26.5 (top) to A28 mixer block (top)	1	N5245-20195
-	Ribbon cable, A23 test set motherboard J547 to A39 port 3 source attenuator	2	N5245-60006
-	Ribbon cable, A23 test set motherboard J548 to A40 port 4 source attenuator		
-	Ribbon cable, A23 test set motherboard J206 to A47 port 3 receiver attenuator	2	N5245-60026
-	Ribbon cable, A23 test set motherboard J207 to A48 port 4 receiver attenuator		
-	Ribbon cable, A23 test set motherboard J552 to A28 mixer brick (2) J52	1	N5247-60015

- a. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and **Figure 1 on page 7** and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".
- b. The N5245-20195 cable is used only with instruments that have a newer HMA26.5 installed. If your PNA has a legacy 5087-7765 HMA26.5 assembly installed, then this cable can be discarded. If you are unclear which HMA26.5 assembly your PNA has installed, refer to **Figure 1 on page 7**.

NOTE

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

Installation Procedure for the Upgrade

The network analyzer must be in proper working condition prior to installing this option. Any necessary repairs must be made before proceeding with this installation.

WARNING

This installation requires the removal of the analyzer's protective outer covers. The analyzer must be powered down and disconnected from the mains supply before performing this procedure.

NOTE

Some of the following figures provided in this procedure contain bias tees. Bias tees are included in the Option 219/419 upgrade kits and can be ignored for Options 217/417 and 222/422.

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 A23 Test Set Motherboard."
- "Step 6. Remove Some Bottom-Side (Test Set) Cables."
- "Step 7. Remove the A27 Mixer Brick Assembly."
- "Step 8. Assemble the A28 Mixer Brick Assembly."
- "Step 9. Install the A27/A28 Mixer Brick Assemblies."
- "Step 10. Assemble the A34 and A35 Reference Coupler Assemblies."
- "Step 11. Install the A34 and A35 Reference Coupler Assemblies."
- "Step 12. Assemble the A47 and A48 Receiver Attenuator Assemblies."
- "Step 13. Install the A47 and A48 Receiver Attenuator Assemblies."
- "Step 14. Assemble the A39 and A40 Source Attenuator Assemblies."
- "Step 15. Install the A39 and A40 Source Attenuator Assemblies."
- "Step 16. Assemble the A33 - A36 Test Port Coupler Assemblies."
- "Step 17. Install the LED Boards, Bulkhead Connectors, and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate."
- "Step 18. Install the 4-Port Coupler Plate Assembly to the Deck."
- "Step 19. Assemble and Install the A12 and A13 40 GHz Doubler Assemblies."
- "Step 20. Install Bracket to A10 Source Assembly."

- “Step 21. Assemble the A10 26.5 GHz Source 2 Assembly.”
- “Step 22. Install the A10 26.5 GHz Source 2 Assembly and Cables.”
- “Step 23. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables.”
- “Step 24. Install the Cable Bracket Mount.”
- “Step 25. Install Some Bottom-Side (Test Set) Cables.”
- “Step 26. Secure the Front Panel Bulkhead Connectors.”
- “Step 27. Install Cables on IF Multiplexer Board.”
- “Step 28. Reinstall the A23 Test Set Motherboard.”
- “Step 29. Install Cables on the A23 Test Set Motherboard.”
- “Step 30. Replace the Front Panel’s Lower Dress Panel.”
- “Step 31. Reinstall Front Panel Assembly.”
- “Step 32. Install the Overlay.”
- “Step 33. Install the Front Panel Jumper Cables.”
- “Step 34. Position the Cables and Wires to Prevent Pinching.”
- “Step 35. Reinstall the Inner Cover.”
- “Step 36. Reinstall the Outer Cover.”
- “Step 37. Remove Option 217 License.”
- “Step 38. Enable Options 417.”
- “Step 39. Verify the PNA Analyzer Program is Running with the Correct Options.”
- “Step 40. Perform Post-Upgrade Adjustments and Calibration.”
- “Step 41. Prepare the PNA for the User.”

Step 1. Obtain a Keyword and Verify the Information

Follow the instructions on the Software Entitlement Certificate supplied to obtain a license key for installation of this upgrade. Refer to **“License Key Redemption” on page 6**.

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 4**.

Step 2. Remove the Outer Cover

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

Step 3. Remove the Inner Cover

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

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 A23 Test Set Motherboard

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A23 test set motherboard” in the PDF Service Guide¹.

1. See **“Downloading the Online PNA Service Guide” on page 7**.

Step 6. Remove Some Bottom-Side (Test Set) Cables

CAUTION

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

NOTE

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

1. Place the analyzer bottom-side up on a flat surface.
2. Remove the following cables. To see an image showing the location of these cables, click the Chapter 6 bookmark "Bottom RF Cables, Standard 2-Port Configuration, Option 217 (S/N Prefixes <6021)" or "Bottom RF Cables, Standard 2-Port Configuration, Option 217 (S/N Prefixes ≥6021)" in the PDF Service Guide.¹

These cables may be discarded - they will not be reinstalled.

- W20 (N5245-20045) Front panel port 1 CPLR THRU to A33 port 1 coupler
- W21 (N5245-20118) A29 port 1 receiver coupler to A37 reference mixer switch
- W22 (N5245-20025) A33 port 1 coupler to front-panel REF 1 CPLR ARM
- W32 (N5245-20106) Front panel port 2 CPLR THRU to A36 port 2 coupler
- W34 (N5245-20024) A36 port 2 coupler to front-panel REF 2 CPLR ARM
- W46 (N5245-20119) A27 mixer brick (R2) to front-panel REF 2 RCVR R2 IN - (2-port only)
- W62 (N5242-60025) A27 mixer brick (R1) to A24 IF multiplexer (P601)
- W63 (N5242-60026) A27 mixer brick (R2) to A24 IF multiplexer (P801)
- W70 (N5247-60024) A24 IF multiplexer board P203 to A16 SPAM board J5
- W72 (N5247-60023) A24 IF multiplexer board P603 to A16 SPAM board J2
- W80 (N5245-20048) A25 HMA26.5 to A27 mixer brick

These cables must be saved - they will be reinstalled.

- W12 (N5245-20050) A29 port 1 receiver coupler to W11
- W18 (N5245-20049) A32 port 2 receiver coupler to W17

1. See ["Downloading the Online PNA Service Guide" on page 7](#).

- W36 (N5245-20155) Front panel jumpers (quantity = 6)

NOTE

Remove and save the cable guards for the front panel jumpers.

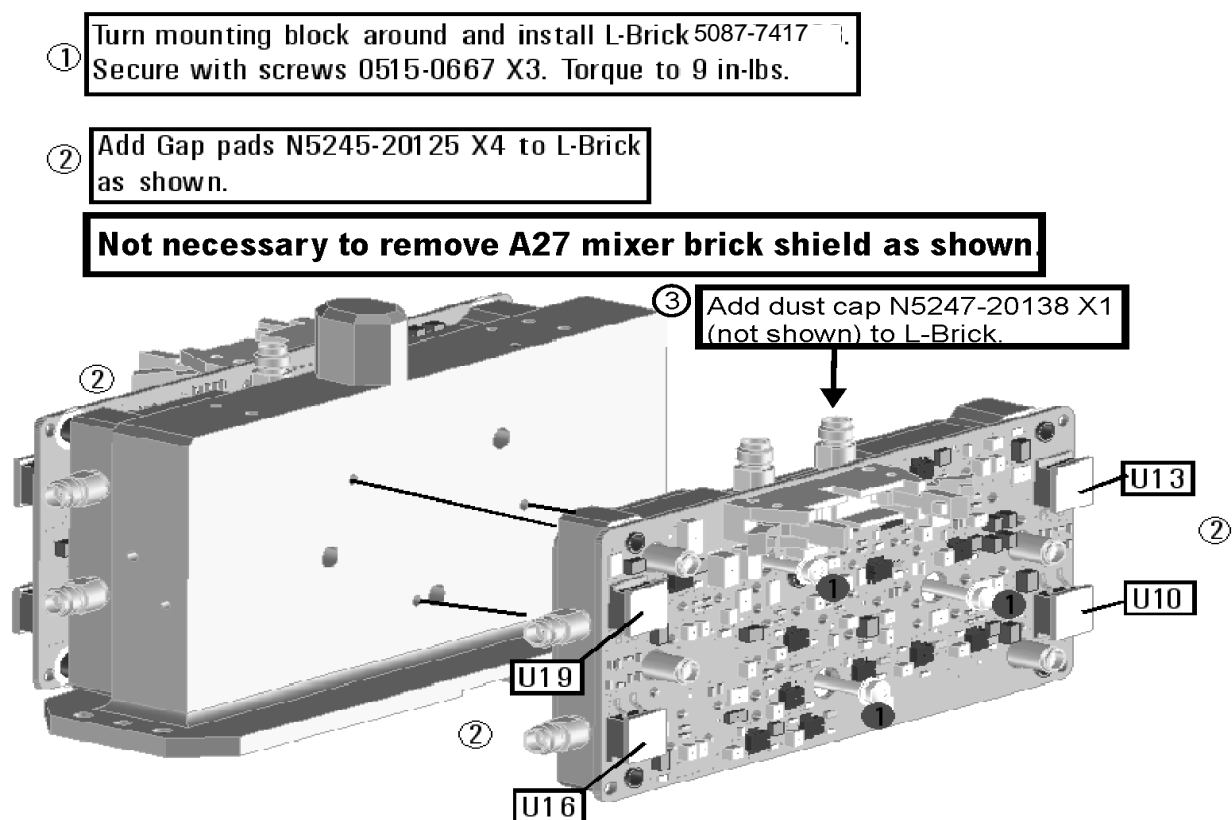
Step 7. Remove the A27 Mixer Brick Assembly

Remove the A27 mixer brick assembly from the PNA. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A27 and A28 Mixer Bricks” in the PDF Service Guide¹.

Step 8. Assemble the A28 Mixer Brick Assembly

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

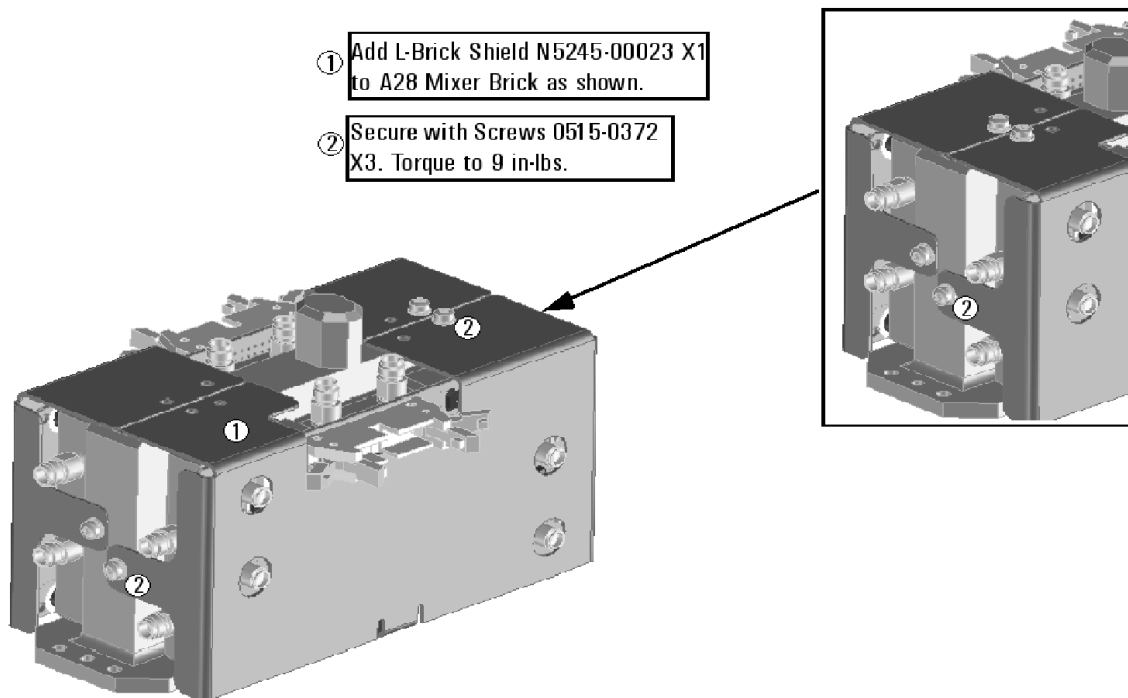
Figure 2 A27/A28 Mixer Brick Assembly (5087-7417, N5245-20125, 0515-0667, N5247-20138)



N5225_124_04

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

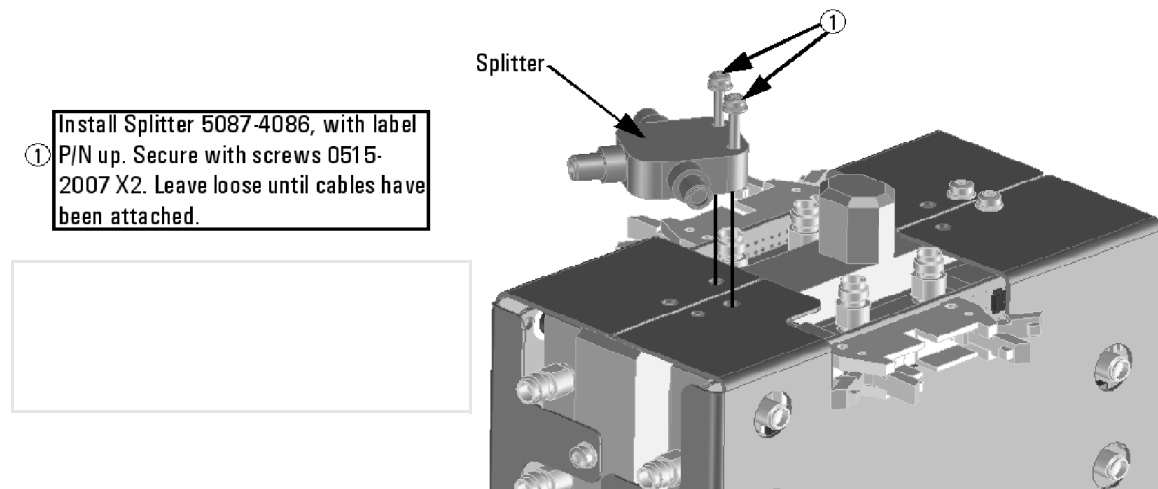
Figure 3 A28 Mixer Brick Shield Installation (N5245-00023, 0515-0372)



N5225_124_05

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

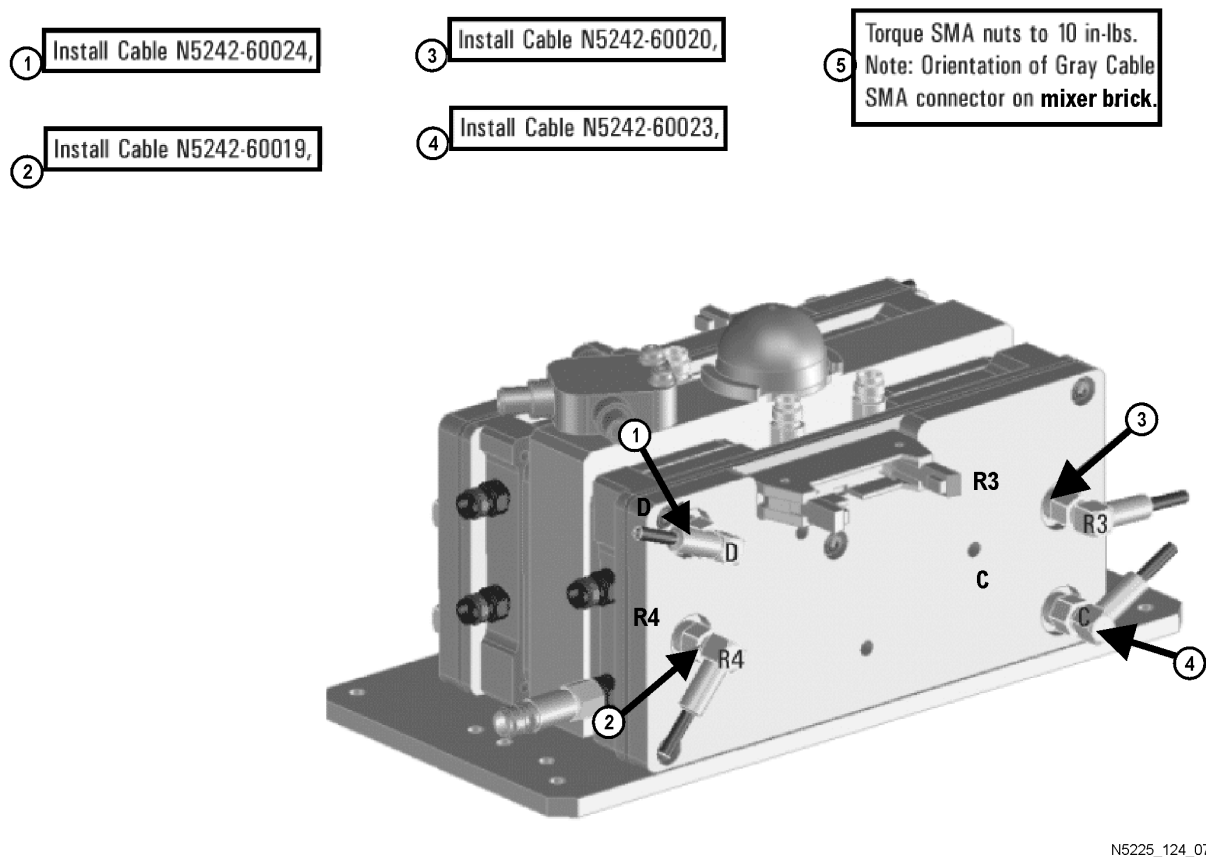
Figure 4 A26 Splitter Installation (5067-4086, 0515-2007)¹



1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and **Figure 1 on page 7** and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".

4. Connect the gray flexible cables to the A28 mixer in the order shown in **Figure 5**. The other ends of the cables will be connected when the IF board is reinstalled later.

Figure 5 A28 Mixer Brick Cable Installation (N5242-60019, N5242-60020, N5242-60023, N5242-60024)^{1, 2}



1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and **Figure 1 on page 7** and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".
2. Attenuator 08490-60039 is shown in the figure, but is not included in this upgrade and not required with the A28 mixer brick (5087-7417).

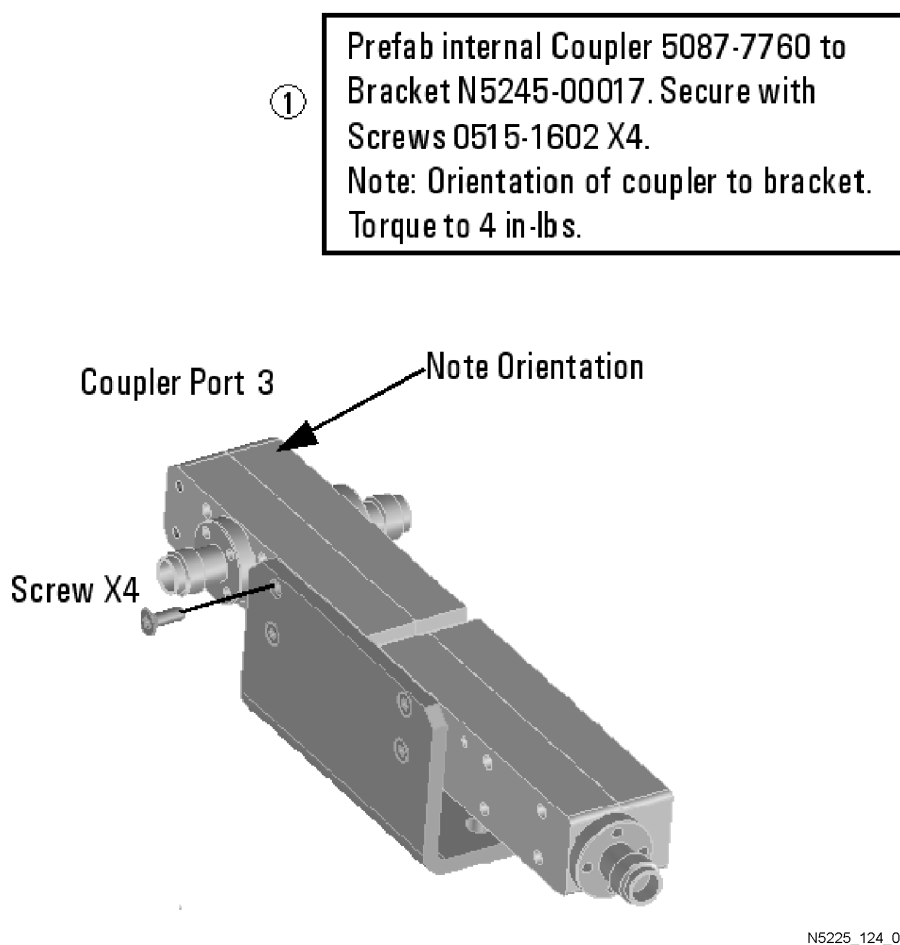
Step 9. Install the A27/A28 Mixer Brick Assemblies

Reinstall the A27 mixer brick cables, and then install the A27/A28 mixer brick assembly, reusing the four existing screws. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A27 and A28 Mixer Bricks” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 10** of this document.

Step 10. Assemble the A34 and A35 Reference Coupler Assemblies

Follow the instructions shown in **Figure 6** and **Figure 7**. New parts are listed in **Table 1 on page 10** of this document.

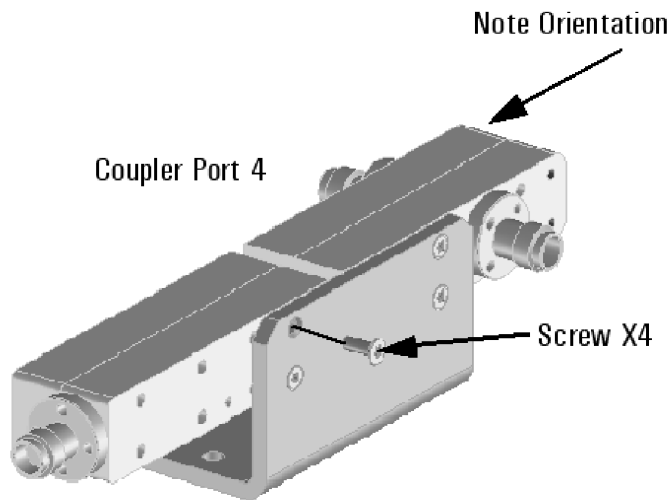
Figure 6 A34 Reference Coupler Port 3 Assembly (0515-7760, 5087-7760, N5245-00017)



1. See **“Downloading the Online PNA Service Guide” on page 7.**

Figure 7 A35 Reference Coupler Port 4 Assembly (0515-7760, 5087-7760, N5245-00017)

- ① Prefab internal Coupler 5087-7760 to Bracket N5245-00017. Secure with Screws 0515-1602 X4.
Note orientation of coupler to bracket. Torque to 4 in-lbs.

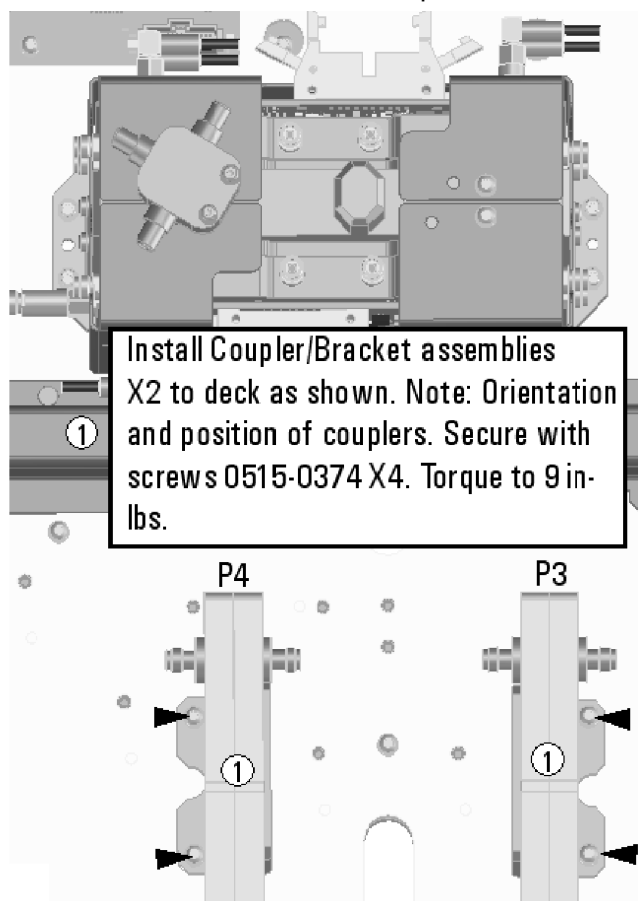


N5225_124_11

Step 11. Install the A34 and A35 Reference Coupler Assemblies

Follow the instructions shown in **Figure 8**. New parts are listed in **Table 1** on **page 10** of this document.

Figure 8 A34 and A35 Reference Coupler Assemblies Installation (0515-0374)^{1, 2}

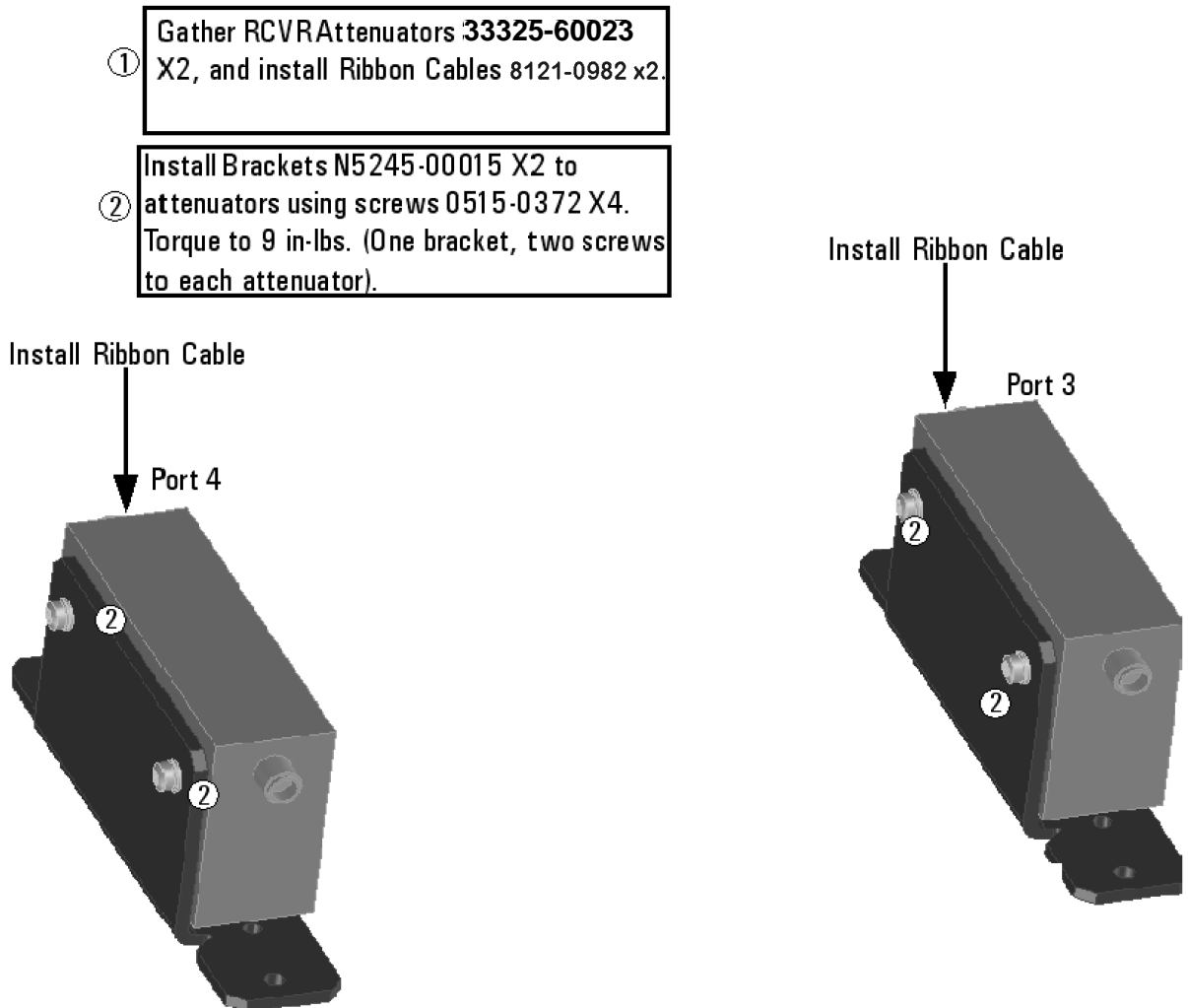


1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and **Figure 1** on **page 7** and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".
2. Attenuator 08490-60039 is shown in the figure, but is not included in this upgrade and not required with the A28 mixer brick (5087-7417).

Step 12. Assemble the A47 and A48 Receiver Attenuator Assemblies

Follow the instructions shown in **Figure 9**. New parts are listed in **Table 1** on **page 10** of this document.

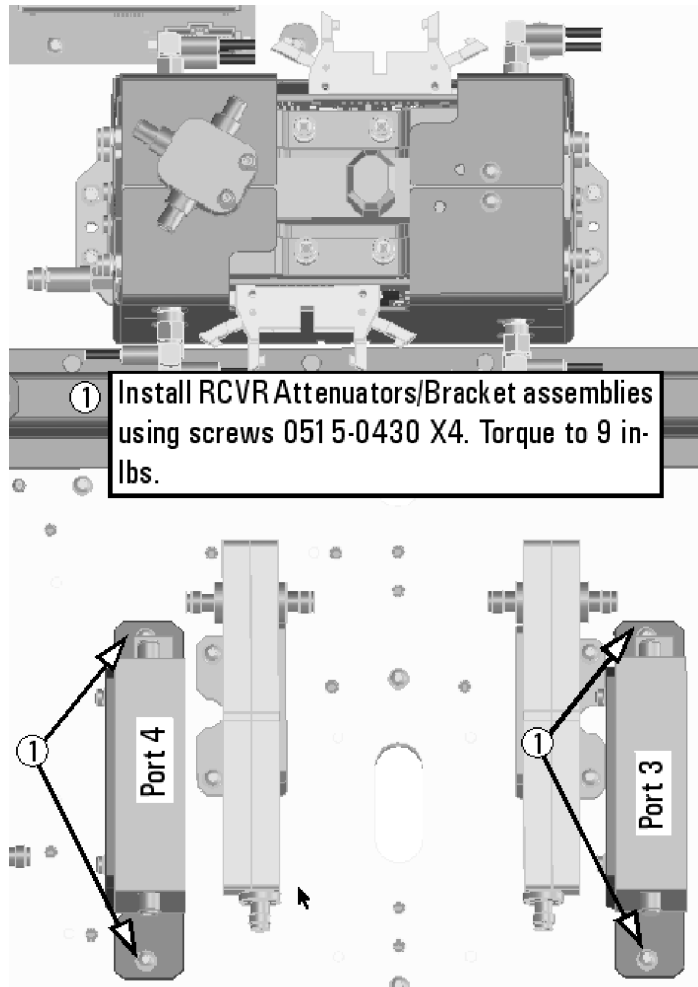
Figure 9 A47 and A48 Receiver Attenuators Assembly (33325-60023, 8121-0982, N5245-00015, and 0515-0372)



Step 13. Install the A47 and A48 Receiver Attenuator Assemblies

Follow the instructions shown in **Figure 9-1**. New parts are listed in **Table 1** on **page 10** of this document.

Figure 9-1 A47 and A48 Receiver Attenuator Assemblies Installation (0515-0430)^{1, 2}



N5225_124_13

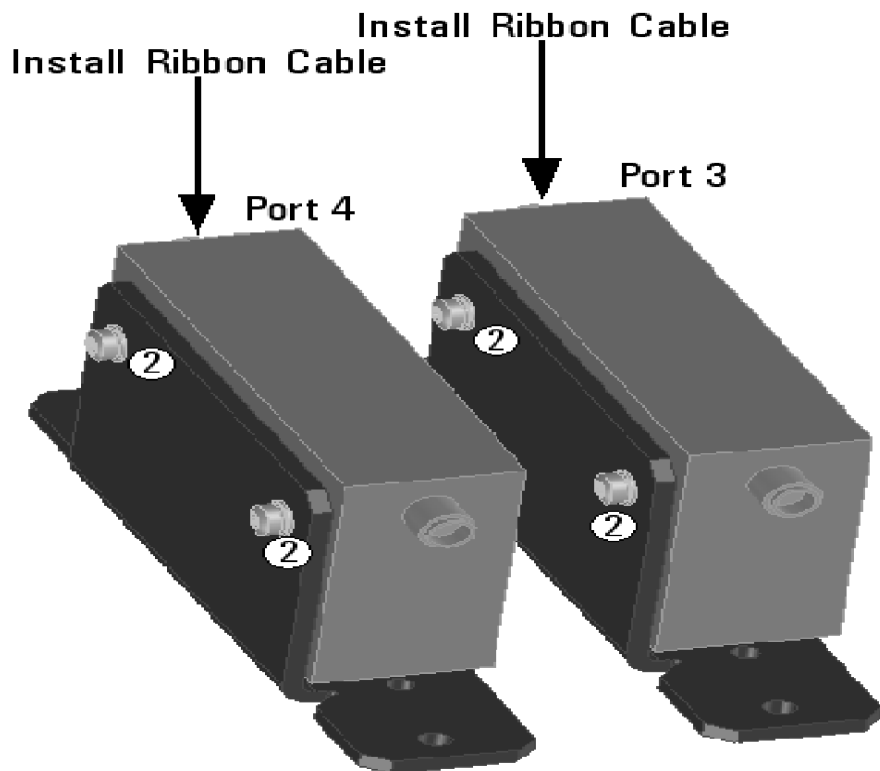
1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and **Figure 1 on page 7** and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 "2-Port Configurations, Serial Number Prefix <6021" and "4-Port Configuration, Serial Number Prefix <6021".
2. Attenuator 08490-60039 is shown in the figure, but is not included in this upgrade and not required with the A28 mixer brick (5087-7417).

Step 14. Assemble the A39 and A40 Source Attenuator Assemblies

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

Figure 10 A39 and A40 Source Attenuators Assembly (33325-60022, N5245-60006, N5245-00015, and 0515-0372)

- ① **Gather SCRA Attenuators 33325-60022 X2, and install Ribbon Cables N5245-60006 X2. (Source)**
- ② **Install Brackets N5245-00015 X2 to attenuators using screws 0515-0372 X4. Torque to 9 in-lbs. (One bracket, two screws to each attenuator).**



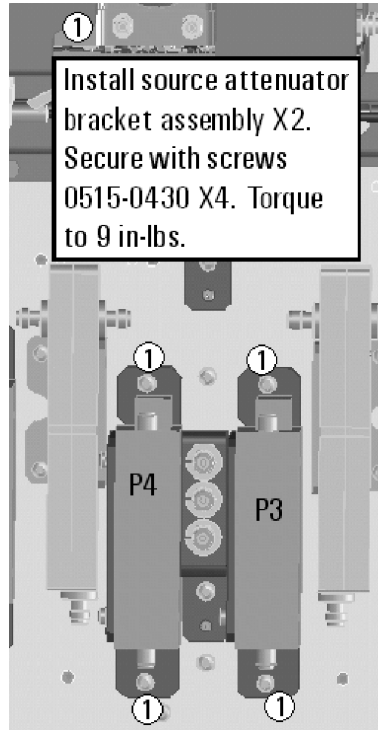
N5225_124_14

Step 15. Install the A39 and A40 Source Attenuator Assemblies

Follow the instructions shown in **Figure 11**. New parts are listed in **Table 1** on **page 10** of this document.

Figure 11

A39 and A40 Source Attenuator Assemblies Installation (0515-0430)



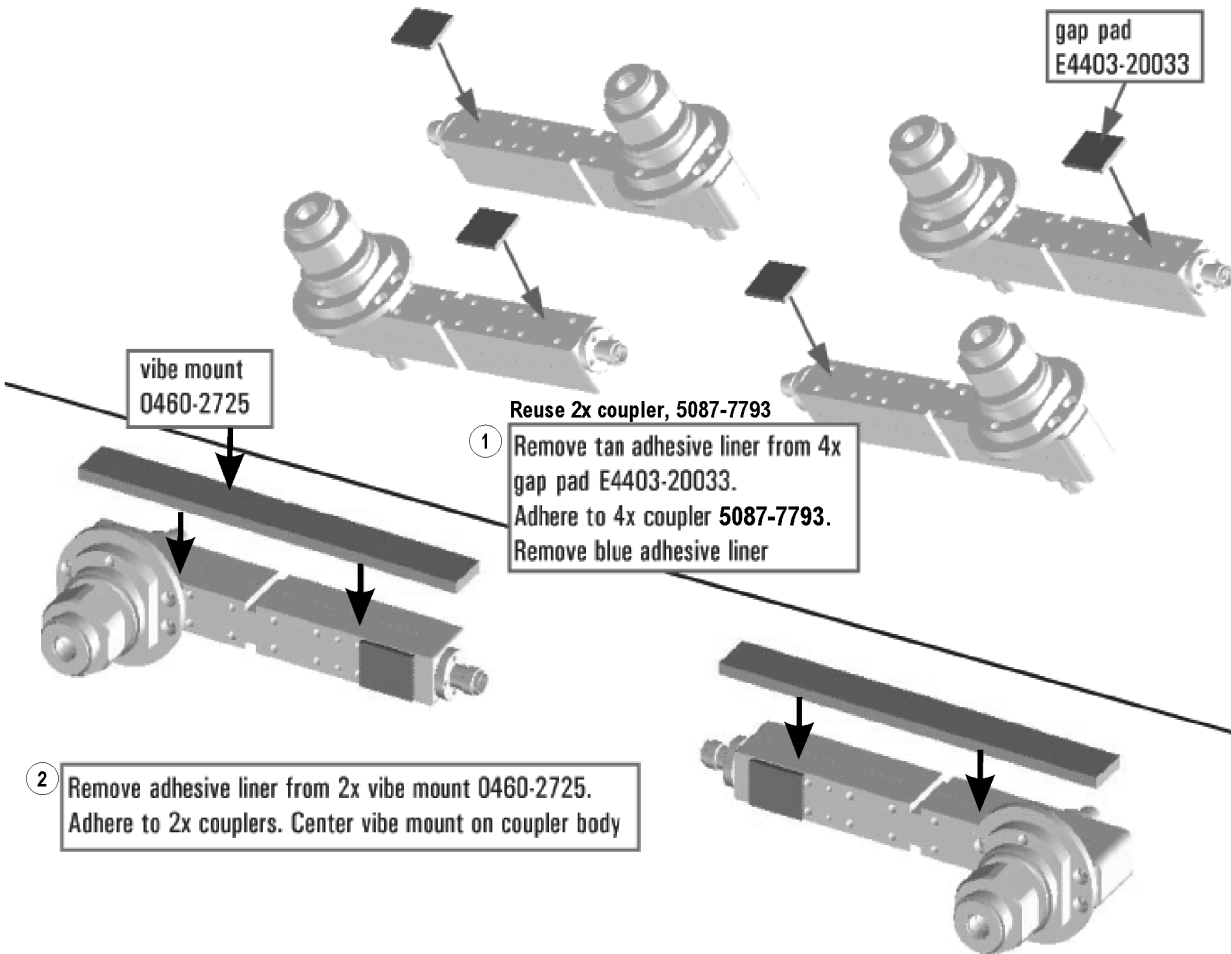
N5225_124_15

Step 16. Assemble the A33 - A36 Test Port Coupler Assemblies

1. Remove the A33 test port 1 coupler and A36 test port 2 coupler from the PNA. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A33 - A36 Test Port Couplers" in the PDF Service Guide¹.
2. Using pliers, remove the adhesive bumper on the A33 test port 1 coupler and on the A36 test port 2 coupler.
3. Follow the two instructions shown in **Figure 12**. New parts are listed in **Table 1 on page 10** of this document.

Figure 12

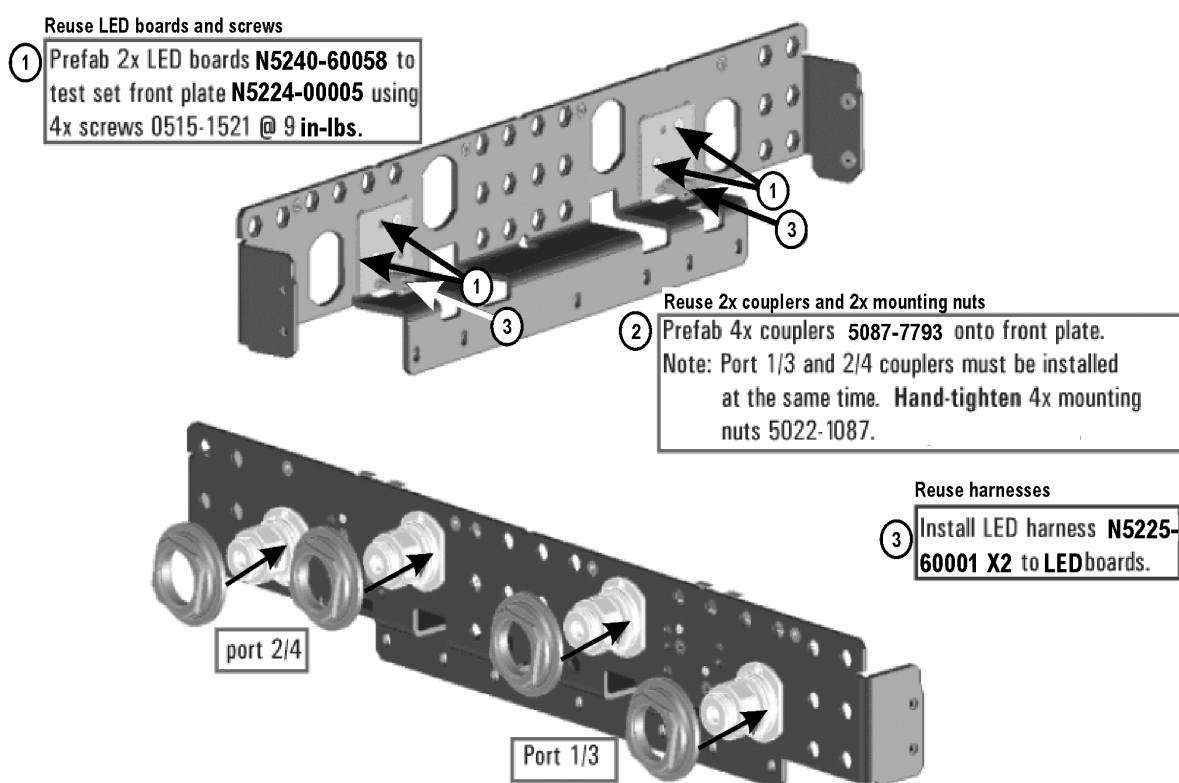
A33 - A36 Test Port Coupler Assembly (E4403-20033, 0460-2725, 5087-7793)



Step 17. Install the LED Boards, Bulkhead Connectors, and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate

1. Remove two screws from each LED board and remove the boards from the 2-port test set front plate of the PNA.
2. Remove the 2-port test set front plate from the test set deck. Keep the screws for reuse later.
3. Follow the two instructions shown in **Figure 13**.

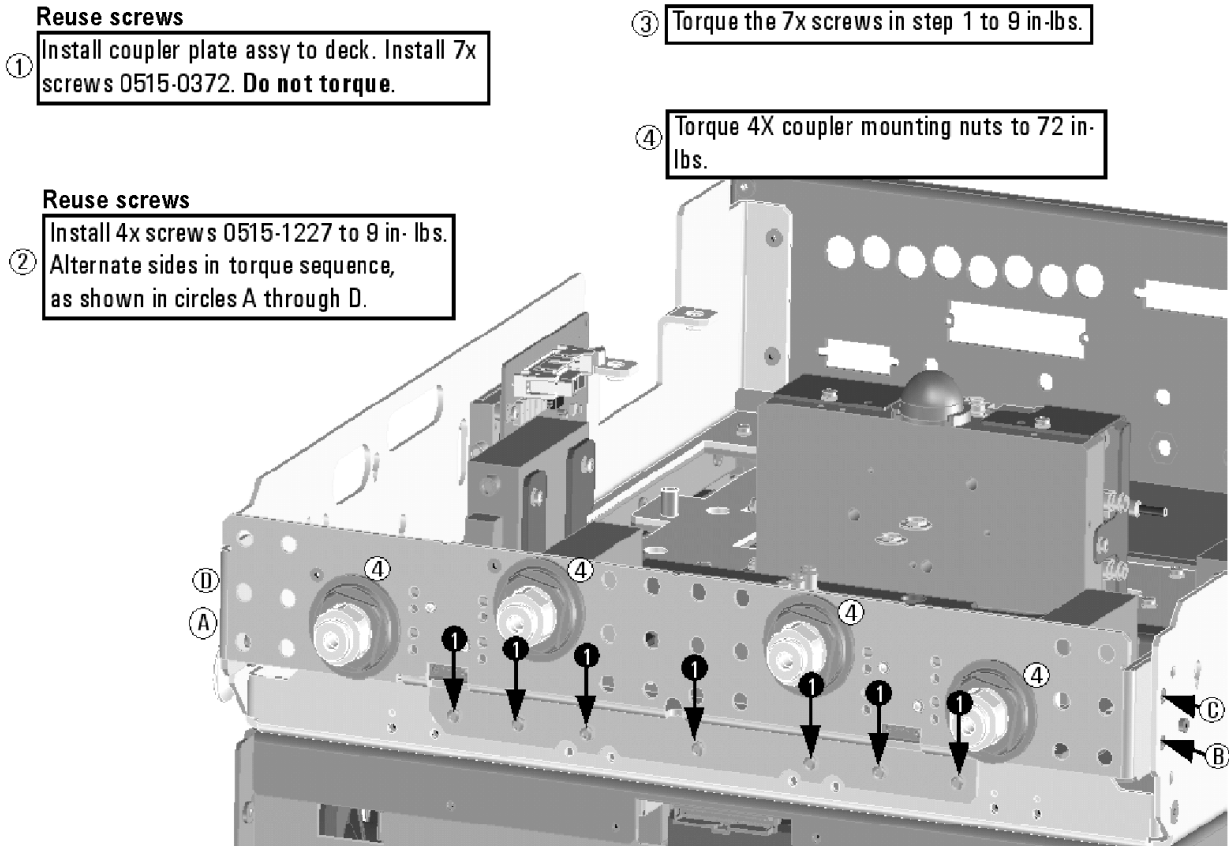
Figure 13 LED Board Assemblies and Test Port Coupler Assemblies Installation (N5240-60058, 5224-00005, 5087-7793, N5225-60001)



Step 18. Install the 4-Port Coupler Plate Assembly to the Deck

Follow the four instructions shown in **Figure 14**.

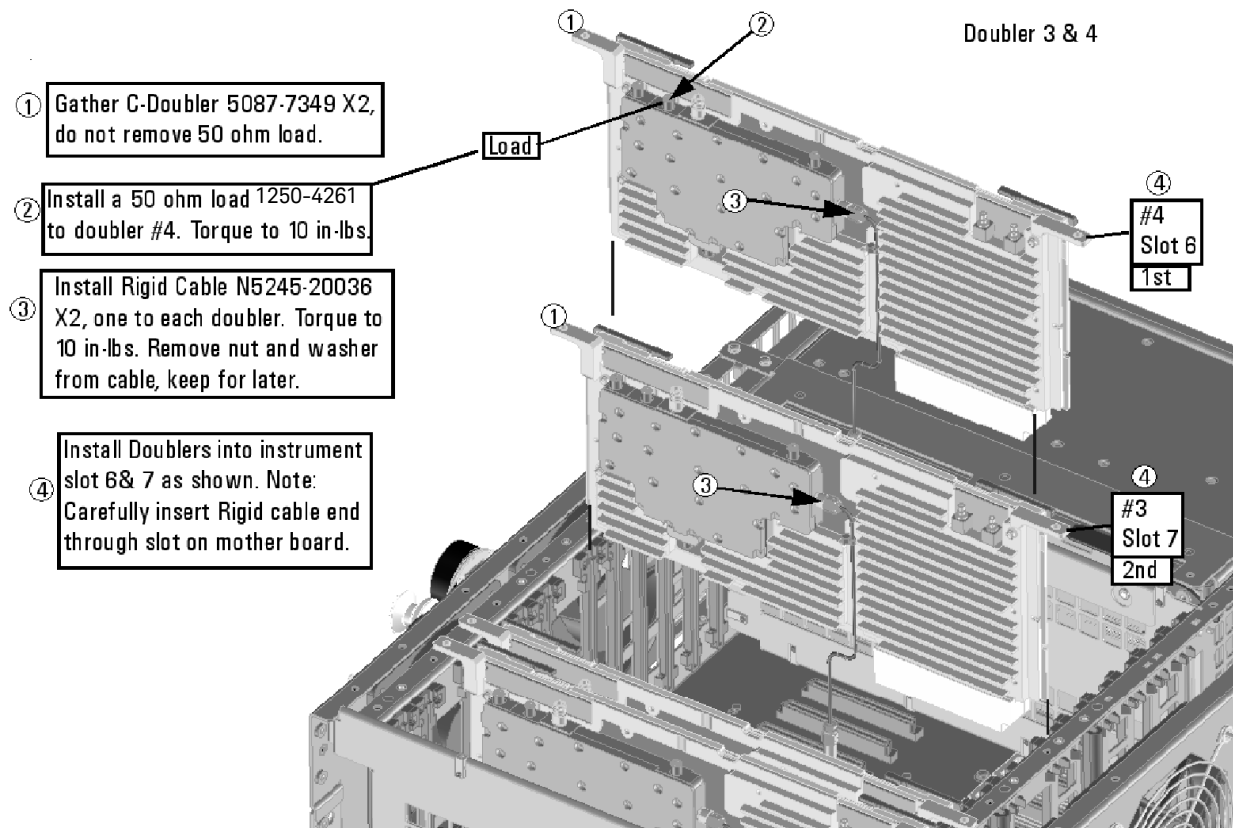
Figure 14 Coupler Plate Assembly Installation (0515-0372, 0515-1227)



Step 19. Assemble and Install the A12 and A13 40 GHz Doubler Assemblies

Follow the instructions shown in **Figure 15**.

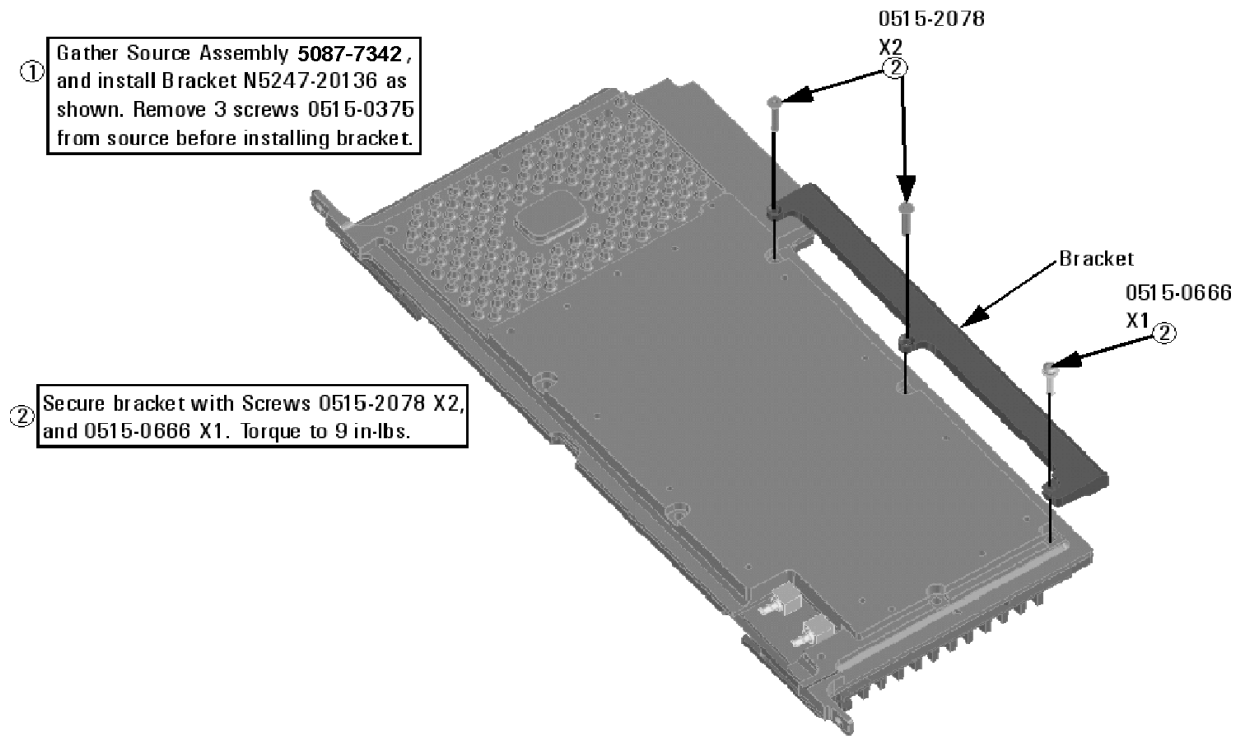
Figure 15 A12 and A13 40 GHz Doubler Installation (5087-7349, 1250-4261, N5245-20036)



Step 20. Install Bracket to A10 Source Assembly

Follow the two instructions shown in **Figure 16**.

Figure 16 A10 Source 2 Assembly Bracket Installation (5087-7342, N5247-20136, 0515-0375, 0515-2078, 0515-0666)



Step 21. Assemble the A10 26.5 GHz Source 2 Assembly

Follow the four instructions shown in **Figure 17**.

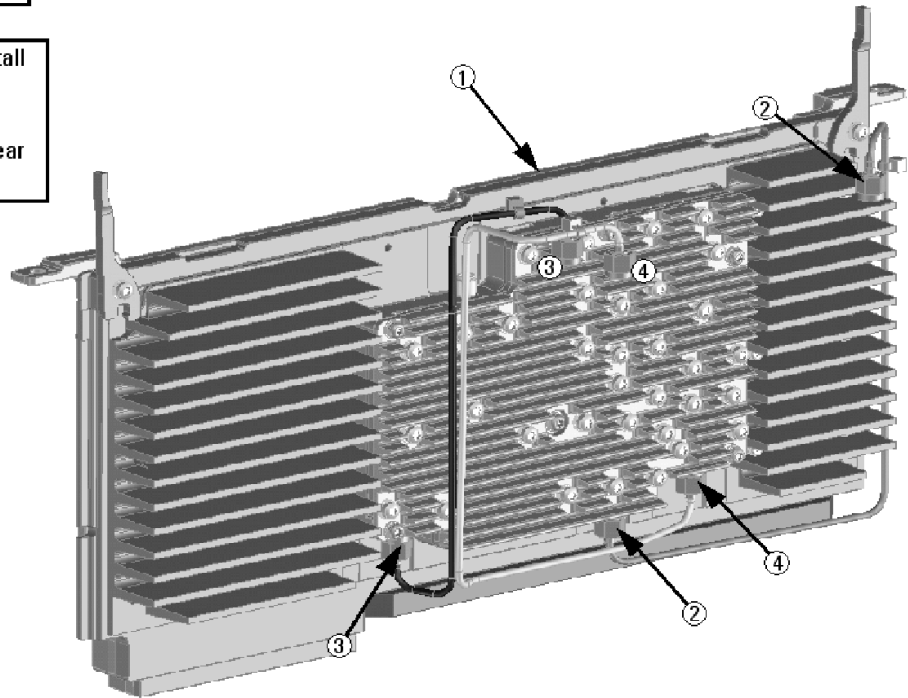
Figure 17 A10 Source 2 Assembly (5087-7342, N545-20032, N5245-20034, N5245-20035)

① Gather Source **5087-7342**.

② Remove SMA Load, and Install Rigid cable N5245-20032. Torque to 10 in-lbs. Keep the SMA Load for later use at rear panel

③ Install Rigid Cable N5245-20034. Torque to 10 in-lbs.

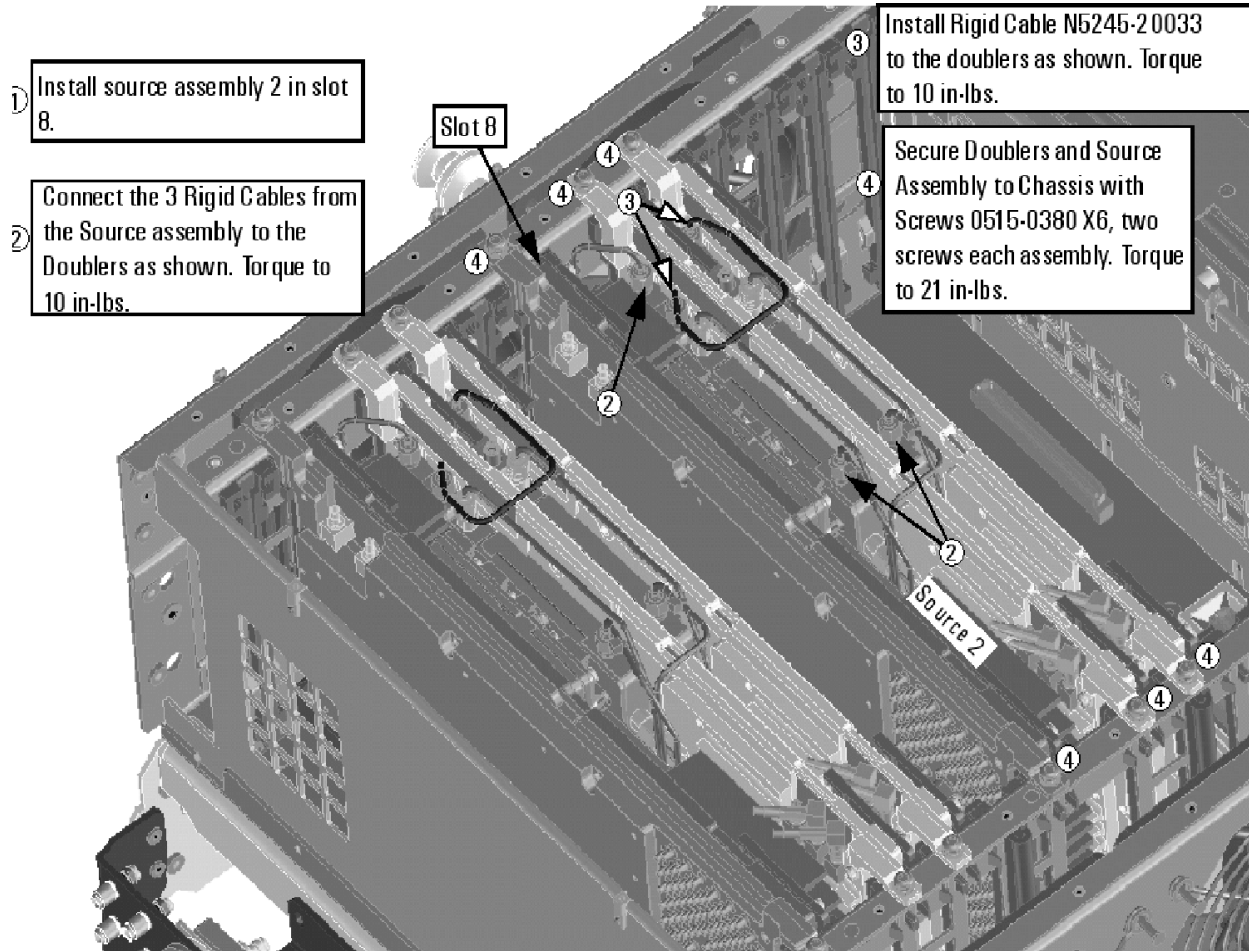
④ Install Rigid Cable **N5245-20035** . Torque to 10 in-lbs.



Step 22. Install the A10 26.5 GHz Source 2 Assembly and Cables

Follow the four instructions shown in **Figure 18**.

Figure 18 A10 Source 2 Assembly Installation (N5245-20033, 0515-0380)



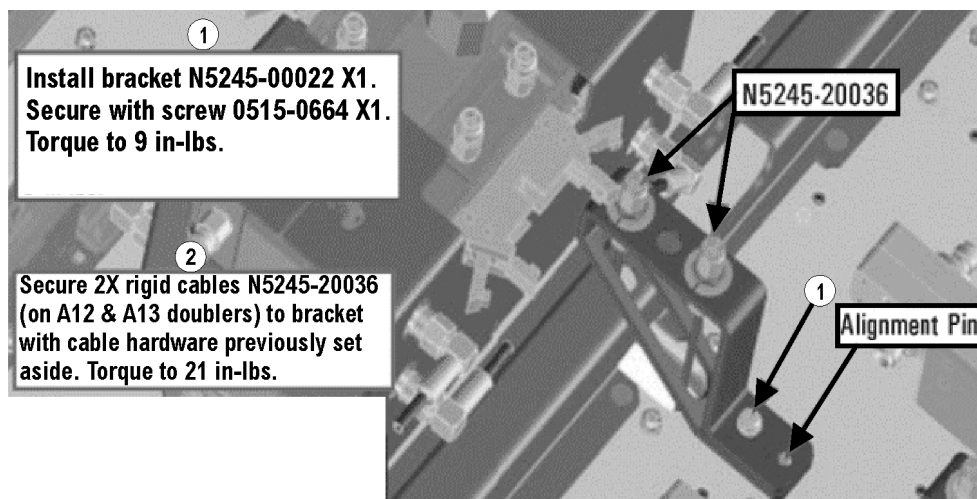
Step 23. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables

1. Install new gray cable W77 (N5242-60030) to connector J5 of the new A17 (source 2) synthesizer board (N5240-60074). The loose end of the cable will be connected on the A14 frequency reference board (J7) after the A17 board has been installed in the analyzer.
2. Install the A17 board into slot 2 in the motherboard. Secure the board into the chassis using two screws (0515-0380). To see an image showing the location of the A17 board in the motherboard, click the Chapter 6 bookmark “Top Assemblies, All Options” in the PDF Service Guide¹.
3. Connect cable W2 (N5245-20100) between the A10 source 2 board and the A17 (source 2) synthesizer board, positioning the cable in the wire looms. Tighten the cable connectors to 10 in-lbs using a 5/16-in torque wrench.
4. Connect the loose end of new gray flex cable W77 (N5242-60030) on the A14 frequency reference board (J7). (The other end of this cable was previously connected to J5 of the source 2 synthesizer board.)

Step 24. Install the Cable Bracket Mount

1. Follow the two instructions shown in **Figure 19**. New parts are listed in **Table 1 on page 10** of this document.

Figure 19 Cable Bracket Mount Installation (N5245-00022, 0515-0664, N5245-20036)



N5225_124_25

1. See “[Downloading the Online PNA Service Guide](#)” on page 7.

Step 25. Install Some Bottom-Side (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 semirigid 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.

CAUTION

Cables that are to be reinstalled are designated with “reuse.”

Semirigid Cables Required for Upgrading to an Option 417 PNA

To see images showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 417, S/N Prefixes <6021” or “Bottom RF Cables, 4-Port, Option 417, S/N Prefixes ≥6021” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 10**.

- W34 (N5245-20019) A36 port 2 coupler to front-panel Port 2 CPLR ARM
- W32 (N5245-20097) RF cable, Front panel port 2 CPLR THRU to A36 port 2 coupler
- W28 (N5245-20096) RF cable, Front panel port 4 CPLR THRU to A35 port 4 coupler
- W46 (N5245-20115) REF 2 RCVR R2 IN to A27 mixer brick (R2) – (4-port only)
- W101 (N5245-20074) Port 4 RCVR D IN to A48 port 4 receiver attenuator
- W30 (N5245-20018) A35 port 4 coupler to front-panel Port 4 CPLR ARM
- W45 (N5245-20191) REF 4 RCVR R4 IN to A28 mixer brick (R4)
- W90 (N5245-20028) A40 port 4 source attenuator to front-panel Port 4 SOURCE OUT
- W102 (N5245-20075) A48 port 4 receiver attenuator to A28 mixer brick (D)
- W29 (N5245-20117) A31 port 4 receiver coupler to front-panel REF 4 SOURCE OUT

* As shown in **Figure 20**, install clamp part number 1400-1334 to secure W29 (N5245-20117).

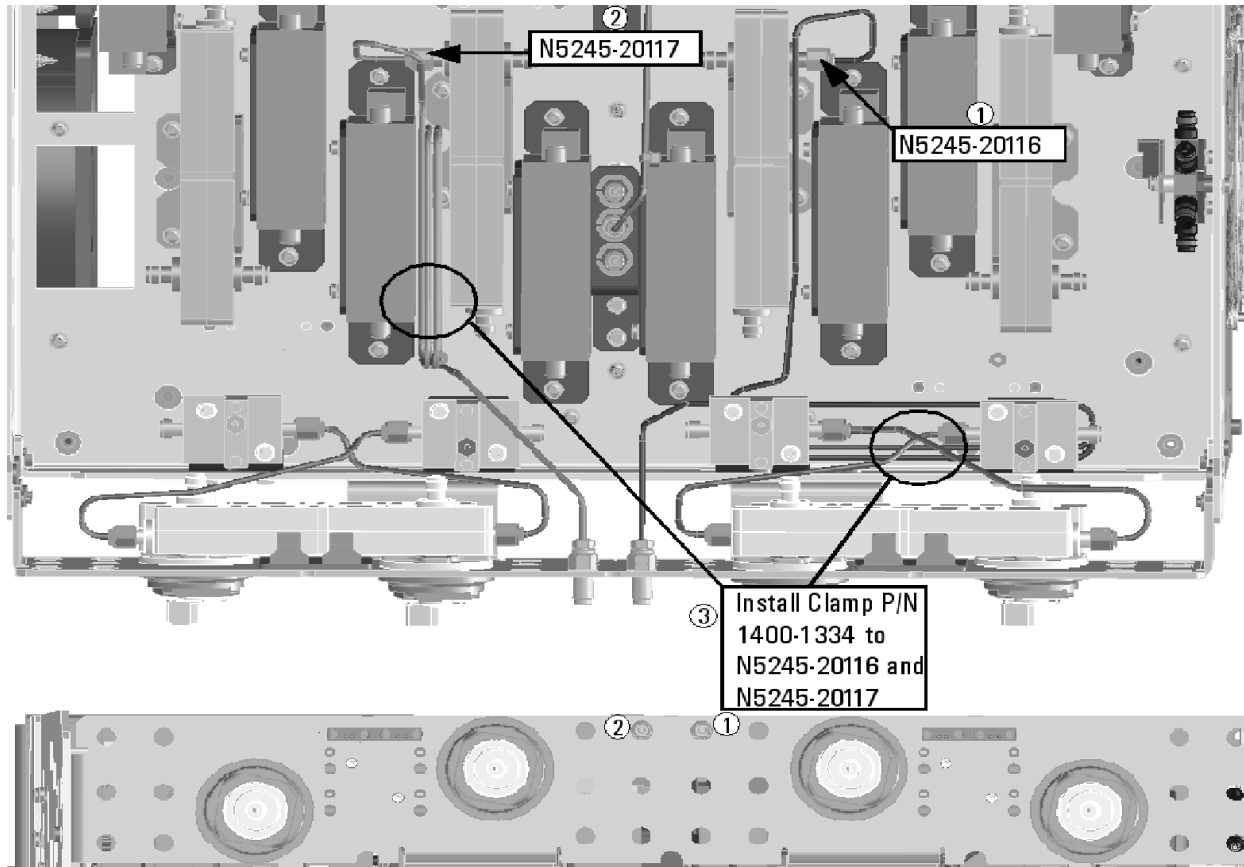
1. See **“Downloading the Online PNA Service Guide” on page 7**.

Installation Procedure for the Upgrade

- W18 (reuse) (N5245-20049) A32 port 2 receiver coupler to W17
- W85 (N5245-20026) A30 port 3 receiver coupler to A39 port 3 source attenuator
- W89 (N5245-20026) A31 port 4 receiver coupler to A40 port 4 source attenuator
- W99 (N5245-20073) Port 3 RCVR C IN to A47 port 3 receiver attenuator
- W20 (N5245-20099) Front panel port 1 CPLR THRU to A33 port 1 coupler
- W26 (N5245-20015) A34 port 3 coupler to front-panel Port 3 CPLR ARM
- W24 (N5245-20098) Front panel port 3 CPLR THRU to A34 port 3 coupler
- W12 (reuse) (N5245-20050) A29 port 1 receiver coupler to W11
- W86 (N5245-20027) A39 port 3 source attenuator to front-panel Port 3 SOURCE OUT
- W25 (N5245-20116) A30 port 3 receiver coupler to front-panel REF 3 SOURCE OUT

* As shown in **Figure 20**, install two clamps (part number 1400-1334) to secure W25 (N5245-20116).

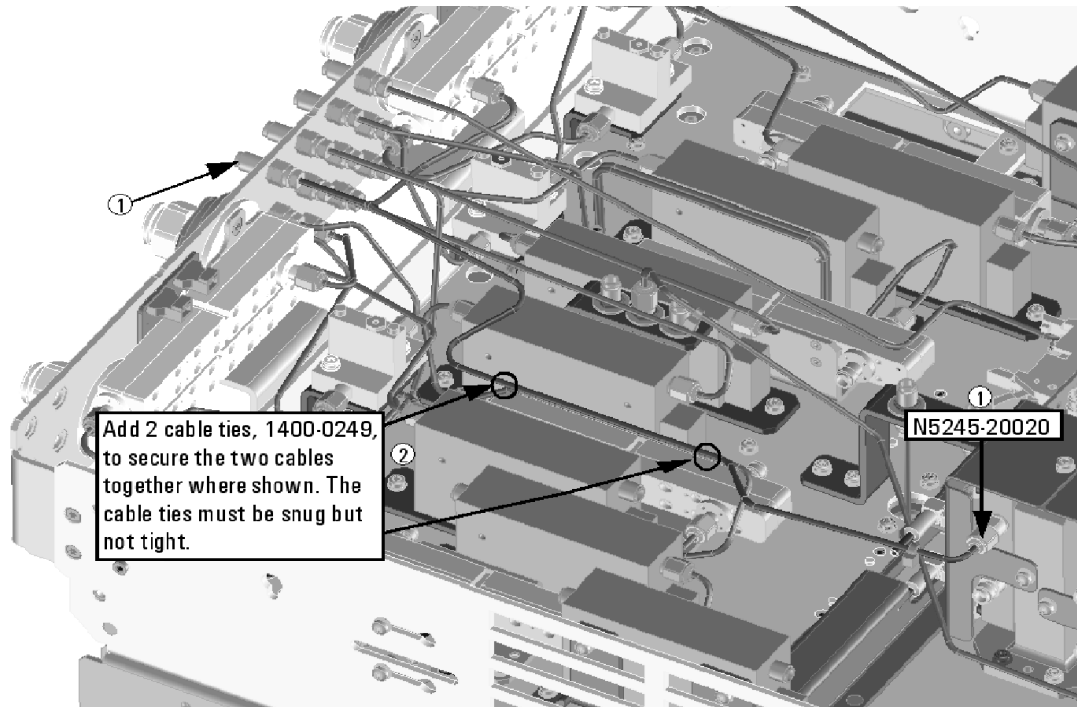
Figure 19-1 Location of W25 Cable Securing Clamp (1400-1334, N5245-20116 N5245-20117)



- W100 (N5245-20066) A47 port 3 receiver attenuator to A28 mixer brick (C)
- W44 (N5245-20020) REF 3 RCVR R3 IN to A28 mixer brick (R3)

* As shown in **Figure 21**, install two cable ties (part number 1400-1334) to secure W44.

Figure 19-2 Location of Cable Ties to Secure W44 (1400-0249, N5245-20020)

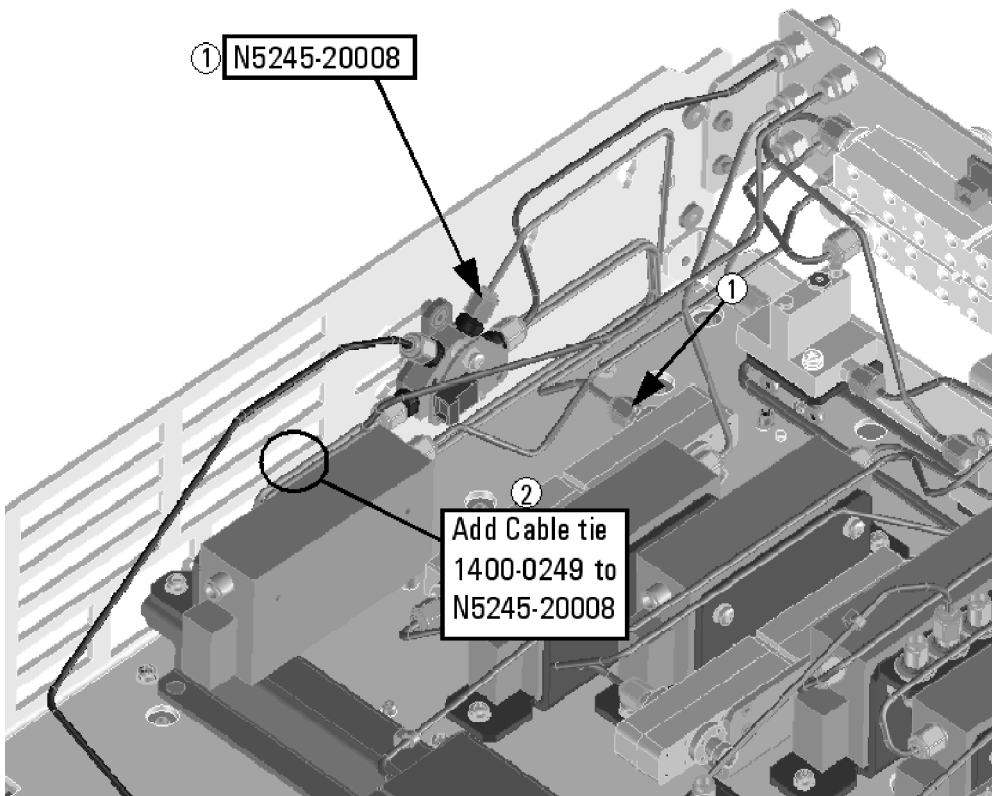


- W14 (N5245-20043) A30 port 3 receiver coupler to W13
- W16 (N5245-20044) A31 port 4 receiver coupler to W15
- W22 (N5245-20014) A33 port 1 coupler to front-panel Port 1 CPLR ARM
- W21 (N5245-20008) A29 port 1 receiver coupler to A37 reference mixer switch

* If the screws that attach the reference mixer switch to the test set deck were loosened, torque these screws now to 9 in-lbs.

* As shown in **Figure 22**, install a cable tie (part number 1400-1334) to secure W21.

Figure 19-3 Location of Cable Tie to Secure W21 (1400-0249, N5245-20008)



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.)

- W203 (N5245-20195) RF cable, A24 mixer brick (top connector) to A21 HMA26.5 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 W203 cable. You can discard the cap.

See also, [“Verify the Model/Version of HMA26.5 Installed” on page 7.](#)

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.)

Installation Procedure for the Upgrade

- W52 (N5452-20013) A21 HMA26.5 to A22 splitter
NOTE: Tighten both screws on the splitter to 9 in-lbs.
- W53 (N5245-20023) A22 splitter to A24 mixer brick
- W54 (N5245-20022) A22 splitter to A23 mixer brick

(If you have the legacy 5086-7765 HMA26.5, please discard N5245-20195¹ semi-rigid cable. Refer to [Figure 1 on page 7](#).)

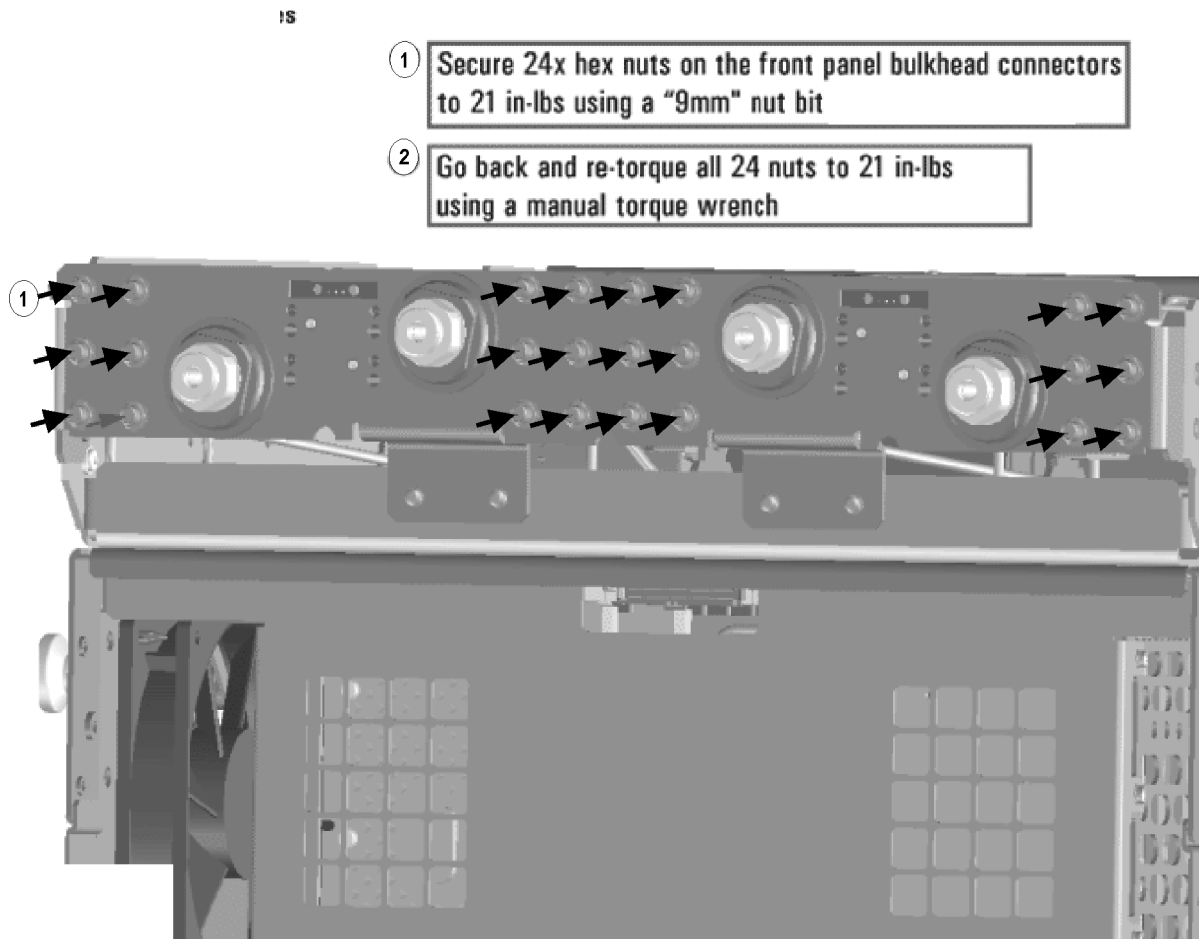
See also, [“Verify the Model/Version of HMA26.5 Installed” on page 7](#).

1. The N5245-20195 cable is used only with instruments that have a newer HMA26.5 installed. If your PNA has a legacy 5087-7765 HMA26.5 assembly installed, then this cable can be discarded. If you are unclear which HMA26.5 assembly your PNA has installed, refer to [Figure 1 on page 7](#).

Step 26. Secure the Front Panel Bulkhead Connectors

Follow the instruction shown in **Figure 23** in this document.

Figure 20 Bulkhead Connections, Front Panel



Step 27. Install Cables on IF Multiplexer Board

Install the following gray flexible cables in the order listed. Mixer brick cables were connected to the mixer bricks earlier in this procedure, but the other ends of these cables still require a connection. To see images showing the location of these cables, click either of the Chapter 6 bookmarks “Bottom RF Cables, 4-Port, Option 417, S/N Prefixes <6021” or “Bottom RF Cables, 4-Port, Option 417, S/N Prefixes ≥6021” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 10**.

- W70 (N5242-60013) A24 IF multiplexer board P203 to A16 SPAM board J2
- W72 (N5242-60015) A24 IF multiplexer board P603 to A16 SPAM board J5
- W62 (N5242-60021) A27 mixer brick (R1) to A24 IF multiplexer (P411)
- W63 (N5242-60022) A27 mixer brick (R2) to A24 IF multiplexer (P412)
- W65 (N5242-60024) A28 mixer brick (D) to A24 IF multiplexer (P801)
- W66 (N5242-60019) A28 mixer brick (R4) to A24 IF multiplexer (P414)
- W67 (N5242-60020) A28 mixer brick (R3) to A24 IF multiplexer (P413)
- W68 (N5242-60023) A28 mixer brick (C) to A24 IF multiplexer (P601)

Step 28. Reinstall the A23 Test Set Motherboard

For instructions on reinstalling the board, click the Chapter 7 bookmark “Removing and Replacing the A23 test set motherboard” in the PDF Service Guide¹.

Step 29. Install Cables on the A23 Test Set Motherboard

CAUTION

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

If not already done in a previous step, install the following new ribbon cables 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 417 (S/N Prefixes <6021” or “Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 417 (S/N Prefixes ≥6021” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 10**.

- Ribbon cable (N5247-60015) from A28 mixer brick (2) J52 to A23 test set motherboard J552
- Ribbon cable (N5245-60026), A47 port 3 receiver attenuator to A23 test set motherboard J206

1. See “[Downloading the Online PNA Service Guide](#)” on page 7.

- Ribbon cable (N5245-60026), A48 port 4 receiver attenuator to A23 test set motherboard J207
- Ribbon cable (N5245-60006), A39 port 3 source attenuator to A23 test set motherboard J547
- Ribbon cable (N5245-60006), A40 port 4 source attenuator to A23 test set motherboard J548

Step 30. 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 24 on page 45**. New parts are listed in **Table 1 on page 10**.

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 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 (label), do not attempt to attach the lower front panel label until **"Step 32. Install the Overlay" on page 45**.

(10 places)

2

3

1

① Peel off liner of lower overlay.

② Align and apply to the front frame assembly.

PART SEQUENCE:
①, ②

- 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.

To see an image of the front panel overlay (N5225-80006), 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 (N5225-80006).
2. Loosely place the overlay in the recess on the lower front panel.

1. See “Downloading the Online PNA Service Guide” on page 7.

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 33. Install the Front Panel Jumper Cables

Install twelve W36 front panel jumper cables (N5245-20155) - use 6 new jumpers and reuse 6 old jumpers. To see an image of the front panel jumper cables, click the Chapter 7 bookmark "Removing and Replacing the Front Panel Assembly" in the PDF Service Guide¹.

Step 34. 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 35. Reinstall the Inner Cover

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

Step 36. Reinstall the Outer Cover

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

Step 37. Remove Option 217 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 217 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**.

1. 'See "Downloading the Online PNA Service Guide" on page 7.

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 38. Enable Options 417

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.
- A keyboard and mouse 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 16.
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’s USB drive slot. Within 5 seconds, the PNA should display a small “New licenses installed” message.

Else, load the license key file(s), manually move your license file(s) to C:\Program Files\Agilent\licensing. It may take Keysight License Manager an extra ~5 seconds to enable the licenses.

NOTE

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

4. Disconnect the USB flash drive from the PNA.
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 39. Verify the PNA Analyzer Program is Running with the Correct Options

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

1. Start the Network Analyzer program.
2. Once the Network Analyzer program is running:
 - Press **Help** > **About NA** and verify that Option 417 is listed in the PNA application.

NOTE

If the options have not been enabled or if the option 217 license has not been removed, perform the prior steps again. If the options are still not enabled, contact Keysight Technologies. Refer to “**Getting Assistance from Keysight**” on page 4.

3. After successful installation of all upgrades, some features require some adjustments to ensure the instrument meets its specified performance. Refer to the following Web site:
<http://mktwww.srs.is.keysight.com/field/service/network/pna/>.

Step 40. 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: Src 2 Synth Only
- synthesizer bandwidth adjustment (only run if the EE default adjustment is not sufficient)
- IF gain adjustment
- source adjustment

- receiver characterization
- receiver adjustment
- IF response adjustment (Option S93090xA/B, S93093A/B, or S93094A/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.

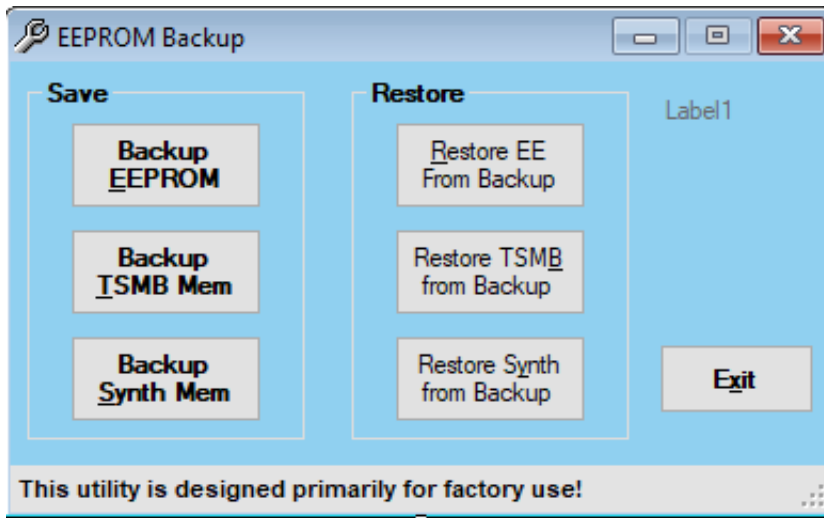
The adjustments listed here generate new correction constants. The analyzer must have a backup of this new data in case any of the data becomes corrupted.

To store the backup data, perform these steps:

- Navigate to the EEPROM Backup Utility, located at:
 - Windows 7 -- C:\Program Files (x86)\Keysight\Network Analyzer\Service\eebackup.exe
 - Windows 10 -- C:\Program Files\Keysight\Network Analyzer\Service\eebackup.exe
- Run the program.
- Click Backup EEPROM.
- Click Backup TSMB Mem.
- Click Backup Synth Mem. (Applies to Version 7 Synthesizers Only)
- Click Exit when the program has finished.

1. See “[Downloading the Online PNA Service Guide](#)” on page 7.

Figure 22 EEPROM Backup Menu



Operator's Check

Perform the Operator's Check to check the basic functionality of the analyzer. For instructions, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide¹.

If you experience difficulty with the basic functioning of the analyzer, contact Keysight. Refer to **"Contacting Keysight" on page 4**.

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.

1. See **"Downloading the Online PNA Service Guide" on page 7**.

Step 41. 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.



This information is subject to change
without notice.

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