

# Keysight Add 4-Port Capability Upgrade Kit

To Upgrade PNA N5224A or N5225A Option 200 to Option 400

Upgrade Kit Order Numbers: N5224AU- 600 and N5225AU- 600

Keysight Kit Number: N5225-60110

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](http://www.keysight.com).



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## Safety Notes

The following safety notes are used throughout this document. Familiarize yourself with each of these notes and its meaning before performing any of the procedures in this document.

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**WARNING**      **Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

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**CAUTION**      Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

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## Description of the Upgrade

This upgrade converts your N5224A or N5225A Option 200 2-port analyzer to a N5224A or N5225A Option 400 4-port analyzer by adding:

- an additional source
- an additional source synthesizer
- two additional doublers
- an additional mixer brick
- two additional reference couplers
- two additional test port couplers
- a splitter
- a modified front panel
- new cables

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## Getting Assistance from Keysight

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

### Contacting Keysight

Assistance with test and measurements needs and information on finding a local Keysight office are available on the Web at:

<http://www.keysight.com/find/assist>

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

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**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.

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## Getting Prepared

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**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.

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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 5.
- Enough time - refer to “[About Installing the Upgrade](#)” on page 6.
- Test equipment for the post-upgrade adjustments and full instrument calibration. To view the equipment list, click the Chapter 3 bookmark “[Tests and Adjustments](#)” in the PDF Service Guide<sup>1</sup>.

## License Key Redemption

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**NOTE** The enclosed Option 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 for the instrument that will receive the option.

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To enable the option product, you must request a license key from: <http://www.keysight.com/find/softwarelicense>. To complete the request, you will need to gather the following information:

- From the certificate
  - Order number
  - Certificate number
- From your instrument
  - Model number
  - Serial number
  - Host ID

The instrument information is available on the network analyzer – on the analyzer’s **Help** menu, click **About Network Analyzer**.

If you provide an email address, Keysight will promptly email your license key. Otherwise, you will receive your license key via postal mail.

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1. See “[Downloading the Online PNA Service Guide](#)” on page 5.

## 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](http://www.keysight.com).
2. In the Search box, enter the model number of the analyzer (Ex: N5225A) and click **Search**.
3. Click **Technical Support > Manuals**.
4. Click **Service Manual**.
5. Click the service guide title to download the PDF file.
6. When the PDF of the Service Guide is displayed, scroll through the Contents section bookmarks to locate the information needed.

## Protecting Your Workspace from Electrostatic Discharge

For information, click on the Chapter 1 bookmark, “Electrostatic Discharge Protection” in the PDF Service Guide<sup>1</sup>.

### 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-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

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**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.

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## About Installing the Upgrade

Products affected . . . . .	N5224A and N5225A Option 200
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 3](#).

**Table 1 Contents of Upgrade Kit N5225-60110**

Ref Desig.	Description	Qty	Part Number
-	Installation note (this document)	1	N5225-90120
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 Was N5242-60150
A26	Splitter	1	5067-4086
A28	Mixer brick (2)	1	5087-7323
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		
A69	3 dB pad, attached to R4 connector on A28 mixer brick	1	08490-60039
-	Front frame, 4-port	1	N5247-20141
-	Machine screw, M2.0 x 6, flat head (8 to attach two reference couplers to brackets)	10	0515-1602
-	Machine screw, M2.5 x 20, pan head (4 to attach A34 and A35 reference coupler assemblies to test set deck)	5	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.)	10	0515-0380
-	Machine screw, M3.0 x 6, flat head (to attach front frame to coupler plate)	3	0515-1946
-	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)	4	0515-0372
-	Machine screw, M2.5 x 16, pan head (2 to attach splitter to mixer brick)	3	0515-2007
-	Machine screw, M3.0 x 25, pan head (3 to attach A28 mixer brick to block)	4	0515-0667
-	Machine screw, M3.0 x 20, flat head (2 to attach bracket to A10 26.5 GHz source)	3	0515-2078
-	Machine screw, M3.0 x 18, pan head (1 to attach bracket to A10 26.5 GHz source)	2	0515-0666
-	Front panel overlay (label), 4-port	1	N5227-80004
-	Keypad overlay (label)	1	N5242-80005
-	Power button overlay (label)	1	N5242-80007
-	Nameplate, N5224A	1	N5224-80001
-	Nameplate, N5225A	1	N5225-80001
-	Test set front plate, 4-port	1	N5224-00005
-	Gap pad (between mixer brick A28 and shield)	4	N5245-20125



**Table 1 Contents of Upgrade Kit N5225-60110**

Ref Desig.	Description	Qty	Part Number
-	Gap pad (between each test coupler and the test set front plate)	4	E4403-20033
-	Shield, mixer brick	1	N5245-00023
-	2.4 mm dust cap for A28 mixer brick	1	N5247-20138
-	50 ohm load, attached to A13 40 GHz doubler	1	1810-0118
-	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 clamp	21	1400-1334
-	Bracket for reference coupler	2	N5245-00017
-	Bracket for cables	1	N5245-00022
-	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
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
W52	RF cable, A25 HMA26.5 to A26 splitter	1	N5245-20013
W53	RF cable, A26 splitter to A27 mixer brick	1	N5245-20023
W54	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
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
W108	RF cable, A30 port 3 receiver coupler to A28 mixer brick (R3)	1	N5224-20024
W109	RF cable, A31 port 4 receiver coupler to A28 mixer brick (R4)/3-dB pad	1	N5224-20027
W110	RF cable, A32 port 2 receiver coupler to A27 mixer brick (R2)	1	N5224-20028
W111	RF cable, A29 port 1 receiver coupler to A33 port 1 coupler	1	N5224-20013

**Table 1 Contents of Upgrade Kit N5225-60110**

<b>Ref Desig.</b>	<b>Description</b>	<b>Qty</b>	<b>Part Number</b>
W112	RF cable, A30 port 3 receiver coupler to A34 port 3 coupler	1	N5224-20015
W113	RF cable, A31 port 4 receiver coupler to A35 port 4 coupler	1	N5224-20016
W114	RF cable, A32 port 2 receiver coupler to A36 port 2 coupler	1	N5224-20014
W115	RF cable, A33 port 1 coupler to A27 mixer brick (A)	1	N5224-20022
W116	RF cable, A34 port 3 coupler to A28 mixer brick (C)	1	N5224-20023
W117	RF cable, A35 port 4 coupler to A28 mixer brick (D)	1	N5224-20026
W118	RF cable, A36 port 2 coupler to A27 mixer brick (B)	1	N5224-20025
-	Ribbon cable, A23 test set motherboard J552 to A28 mixer brick (2) J52	1	N5247-60015

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**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.

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## 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.

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**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.**

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### 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 A33 - A36 Test Port Coupler Assemblies.

Step 13. Install the LED Boards, Bulkhead Connectors, and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate.

Step 14. Install the 4-Port Coupler Plate Assembly to the Deck.

Step 15. Assemble and Install the A12 and A13 40 GHz Doubler Assemblies.

Step 16. Install Bracket to A10 Source Assembly.

Step 17. Assemble the A10 26.5 GHz Source 2 Assembly.

Step 18. Install the A10 26.5 GHz Source 2 Assembly and Cables.

Step 19. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables.

Step 20. Install the Cable Bracket Mount.

Step 21. Install the Test Set Cables.

Step 22. Reinstall the A23 Test Set Motherboard.

Step 23. Install Cable on the A23 Test Set Motherboard.

Step 24. Replace the Front Frame in the Front Panel Assembly.

- Step 25. Reinstall Front Panel Assembly.
- Step 26. Install the Overlays & Nameplate.
- Step 27. Position the Cables and Wires to Prevent Pinching.
- Step 28. Reinstall the Inner Cover.
- Step 29. Reinstall the Outer Cover.
- Step 30. Enable Options P04 and 400.
- Step 31. Perform Post-Upgrade Adjustments and Calibration.
- Step 32. Prepare the PNA for the User.

## **Step 1. Obtain a Keyword and Verify the Information**

Follow the instructions on the Option Entitlement Certificate supplied to obtain a license key for installation of this upgrade. Refer to [“License Key Redemption” on page 4](#).

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.

If the model number, serial number, or option number do not match those on your license key, 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 3](#).

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

## **Step 2. Remove the Outer Cover**

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide<sup>1</sup>.

## **Step 3. Remove the Inner Cover**

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide<sup>1</sup>.

## **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 Guide<sup>1</sup>.

## **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 Guide<sup>1</sup>.

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

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1. See [“Downloading the Online PNA Service Guide” on page 5](#).

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**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.

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**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.

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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 200" in the PDF Service Guide<sup>1</sup>.

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

- 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
- W110 (N5224-20006) A32 port 2 receiver coupler to A27 mixer brick (R2)
- W111 (N5224-60012) A29 port 1 receiver coupler to A33 port 1 coupler
- W114 (N5224-20011) A32 port 2 receiver coupler to A36 port 2 coupler
- W115 (N5224-20010) A33 port 1 coupler to A27 mixer brick (A)
- W118 (N5224-20009) A36 port 2 coupler to A27 mixer brick (B)

These cables must be saved - they will be reinstalled.

- W12 (N5245-20109) A29 port 1 reference coupler to W11
- W18 (N5245-20111) A32 port 2 reference coupler to W17

## 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 Guide<sup>1</sup>.

## Step 8. Assemble the A28 Mixer Brick Assembly

1. Follow the instructions shown in [Figure 1](#). New parts are listed in [Table 1 on page 7](#) of this document.

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1. See "[Downloading the Online PNA Service Guide](#)" on page 5.

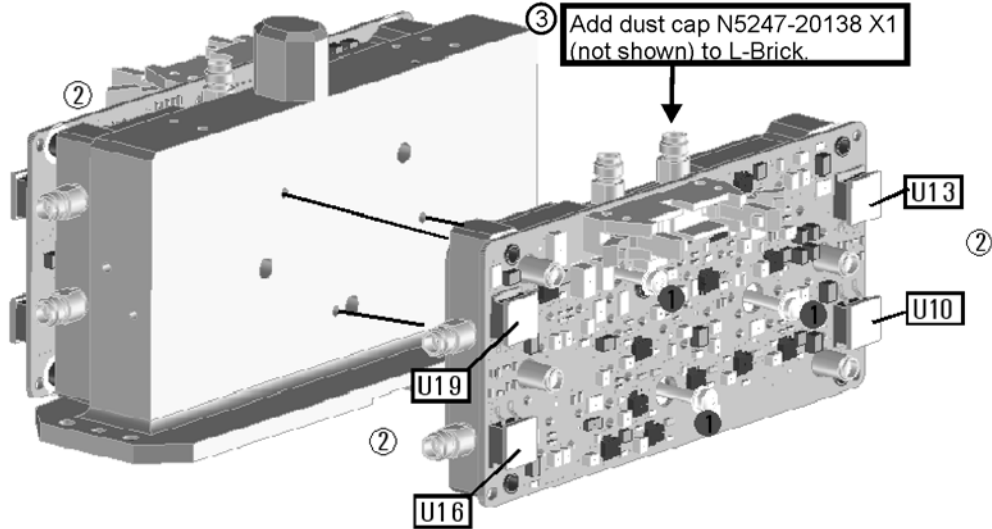
**Figure 1     A28 Mixer Brick Assembly**

① Turn mounting block around and install L-Brick 5087-7323. Secure with screws 0515-0667 X3. Torque to 9 in-lbs.

② Add Gap pads N5245-20125 X4 to L-Brick as shown.

**Not necessary to remove A27 mixer brick shield as shown**

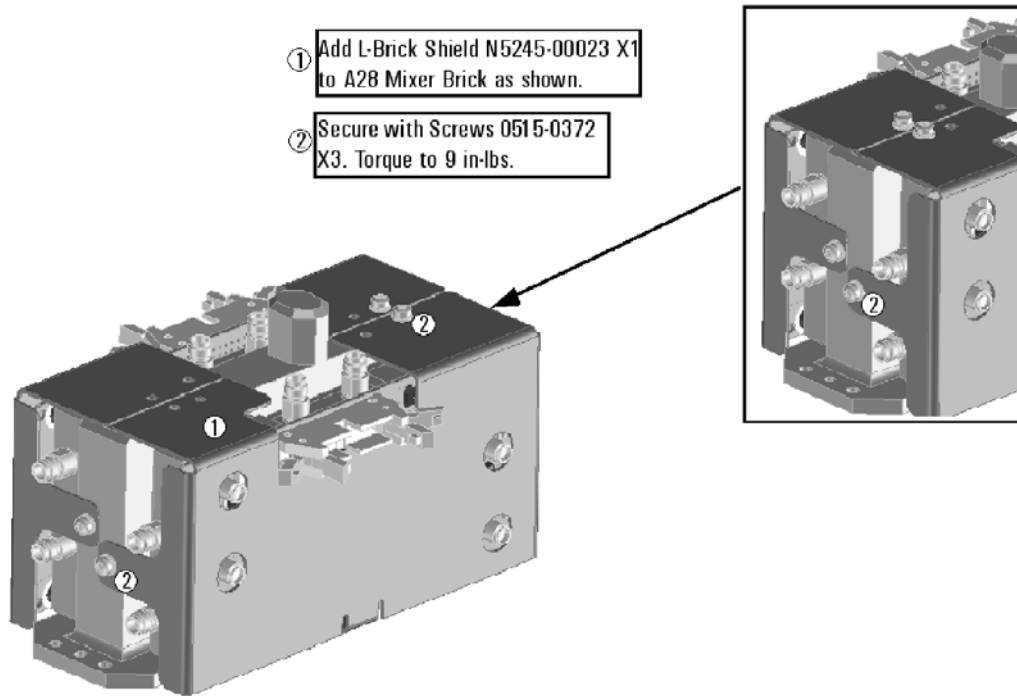
③ Add dust cap N5247-20138 X1 (not shown) to L-Brick.



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

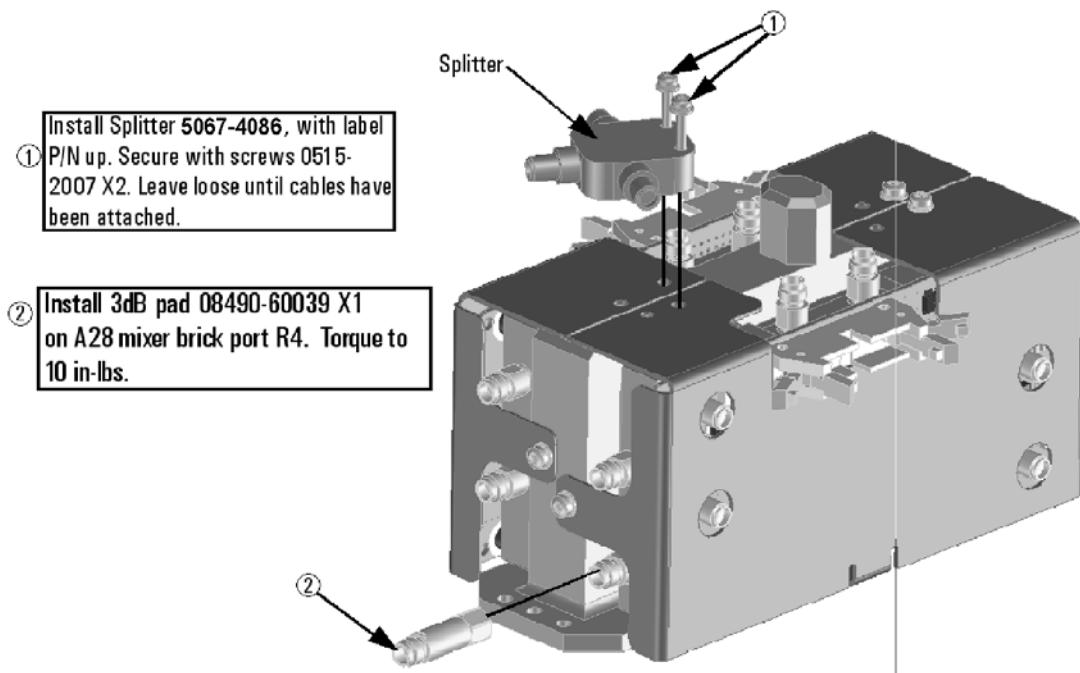
**Figure 2     A28 Mixer Brick Shield Installation**



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

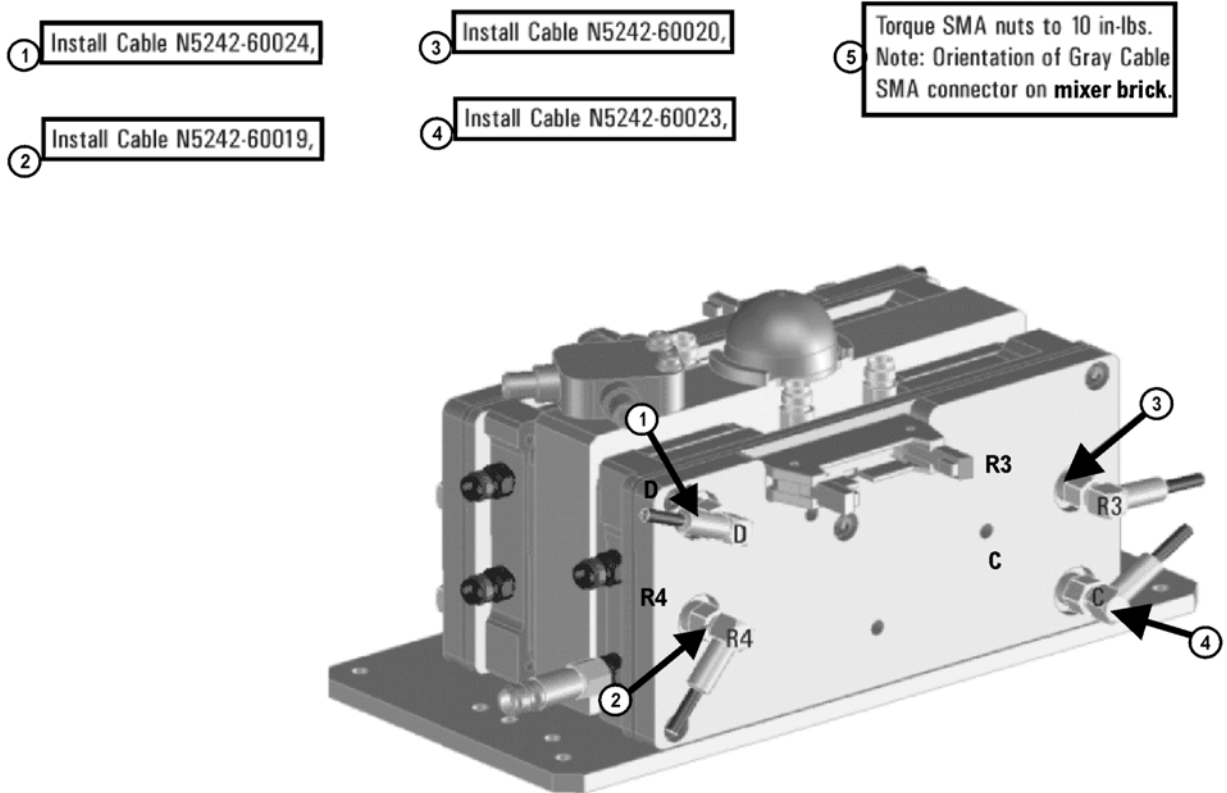
**Figure 3** A69 3 dB Pad and A26 Splitter Installation





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

**Figure 4 A28 Mixer Brick Cable Installation**



N5225\_124\_07

### Step 9. Install the A27/A28 Mixer Brick Assemblies

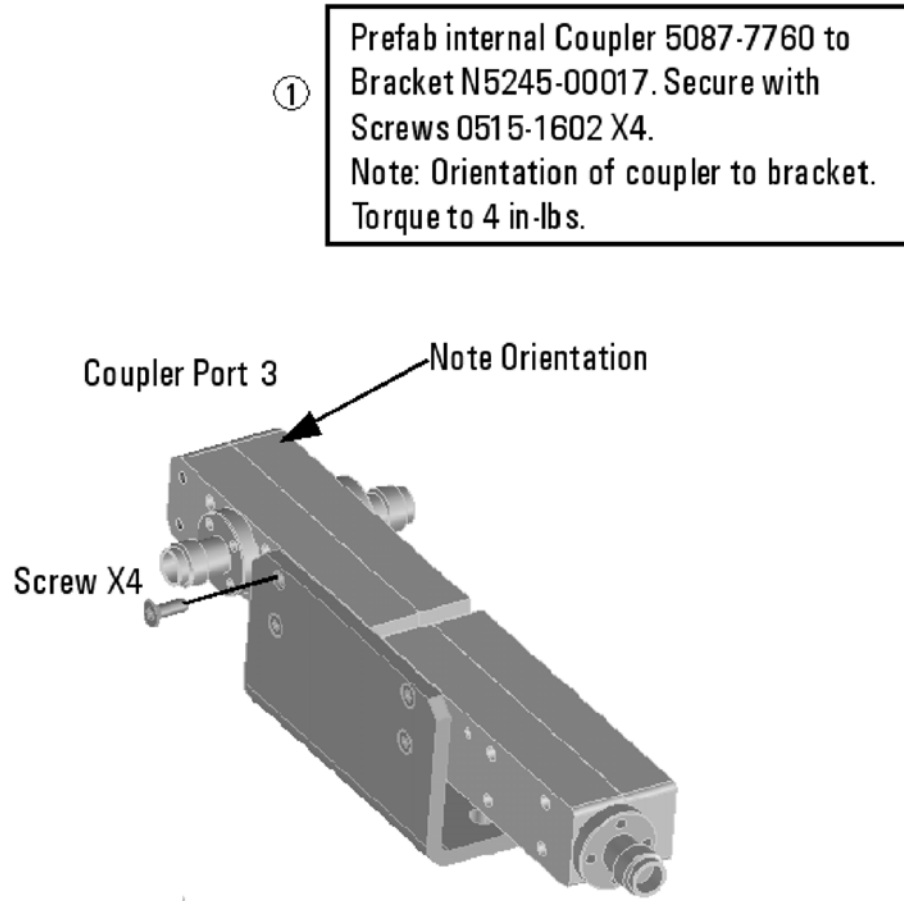
Reinstall the A27 mixer brick cables, and then install the A27/A28 mixer brick assembly, reusing the four existing screws. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A27 and A28 Mixer Bricks" in the PDF Service Guide<sup>1</sup>. New parts are listed in [Table 1 on page 7](#) of this document.

1. See "[Downloading the Online PNA Service Guide](#)" on page 5.

## Step 10. Assemble the A34 and A35 Reference Coupler Assemblies

Follow the instructions shown in [Figure 5](#) and [Figure 6](#). New parts are listed in [Table 1 on page 7](#) of this document.

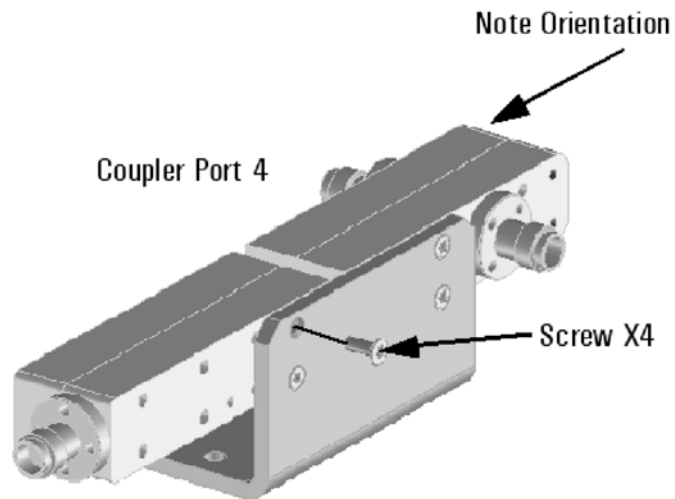
**Figure 5**      **A34 Reference Coupler Port 3 Assembly**



N5225\_124\_09

**Figure 6 A35 Reference Coupler Port 4 Assembly**

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.

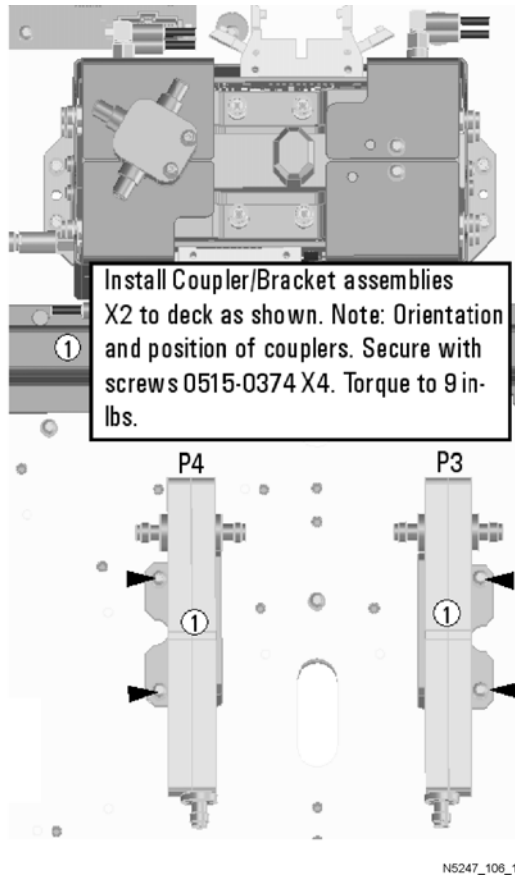


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## Step 11. Install the A34 and A35 Reference Coupler Assemblies

Follow the instructions shown in [Figure 7](#). New parts are listed in [Table 1 on page 7](#) of this document.

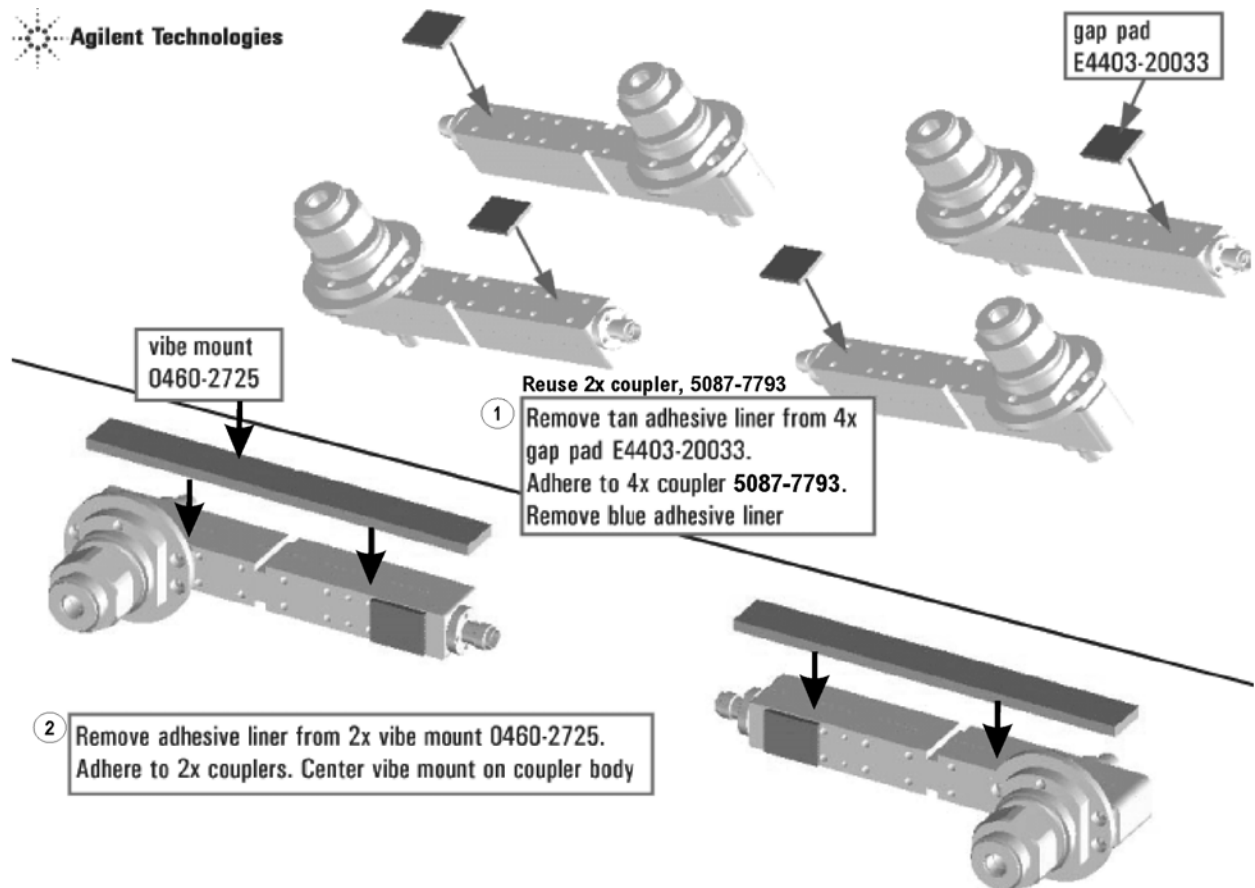
**Figure 7** A34 and A35 Reference Coupler Assemblies Installation



## Step 12. Assemble the A33 - A36 Test Port Coupler Assemblies

1. Remove the A33 test port 1 coupler and A36 test port 2 coupler from the PNA. For instructions, click the Chapter 7 bookmark, "Removing and Replacing the A33 - A36 Test Port Couplers" in the PDF Service Guide<sup>1</sup>.
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 8](#). New parts are listed in [Table 1 on page 7](#) of this document.

**Figure 8** A33 - A36 Test Port Coupler Assembly

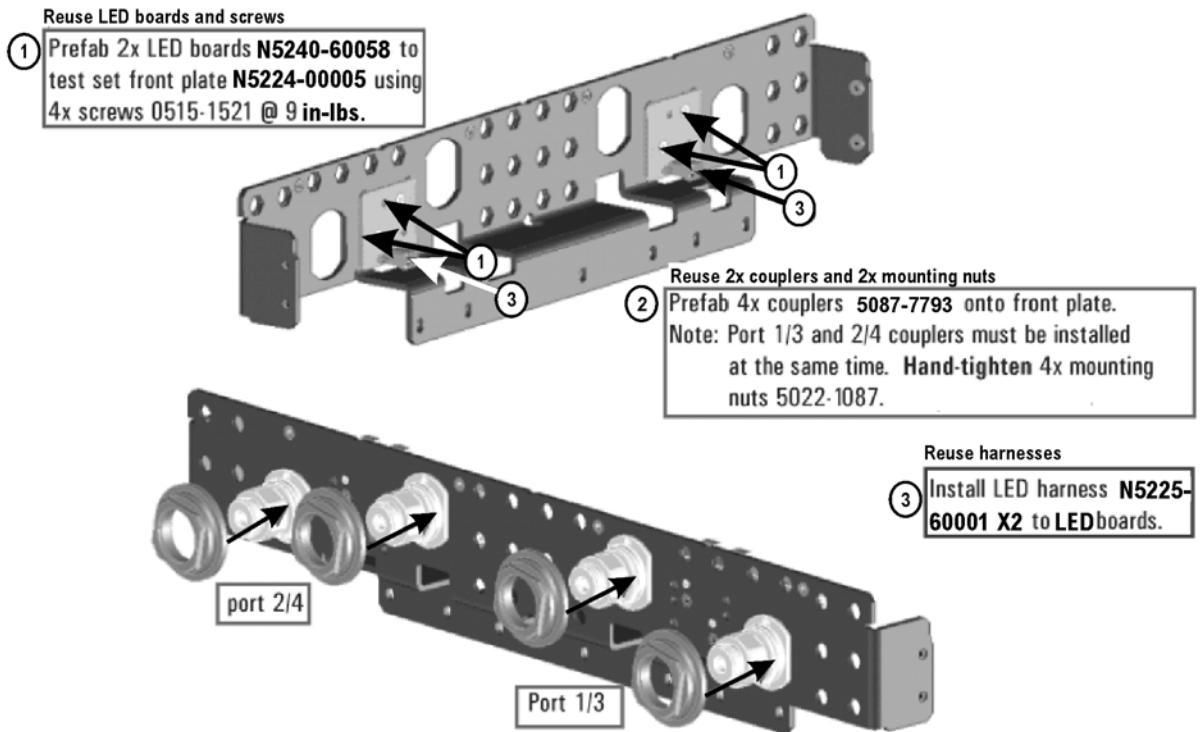


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### Step 13. Install the LED Boards, Bulkhead Connectors, and Test Port Coupler Assemblies to the 4-Port Test Set Front Plate

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 9](#).

**Figure 9 LED Board Assemblies and Test Port Coupler Assemblies Installation**

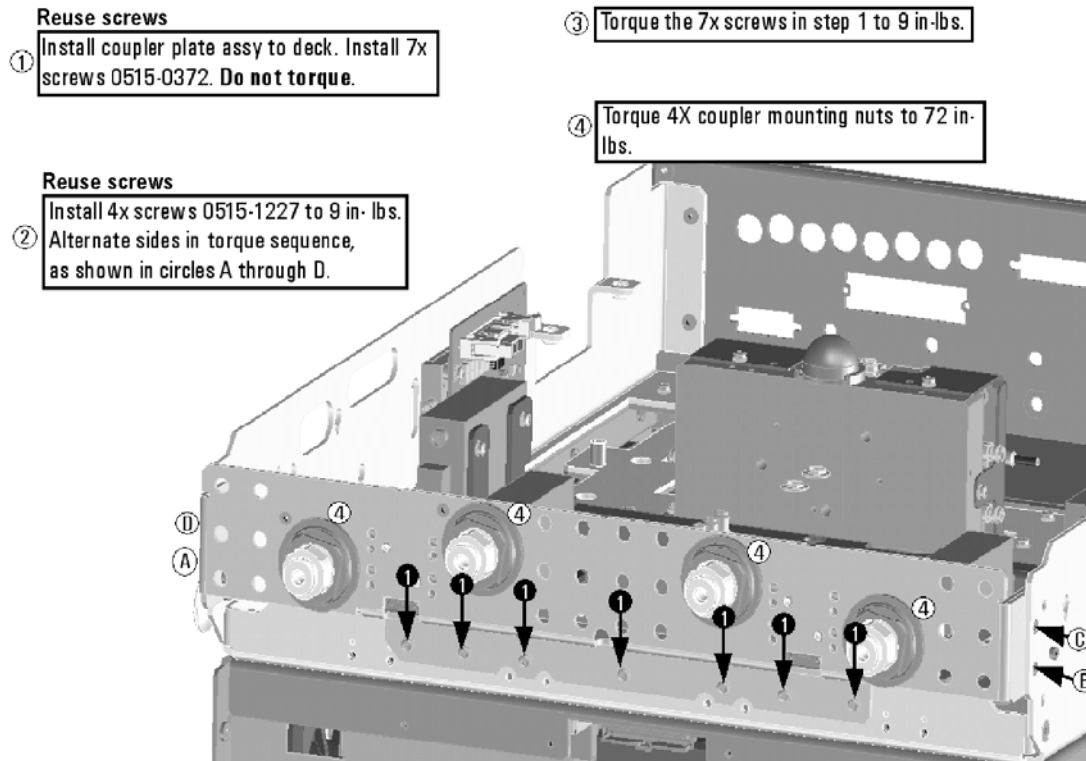


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## Step 14. Install the 4-Port Coupler Plate Assembly to the Deck

Follow the four instructions shown in **Figure 10**.

**Figure 10** Coupler Plate Assembly Installation

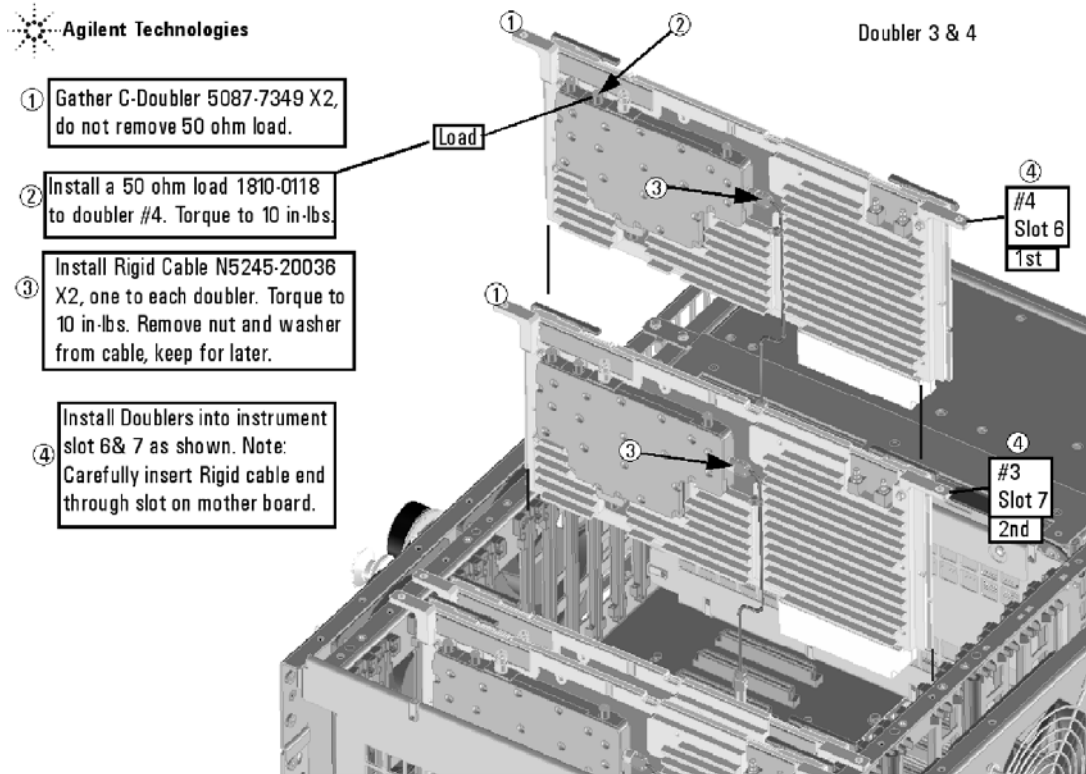


N5225\_124\_20

## Step 15. Assemble and Install the A12 and A13 40 GHz Doubler Assemblies

Follow the instructions shown in [Figure 11](#).

**Figure 11** A12 and A13 40 GHz Doubler Installation



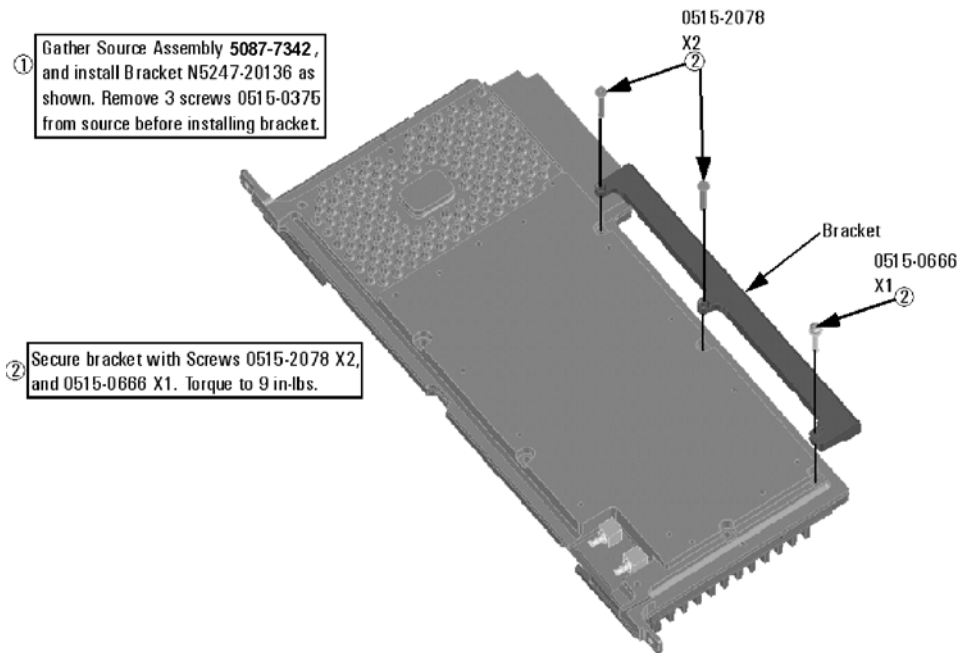
N5225\_124\_24



## Step 16. Install Bracket to A10 Source Assembly

Follow the two instructions shown in [Figure 12](#).

**Figure 12** A10 Source 2 Assembly Bracket Installation

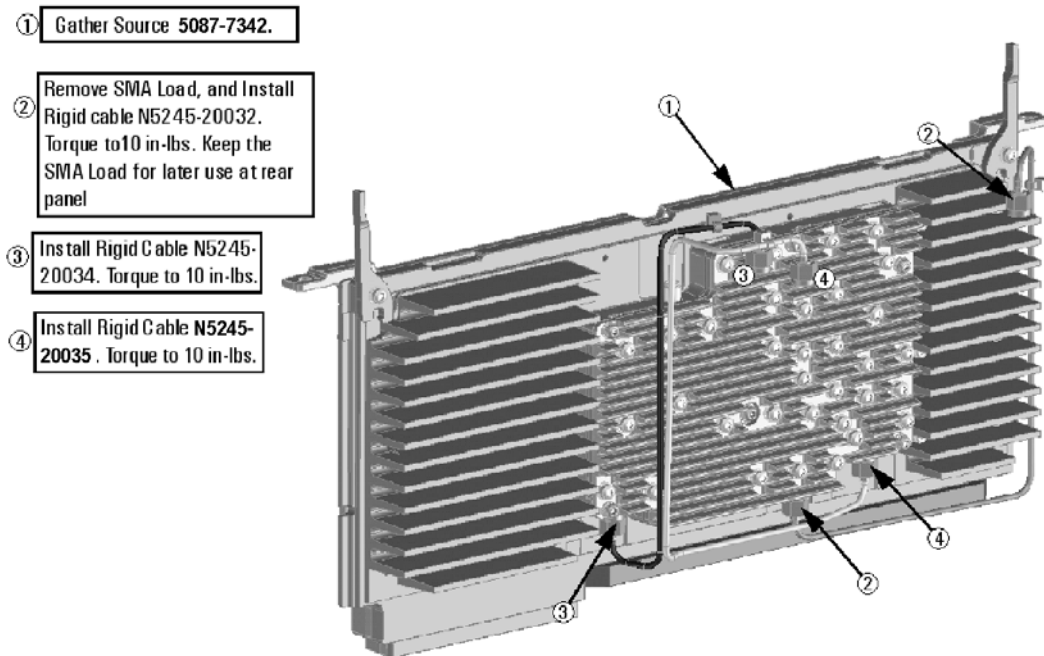


N5225\_124\_21

## Step 17. Assemble the A10 26.5 GHz Source 2 Assembly

Follow the four instructions shown in [Figure 13](#).

**Figure 13** A10 Source 2 Assembly

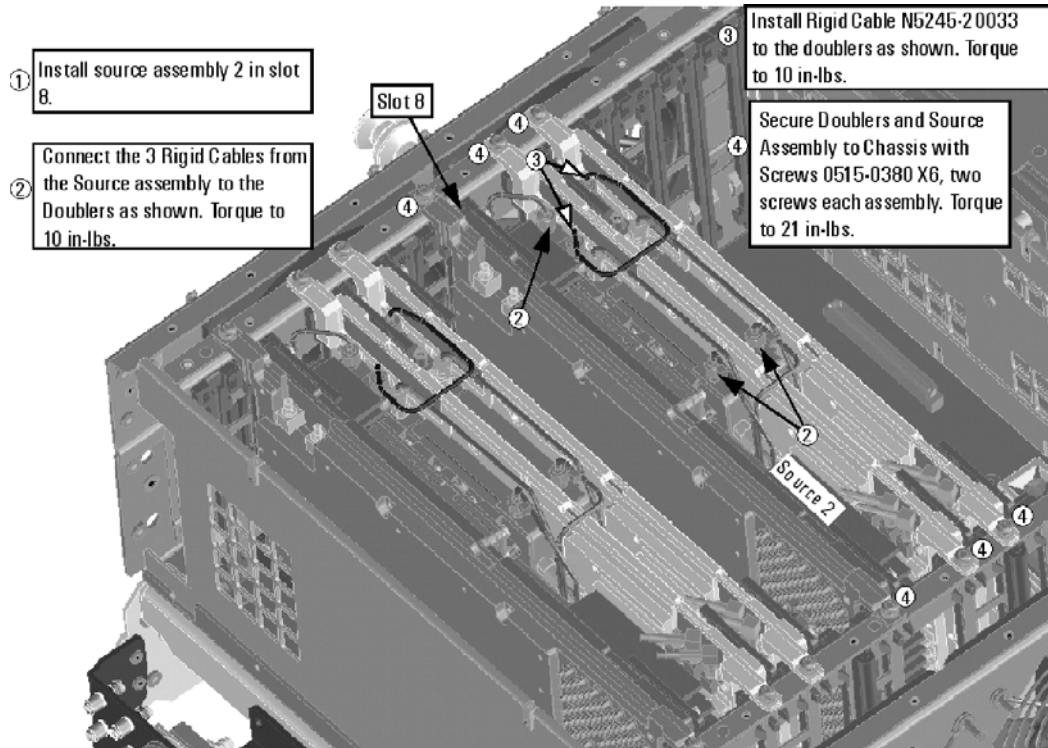


N5225\_124\_22

## Step 18. Install the A10 26.5 GHz Source 2 Assembly and Cables

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

**Figure 14** A10 Source 2 Assembly Installation



N5225\_124\_26

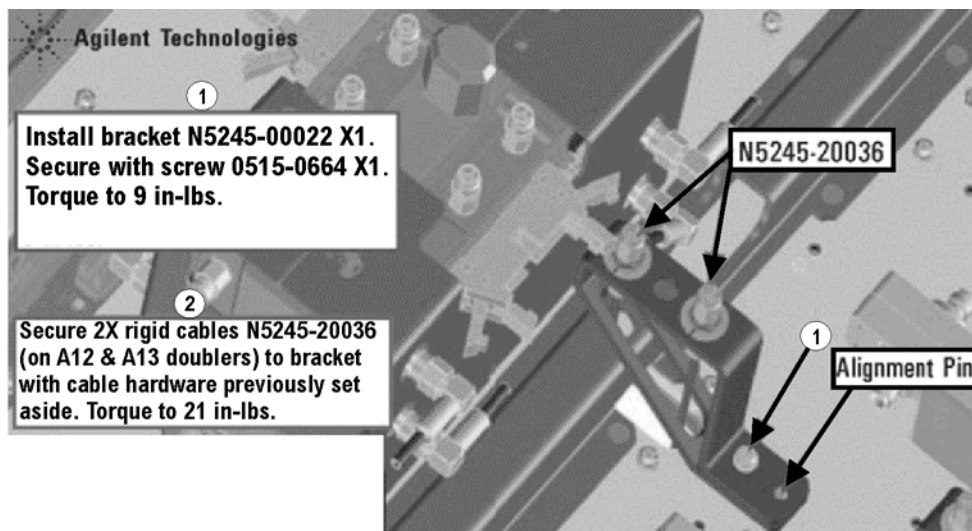
## Step 19. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables

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 Guide<sup>1</sup>.
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 20. Install the Cable Bracket Mount

1. Follow the two instructions shown in [Figure 15](#). New parts are listed in [Table 1 on page 7](#) of this document.

**Figure 15** Cable Bracket Mount Installation



N5225\_124\_25

1. See "Downloading the Online PNA Service Guide" on page 5.

## Step 21. Install the Test Set Cables

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**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.

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

---

### Flexible Cables Required for Upgrading to an Option 400 PNA

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 400” in the PDF Service Guide<sup>1</sup>. New parts are listed in [Table 1 on page 7](#).

- 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)

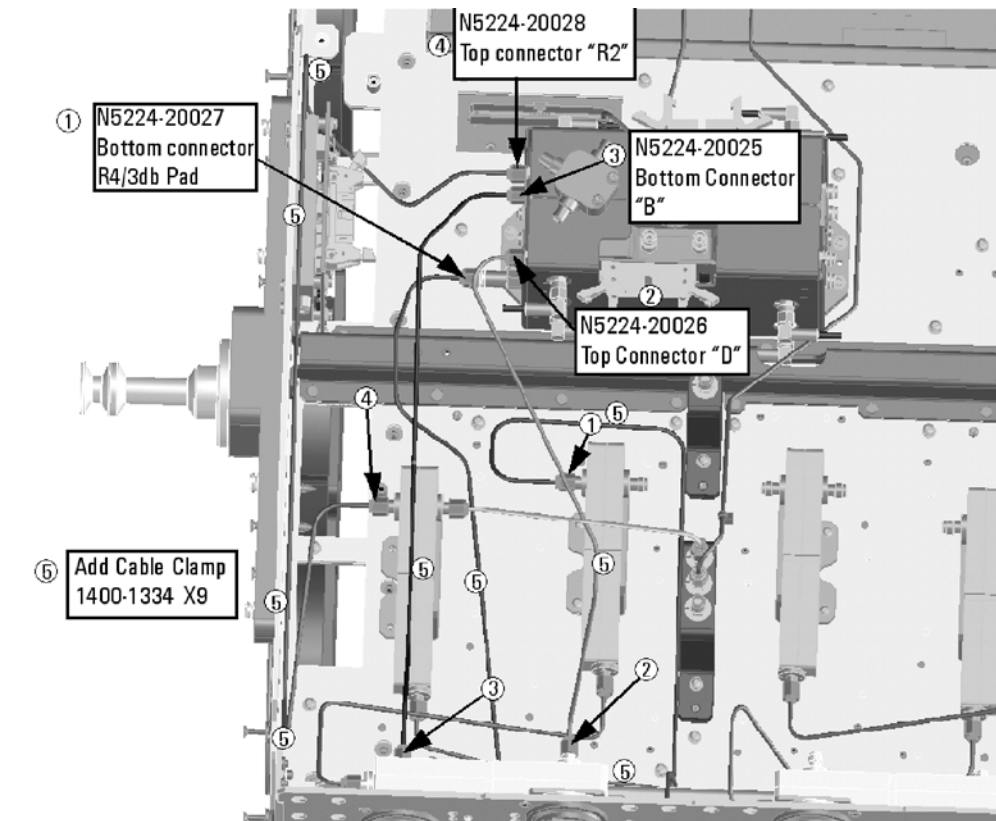
### Semirigid Cables Required for Upgrading to an Option 400 PNA

To see images showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 400” in the PDF Service Guide<sup>1</sup>. New parts are listed in [Table 1 on page 7](#).

- W109 (N5224-20027) A31 port 4 receiver coupler to A28 mixer brick (R4)/3-dB pad
  - \* As shown in [Figure 16](#), install clamp (part number 1400-1334) to secure W109.
- W108 (N5224-20024) A30 port 3 receiver coupler to A28 mixer brick (R3)
  - \* As shown in [Figure 17](#), install clamp (part number 1400-1334) to secure W108 (N5224-20024).
- W114 (N5224-20014) A32 port 2 receiver coupler to A36 port 2 coupler
- W113 (N5224-20016) A31 port 4 receiver coupler to A35 port 4 coupler
- W111 (N5224-20013) A29 port 1 receiver coupler to A33 port 1 coupler
- W112 (N5224-20015) A30 port 3 receiver coupler to A34 port 3 coupler
- W117 (N5224-20026) A35 port 4 coupler to A28 mixer brick (D)
  - \* As shown in [Figure 16](#), install clamp (part number 1400-1334) to secure W117.

- W118 (N5224-20025)A36 port 2 coupler to A27 mixer brick (B)
  - \* As shown in **Figure 16**, install clamp (part number 1400-1334) to secure W118.
- W110 (N5224-20028)A32 port 2 receiver coupler to A27 mixer brick (R2)
  - \* As shown in **Figure 16**, install clamp (part number 1400-1334) to secure W118.

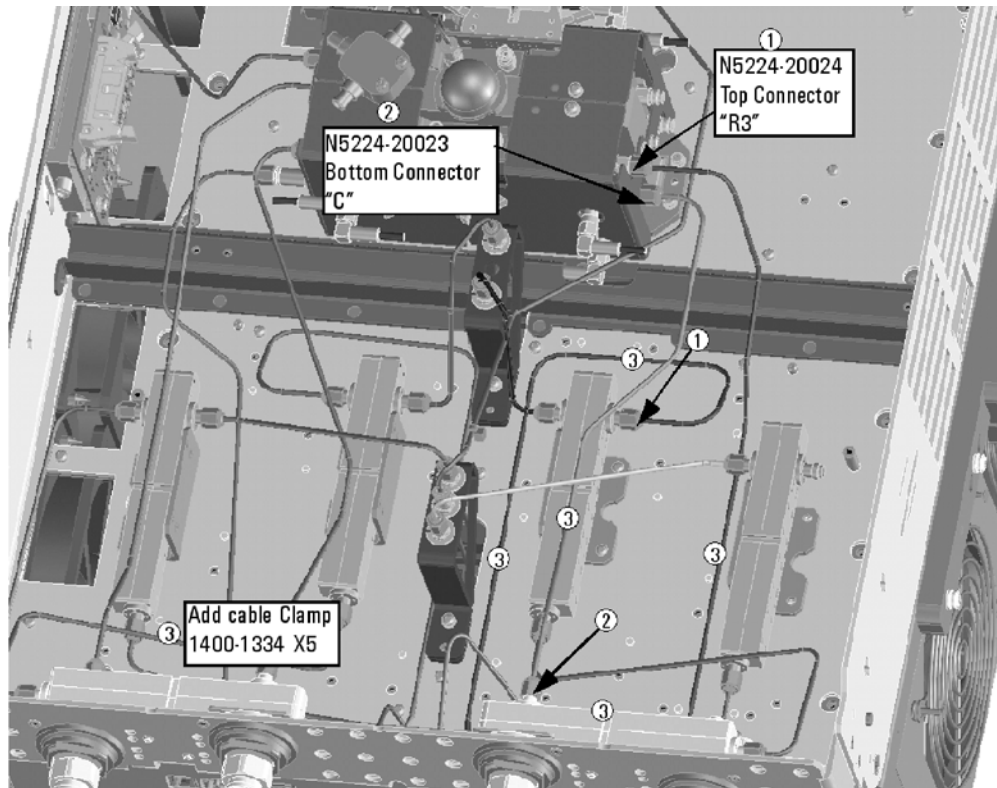
**Figure 16** Location of Cable Clamps for W109 (N5224-20027), W110 (N5224-20028), W117 (N5224-20026), and W118 (N5224-20025)



N5225\_120\_01

- W18 (reuse) (N5245-20111) A32 port 2 reference coupler to W17
- W116 (N5224-20023)A34 port 3 coupler to A28 mixer brick (C)
  - \* As shown in **Figure 17**, install clamp (part number 1400-1334) to secure W116 (N5224-20023).

**Figure 17** Location of Cable Clamps for W108 (N5224-20024) and W116 (N5224-20023)

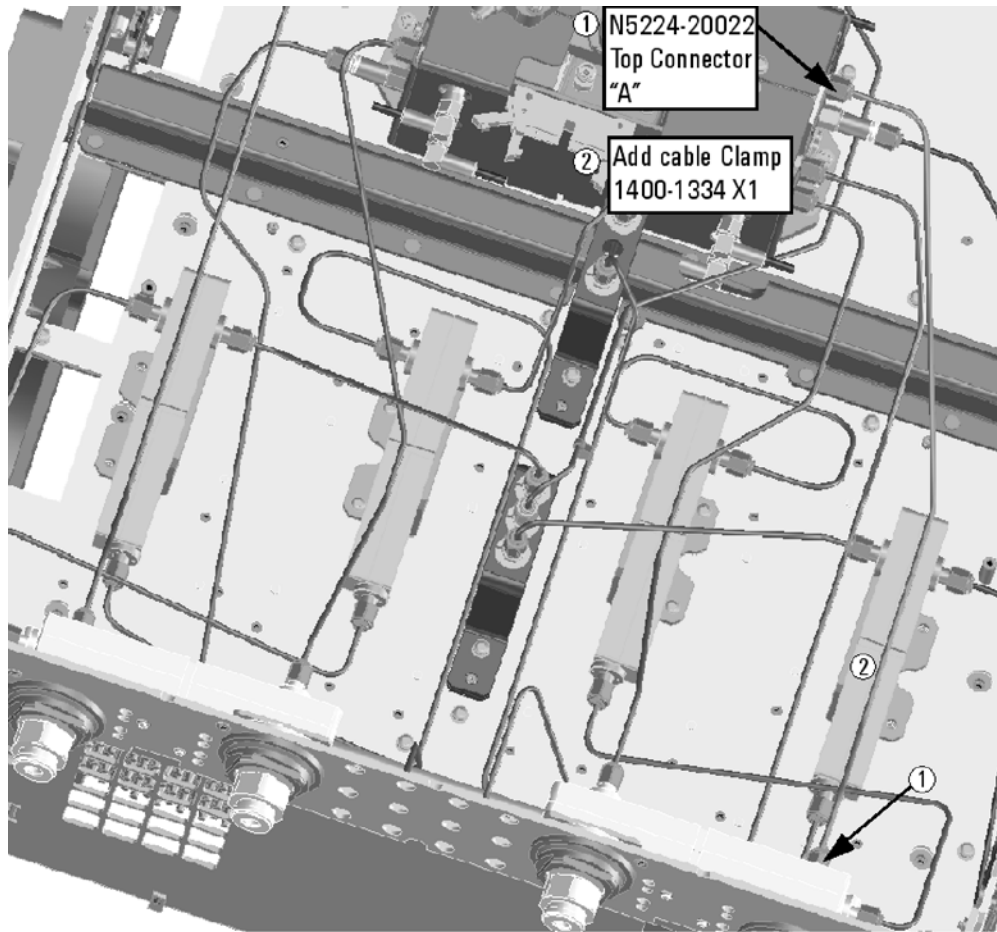


N5225\_120\_02

- W14 (N5245-20043) A30 port 3 reference coupler to W13
- W16 (N5245-20044) A31 port 4 reference coupler to W15
- W12 (reuse) (N5245-20109) A29 port 1 reference coupler to W11
- W115 (N5224-20022) A33 port 1 coupler to A27 mixer brick (A)

\* As shown in **Figure 18**, install clamp (part number 1400-1334) to secure W115 (N5224-20022).

**Figure 18** Location of Cable Clamp for W115 (N5224-20022)



N5225\_120\_03

- W52 (N5245-20013)A25 HMA26.5 to A26 splitter
- W53 (N5245-20023)A26 splitter to A27 mixer brick
- W54 (N5245-20022)A26 splitter to A28 mixer brick

**NOTE:** Tighten both screws on the splitter to 9 in-lbs.

### **Step 22. 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 Guide<sup>1</sup>.

### **Step 23. Install Cable on the A23 Test Set Motherboard**

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

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If not already done in a previous step, install the following new ribbon cable.

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

To see an image showing its locations, click the Chapter 6 bookmark “Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 400” in the PDF Service Guide<sup>1</sup>. New parts are listed in [Table 1 on page 7](#).

## Step 24. Replace the Front Frame in the Front Panel Assembly

Before the front frame can be replaced, the items making up the back side of the front panel assembly must be removed. For instructions on removing these items, click the Chapter 7 bookmark “Removing and Replacing the A1-A3 and Other Front Panel Subassemblies” in the PDF Service Guide<sup>1</sup>. New parts are listed in [Table 1 on page 7](#).

1. In the section “Removing the A2 USB Board,” perform the only step.
2. In the section “Removing the A1 Front Panel Interface Board and Keypad Assembly,” perform steps 1 - 5.
3. In the section “Removing the Power Switch Board and Power Button Keypad,” perform only step 1.
4. Remove the braided gasket from the backside edges of the 2-port front frame and install it in the 4-port front frame.
5. Reassemble the front panel assembly with the new 4-port front frame (N5247-20141) by reversing the order of the instructions previously followed.

## Step 25. Reinstall Front Panel Assembly

1. For instructions on reinstalling the front panel assembly, click the Chapter 7 bookmark “Removing and Replacing the Front Panel Assembly” in the PDF Service Guide<sup>1</sup>.
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.

## Step 26. Install the Overlays & Nameplate

To see an image of the front panel overlay (N5227-80004), keypad overlay (N5242-80005), and power button overlay (N5242-80007), click the Chapter 6 bookmark “Front Panel Assembly, Front Side, All Options” in the PDF Service Guide<sup>1</sup>. New parts are listed in [Table 1 on page 7](#).

1. Remove the protective backing from the new front panel overlay (N5227-80004).
2. Loosely place the overlay in the recess on the lower 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.
4. Repeat steps 1-3 to install the keypad overlay (N5242-80005).
5. Repeat steps 1-3 to install the power button overlay (N5242-80007).
6. Repeat steps 1-3 to install the nameplate (N5224-80001 for model N5224A or N5225-80001 for model

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1. See [“Downloading the Online PNA Service Guide” on page 5](#).

N5225A).

## Step 27. Position the Cables and Wires to Prevent Pinching

On the top side of the PNA, carefully position the grey 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 28. Reinstall the Inner Cover

For instructions, click the Chapter 7 bookmark "Removing the Covers" in the PDF Service Guide<sup>1</sup>.

## Step 29. Reinstall the Outer Cover

For instructions, click the Chapter 7 bookmark "Removing the Covers" in the PDF Service Guide<sup>1</sup>.

## Step 30. Enable Options P04 and 400

### 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.

### Option Enable Procedure

1. To start the option enable utility, press UTILITY **System**, then **Service**, then **Option Enable**. An option enable dialog box will appear.
2. Click the arrow in the **Select Desired Option** box. A list of available options will appear.
3. In the **Select Desired Option** list, click **P04 - 4-Ports**.
4. Using the keyboard, enter the license key in the box provided. The license key is printed on the license message you received from Keysight. Enter this key *exactly* as it is printed on the message.
5. Click **Enable**.
6. Click **Yes** in answer to the displayed question in the **Restart Analyzer?** box.
7. Repeat steps 3-6 to enable Option 400, clicking **400 - Configurable Test Set** in step 3.
8. When the installation is complete, click **Exit**.

### Option Verification Procedure

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

1. On the analyzer's **Help** menu, click **About Network Analyzer**.
2. Verify that "P04," and "400" are listed after "Options:" in the display. Click **OK**.

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**NOTE** If the options have not been enabled, perform the [“Option Enable Procedure”](#) again. If the options are still not enabled, contact Keysight Technologies. Refer to [“Getting Assistance from Keysight” on page 3](#).

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## Step 31. Perform Post-Upgrade Adjustments and Calibration

### Adjustments

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

- default EE
- source adjustment
- receiver adjustment
- receiver characterization

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.

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 check the basic functionality of the analyzer. For instructions, click the Chapter 3 bookmark [“Tests and Adjustments”](#) in the PDF Service Guide<sup>1</sup>.

If you experience difficulty with the basic functioning of the analyzer, contact Keysight. Refer to [“Contacting Keysight” on page 3](#).

### Calibration

Although the analyzer functions, its performance relative to its specifications has not been verified. It is recommended that a full instrument calibration be performed using the analyzer’s internal performance test software. To view information on the performance test software, click the Chapter 3 bookmark [“Tests and Adjustments”](#) in the PDF Service Guide<sup>1</sup>.

## Step 32. 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.

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1. See [“Downloading the Online PNA Service Guide” on page 5](#).

This information is subject to change without notice.

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