

Installation Note

Keysight Add Source and Receiver Attenuators Upgrade Kit For Version 6, Single-Source Synthesizers

To Upgrade PNA N5224A/B or N5225A/B Option 401 to Option 417 or
PNA-X N5244A/B or N5245A/B Option 401 to Option 417

For Analyzers with Serial Numbers Prefixed MY/SG/US5150 and
Below Upgrade Kit Order Numbers: N5224AU-417, N5225AU-417,
N5224BU-417, N5225BU-417, N244AU-417, N5245AU-417,
N5244BU-417, and N5245BU-417

Keysight Kit Number: N5225-60107

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 Source and Receiver Attenuators Upgrade Kit
Upgrade Kit Number: N5225-60107
Installation Note

Description of the Upgrade

NOTE

Some of the assembly drawings in this document may be different from your instrument, but the process is similar for both an “A” model and “B” model instruments.

NOTE

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

This upgrade adds the following items to your N5224A/B Option 401 or N5225A/B Option 401 or N5244B Option 401 or N5245B Option 401 network analyzer:

- a 60-dB source attenuator in each source port channel
- a 35-dB receiver attenuator in each receiver channel
- front panel overlay replacement
- new cables

After installation of this upgrade, your analyzer will be an N5224A/B Option 417 or N5225A/B Option 417 or N5244B Option 417 or N5245B Option 417.

Refer to **“Overview of the Installation Procedure” on page 10.**

CAUTION

This repair must be done at a service center or a self-maintainer service center! Refer to **“Getting Assistance from Keysight” on page 2.**

Getting Assistance from Keysight

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

Contacting Keysight

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

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

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

NOTE

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

If You Have Problems With the Upgrade Kit Contents

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

Keysight () link.

Getting Prepared

CAUTION

The PNA contains extremely sensitive components that can be ruined if mishandled. Follow instructions carefully when making cable connections, especially wire harness connections.

The person performing the work accepts responsibility for the full cost of the repair or replacement of damaged components.

NOTE

IMPORTANT!

- 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 5](#).
 - 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 ¹.
-

1. See [“Downloading the Online PNA Service Guide” on page 6](#).

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

- A license key - refer to [“License Key File 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 7](#).
- Enough time - refer to [“About Installing the Upgrade” on page 7](#).
- 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.

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1. See [“Downloading the Online PNA Service Guide” on page 6](#).

License Key File Redemption

NOTE

The only difference between an A model license key redemption and a B model is that the A model uses a 12-character license key and the B model uses a license key file.

NOTE

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

If you are unfamiliar with the licensing process:

- For A models: Refer to <https://www.keysight.com/us/en/assets/9018-03565/installation-guides/9018-03565.pdf> (N5225-90110).
 - For B models: Refer to the <https://www.keysight.com/us/en/assets/9018-04534/installation-guides/9018-04534.pdf> (N5242-90024).
-

NOTE

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

To enable the option product, you must request license key(s) (A models) or license key files(s) (B models) 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
- **A models ONLY:** From the online Keysight HostID utility

Part of the OEC procedure to obtain the 12-digit license key online requires you to provide the HostID number of the PNA. This HostID number is NOT the one currently shown on the PNA. To find your new HostID, go to

Description of the Upgrade Getting Prepared

<http://www.na.support.keysight.com/pna/upgrades.html> and, using the HostID utility, enter the PNA serial number and your new, upgraded PNA-X model number - N5224A, N5225A, N5244A, or N5245A.

– Host ID

Using the information just gathered, you must request license key(s) for your A model or for your B models, a license key file(s) from the Keysight Software Manager: <http://www.keysight.com/find/softwaremanager>.

You will need to provide an email address, Keysight will promptly email your A model license key(s) or a for a B model, license key file(s) attachment message. Refer to **“License Key File Redemption” 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

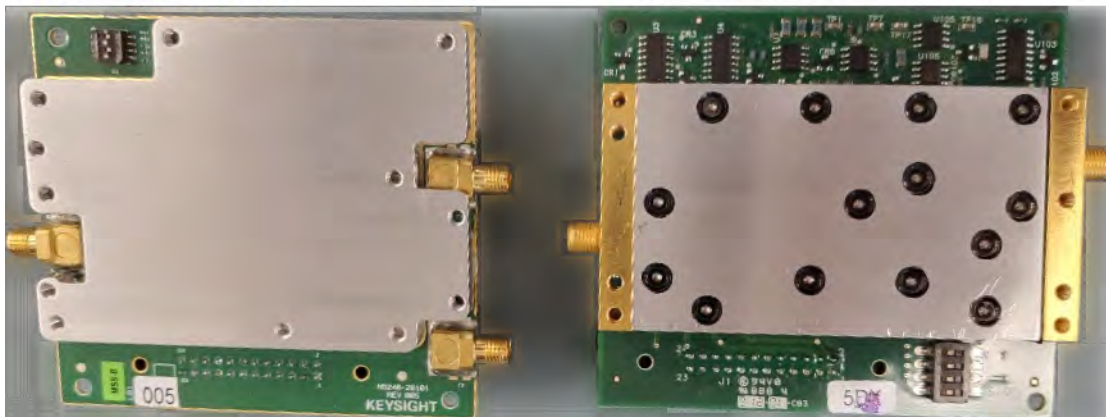
(If you have the legacy 5086-7765 HMA26.5, please discard the N5245-20195 semi-rigid cables. Refer to **Figure 1 on page 5.**)

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

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.



Verify the License Contents

Refer to the license message you received from Keysight:

If the model number, serial number, or option number do not match those on the license message you received from Keysight, you will not be able to install the license key file. If this is the case, contact Keysight for assistance. Refer to **“Overview of the Installation Procedure” on page 10.**

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.

Description of the Upgrade Getting Prepared

Protecting Your Workspace from Electrostatic Discharge

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

ESD Equipment Required for the Installation

Description	Keysight Part Number
ESD grounding wrist strap	9300-1367
5-ft grounding cord for wrist strap	9300-0980
2 x 4 ft conductive table mat and 15-ft grounding wire	9300-0797
ESD heel strap (for use with conductive floors)	9300-1308

Tools Required for the Installation

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

CAUTION

Use a 5/16-in torque wrench set to 10 in-lbs on all cable connections.

About Installing the Upgrade

Products affected	N5224A/B, N5225A/B, N5244B, and N5245B Option 401
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	2 hours
Estimated adjustment time	0.5 hour
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 2**.

Table 2 Contents of Upgrade Kit N5225-60107

Ref Desig.	Description	Qty	Part Number
--	Installation note (this document)	1	N5225-90107
--	Software Entitlement Certificate	1	5964-5145
--	China RoHS Addendum	1	9320-6722
A38– A41	0–60 dB source step attenuator	4	33325-60022
A46– A49	0–35 dB receiver step attenuator	4	33325-60023
--	Attenuator bracket (For A47 port 3 & A48 port 4 rcvr attenuators & all src attenuators.)	6	N5245-00015
--	Attenuator bracket (For A46 port 1 and A49 port 2 receiver attenuators.)	2	N5225-00001
--	Lower Front panel overlay – PNA A models (N5224/5A)	1	N5225-80003
--	Lower Front panel overlay – PNA B models (N5224/5B)	1	N5225-80006
--	Lower Front panel overlays – PNA-X models (N5244/5B)	1	N5242-80031
--	Machine screw, M3 x 8, pan head (to attach brackets to attenuators; to attach port 1 and port 2 receiver attenuators to deck)	27	0515-0372
--	Machine screw, M3 x 6, pan head (to attach source attenuators and port 3 and port 4 receiver attenuators to deck)	15	0515-0430
--	Machine screw, M3.0 x 6, flat head (to attach front frame to coupler plate)	2	0515-1946
--	Cable tie wrap	6	1400-0249
--	Cable clamp	11	1400-1334
--	Protective caps	4	1401-0214
W12	A29 port 1 receiver coupler to W11	1	N5245-20050
W18	A32 port 2 receiver coupler to W17	1	N5245-20049
W21	A29 port 1 receiver coupler to A37 reference mixer switch	1	N5245-20008
W25	A30 port 3 receiver coupler to front-panel REF 3 SOURCE OUT	1	N5245-20116
W29	A31 port 4 receiver coupler to front-panel REF 4 SOURCE OUT	1	N5245-20117
W33	RF cable, A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT	1	N5245-20010

Description of the Upgrade
Items Included in the Upgrade Kit

Table 2 **Contents of Upgrade Kit N5225-60107**

Ref Desig.	Description	Qty	Part Number
W46	REF 2 RCVR R2 IN to A27 mixer brick (R2) – (4-port only)	1	N5245-20115
W81	RF cable, A29 test port 1 receiver coupler to A38 test port 1 source attenuator	1	N5245-20029
W82	RF cable, A38 test port 1 source attenuator to front-panel Port 1 SOURCE OUT	1	N5245-20077
W85	RF cable, A30 test port 3 receiver coupler to A39 test port 3 source attenuator	1	N5245-20026
W86	RF cable, A39 test port 3 source attenuator to front-panel Port 3 SOURCE OUT	1	N5245-20027
W89	RF cable, A31 test port 4 receiver coupler to A40 test port 4 source attenuator	1	N5245-20026
W90	RF cable, A40 test port 4 source attenuator to front-panel Port 4 SOURCE OUT	1	N5245-20028
W93	RF cable, A32 test port 2 receiver coupler to A41 test port 2 source attenuator	1	N5245-20029
W94	RF cable, A41 test port 2 source attenuator to front-panel Port 2 SOURCE OUT	1	N5245-20031
W97	RF cable, front-panel Port 1 RCVR A IN to A46 port 1 receiver attenuator	1	N5245-20054
W98	RF cable, A46 port 1 receiver attenuator to A27 mixer brick (A)	1	N5245-20056
W99	RF cable, front-panel 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, front-panel 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
W103	RF cable, Port 2 RCVR B IN to A49 port 2 receiver attenuator	1	N5245-20055
W104	RF cable, A49 port 2 receiver attenuator to A27 mixer brick (B)	1	N5245-20057
--	Ribbon cable, A23 test set motherboard J205 to A46 port 1 receiver attenuator	4	N5245-60026
--	Ribbon cable, A23 test set motherboard J206 to A47 port 3 receiver attenuator		
--	Ribbon cable, A23 test set motherboard J207 to A48 port 4 receiver attenuator		
--	Ribbon cable, A23 test set motherboard J208 to A49 port 2 receiver attenuator		
--	Ribbon cable, A23 test set motherboard J549 to A38 test port 1 source attenuator	4	N5245-60006
--	Ribbon cable, A23 test set motherboard J547 to A39 test port 3 source attenuator		
--	Ribbon cable, A23 test set motherboard J548 to A40 test port 4 source attenuator		
--	Ribbon cable, A23 test set motherboard J546 to A41 test port 2 source attenuator		

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 Some Bottom-Side (Test Set) Cables."
- "Step 4. Assemble the Port 1 and Port 2 Receiver Attenuator Assemblies."
- "Step 5. Install the Port 1 and Port 2 Receiver Attenuator Assemblies."
- "Step 6. Assemble the Port 3 and Port 4 Receiver Attenuator Assemblies."
- "Step 7. Install the Port 3 and Port 4 Receiver Attenuator Assemblies."
- "Step 8. Assemble the Source Attenuator Assemblies."
- "Step 9. Install the Source Attenuator Assemblies."
- "Step 10. Install Some Bottom-Side (Test Set) Cables."
- "Step 11. Remove the Old Lower Front Panel Overlay."
- "Step 12. Reinstall Front Panel Assembly."
- "Step 13. Install the New Lower Front Panel Overlay."
- "Step 14. Reinstall Front Panel Jumpers."
- "Step 15. Install the Second Source Boards."
- "Step 16. Reinstall the Outer Cover."
- "Step 17. Remove Option 401 License."
- "Step 18. Enable Option 417."
- "Step 19. Perform Post-Upgrade Adjustments and Calibration."
- "Step 20. 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 File 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.

Once the license key (A models) or license key file (B models) has been received and the information verified, you can proceed with the installation at **“Step 2. Remove the Outer Cover” on page 11**.

NOTE

If the model number, serial number, or option number do not match those on your license key (A models) or license key file (B models), 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 2**.

Step 2. Remove the Outer Cover

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

Step 3. Remove Some Bottom-Side (Test Set) Cables

NOTE

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

CAUTION

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

1. Place the analyzer bottom-side up on a flat surface.
2. Remove the following cables. To see an image showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, Standard 4-Port Configuration, Option 401 (S/N Prefixes <6021)” or “Bottom RF Cables, Standard 4-Port Configuration, Option 400 (S/N Prefixes ≥6021)” in the PDF Service Guide¹.

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

- W12 (N5245-20109) A29 port 1 receiver coupler to W11
- W18 (N5245-20111) A32 port 2 receiver coupler to W17
- W19 (N5245-20039) A29 test port 1 receiver coupler to front-panel

1. See **“Downloading the Online PNA Service Guide” on page 6**.

Description of the Upgrade
Installation Procedure for the Upgrade

Port 1 SOURCE OUT

- W21 (N5245-20110) A29 port 1 receiver coupler to A37 reference mixer switch
- W23 (N5245-20051) A30 test port 3 receiver coupler to front-panel Port 3 SOURCE OUT
- W25 (N5245-20016) A30 port 3 receiver coupler to front-panel REF 3 SOURCE OUT
- W27 (N5245-20052) A31 test port 4 receiver coupler to front-panel Port 4 SOURCE OUT
- W29 (N5245-20017) A31 port 4 receiver coupler to front-panel REF 4 SOURCE OUT
- W31 (N5245-20040) A32 test port 2 receiver coupler to front-panel Port 2 SOURCE OUT
- W33 (N5245-20108) A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT
- W37 (N5245-20041) Front-panel Port 1 RCVR A IN to A27 mixer brick (A)
- W38 (N5245-20037) Front-panel Port 3 RCVR C IN to A28 mixer brick (C)
- W39 (N5245-20038) Front-panel Port 4 RCVR D IN to A28 mixer brick (D)
- W40 (N5245-20042) Port 2 RCVR B IN to A27 mixer brick (B)
- W46 (N5245-20011) Front-panel REF 2 RCVR R2 IN to A27 mixer brick (R2)

These cables must be saved – they will be reinstalled.

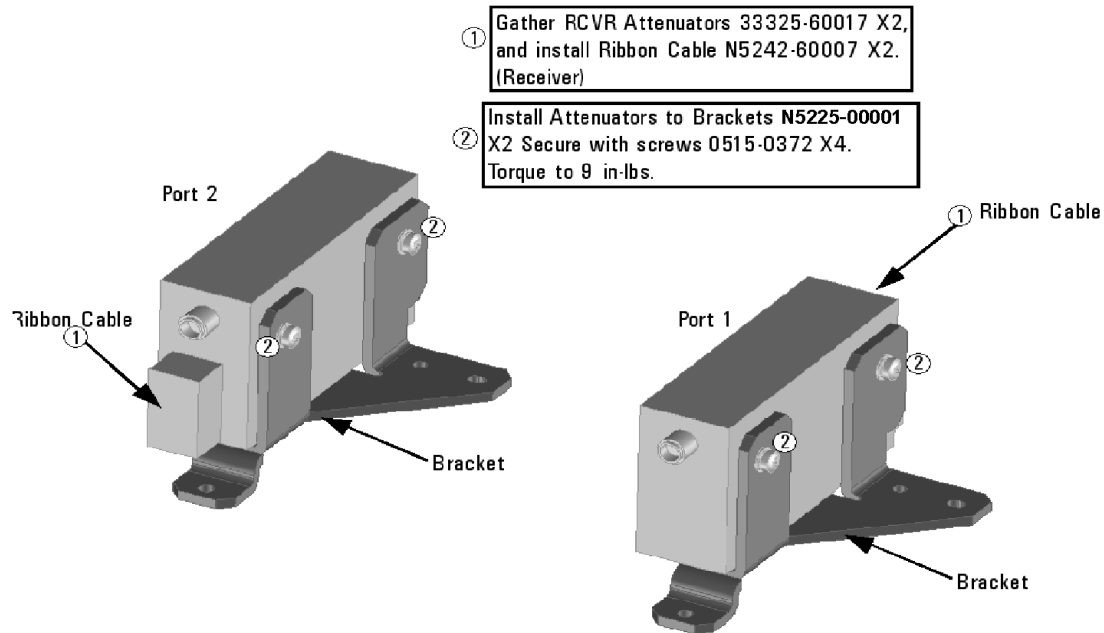
- W14 (N5245-20043) A30 port 3 receiver coupler to W13
- W16 (N5245-20044) A31 port 4 receiver coupler to W15
- W44 (N5245-20020) REF 3 RCVR R3 IN to A28 mixer brick (R3)
- W45 (N5245-20021) REF 4 RCVR R4 IN to 3 dB pad on A28 mixer brick (R4)
- W36 (N5245-20155) Front panel jumpers (quantity = 12)

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

Step 4. Assemble the Port 1 and Port 2 Receiver Attenuator Assemblies

Refer to **Figure 1** for this step of the procedure. New parts are listed in **Table 2 on page 8**. Use a T-10 TORX driver to tighten all screws.

Figure 1 Port 1 and Port 2 Receiver Attenuator and Bracket Assembly (0515-0372, 33325-60017, N5225-00001, N5242-60007)

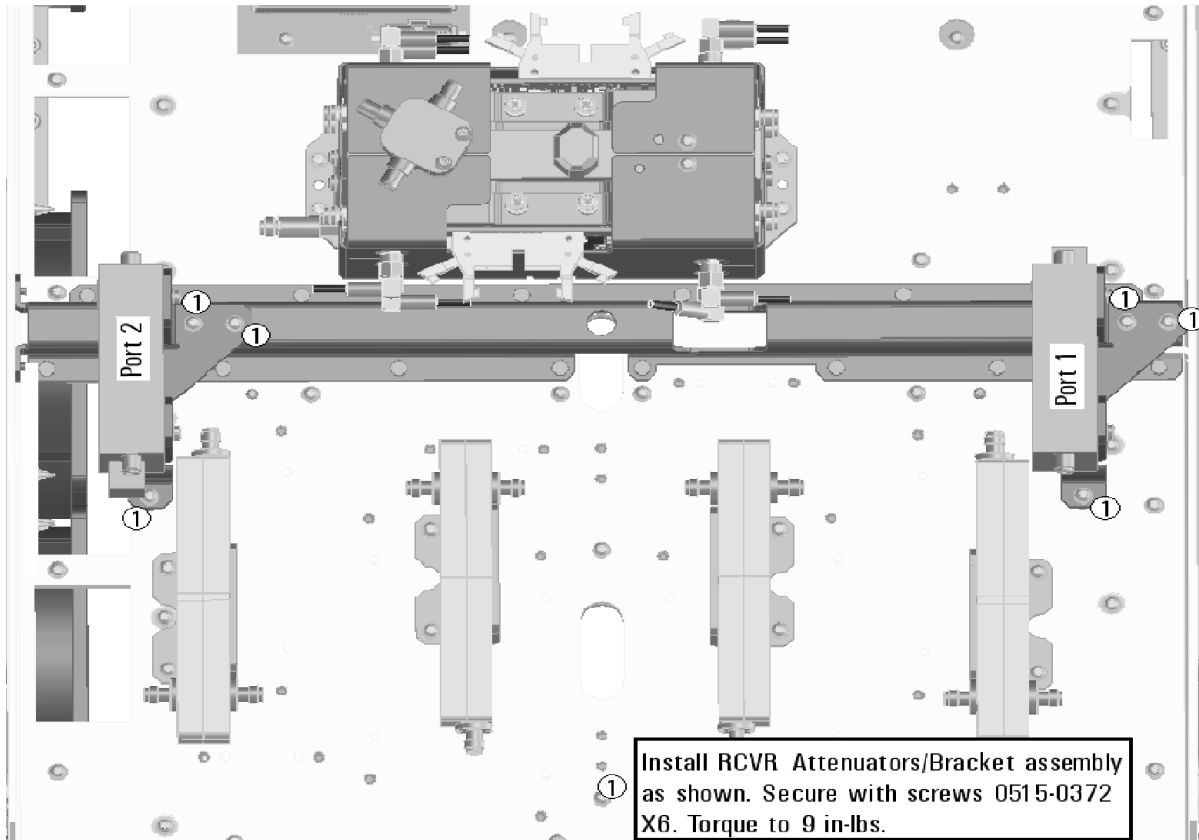


N5225_107_01

Step 5. Install the Port 1 and Port 2 Receiver Attenuator Assemblies

Refer to **Figure 2** for this step of the procedure. New parts are listed in **Table 2 on page 8**. Use a T-10 TORX driver to tighten all screws.

Figure 2 Port 1 and Port 2 Receiver Attenuator Assemblies Installation (0515-0372)¹



N5225_107_02

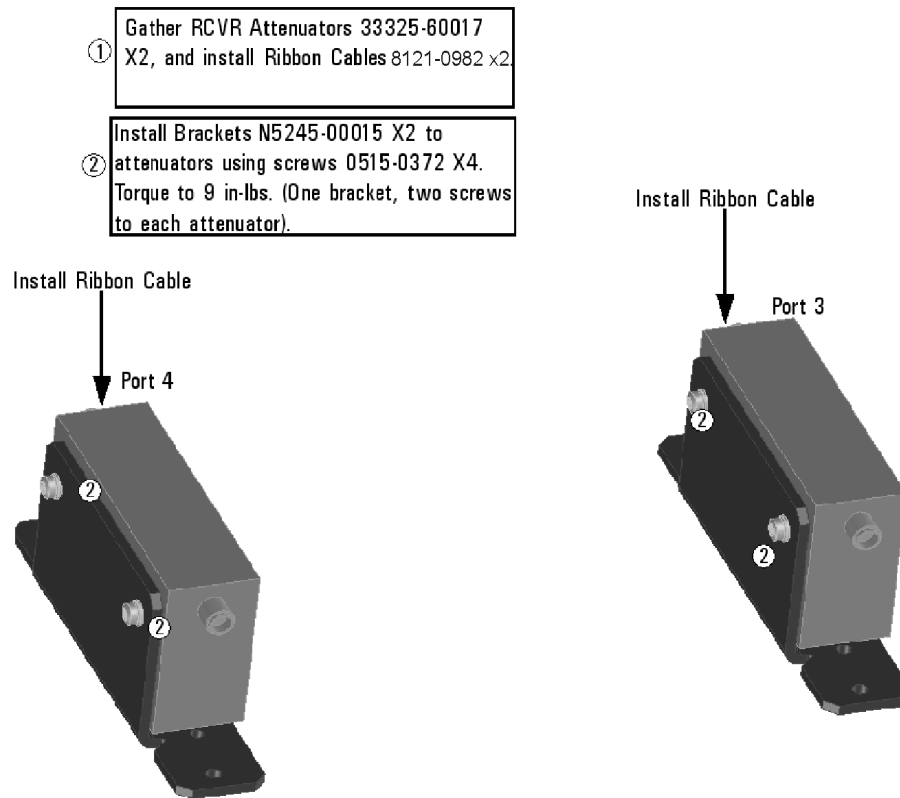
1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to **“Verify the Model/Version of HMA26.5 Installed” on page 5**.

Step 6. Assemble the Port 3 and Port 4 Receiver Attenuator Assemblies

Refer to **Figure 3** for this step of the procedure. New parts are listed in **Table 2 on page 8**. Use a T-10 TORX driver to tighten all screws.

Figure 3

Port 3 and Port 4 Receiver Attenuator and Bracket Assembly (0515-0372, 8121-0982, 33325-60017, N5245-00015)

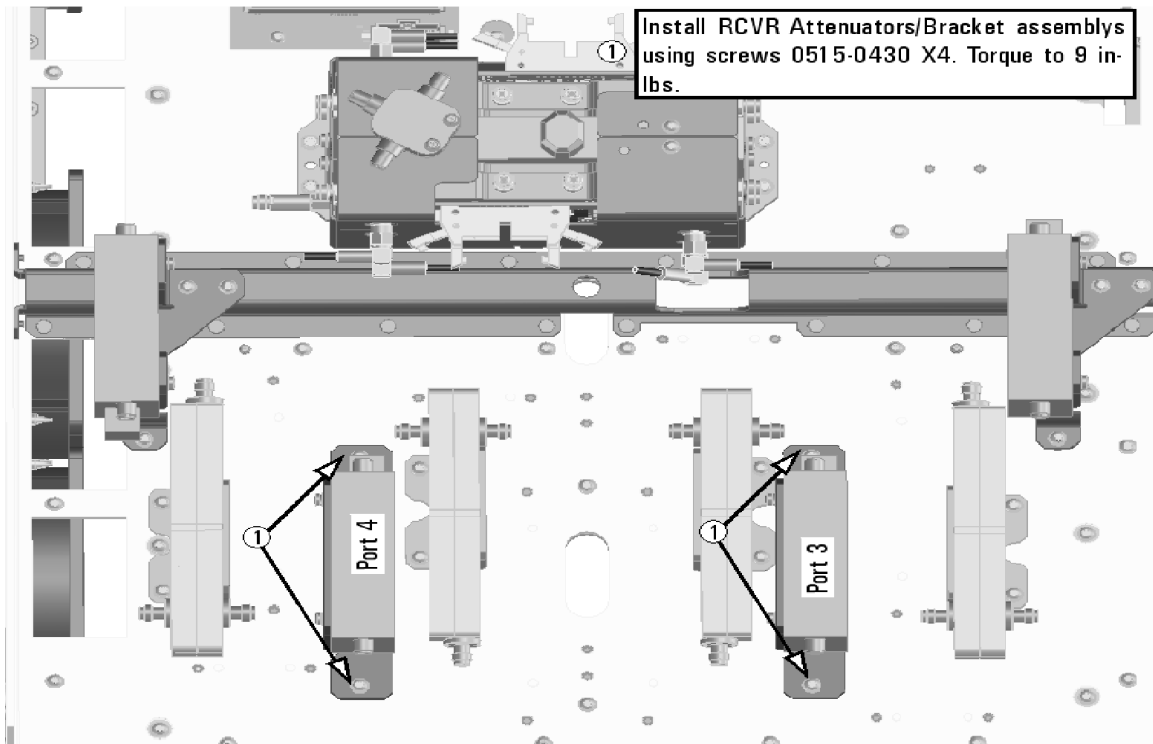


N5225_107_03

Step 7. Install the Port 3 and Port 4 Receiver Attenuator Assemblies

Refer to **Figure 4** for this step of the procedure. New parts are listed in **Table 2 on page 8**. Use a T-10 TORX driver to tighten all screws.

Figure 4 Port 3 and Port 4 Receiver Attenuator Assemblies Installation (0515-0430)¹



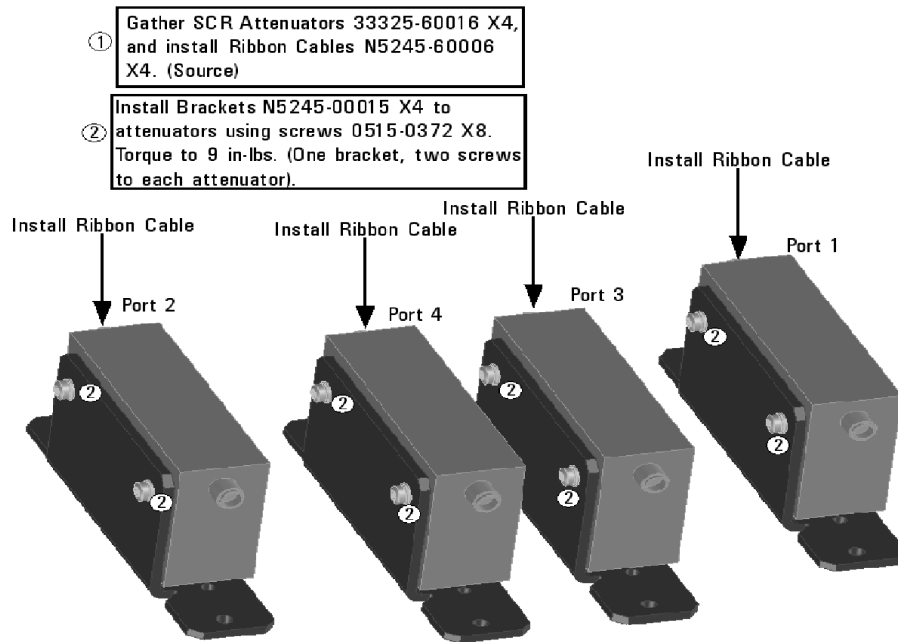
N5225_107_04

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 **“Verify the Model/Version of HMA26.5 Installed” on page 5**.

Step 8. Assemble the Source Attenuator Assemblies

Refer to **Figure 5** for this step of the procedure. New parts are listed in **Table 2 on page 8**. Use a T-10 TORX driver to tighten all screws.

Figure 5 Source Attenuator and Brackets Assembly (0515-0372, 33325-60016, N5245-60006, N5245-00015)

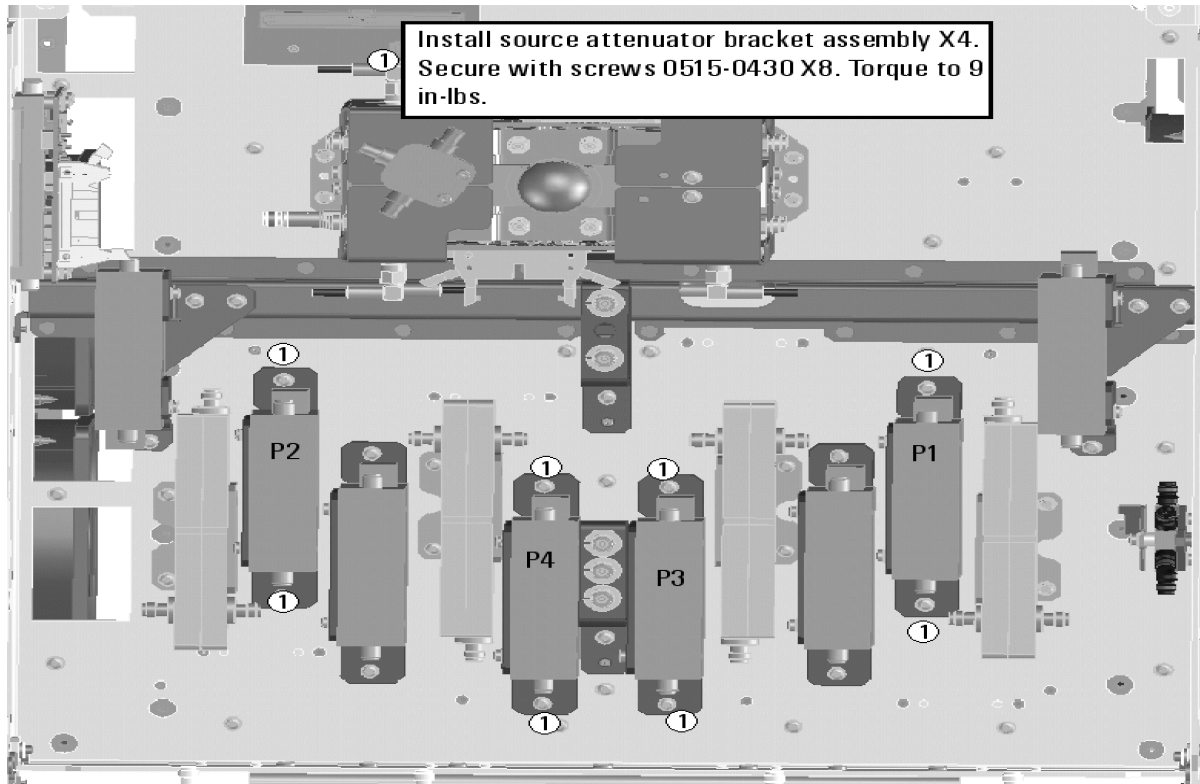


N5225_107_05

Step 9. Install the Source Attenuator Assemblies

Refer to **Figure 5-1** for this step of the procedure. New parts are listed in **Table 2 on page 8**. Use a T-10 TORX driver to tighten all screws.

Figure 5-1 A26 and A27 Test Port Bridge Assembly (0515-0430)¹



N5225_107_06

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 **“Verify the Model/Version of HMA26.5 Installed” on page 5**.

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

Follow the two instructions shown in **Figure 5** in this document. New parts are listed in **Table 2 on page 8** of this document.

CAUTION

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

Install the Semirigid Cables

To see an image showing the location of these cables, click the Chapter 6 bookmarks “Bottom RF Cables, 4-Port Configuration, Option 417” in the PDF Service Guide¹. New parts are listed in **Table 2 on page 8**.

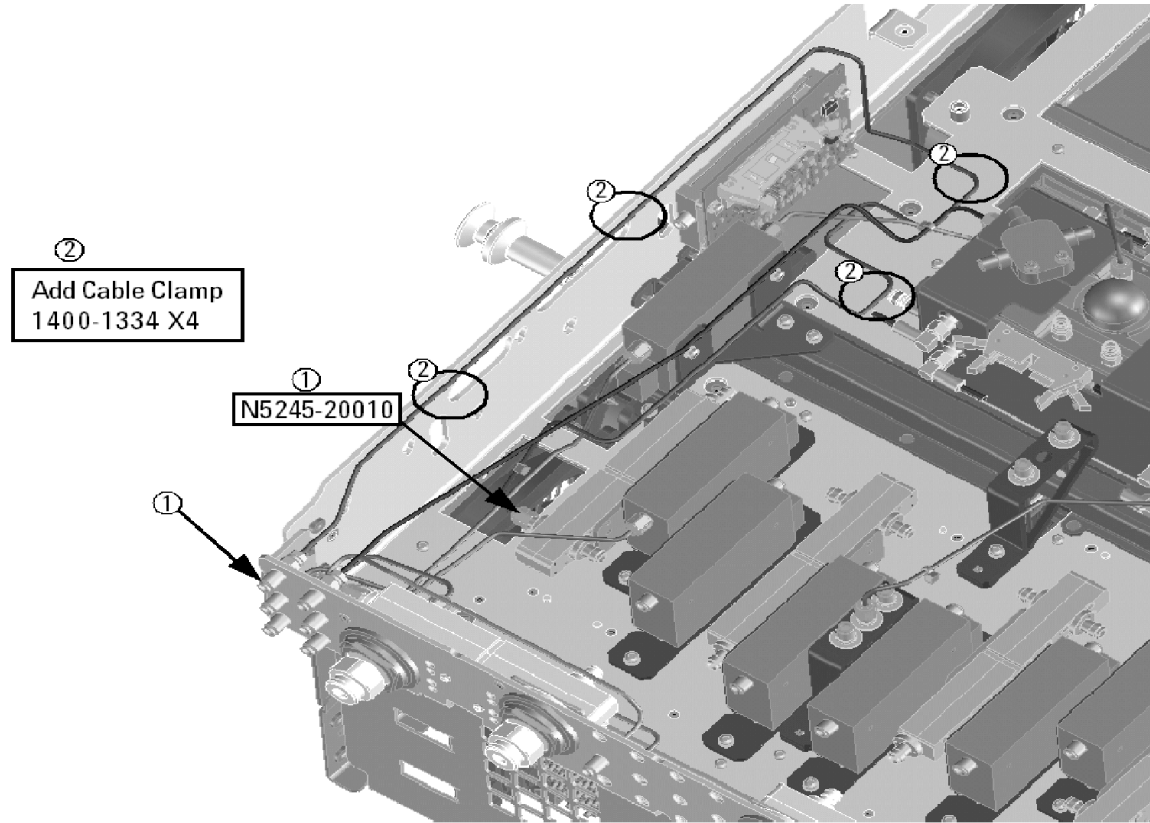
Install the following new cables in the order listed.

- W103 (N5245-20055) Port 2 RCVR B IN to A49 port 2 receiver attenuator
- W94 (N5245-20031) A41 port 2 source attenuator to front-panel Port 2 SOURCE OUT
- W33 (N5245-20010) A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT

* As shown in **Figure 5-2**, install four clamps (part number 1400-1334) to secure W33.

1. See “**Downloading the Online PNA Service Guide**” on page 6.

Figure 5-2 Location of Cable Clamps for Cable (N5245-20010, 1400-1334)¹



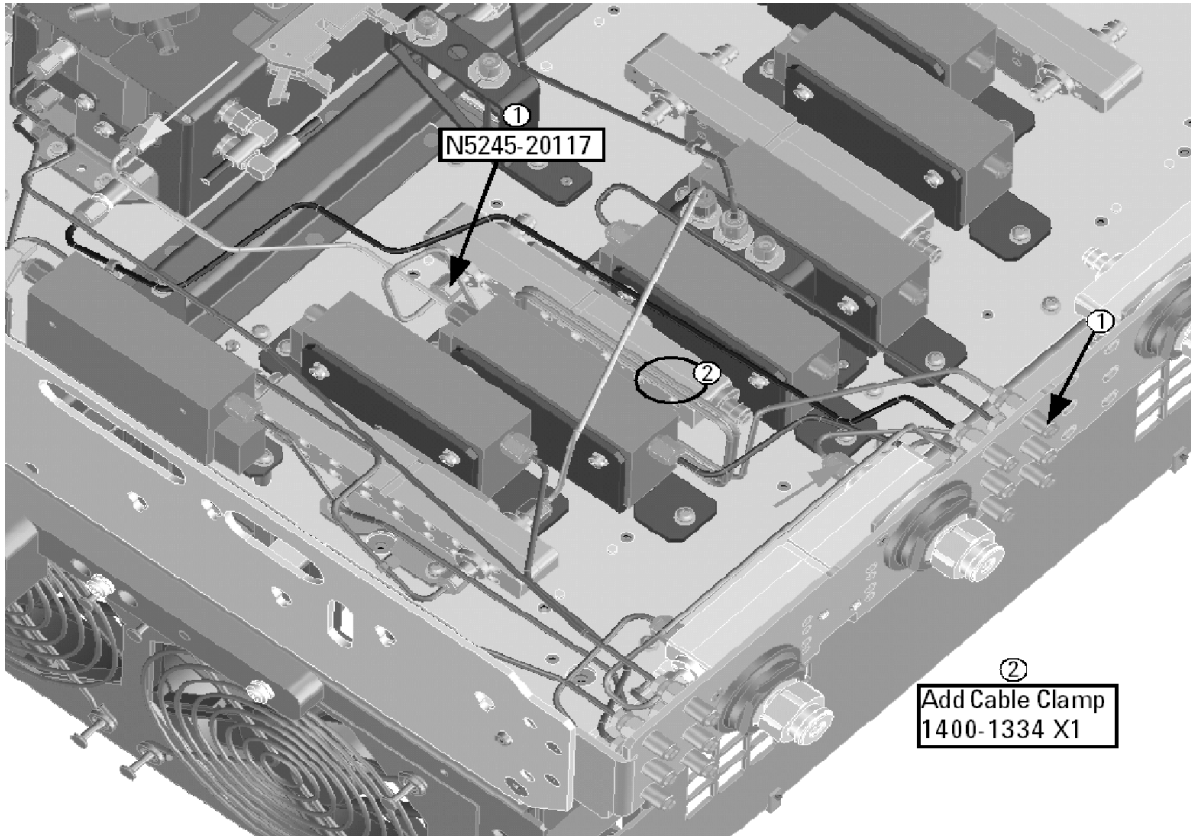
N5225_107_07

- W104 (N5245-20057) A49 port 2 receiver attenuator to A27 mixer brick (B)
- W46 (N5245-20115) REF 2 RCVR R2 IN to A27 mixer brick (R2)
- W101 (N5245-20074) Port 4 RCVR D IN to A48 port 4 receiver attenuator
- W45 (reuse) (N5245-20021) REF 4 RCVR R4 IN to 3 dB pad on 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

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 **“Verify the Model/Version of HMA26.5 Installed” on page 5.**

* As shown in **Figure 5-3**, install one clamp (part number 1400-1334) to secure W29.

Figure 5-3 Location of Cable Clamps for Cable (N5245-20117, 1400-1334)¹



N5225_107_08

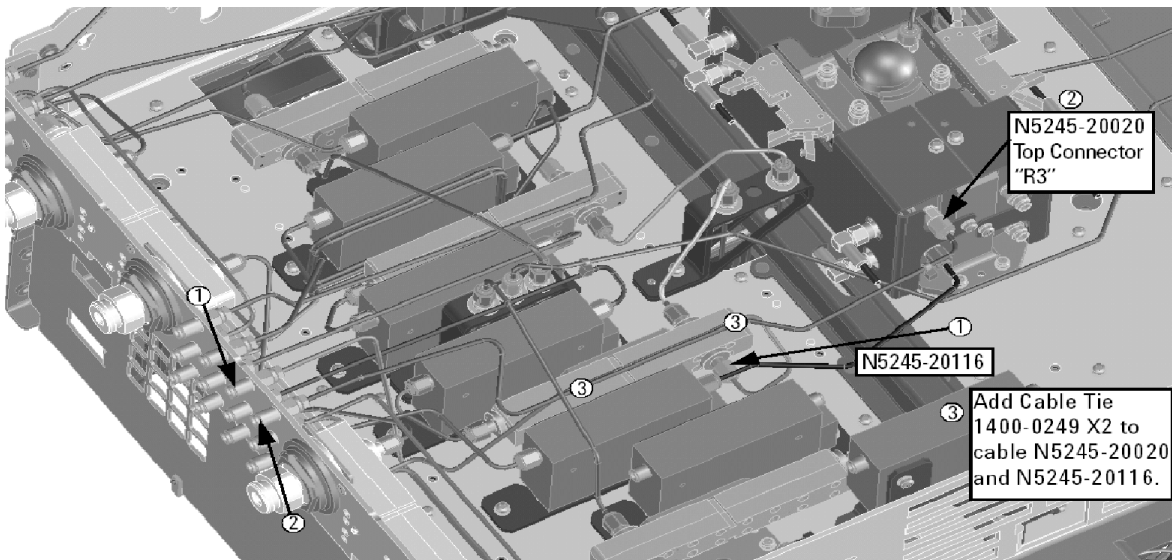
- W18 (N5245-20049) A32 port 2 receiver coupler to W17
- W85 (N5245-20026) A30 port 3 receiver coupler to A39 port 3 source attenuator
- W89 (N5245-20026) A31 port 4 receiver coupler to A40 port 4 source attenuator
- W99 (N5245-20073) Port 3 RCVR C IN to A47 port 3 receiver attenuator
- W86 (N5245-20027) 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

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 **"Verify the Model/Version of HMA26.5 Installed"** on **page 5**.

Description of the Upgrade
Installation Procedure for the Upgrade

- W100 (N5245-20066) A47 port 3 receiver attenuator to A28 mixer brick (C)
- W44 (reuse) (N5245-20020) REF 3 RCVR R3 IN to A28 mixer brick (R3)
* As shown in **Figure 6**, install two cable ties (part number 1400-0249) to secure W25 and W44.

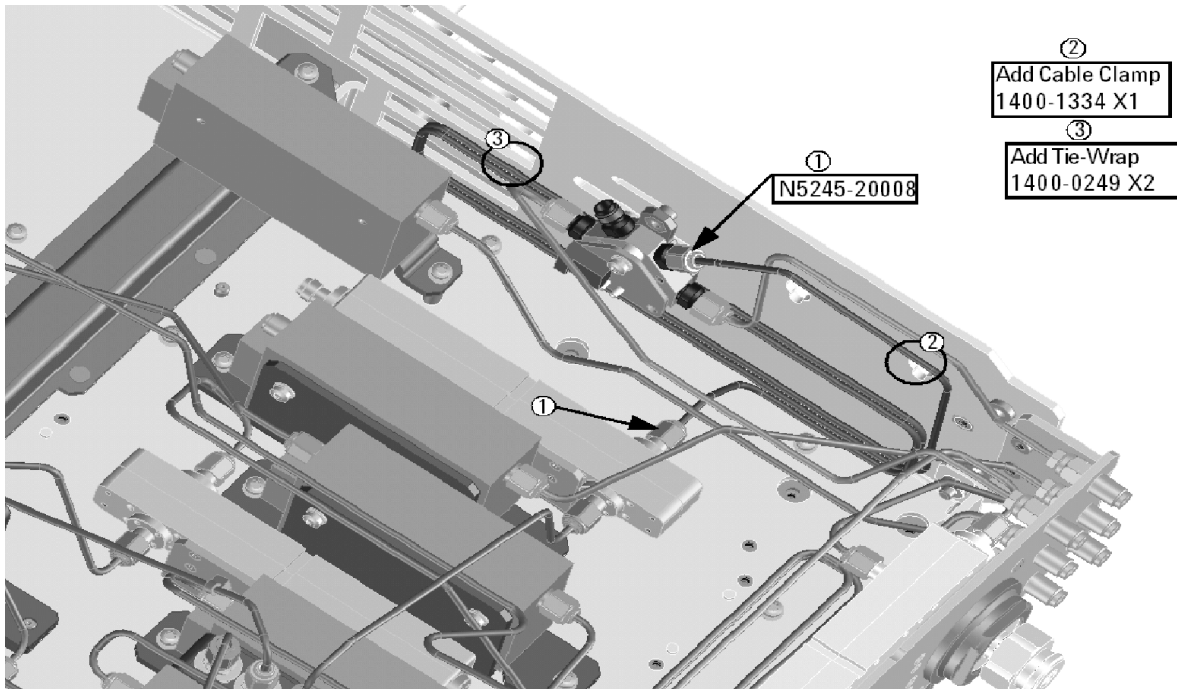
Figure 6 Location of Cable Ties (N5245-20020, N5245-20116, 1400-0249)



N5225_107_09

- W14 (reuse) (N5245-20043) A30 port 3 receiver coupler to W13
- W16 (reuse) (N5245-20044) A31 port 4 receiver coupler to W15
- W97 (N5245-20054) Front-panel Port 1 RCVR A IN to A46 port 1 receiver attenuator
- W82 (N5245-20077) A38 port 1 source attenuator to front-panel Port 1 SOURCE OUT
- W21 (N5245-20008) A29 port 1 receiver coupler to A37 reference mixer switch
* As shown in **Figure 7**, install one cable tie (part number 1400-0249) and one clamp (part number 1400-1334) to secure W21.

Figure 7 Location of Cable Tie and Clamp for W21 (N5245-20008, 1400-1334, 1400-0249)



N5225_107_10

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

- W98 (N5245-20056) A46 port 1 receiver attenuator to A27 mixer brick (A)
- W81 (N5245-20029) A29 port 1 receiver coupler to A38 port 1 source attenuator
- W93 (N5245-20029) A32 port 2 receiver coupler to A41 port 2 source attenuator

Install the Ribbon Cables

To see an image showing the location of these cables, click the Chapter 6 bookmarks “Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 417” in the PDF Service Guide¹. New parts are listed in **Table 2 on page 8**.

Connect step attenuator ribbon cables as follows:

- (N5245-60006) A38 port 1 source step attenuator to A23 test set motherboard J549
- (N5245-60006) A39 port 3 source step attenuator to A23 test set motherboard J547
- (N5245-60006) A40 port 4 source step attenuator to A23 test set

1. See **“Downloading the Online PNA Service Guide” on page 6**.

Description of the Upgrade
Installation Procedure for the Upgrade

motherboard J548

- (N5245-60006) A41 port 2 source step attenuator to A23 test set motherboard J546
- (N5245-60026) A46 port 1 receiver step attenuator to A23 test set motherboard J205
- (N5245-60026) A47 port 3 receiver step attenuator to A23 test set motherboard J206
- (N5245-60007) A48 port 4 receiver step attenuator to A23 test set motherboard J207
- (N5245-60007) A49 port 2 receiver step attenuator to A23 test set motherboard J208.

Step 11. Remove the Old Lower Front Panel Overlay

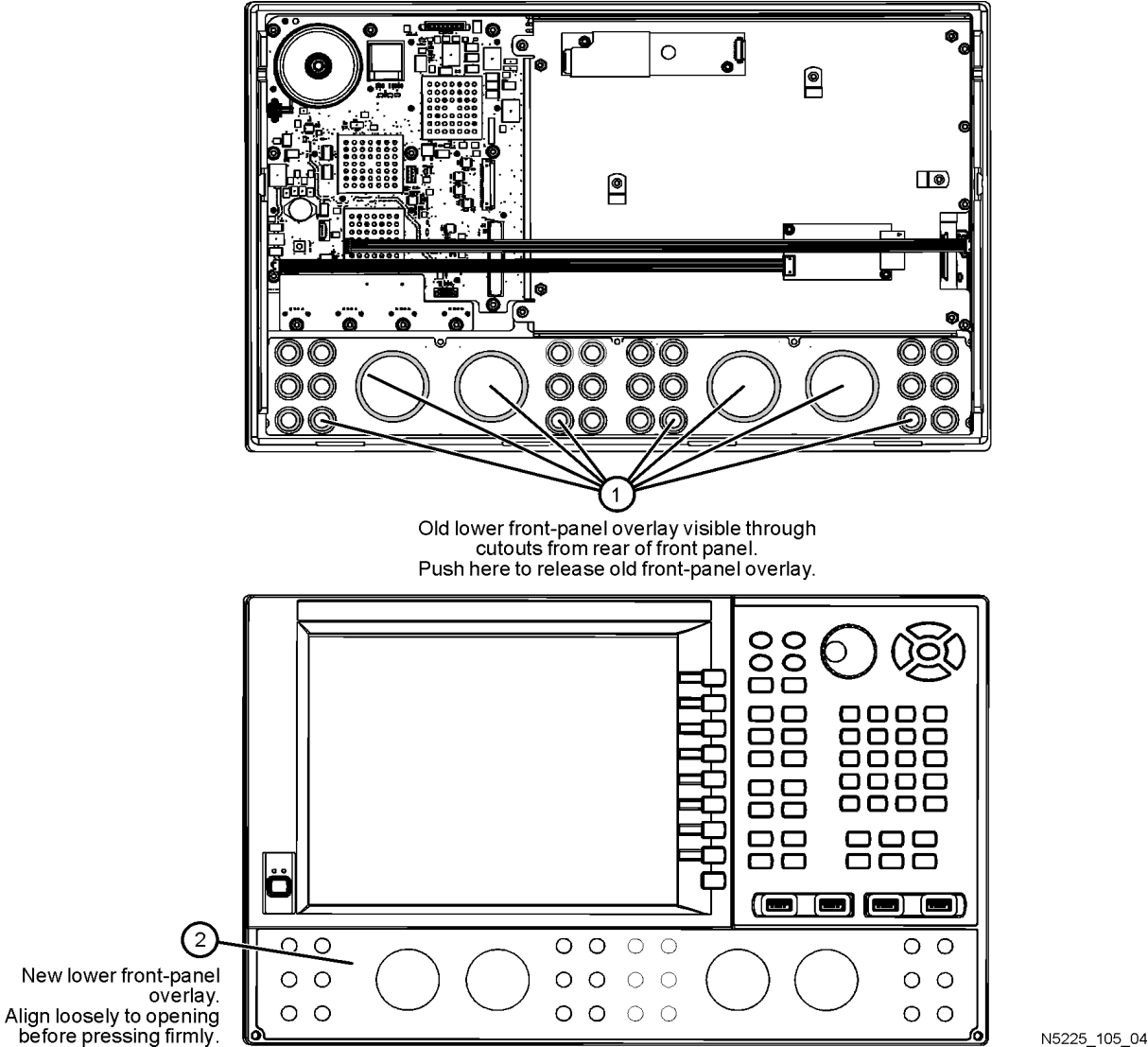
Refer to **Figure 8 on page 26** for this step of the procedure. New parts are listed in **Table 2 on page 8**.

1. From the back side of the front panel, use a blunt object in the cutouts in the lower front dress panel to push on the old overlay (item ①) and separate it from the front dress panel.
2. From the front side of the front panel, pull off the overlay completely and discard it.
3. Remove any adhesive remaining on the front panel.

CAUTION

To avoid possible damage to the lower front panel overlay (label), do not attempt to attach the lower front panel label until **“Step 13. Install the New Lower Front Panel Overlay” on page 27**.

Figure 8 Lower Front Panel Overlay Replacement



Step 12. Reinstall Front Panel Assembly

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

Step 13. Install the New Lower Front Panel Overlay

Refer to **Figure 8 on page 26** for this step of the procedure. New parts are listed in **Table 2 on page 8**.

1. Remove the protective backing from the new front panel overlay, N5225-80003 for PNA N5224/5A or N5225-80006 for PNA N5224/5B or N5242-80031 for PNA-X N5244/5B models (item ①).
2. Starting from either side, **loosely** place the overlay in the recess on the lower front panel, ensuring that it fits tightly against the edges of the recess.
3. Once the overlay is in place, press it firmly onto the frame to secure it.

Step 14. Reinstall Front Panel Jumpers

Reinstall all twelve of the front panel jumper cables (W36), part number N5245-20155. Torque to 10 in-lbs.

Step 15. Install the Second Source Boards

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.

1. See “**Downloading the Online PNA Service Guide**” on page 6.

Step 16. Reinstall the Outer Cover

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

Step 17. Remove Option 401 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.

A Model Option 401 License Removal Procedure

For B models, refer to “**B Model Option 401 License Removal 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 **401**.
4. Click **Remove**.

B Model Option 401 License Removal Procedure

For A models, refer to “**A Model Option 401 License Removal Procedure.**”

1. To start the Keysight License Manager, press **Start > Keysight License Manager > Keysight License Manager**. A Keysight License Manager dialog box will appear.
2. Right click the on the desired option and click **Delete**.
3. In the Keysight License Manager dialog box that appears, press or click **Yes** to confirm delete.
4. A message displays stating that the option removal was successful.

1. See “**Downloading the Online PNA Service Guide**” on page 6.

Step 18. Enable Option 417

Procedure Requirements

- The analyzer must be powered up and operating to perform this procedure.
- The Network Analyzer program must **not** be running.
- Refer to the license message you received from Keysight: Verify that the analyzer's model and serial numbers match those on the license message you received from Keysight.
- A keyboard must be connected to the network analyzer.

For "A" models, refer to **"Option Enable Procedure for "A" Model Instruments" on page 29.**

For "B" models refer to **"Option Enable Procedure for "B" Model Instruments" on page 30.**

Option Enable Procedure for "A" Model Instruments

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 **417 - Configurable TS + Attens**.
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. When the installation is complete, click **Exit**.

"A" Model 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 "417" is listed after "Options:" in the display.

3. Click **OK**.

NOTE

If the option has not been enabled or an older option has not been removed, contact Keysight Technologies. Refer to [“Getting Assistance from Keysight” on page 2](#).

Option Enable Procedure for “B” Model Instruments

NOTE

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

A single license file may contain more than one feature.

1. Locate the email(s) from Keysight which contain license file attachments. These emails are a result of Step 3 on [“License Key File Redemption” on page 4](#).
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 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.

“B” Model Option Verification Procedure

NOTE

If if the option(s) have not been enabled or if Option 401 has not been removed, contact Keysight Technologies. Refer to “[Getting Assistance from Keysight](#)” on page 2.

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.
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 19. Perform Post-Upgrade Adjustments and Calibration

Adjustments

NOTE

IMPORTANT!

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

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

- 10 MHz frequency reference adjustment
- EE default adjustment: Synth LO only (Version 6 synthesizers)
- source adjustment
- IF gain adjustment
- receiver characterization
- receiver adjustment
- IF Response adjustment (For A model: Options 090, 093, or 094 Only. For B models: Options S93090xA/B, S93093A/B, or S93094A/B Only.)
- Noise adjustment (For N5244/5B models: Option 029 with S93029A/B Only.)

These adjustments are described in the PNA Service Guide and in the PNA on-line HELP. A list of equipment required to perform these adjustments is also found in the service guide.

To view this service guide information, click the Chapter 3 bookmark “Tests and Adjustments” in the PDF Service Guide¹.

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

EEPROM Backup

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

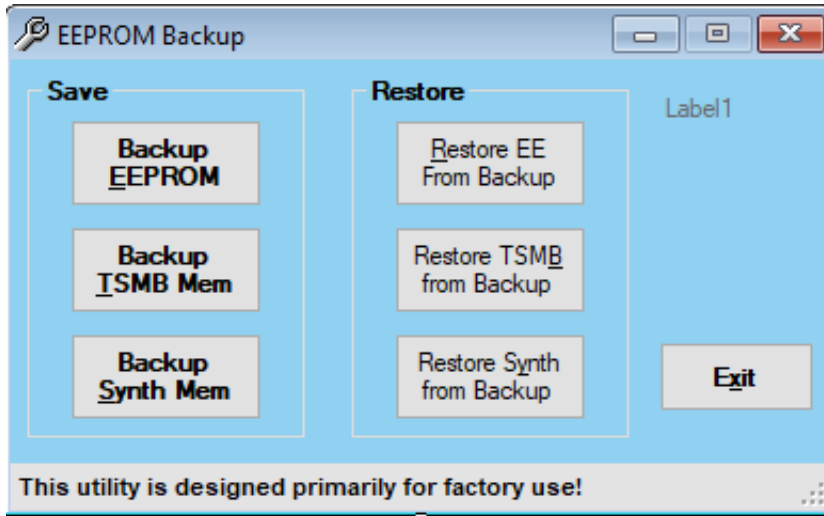
The adjustments listed here generate new correction constants. The analyzer must have a backup of this new data in case any of the data becomes corrupted.

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 6](#).

Figure 9 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 2**.

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.

Step 20. 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.

