

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 201 to Option 217 or PNA-X N5244B or N5245B Option 201 to Option 217

Upgrade Kit Order Number: N5224AU-217 or N5225AU-217 or N5224BU-217 or N5224BU-217 or N5244BU-217 or N5245BU-217

Keysight Kit Number: N5225-60103

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**.



Notices

© Keysight Technologies, Inc.
2011-2022

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies, Inc. as governed by United States and international copyright laws.

Trademark Acknowledgments

Manual Part Number

N5225-90103

Edition

Edition 2, January 2022
Supersedes: December 2020

Printed in USA/Malaysia

Published by:
Keysight Technologies
1400 Fountaingrove Parkway
Santa Rosa, CA 95403

Warranty

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED “AS IS,” AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, KEYSIGHT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. KEYSIGHT SHALL NOT BE LIABLE FOR ERRORS OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR ANY INFORMATION CONTAINED HEREIN. SHOULD KEYSIGHT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS

COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT WILL CONTROL.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

U.S. Government Rights

The Software is “commercial computer software,” as defined by Federal Acquisition Regulation (“FAR”) 2.101. Pursuant to FAR 12.212 and 27.405-3 and Department of Defense FAR Supplement (“DFARS”) 227.7202, the U.S. government acquires commercial computer software under the same terms by which the software is customarily provided to the public.

Accordingly, Keysight provides the Software to U.S. government customers under its standard commercial license, which is embodied in its End User License Agreement (EULA), a copy of which can be found at

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

The license set forth in the EULA represents the exclusive authority by which the U.S. government may use, modify, distribute, or disclose the Software. The EULA and the license set forth therein, does not require or permit, among other things, that Keysight: (1) Furnish technical information related to commercial computer software or commercial computer software documentation that is not customarily provided to the public; or (2) Relinquish to, or otherwise provide, the government rights in excess of these rights customarily provided to the public to use, modify, reproduce, release, perform, display, or disclose commercial computer software or commercial computer software

documentation. No additional government requirements beyond those set forth in the EULA shall apply, except to the extent that those terms, rights, or licenses are explicitly required from all providers of commercial computer software pursuant to the FAR and the DFARS and are set forth specifically in writing elsewhere in the EULA. Keysight shall be under no obligation to update, revise or otherwise modify the Software. With respect to any technical data as defined by FAR 2.101, pursuant to FAR 12.211 and 27.404.2 and DFARS 227.7102, the U.S. government acquires no greater than Limited Rights as defined in FAR 27.401 or DFAR 227.7103-5 (c), as applicable in any technical data.

Safety Notices

CAUTION

A **CAUTION** 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 damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

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.

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 201 or N5225A/B Option 201 or N5244B Option 201 or N5245B Option 201 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 217 or N5225A/B Option 217 or N5244B Option 217 or N5245B Option 217.

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

CAUTION

This repair must be done at a service center or a self-maintainer service center! Refer to **“Getting Assistance from Keysight” on page 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! Before you begin this upgrade:

- This document contains references to legacy and new A25 HMA26.5 Multiplier/Amplifier. Your model instrument may have either a legacy assembly 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 9](#).

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 10](#).
- Enough time - refer to [“About Installing the Upgrade” on page 10](#).
- 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 9](#).

License Key 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 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.

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 <http://mktwww.srs.is.keysight.com/field/service/network/pna/> and, using the HostID utility, enter the PNA serial number and your new, upgraded PNA-X model number - N5224A, N5225A, N5244A, or N5245A.

Getting Prepared

– 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 Redemption” on page 6**.

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**.)

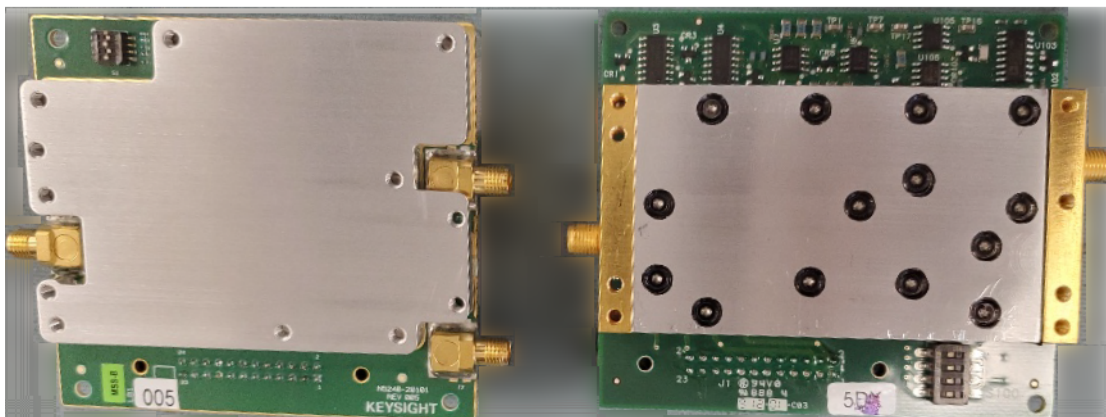
The new N5240-60101 HMA26.5 has the splitter integrated into the assembly. Refer to **Figure 1 on page 7**.

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.



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 **“Getting Assistance from Keysight” on page 4.**

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., N2222B).
5. Press **Enter**.
6. Scroll down to the **PRINT DOCUMENTATION** section and click to select **Service Manual**.

The **Service Manual** for your instrument will be displayed near the top of the right column.

7. Click the hyperlink of the Service Guide title to download the PDF file.
8. When the PDF of the Service Guide is displayed, scroll through the Contents section bookmarks to locate the information needed.

Protecting Your Workspace from Electrostatic Discharge

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

ESD Equipment Required for the Installation

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

Tools Required for the Installation

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

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	N5224A/B and N5225A/B and N5244B and N5245B Option 201
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	2 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 2 **Contents of Upgrade Kit N5225-60103**

Ref Desig.	Description	Qty	Part Number
--	Installation note (this document)	1	N5225-90103
--	Software Entitlement Certificate	1	5964-5145
--	China RoHS Addendum	1	9320-6722
A38, A41	0–60 dB source step attenuator	2	33325-60022
A46, A49	0–35 dB receiver step attenuator	2	33325-60023
--	Attenuator bracket (For source attenuators.)	2	N5245-00015
--	Attenuator bracket (For receiver attenuators.)	2	N5225-00001
--	Cable clamp	8	1400-1334
--	Cable tie	5	1400-0249
--	Protective caps	2	1401-0214
--	Front panel overlay - PNA A models (N5224/5A)	1	N5225-80002
--	Front panel overlay - PNA B models (N5224/5B)	1	N5225-80005
--	Front panel overlay - PNA-X B models (N5244/5B)	1	N5242-80029
--	Machine screw, M3 x 8, pan head (to attach brackets to attenuators; to attach receiver attenuators to deck)	17	0515-0372
--	Machine screw, M3 x 6, pan head (to attach source attenuators to deck)	4	0515-0430
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	N5245-20118
W33	RF cable, A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT	1	N5245-20010
W46	REF 2 RCVR R2 IN to A27 mixer brick (R2) – (2-port only)	1	N5245-20119
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
W93	RF cable, A32 test port 2 receiver coupler to A41 test port 2 source attenuator	1	N5245-20029

Table 2 Contents of Upgrade Kit N5225-60103

Ref Desig.	Description	Qty	Part Number
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
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	2	N5245-60026
--	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	2	N5245-60006
--	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 A46 and A49 Receiver Attenuator Assemblies."
- "Step 5. Install the A46 and A49 Receiver Attenuator Assemblies."
- "Step 6. Assemble the A38 and A41 Source Attenuator Assemblies."
- "Step 7. Install the A38 and A41 Source Attenuator Assemblies."
- "Step 8. Install Some Bottom-Side (Test Set) Cables."
- "Step 9. Remove the Old Lower Front Panel Overlay."
- "Step 10. Reinstall Front Panel Assembly."
- "Step 11. Install the New Lower Front Panel Overlay."
- "Step 12. Reinstall Front Panel Jumpers."
- "Step 13. Position the Cables and Wires to Prevent Pinching."
- "Step 14. Reinstall the Outer Cover."
- "Step 15. Remove Option 201 License."
- "Step 16. Enable Options 217."
- "Step 17. Perform Post-Upgrade Adjustments and Calibration."
- "Step 18. 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 (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 14**.

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 4**.

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

CAUTION

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

NOTE

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 200 (S/N Prefixes <6021)” or “Bottom RF Cables, Standard 2-Port Configuration, Option 200 (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 Port 1 SOURCE OUT

1. See **“Downloading the Online PNA Service Guide” on page 9**.

Installation Procedure for the Upgrade

- W21 (N5245-20120) A29 port 1 receiver coupler to A37 reference mixer switch
- W31 (N5245-20040) A32 test port 2 receiver coupler to front-panel Port 2 SOURCE OUT
- W33 (N5245-20121) 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)
- 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.

- W41 (N5245-20007) A37 reference mixer switch to front-panel REF 1 SOURCE OUT
- W42 (N5245-20006) REF 1 RCVR R1 IN to A37 reference mixer switch
- W36 (N5245-20155) Front panel jumpers (quantity = 6)

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

Step 4. Assemble the A46 and A49 Receiver Attenuator Assemblies

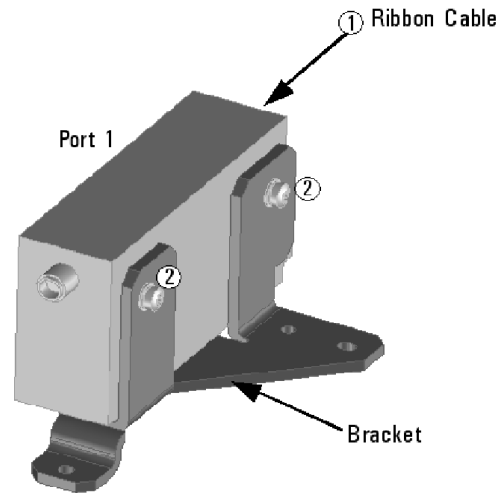
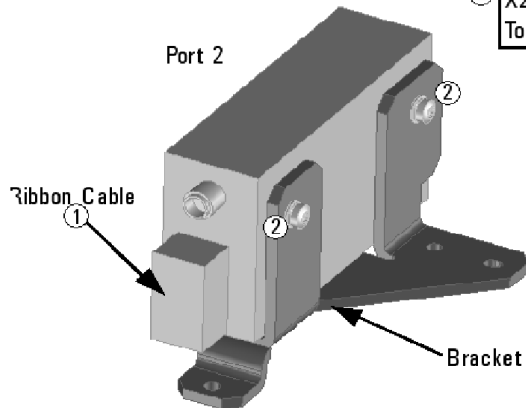
Refer to **Figure 2** for this step of the procedure. New parts are listed in **Table 2 on page 11**. Use a T-10 TORX driver to tighten all screws.

Figure 2

Port 1 and Port 2 Receiver Attenuator and Bracket Assembly (0515-0372, 33325-60017, N5225-00001, N5245-60026)

① Gather RCVR Attenuators 33325-60017 X2, and install Ribbon Cable N5245-60026 X2. (Receiver)

② Install Attenuators to Brackets N5225-00001 X2 Secure with screws 0515-0372 X4. Torque to 9 in-lbs.

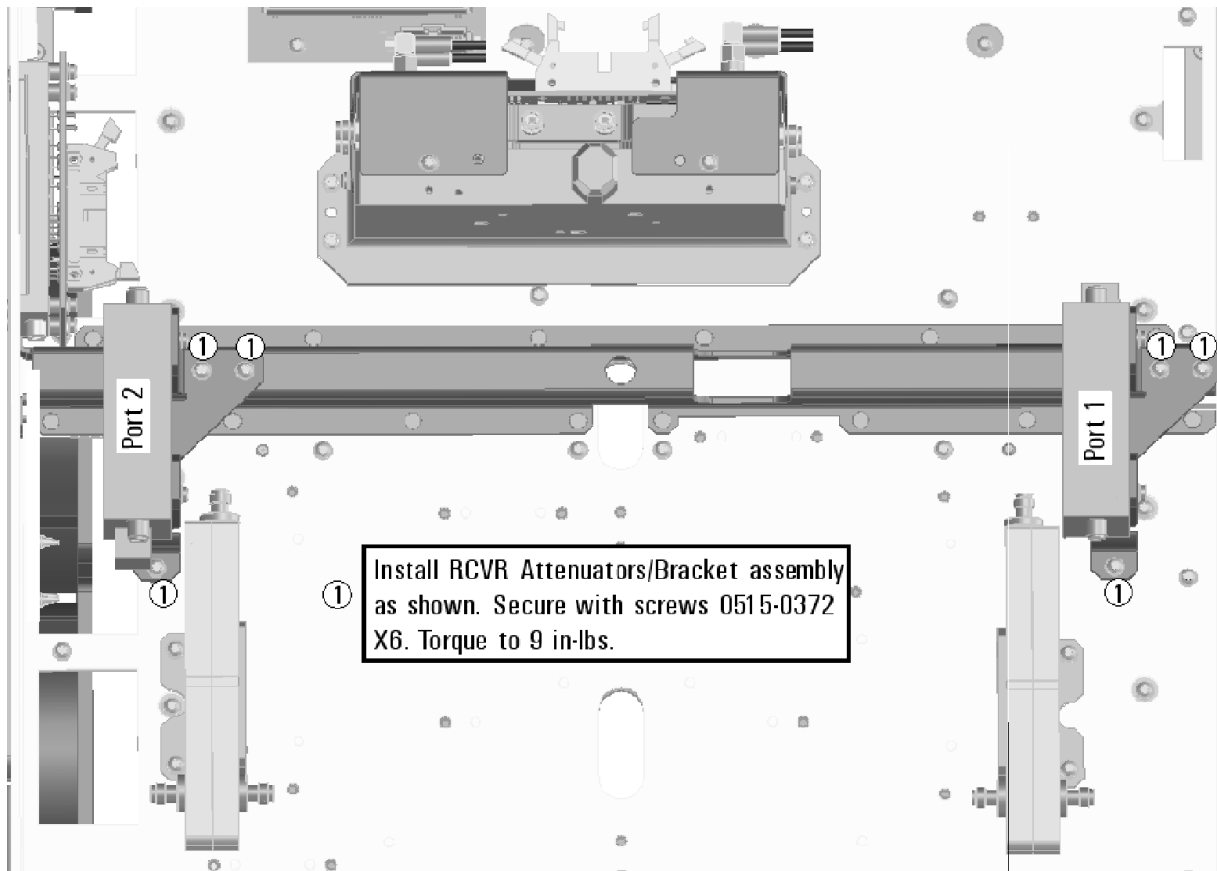


Step 5. Install the A46 and A49 Receiver Attenuator Assemblies

Refer to **Figure 3** for this step of the procedure. New parts are listed in **Table 2 on page 11**. Use a T-10 TORX driver to tighten all screws.

Figure 3

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



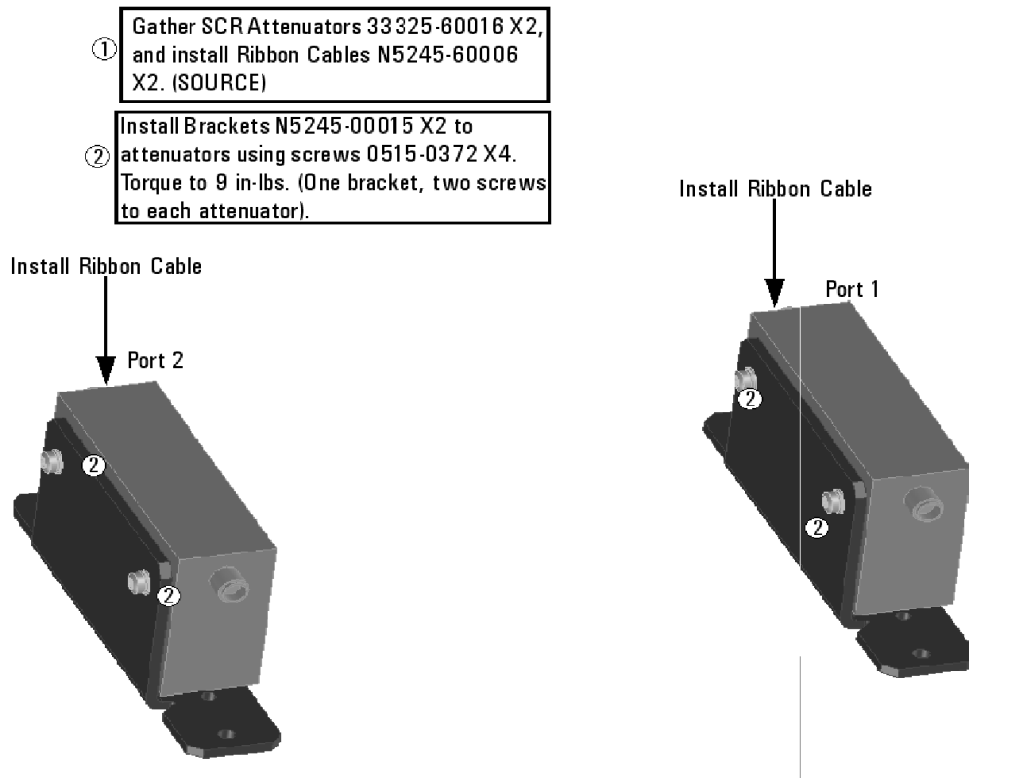
N5225_103_04

Step 6. Assemble the A38 and A41 Source Attenuator Assemblies

Refer to **Figure 4** for this step of the procedure. New parts are listed in **Table 2 on page 11**. Use a T-10 TORX driver to tighten all screws.

Figure 4

Source Attenuator and Brackets Assembly (0515-0372, 33325-60016, N5245-60006, N5245-60015)

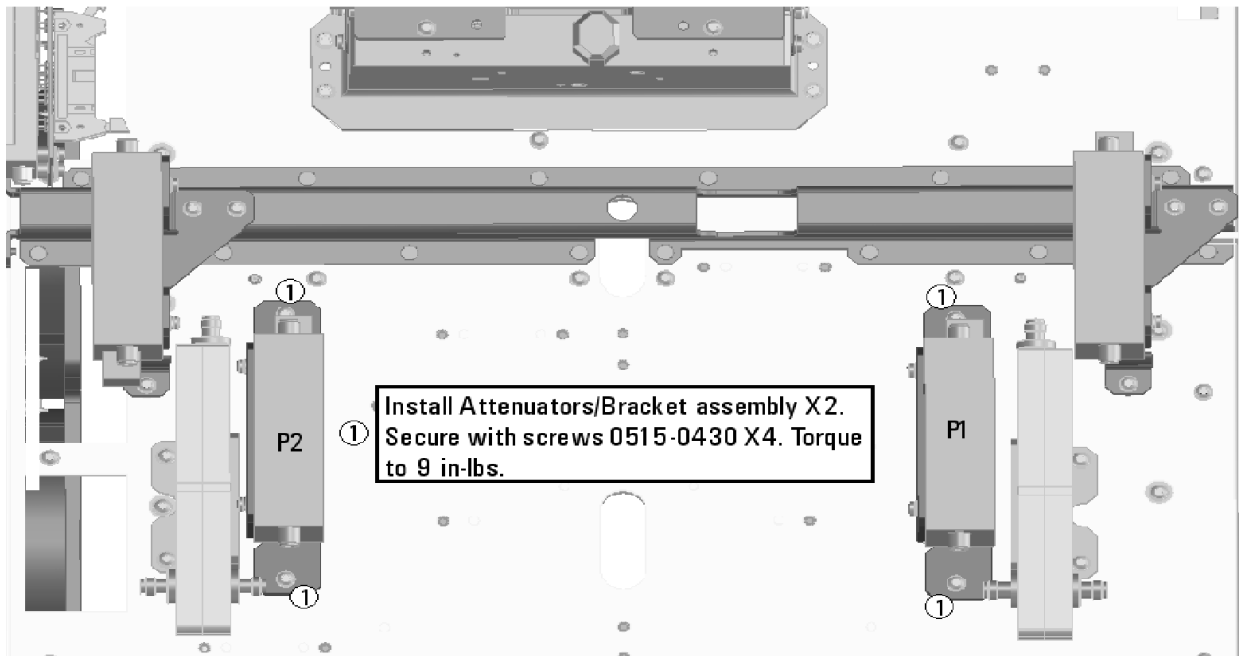


Step 7. Install the A38 and A41 Source Attenuator Assemblies

Refer to **Figure 5** for this step of the procedure. New parts are listed in **Table 2 on page 11**. Use a T-10 TORX driver to tighten all screws.

Figure 5

Source Attenuator Assemblies Installation (0515-0430)



N5225_103_06

Step 8. 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.

Install the Semi-rigid Cables

To see an image showing the location of these cables, click the Chapter 6 bookmarks “Bottom RF Cables, 2-port Configuration, Option 217 (S/N Prefixes <6021)” or “Bottom RF Cables, 2-port Configuration, Option 217 (S/N Prefixes ≥6021)” in the PDF Service Guide¹. New parts are listed in **Table 2 on page 11**.

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

1. See **“Downloading the Online PNA Service Guide” on page 9**.

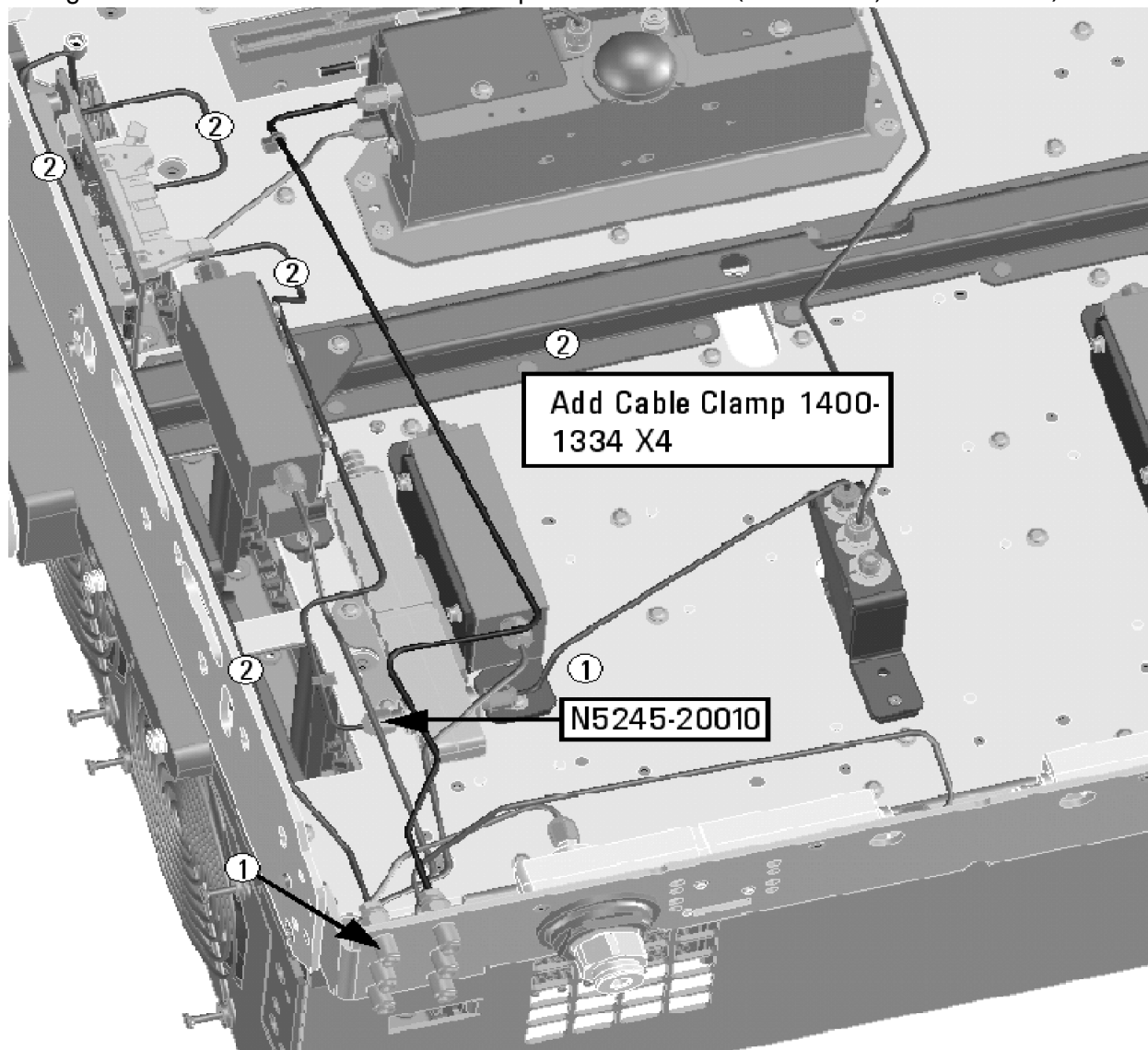
Installation Procedure for the Upgrade

SOURCE OUT

- W33 (N5245-20010) A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT

* As shown in **Figure 6 on page 20**, install four cable clamps (part number 1400-1334) to secure W33 (part number N5245-20010).

Figure 6 Location of Cable Clamps to Secure W33 (1400-1334, N5245-20010)



N5225_103_01

- W104 (N5245-20057) A49 port 2 receiver attenuator to A27 mixer brick (B)
- W46 (N5245-20119) REF 2 RCVR R2 IN to A27 mixer brick (R2)
- W18 (N5245-20049) A32 port 2 receiver coupler to W17
- W12 (N5245-20050) A29 port 1 receiver coupler to W11

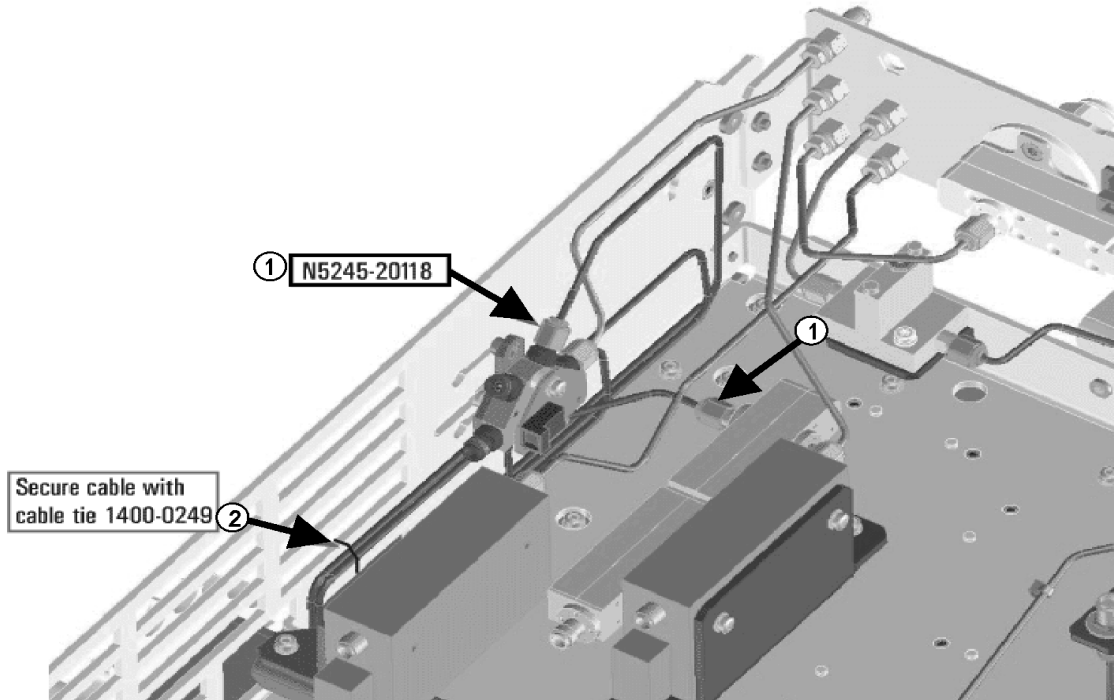
Installation Procedure for the Upgrade

- W82 (N5245-20077) A38 port 1 source attenuator to front-panel Port 1 SOURCE OUT
- W42 (reuse) (N5245-20006) REF 1 RCVR R1 IN to A37 reference mixer switch
- W41 (reuse) (N5245-20007) A37 reference mixer switch to front-panel REF 1 SOURCE OUT
- W21 (N5245-20118) A29 port 1 receiver coupler to A37 reference mixer switch

If the two 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 7**, install a cable tie (part number 1400-0249) to secure W21 (part number N5245-20118).

Figure 7 Location of Cable Tie to Secure W21 (1400-0248, N5245-20018)



- 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, 2-port, Option 217 (S/N Prefixes <6021)” in the PDF Service Guide¹. New parts are listed in **Table 2 on page 11**.

Connect step attenuator ribbon cables as follows:

- (N5245-60006) A38 port 1 source step attenuator to A23 test set motherboard J549
- (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) A49 port 2 receiver step attenuator to A23 test set motherboard J208.

Step 9. Remove the Old Lower Front Panel Overlay

Refer to **Figure 8 on page 23** for this step of the procedure. Although this figure shows a 4-port PNA, the concept is the same for a 2-port PNA. New parts are listed in **Table 2 on page 11**.

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.

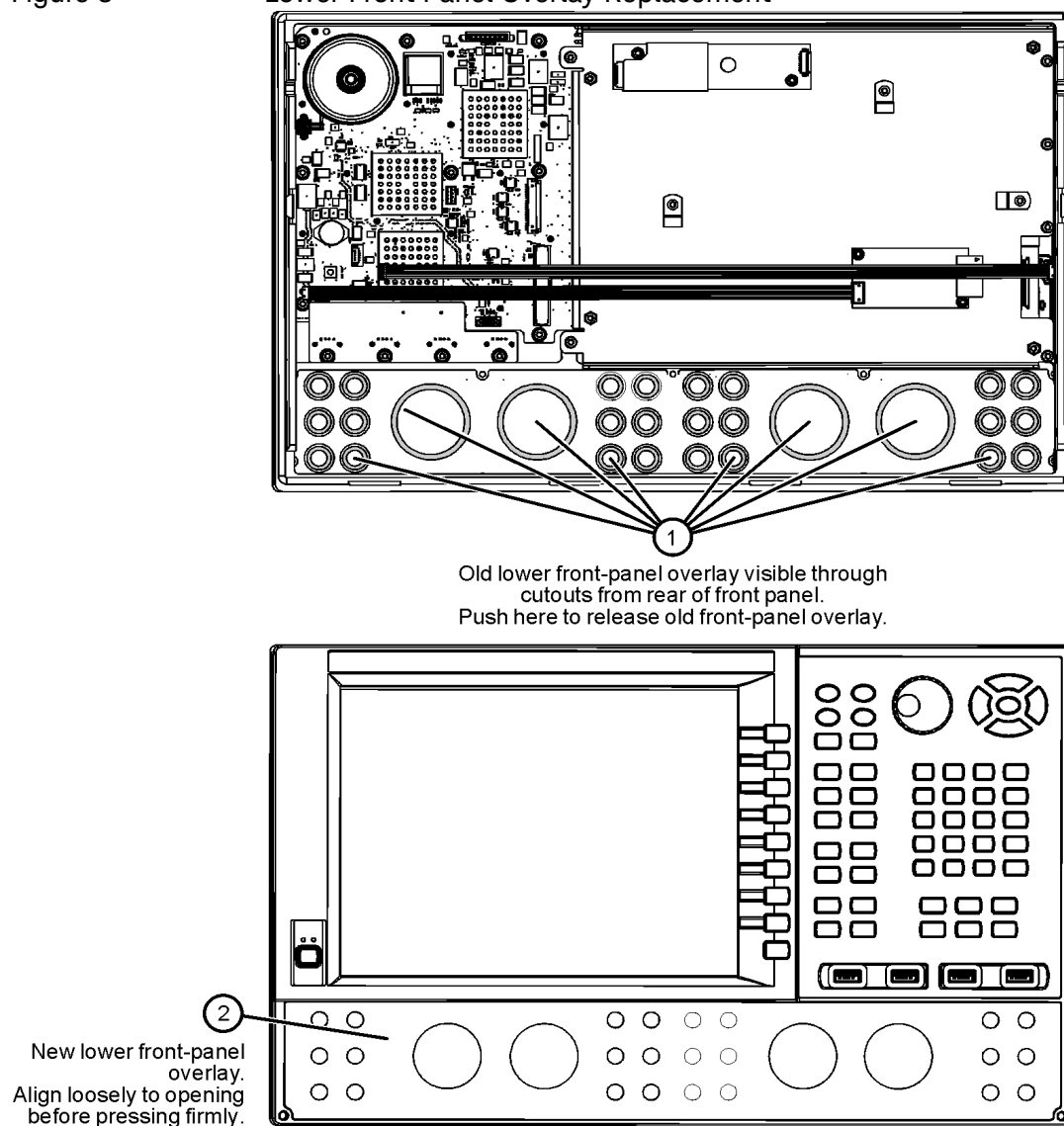
CAUTION

To avoid possible damage to the lower front panel overlay (label), do not attempt to attach the lower front panel label until **“Step 11. Install the New Lower Front Panel Overlay” on page 24**.

1. See **“Downloading the Online PNA Service Guide” on page 9**.

Figure 8

Lower Front Panel Overlay Replacement



N5225_105_04

Step 10. 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.

1. See [“Downloading the Online PNA Service Guide” on page 9](#).

Step 11. Install the New Lower Front Panel Overlay

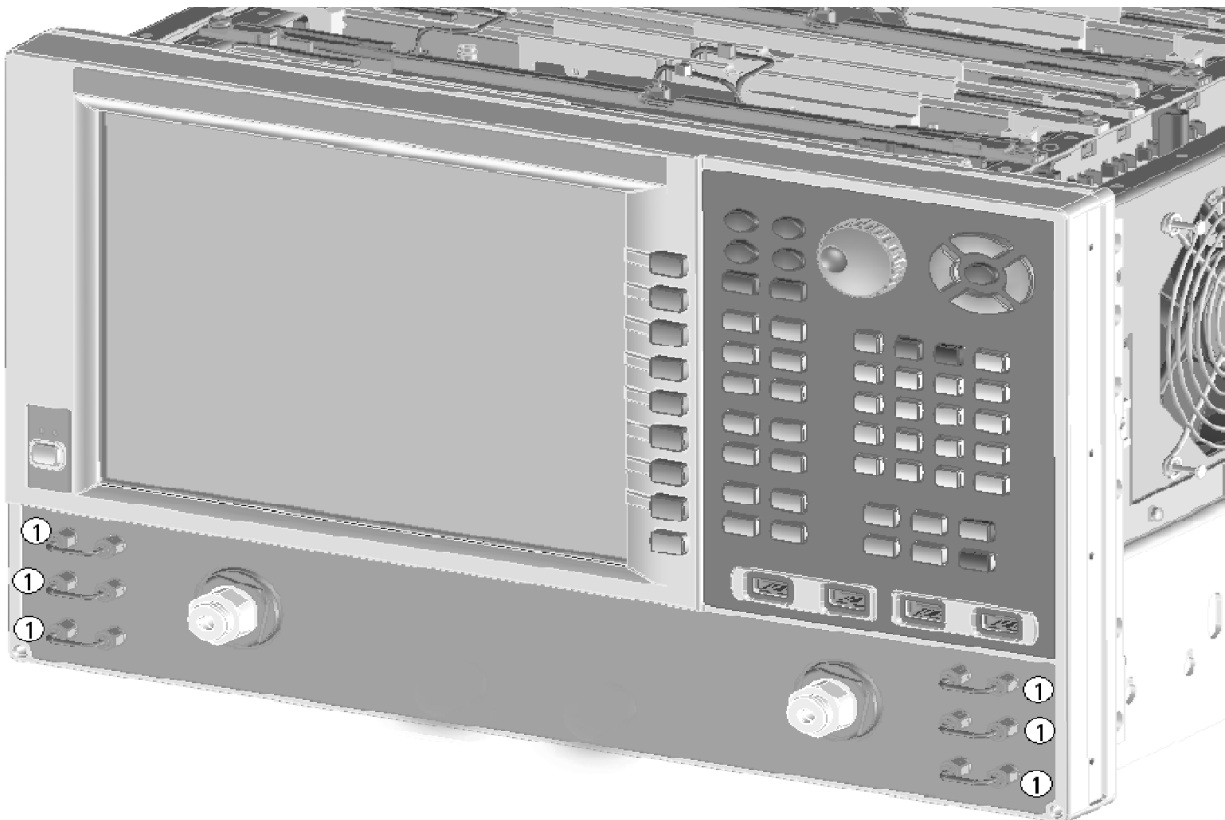
Refer to **Figure 8 on page 23** for this step of the procedure. New parts are listed in **Table 2 on page 11**.

1. Remove the protective backing from the new lower front panel overlay, N5225-80002 (N5224/5A) or N5225-80005 (N5224/5B) or N5242-80029 (N5244/5B)—(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 12. Reinstall Front Panel Jumpers

As shown in **Figure 9**, reinstall the six front panel jumper cables (part number N5245-20155).

Figure 9 Front Panel Jumper Cables Installation



① **Install 6x jumper cables and torque to 10 in-lbs.**

Step 13. 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 14. Reinstall the Outer Cover

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

Step 15. Remove Option 201 License

Procedure Requirements

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

A Model Option 201 License Removal Procedure

For B models, refer to "[B Model Option 201 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 **201**.
4. Click **Remove**.

B Model Option 201 License Removal Procedure

For A models, refer to "[A Model Option 201 License Removal Procedure.](#)"

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

Step 16. Enable Options 217

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 and mouse must be connected to the network analyzer.

For "A" models, refer to **"Option Enable Procedure for "A" Model Instruments" on page 26**.

For "B" models refer to **"Option Enable Procedure for "B" Model Instruments" on page 27**.

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 **217 - 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 "217" is listed after "Options:" in the display. Click **OK**.

NOTE

If the option(s) have not been enabled or an older option has not been removed, 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/>.

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 Redemption](#)” on [page 6](#).
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 the option(s) have not been enabled or if your older options have not been removed, contact Keysight Technologies. Refer to “[Getting Assistance from Keysight](#)” on page 4.

1. Start the Network Analyzer program.
2. Once the Network Analyzer program is running:
 - Press **Help** > **About NA** and verify that Option 217 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 17. Perform Post-Upgrade Adjustments and Calibration

Adjustments

NOTE

IMPORTANT!

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

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

- 10 MHz frequency reference adjustment
- EE default adjustment: Synth LO only (Version 6 synthesizers)
- synthesizer bandwidth adjustment (only if EE default adjustment is insufficient)
- source adjustment: Src 1 Synth Only
- receiver 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.

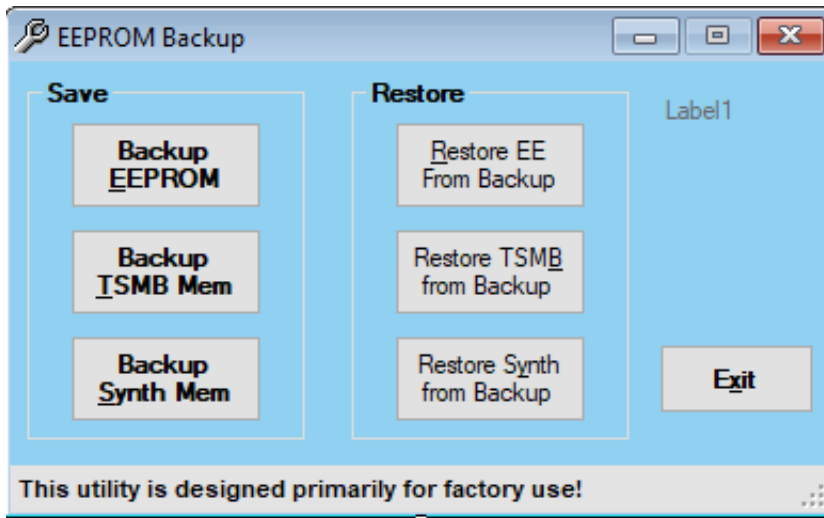
The adjustments listed here generate new correction constants. The analyzer must have a backup of this new data in case any of the data becomes corrupted.

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 9](#).

Figure 10 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.

Step 18. Prepare the PNA for the User

1. If necessary, reinstall front jumper cables.
2. Install the cable guards, pushing them over the front jumper cables until the cushioning material touches the front panel of the PNA.
3. Install the dust caps on the test ports.
4. Clean the analyzer, as needed, using a damp cloth.

1. See **"Downloading the Online PNA Service Guide" on page 9**.

