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

To Upgrade PNA N5224B or N5225B Option 201 to Option 401

Upgrade Kit Order Numbers: N5224BU- 601 and N5225BU- 601

Keysight Kit Number: N5225-60117

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.**

KEYSIGHT TECHNOLOGIES

KEYSIGHT TECHNOLOGIES

Installation Note

# 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

N5225-90117

## Edition

Edition 2, January 2022

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/sweul 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.

Keysight Add 4-Port Capability Upgrade Kit
Upgrade Kit Number: N5225-60117
Installation Note

## Description of the Upgrade

This upgrade converts your N5224B or N5225B Option 201 2-port analyzer to a N5224B or N5225B Option 401 4-port analyzer by adding:

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

Refer to "Overview of the Installation Procedure" on page 14.

**CAUTION**

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

KEYSIGHT TECHNOLOGIES

# Getting Assistance from Keysight

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

## Contacting Keysight

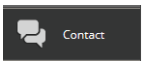
Assistance with test and measurements needs and information on finding a local Keysight office are available on the Web at:
http://www.keysight.com/find/assist

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

**NOTE**

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

### If You Have Problems With the Upgrade Kit Contents

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

# Getting Prepared

**CAUTION**

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

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

**NOTE**

**IMPORTANT!**

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

a. See "Downloading the Online PNA Service Guide" on page 8.

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

- A license key - refer to "License Key Redemption" below.
- A PDF copy or a paper copy of the PNA Service Guide - refer to "Downloading the Online PNA Service Guide" below.
- An ESD-safe work area - refer to "Protecting Your Workspace from Electrostatic Discharge" below.
- Correct tools - refer to "Tools Required for the Installation" on page 9.
- Enough time - refer to "About Installing the Upgrade" on page 9.
- Test equipment for the post-upgrade adjustments and full instrument calibration. To view the equipment list, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

1. See "Downloading the Online PNA Service Guide" on page 8.

## License Key Redemption

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

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

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

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

To enable the option product(s), you must request license key(s) file from the Keysight Software Manager: http://www.keysight.com/find/softwaremanager:

To complete the request, you will need to gather the following information:

– From the certificate
  – Order number
  – Certificate number
– From your instrument

  (Instrument information is available in the network analyzer - on the toolbar, click Help, then click About Network Analyzer.)
  – Model number
  – Serial number

Using the information just gathered, you must request license key(s) from the Keysight Software Manager: http://www.keysight.com/find/softwaremanager.

You will need to provide an email address, to which Keysight will promptly email your license key file. Refer to “License Key Redemption” on page 6.

## Verify the License Contents

Refer to the license message you received from Keysight:

If the model number, serial number, or option number do not match those on the license message you received from Keysight, you will not be able to install the license key file. If this is the case you received from Keysight, you will not be able to install the license key file. If this is the case, contact Keysight for assistance. Refer to "Getting Assistance from Keysight" on page 4.

## Verify the Model/Version of HMA26.5 Installed

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

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

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

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

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



## Downloading the Online PNA Service Guide

To view the online Service Guide for your PNA model number, use the following steps:

1. Go to www.keysight.com.
2. In the Search box, enter the model number of the analyzer (e.g., N5225B) and click **Search**.
3. Click **Support** > **Keysight Product Support**.
4. In the **Search Support** area type your instrument's model number (e.g., N2225B).
5. Press **Enter**.
6. Scroll down to the **PRINT DOCUMENTATION** section and click to select **Service Manual**.

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

## Protecting Your Workspace from Electrostatic Discharge

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

1. See "Downloading the Online PNA Service Guide" on page 8.

### 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 |

**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.

## About Installing the Upgrade

| | |
|---|---|
| Products affected | N5224B and N5225B Option 201 |
| Installation to be performed by | Keysight service center or personnel qualified by Keysight |
| Estimated installation time | 5 hours |
| Estimated adjustment time | 0.5 hours |
| Estimated full instrument calibration time | 4.5 hours |

## Items Included in the Upgrade Kit

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

Table 2 Contents of Upgrade Kit N5225-60117

| Ref Desig. | Description | Qty | Part Number |
|---|---|---|---|
| - | Installation note (this document) | 1 | N5225-90117 |
| - | Software Entitlement Certificate | 1 | 5964-5145 |
| - | China RoHS Addendum for kits | 1 | 9320-6722 |
| A10 | 26.5 GHz source (2) board | 1 | 5087-7342 |
| A12 | 40 GHz doubler assembly port 3 | 2 | 5087-7349 |
| A13 | 40 GHz doubler assembly port 4 | | |
| A17 | 13.5 GHz (source 2) synthesizer board | 1 | N5240-60074 |
| A26[a] | Splitter | 1 | 5067-4086 |
| A28 | Mixer brick (2) | 1 | 5087-7417 |
| A30 | Test port 3 receiver coupler | 2 | 5087-7760 |
| A31 | Test port 4 receiver coupler | | |
| A34 | Test port 3 coupler | 2 | 5087-7793 |
| A35 | Test port 4 coupler | | |
| - | Machine screw, M3.0 x 6, flat head (to attach front frame to coupler plate) | 2 | 0515-1946 |
| - | Machine screw, M2.0 x 6, flat head (8 to attach two receiver couplers to brackets) | 8 | 0515-1602 |
| - | Machine screw, M2.5 x 20, pan head (4 to attach A34 and A35 receiver coupler assemblies to test set deck) | 4 | 0515-0374 |
| - | Machine screw, M4.0 x 10, pan head (2 each to attach the following boards to the analyzer chassis: A17 13.5 GHz synthesizer board, A10 26.5 GHz source board, A12 40 GHz doubler assembly port 3, and A13 40 GHz doubler assembly port 4.) | 7 | 0515-0380 |
| - | Machine screw, M3.0 x 12, pan head (1 to attach cable bracket to test set deck. | 2 | 0515-0664 |
| - | Machine screw, M3.0 x 8, pan head (3 to attach shield to A28 mixer brick; 8 to attach two src attn and two rcvr attn to brackets) | 4 | 0515-0372 |
| - | Machine screw, M2.5 x 16, pan head (2 to attach splitter to mixer brick) | 2 | 0515-2007 |
| - | Machine screw, M3.0 x 25, pan head (3 to attach A28 mixer brick to block) | 2 | 0515-0667 |
| - | Machine screw, M3.0 x 20, flat head (2 to attach bracket to A10 26.5 GHz source) | 2 | 0515-2078 |
| - | Machine screw, M3.0 x 18, pan head (1 to attach bracket to A10 26.5 GHz source) | 1 | 0515-0666 |

Table 2 Contents of Upgrade Kit N5225-60117

| Ref Desig. | Description | Qty | Part Number |
|---|---|---|---|
| - | Test set front plate, 4-port | 1 | N5224-00005 |
| - | Front panel overlay (label), 4-port | 1 | N5227-80020 |
| - | Dress panel, lower 4-port | 1 | N5240-00009 |
| - | Gap pad (between mixer brick A28 and shield) | 4 | N5245-20125 |
| - | Gap pad (between each test coupler and the test set front plate) | 4 | E4403-20033 |
| - | Shield, mixer brick | 1 | N5245-00023 |
| - | 50 ohm load, attached to A13 40 GHz doubler | 2 | 1250-4261 |
| - | Vibration mount (between couplers 1 & 3, and 2 & 4) | 2 | 0460-2725 |
| - | Mounting nuts (for port 3 & 4 test port couplers) | 2 | 5022-1087 |
| - | Cable guard, center jumper cables | 1 | N5242-00049 |
| - | Cable clamp. | 12 | 1400-1334 |
| - | Cable tie wrap | 6 | 1400-0249 |
| - | Dust caps for test ports | 2 | 1401-0214 |
| - | 2.4 mm dust cap for A28 mixer brick | 1 | N5247-20138 |
| - | Bracket for receiver 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 |
| W20 | RF cable, Front panel port 1 CPLR THRU to A33 port 1 coupler | 1 | N5245-20099 |
| W21 | RF cable, A29 port 1 receiver coupler to A37 reference mixer switch | 1 | N5245-20110 |

Table 2 Contents of Upgrade Kit N5225-60117

| Ref Desig. | Description | Qty | Part Number |
|---|---|---|---|
| W22 | RF cable, A33 port 1 coupler to front-panel Port 1 CPLR ARM | 1 | N5245-20014 |
| W23 | RF cable, A30 port 3 rcvr coupler to front-panel Port 3 SOURCE OUT | 1 | N5245-20051 |
| W24 | RF cable, Front panel port 3 CPLR THRU to A34 port 3 coupler | 1 | N5245-20098 |
| W25 | RF cable, A30 port 3 receiver coupler to front-panel REF 3 SOURCE | 1 | N5245-20016 |
| W26 | RF cable, A34 port 3 coupler to front-panel Port 3 CPLR ARM | 1 | N5245-20015 |
| W27 | RF cable, A31 port 4 rcvr coupler to front-panel Port 4 SOURCE OUT | 1 | N5245-20052 |
| W28 | RF cable, Front panel port 4 CPLR THRU to A35 port 4 coupler | 1 | N5245-20096 |
| W29 | RF cable, A31 port 4 receiver coupler to front-panel REF 4 SOURCE OUT | 1 | N5245-20017 |
| W30 | RF cable, A35 port 4 coupler to front-panel Port 4 CPLR ARM | 1 | N5245-20018 |
| W32 | RF cable, Front panel port 2 CPLR THRU to A36 port 2 coupler | 1 | N5245-20097 |
| W33 | RF cable, A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT – (4-port only) | 1 | N5245-20108 |
| W34 | RF cable, A36 port 2 coupler to front-panel Port 2 CPLR ARM | 1 | N5245-20019 |
| W36 | RF cable, Front panel jumper | 6 | N5245-20155 |
| W38 | RF cable, Port 3 RCVR C IN to A28 mixer brick (C) | 1 | N5245-20037 |
| W39 | RF cable, Port 4 RCVR D IN to A28 mixer brick (D) | 1 | N5245-20038 |
| W44 | RF cable, REF 3 RCVR R3 IN to A28 mixer brick (R3) | 1 | N5245-20020 |
| W45 | RF cable, REF 4 RCVR R4 IN to A28 mixer brick (R4) | 1 | N5245-20191 |
| W52[a] | RF cable, A25 HMA26.5 to A26 splitter | 1 | N5245-20013 |
| W53[a] | RF cable, A26 splitter to A27 mixer brick | 1 | N5245-20023 |
| W54[a] | RF cable, A26 splitter to A28 mixer brick | 1 | N5245-20022 |
| W62 | RF cable, A27 mixer brick (R1) to A24 IF multiplexer (P411) | 1 | N5242-60021 |
| W63 | RF cable, A27 mixer brick (R2) to A24 IF multiplexer (P412) | 1 | N5242-60022 |
| W65 | RF cable, A28 mixer brick (D) to A24 IF multiplexer (P801) | 1 | N5242-60024 |
| 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 |

Table 2 Contents of Upgrade Kit N5225-60117

| Ref Desig. | Description | Qty | Part Number |
|---|---|---|---|
| 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 |
| W203[b] | RF cable, A25 HMA26.5 (top) to A28 mixer brick (top) | 1 | N5245-20195 |
| - | Ribbon cable, A23 test set motherboard J552 to A28 mixer brick (2) J52 | 1 | N5247-60015 |

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

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

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

# Installation Procedure for the Upgrade

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

**WARNING**

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

## 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 Receiver Coupler Assemblies."

"Step 11. Install the A34 and A35 Receiver Coupler Assemblies."

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

"Step 13. Install the LED Boards 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. Secure the Front Panel Bulkhead Connectors."

"Step 23. Reinstall the A23 Test Set Motherboard."

"Step 24. Install Cable on the A23 Test Set Motherboard."

"Step 25. Replace the Front Panel's Lower Dress Panel."

"Step 26. Reinstall Front Panel Assembly."

"Step 27. Install the Overlay."

"Step 28. Install the Front Panel Jumper Cables."

"Step 29. Position the Cables and Wires to Prevent Pinching."

"Step 30. Reinstall the Inner Cover."

"Step 31. Reinstall the Outer Cover."

"Step 32. Remove Option 201 License."

"Step 33. Enable Options 401."

"Step 34. Perform Post-Upgrade Adjustments and Calibration."

"Step 35. 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.

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 4.

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

**NOTE**

**If the model number, serial number, or option number do not match those on your license key file, you will not be able to install the option. If this is the case, contact Keysight for assistance before beginning the installation of this upgrade. Refer to "Contacting Keysight" on page 4.**

## Step 2. Remove the Outer Cover

For instructions, click the Chapter 7 bookmark "Removing the Covers" in the PDF Service Guide[1].

1. See "Downloading the Online PNA Service Guide" on page 8.

### Step 3.Remove the Inner Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide[1].

### 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[1].

### 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[1].

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

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

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

1. Place the analyzer bottom-side up on a flat surface.
2. Remove the following cables. To see an image showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, Standard 2-Port Configuration, Option 201 (S/N Prefixes <6021)” or “Bottom RF Cables, Standard 2-Port Configuration, Option 201 (S/N Prefixes ≥6021) in the PDF Service Guide[1].

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

- W20 (N5245-20045) Front panel port 1 CPLR THRU to A33 port 1 coupler
- W21 (N5245-20120 A29 port 1 receiver coupler to A37 reference mixer switch
- W22 (N5245-20025) A33 port 1 coupler to front-panel REF 1 CPLR ARM
- W32 (N5245-20106) Front panel port 2 CPLR THRU to A36 port 2 coupler
- W34 (N5245-20024) A36 port 2 coupler to front-panel REF 2 CPLR ARM
- W33 (N5245-20121) A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT

1. See “Downloading the Online PNA Service Guide” on page 8.

- W62 (N5242-60025) A27 mixer brick (R1) to A24 IF multiplexer (P601)
- W63 (N5242-60026) A27 mixer brick (R2) to A24 IF multiplexer (P801)
- W70 (N5247-60024) A24 IF multiplexer board P203 to A16 SPAM board J5
- W72 (N5247-60023) A24 IF multiplexer board P603 to A16 SPAM board J2
- W80 (N5245-20048) A25 HMA26.5 to A27 mixer brick

These cables must be saved - they will be reinstalled.

- W12 (N5245-20109) A29 port 1 receiver coupler to W11
- W18 (N5245-20111) A32 port 2 receiver coupler to W17
- W40 (N5245-20042) Front panel port 2 RCVR B IN to A27 mixer brick (B)
- W36 (N5245-20155) Front panel jumpers (quantity = 6)

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

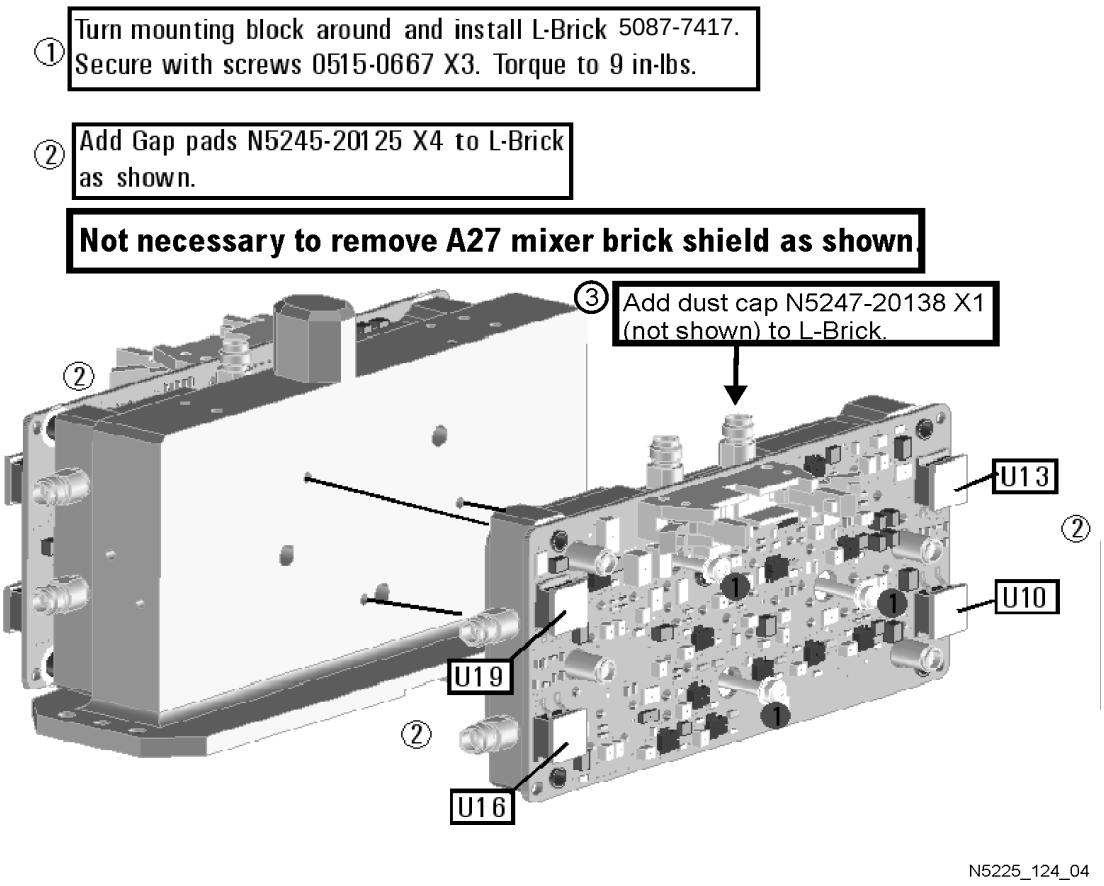
## Step 7. Remove the A27 Mixer Brick Assembly

Remove the A27 mixer brick assembly from the PNA. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A27 and A28 Mixer Bricks” in the PDF Service Guide[1].

## Step 8. Assemble the A28 Mixer Brick Assembly

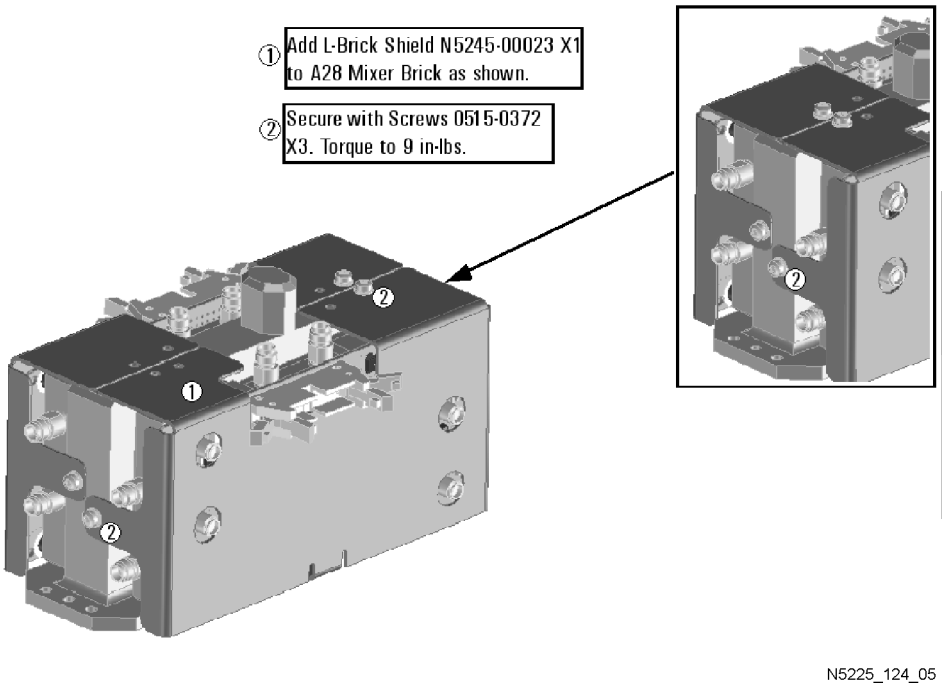
1. Follow the instruction shown in Figure 2. New parts are listed in Table 2 on page 10 of this document.

Figure 2 A27/A28 Test Port Bridge Assembly (5087-7417, 0515-0667(x3), N5245-20125 (x4), N5247-20138 (x1))



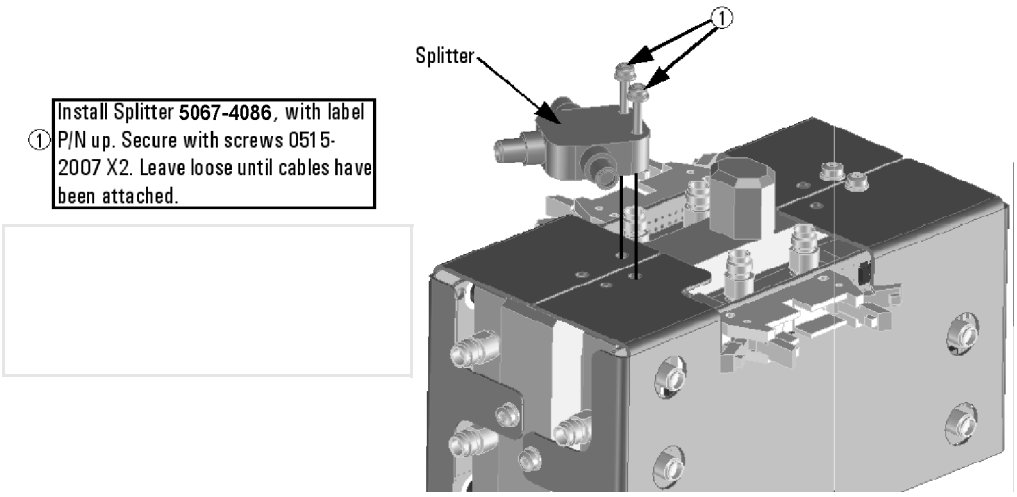
2. Follow the two instructions shown in Figure 3.

Figure 3 A28 Test Port Bridge Shield Installation



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

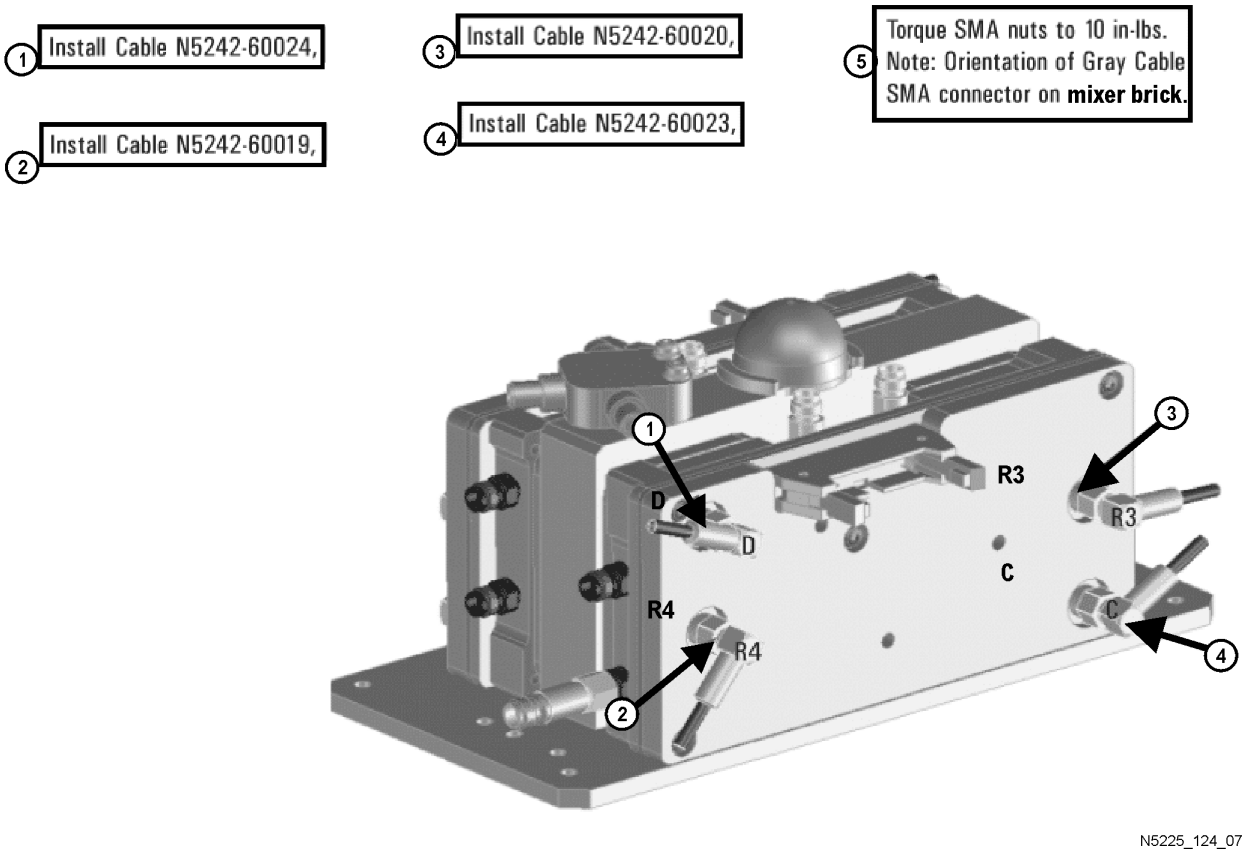
Figure 4 A26 Splitter[1] and A27/A28 Test Port Bridge Assembly




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

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

Figure 5 A26 and A27 Test Port Bridge Assembly (N5242-60019, N5242-60020, N5242-60023, N5242-60024)[1, 2]




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

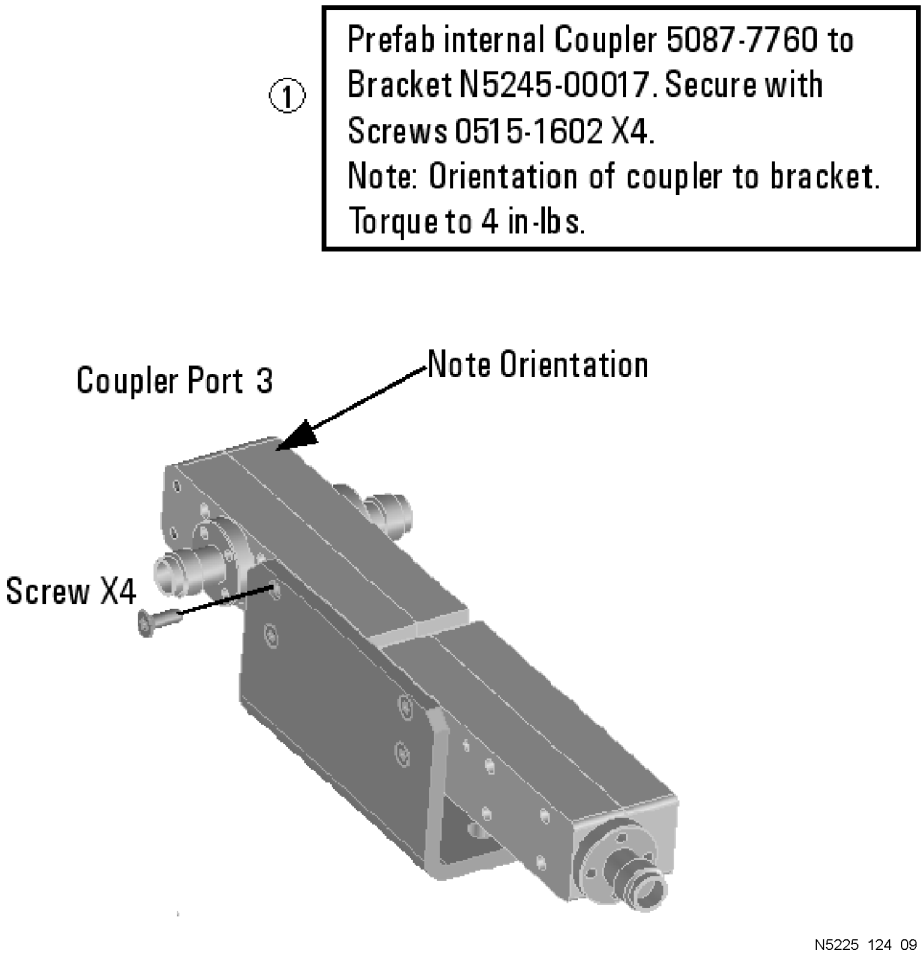
## Step 9. Install the A27/A28 Mixer Brick Assemblies

Reinstall the A27 mixer brick cables, and then install the A27/A28 mixer brick assembly, reusing the four existing screws. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A27 and A28 Mixer Bricks” in the PDF Service Guide[1]. New parts are listed in Table 2 on page 10 of this document.

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

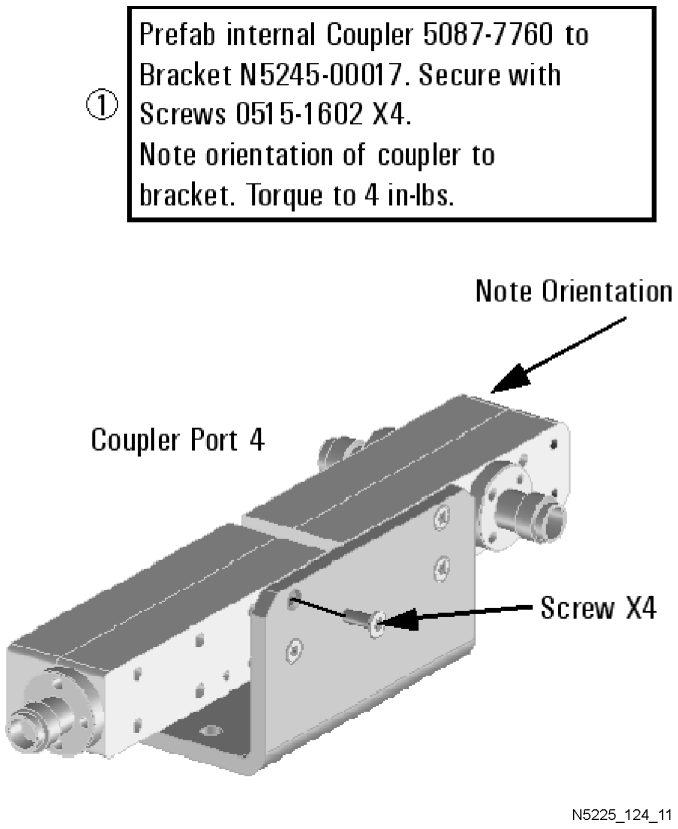
Follow the instructions shown in Figure 6 and Figure 7-1. New parts are listed in Table 2 on page 10 of this document.

Figure 6 A34 Receiver Coupler Port 3 Assembly (0515-1602, 5087-7760, N5245-00017)




1. See “Downloading the Online PNA Service Guide” on page 8.

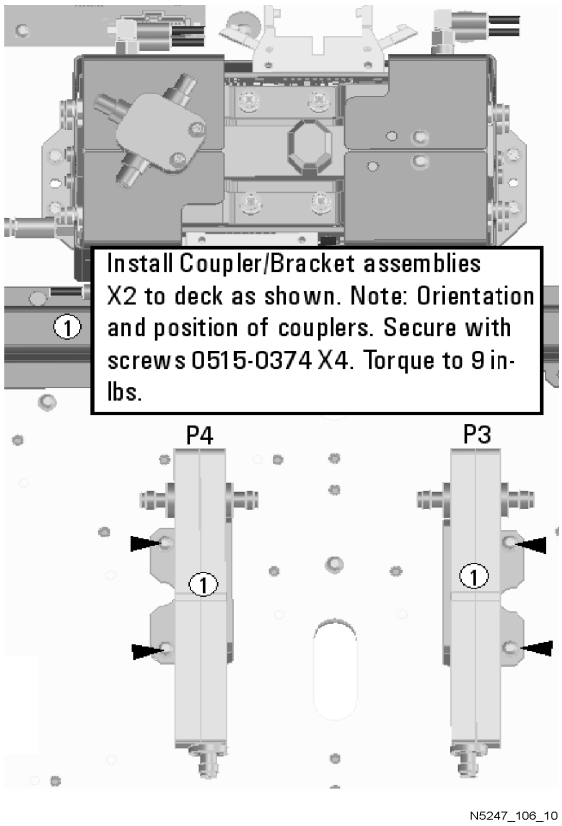
Figure 7 A35 Receiver Coupler Port 4 Assembly (0515-7760, 5087-7760, N5245-00017)



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

Follow the instructions shown in Figure 7-1. New parts are listed in Table 2 on page 10 of this document.

Figure 7-1 A34 and A35 Receiver Coupler Assemblies Installation (0515-0374) [1, 2]



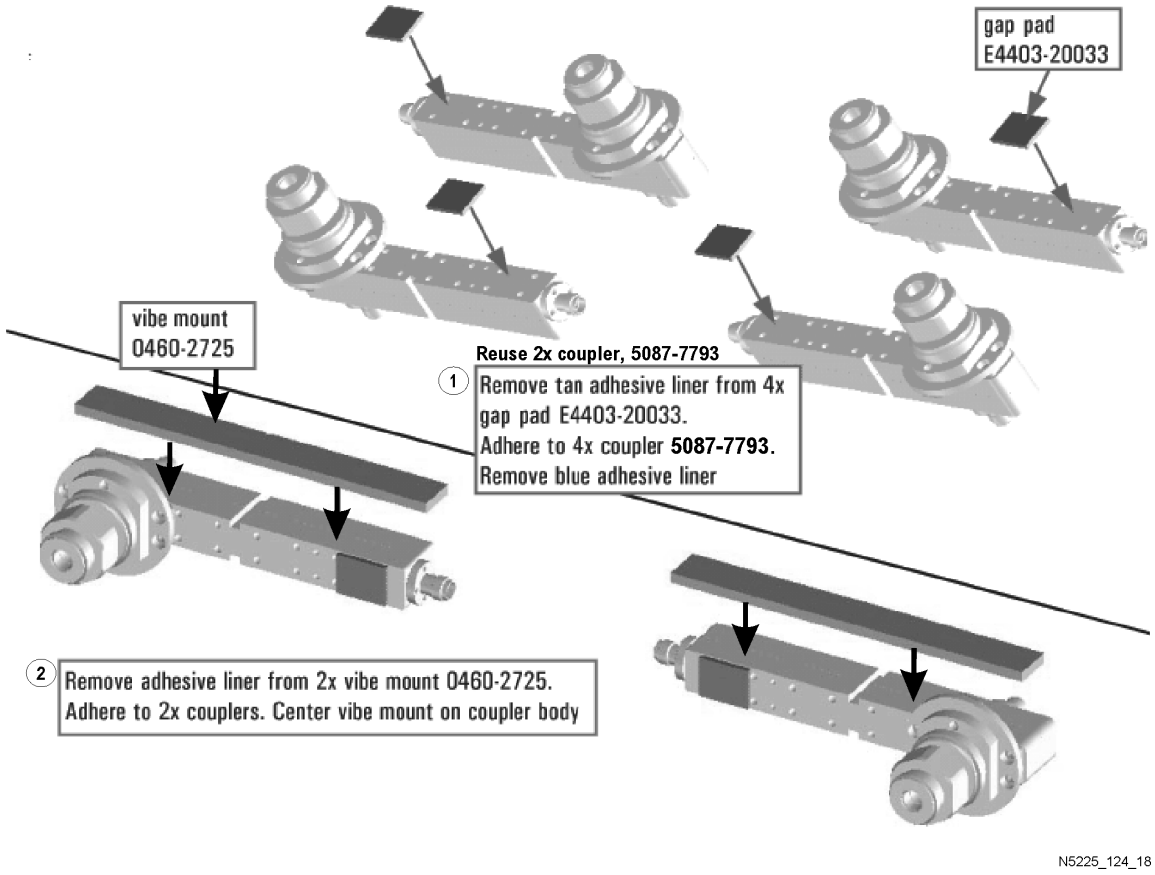

1. The A26 splitter (5067-4086) and N5245-20013, N5245-20022, N5245-20023, N545-20101, and N5245-20150 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If you are unclear which HMA26.5 assembly your PNA has installed, refer to Chapter 7 Repairs and Figure 1 on page 7 and for details on A26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

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

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[1].

5. Using pliers, remove the adhesive bumper on the A33 test port 1 coupler and on the A36 test port 2 coupler.
6. Follow the two instructions shown in Figure 8. New parts are listed in Table 2 on page 10 of this document.

Figure 8 A33 - A36 Test Port Coupler Assembly (E4403-20033, 0460-2725, 5087-7793)

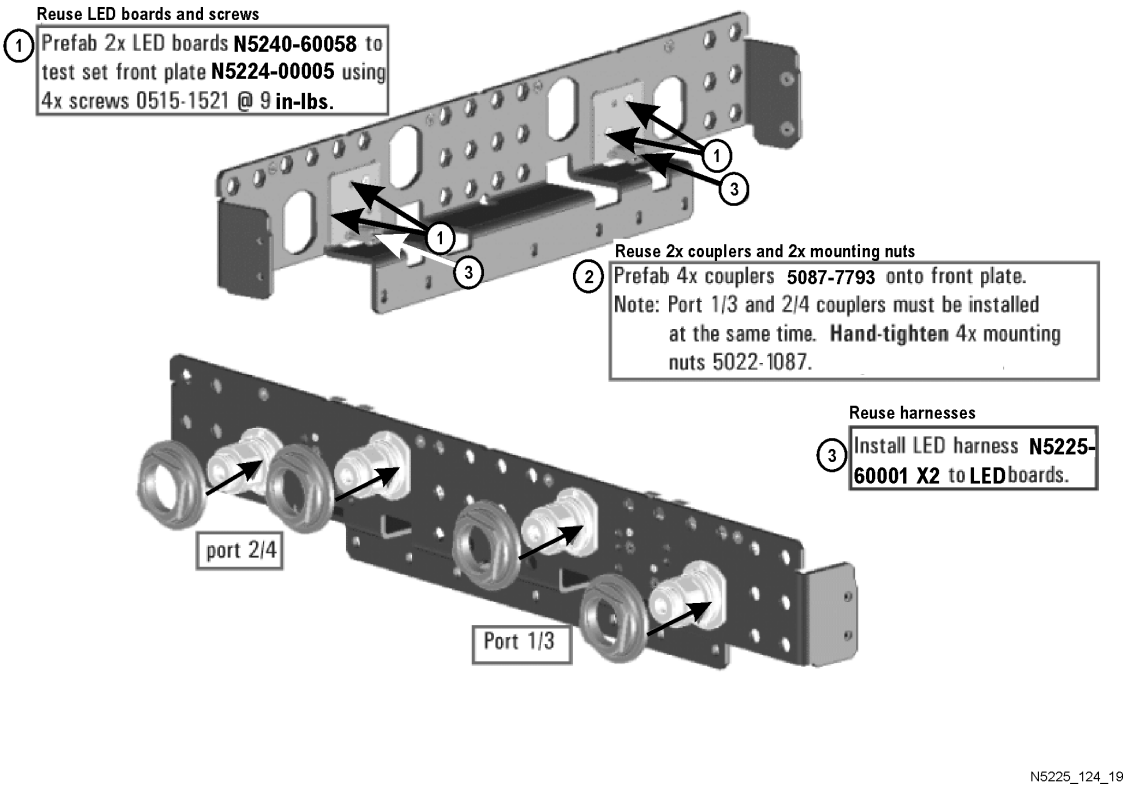



1. See “Downloading the Online PNA Service Guide” on page 8.

## Step 13. Install the LED Boards 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.

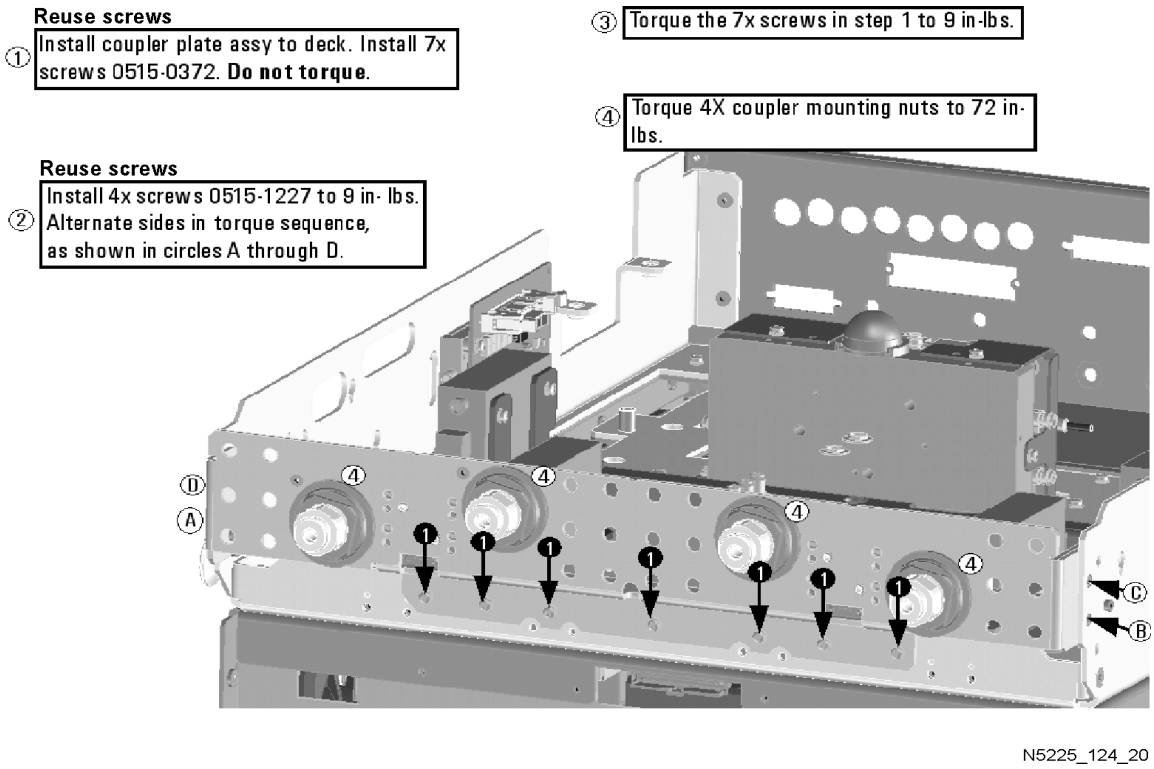
Figure 9 LED Board Assemblies and Test Port Coupler Assemblies Installation (N5240-60058, N5224-00005, 5087-7793, 5022-1087, N5225-60001, 0515-1521)



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

Follow the four instructions shown in Figure 10.

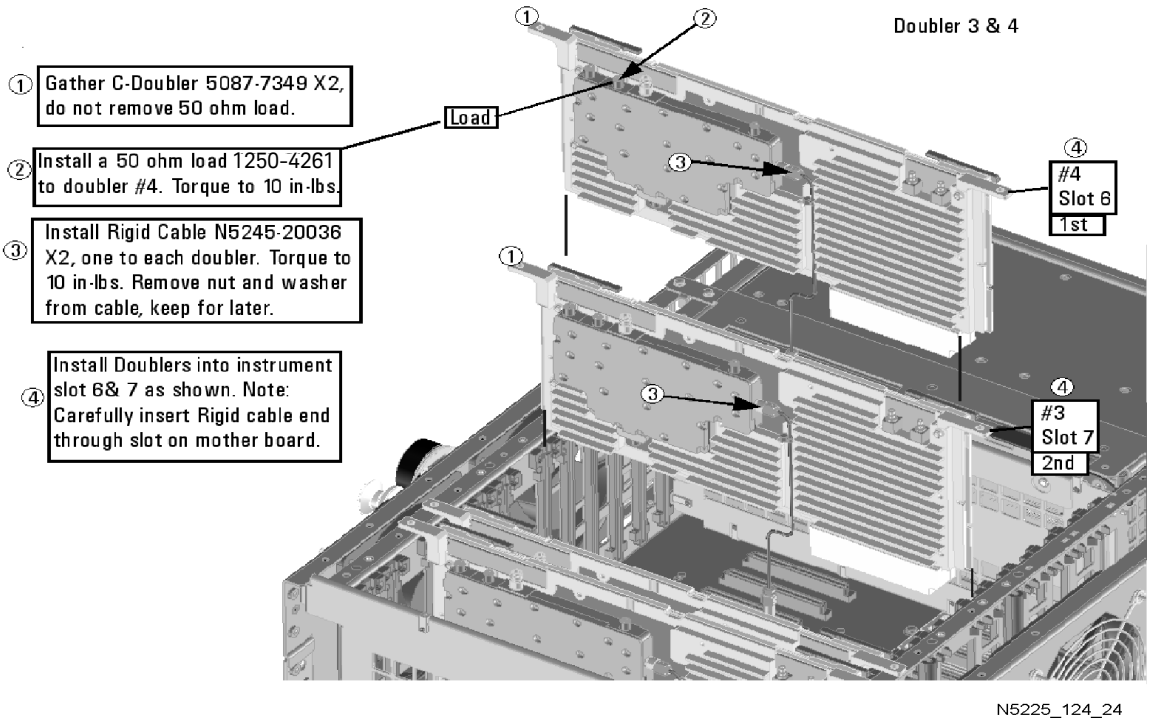
Figure 10 Coupler Plate Assembly Installation (0515-0372, 0515-1227)



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

Follow the instructions shown in Figure 11.

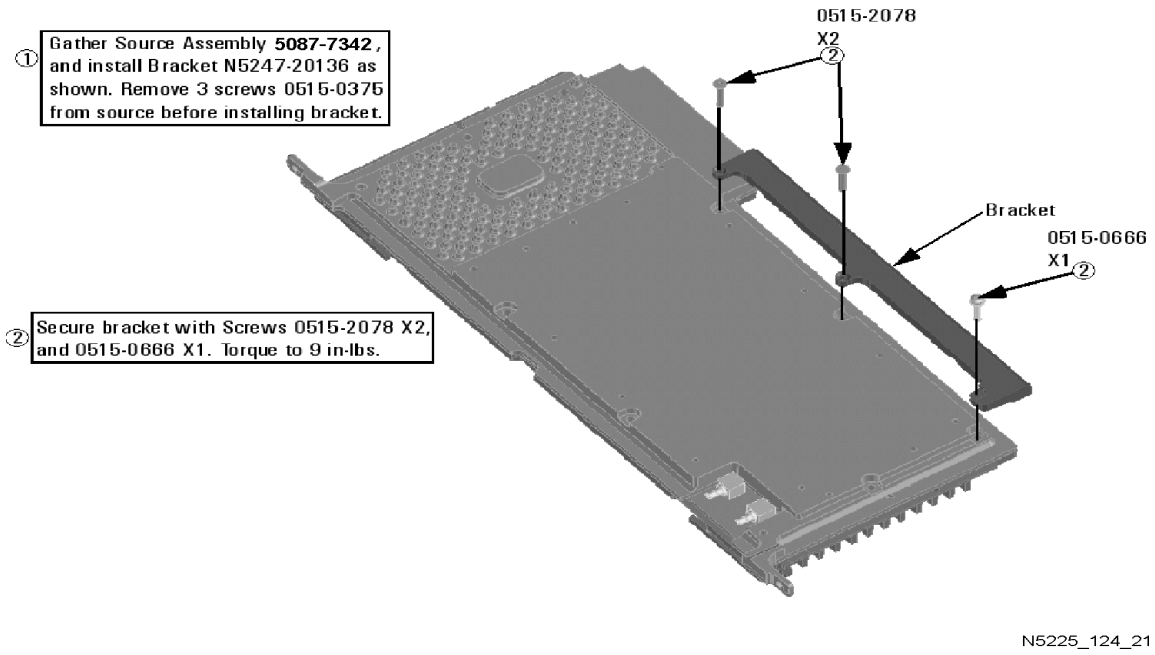
Figure 11 A12 and A13 40 GHz Doubler Installation (5087-7349, 1250-4261, N5245-20036)



## Step 16. Install Bracket to A10 Source Assembly

Follow the two instructions shown in Figure 12.

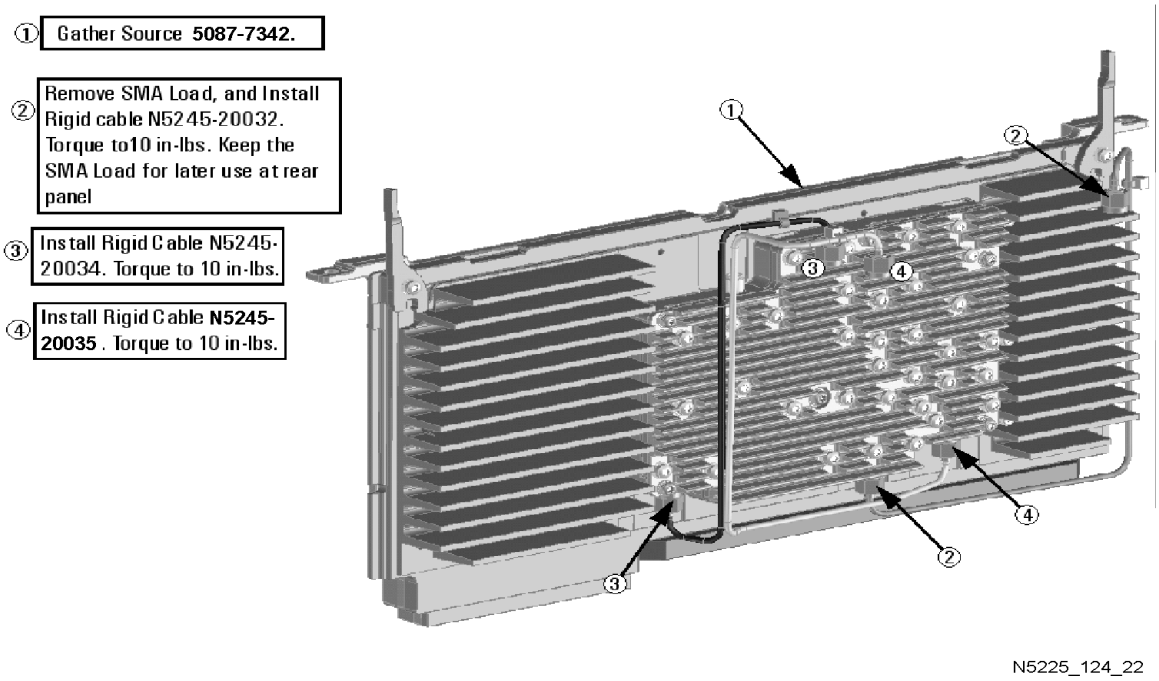
Figure 12 A10 Source 2 Assembly Bracket Installation (5087-7342, N5247-20136, 0515-0375, 0515-2078, 0515-0666)



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

Follow the two instructions shown in Figure 13.

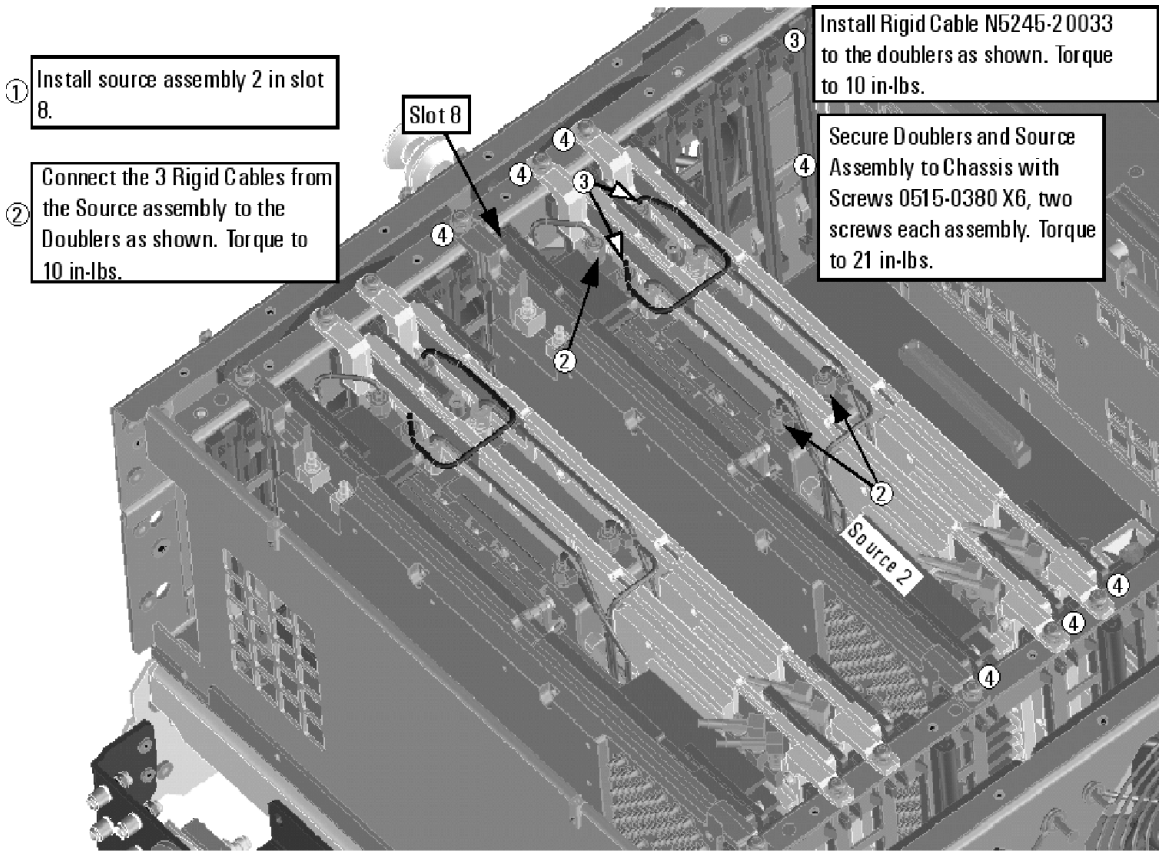
Figure 13 A10 Source 2 Assembly (5087-7342, N545-20032, N5245-20034, N5245-20035)



## 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 (N5245-20033, 0515-0380)




## 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[1].

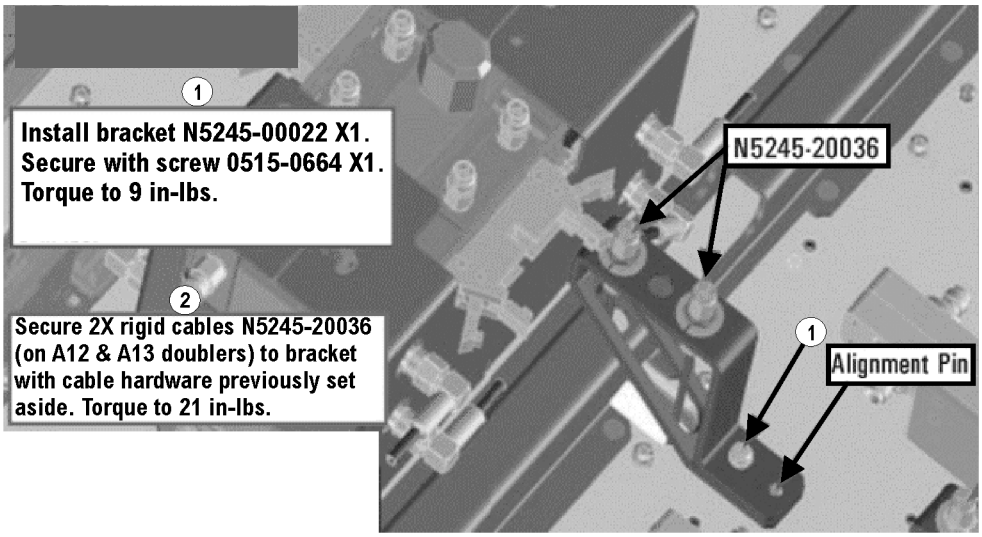
1. See “Downloading the Online PNA Service Guide” on page 8.

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 2 on page 10 of this document.

Figure 15 Cable Bracket Mount Installation (N5245-00022, 0515-0664, N5245-20036)




N5225_124_25

## Step 21. Install the Test Set Cables

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

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

**CAUTION** Use a 5/16-in torque wrench set to 10 in-lbs on all cable connections except the front and rear panel bulkhead connectors. On these, use a 9 mm nutsetter or open end torque wrench set to 21 in-lb.

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

Flexible Cables Required for Upgrading to an Option 401 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 401, S/N Prefixes <6021” or “Bottom RF Cables, 4-Port, Option 401, S/N Prefixes ≥6021” in the PDF Service Guide[1]. New parts are listed in Table 2 on page 10.

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

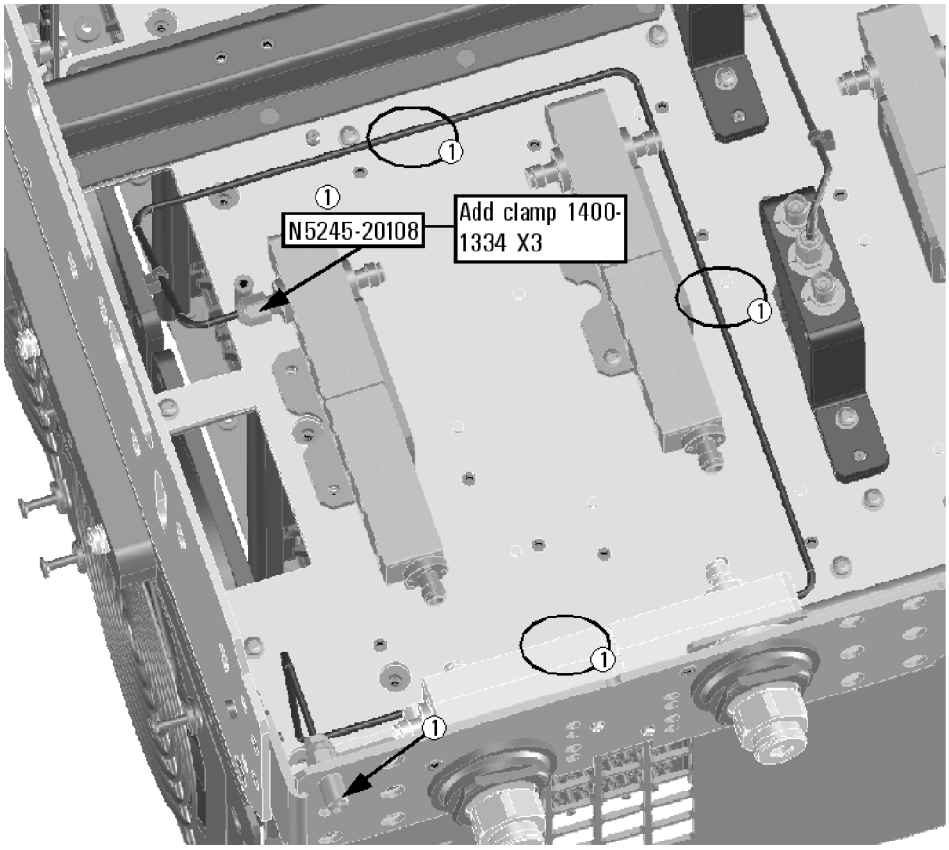
**Semirigid Cables Required for Upgrading to an Option 401 PNA**

To see images showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 401, S/N Prefixes <6021” or “Bottom RF Cables, 4-Port, Option 401, S/N Prefixes ≥6021” in the PDF Service Guide[1]. New parts are listed in Table 2 on page 10.

- W33 (N5245-20108) A32 port 2 receiver coupler to front-panel REF 2 SOURCE OUT – (4-port only)

* As shown in Figure 16, install clamp (part number 1400-1334) to secure W33 (N5245-20108).

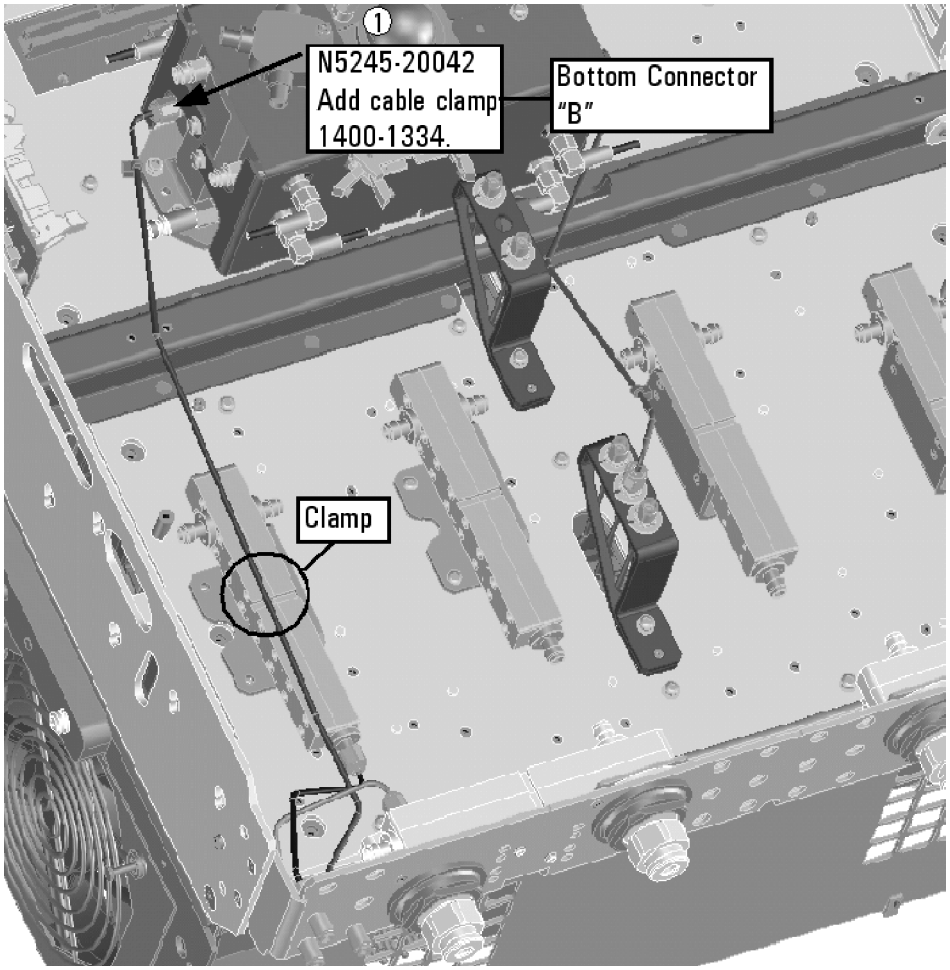
Figure 16 Location of Cable Clamps for W33 (N5245-20108)




– W40 (reuse) (N5245-20042)Port 2 RCVR B IN to A27 mixer brick (B)

* As shown in Figure 17, install clamp (part number 1400-1334) to secure W40 (N5245-20042).

Figure 17 Location of Cable Clamp for W40 (N5245-20042)[1, 2]



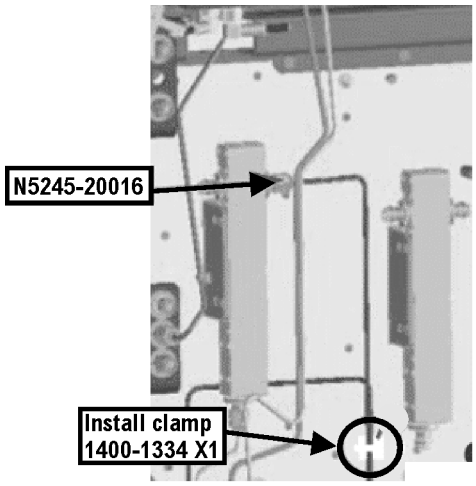

- W34 (N5245-20019) A36 port 2 coupler to front-panel Port 2 CPLR ARM
- W32 (N5245-20097) Port 2 CPLR THRU to A36 port 2 coupler
- W28 (N5245-20096) Port 4 CPLR THRU to A35 port 4 coupler
- W39 (N5245-20038) Port 4 RCVR D IN to A28 mixer brick (D)
- W30 (N5245-20018) A35 port 4 coupler to front-panel port 4 CPLR ARM
- W45 (N5245-20191)REF 4 RCVR R4 IN to A28 mixer brick (R4)
- W27 (N5245-20052) A31 port 4 rcvr coupler to front-panel Port 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 Chapter 7 Repairs and Figure 1 on page 7 and for details on A26 splitter and cabling, refer to your option-model in Chapter 6 “2-Port Configurations, Serial Number Prefix <6021" and “4-Port Configuration, Serial Number Prefix <6021".
2. Attenuator 08490-60039 is shown in the figure, but is not included in this upgrade and not required with the A28 mixer brick (5087-7417).

– W29 (N5245-20017) A31 port 4 receiver, coupler to front-panel REF 4 SOURCE OUT
– W18 (reuse) (N5245-20111) A32 port 2 receiver coupler to W17
– W38 (N5245-20037) Port 3 RCVR C IN to A28 mixer brick (C)
– W44 (N5245-20020) REF 3 RCVR R3 IN to A28 mixer brick (R3)
– W12 (reuse) (N5245-20109) A29 port 1 receiver coupler to W11
– W20 (N5245-20099) Port 1 CPLR THRU to A33 port 1 coupler
– W24 (N5245-20098) Port 3 CPLR THRU to A34 port 3 coupler
– W26 (N5245-20015) A34 port 3 coupler to front-panel Port 3 CPLR ARM
– W23 (N5245-20051) A30 port 3 rcvr coupler to front-panel Port 3 SOURCE OUT
– W25 (N5245-20016) A30 port 3 rcvr coupler to front-panel REF 3 SOURCE OUT

* As shown in Figure 18, install clamp (part number 1400-1331) to secure W25 (N5245-20016).

Figure 18 Location of Cable Clamp for W25 (1400-1334, N5245-20016)



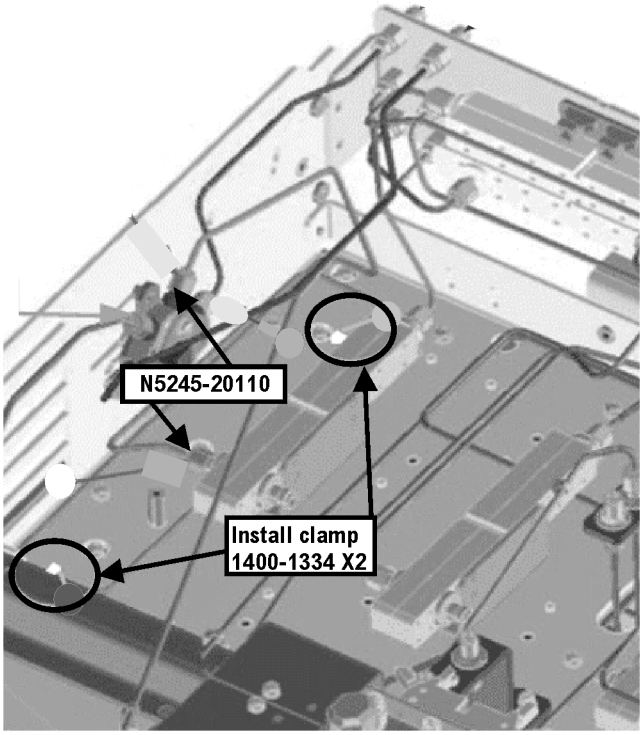

N5245_013_01

– W22 (N5245-20014) A33 port 1 coupler to front-panel Port 1 CPLR ARM
– W21 (N5245-20110) A29 port 1 receiver coupler to A37 reference mixer switch

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

* As shown in Figure 19, install two clamps (part number 1400-1334) to secure W21 (N5245-20110).

Figure 19 Location of Cable Clamps for W21 (N5245-20110, 1400-0249)




– W14 (N5245-20043)A30 port 3 receiver coupler to W13
– W16 (N5245-20044)A31 port 4 receiver coupler to W15

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

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

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

– W203 (N5245-20195) RF cable, A24 mixer brick (top connector) to A21 HMA25.6 A24 mixer brick (top connector)

**NOTE** You will need to remove the cap that is installed on the HMA26.5 top connector, before connecting the other end of the W203 cable. You can discard the cap.

See also, "Verify the Model/Version of HMA26.5 Installed" on page 7.

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

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

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

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

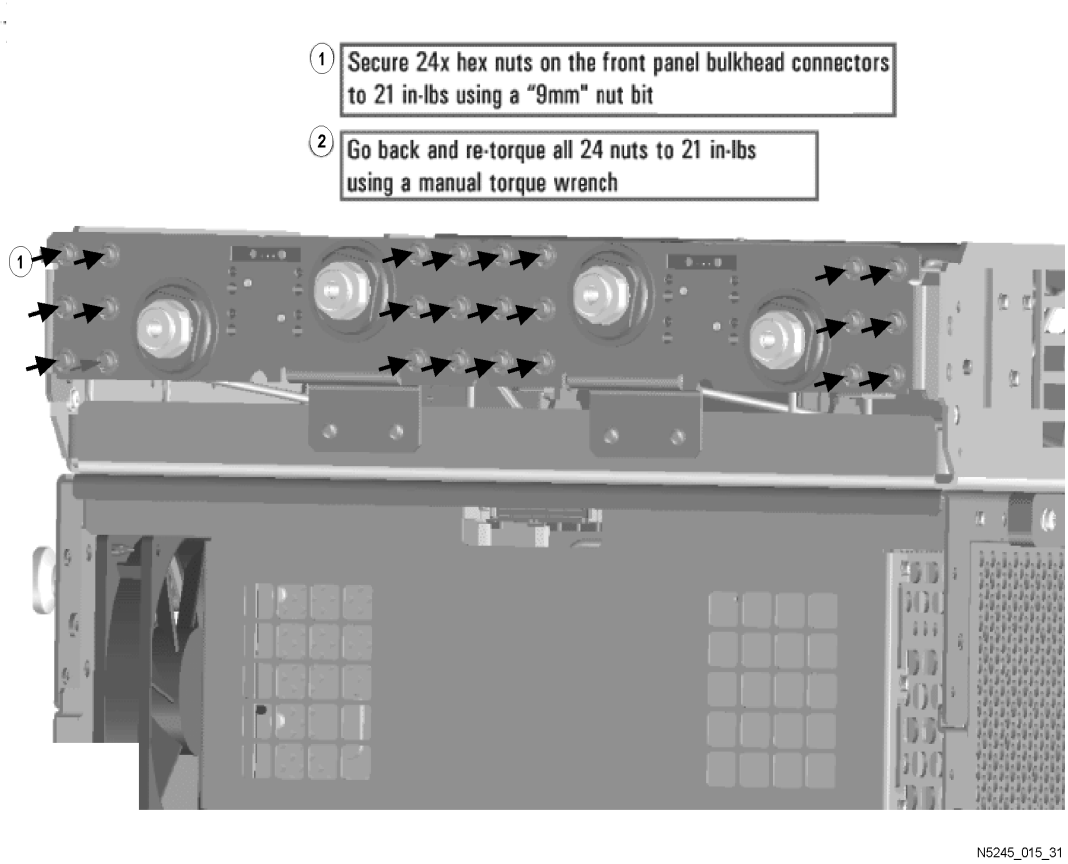
See also, "Verify the Model/Version of HMA26.5 Installed" on page 7.

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

## Step 22. Secure the Front Panel Bulkhead Connectors

Follow the instruction shown in Figure 20 in this document.

Figure 20 Bulkhead Connections, Front Panel




## Step 23.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[1].

1. See "Downloading the Online PNA Service Guide" on page 8.

## Step 24.Install Cable on the A23 Test Set Motherboard

**CAUTION**

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

If not already done in a previous step, install the following new ribbon cable. To see an image showing the location, click the Chapter 6 bookmark "Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 417" in the PDF Service Guide[1]. New parts are listed in Table 2 on page 10.

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

## Step 25. Replace the Front Panel's Lower Dress Panel

Before the front panel's lower dress panel can be replaced, the 2-port lower dress panel and the lower front panel label must be removed from the front panel assembly. Refer to Figure 21 on page 41. New parts are listed in Table 2 on page 10.

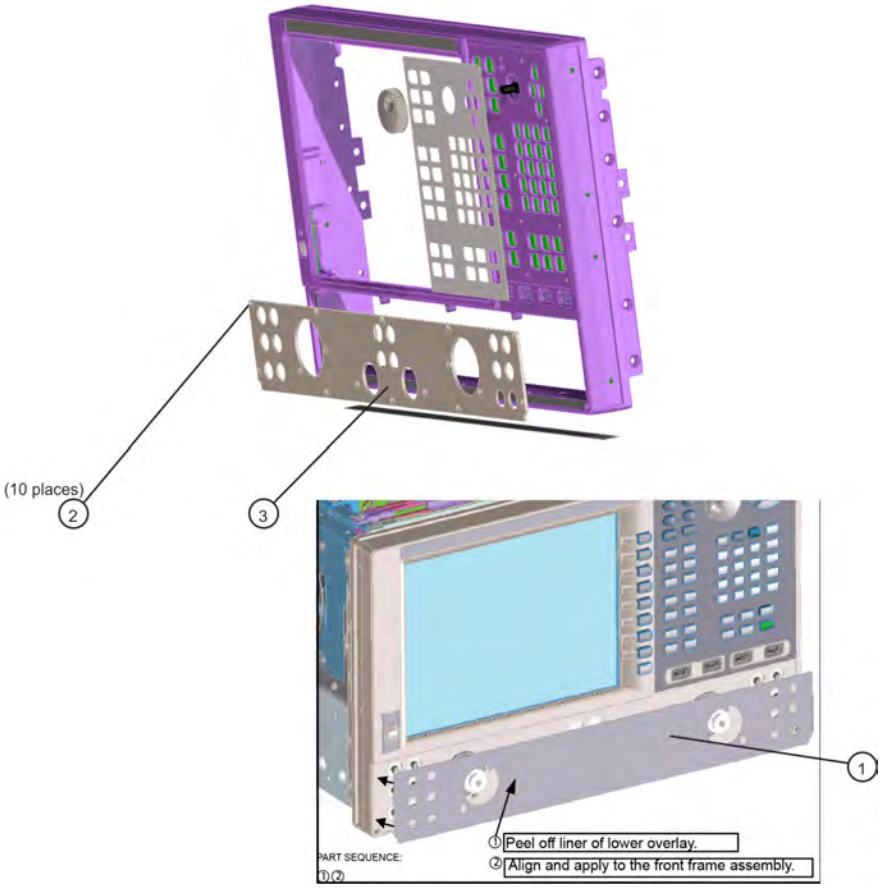
1. Remove the 2-Port lower front panel label (item ①).
2. Remove the 10 screws (save the screws for reuse) from the 2-port dress panel and remove the dress panel (item ② and ③ respectively).
3. Reassemble the front panel's lower dress panel assembly with the new 4-port dress panel (N5240-00009) by reversing the order of step 2 in the instructions previously followed.

**NOTE**

**IMPORTANT!** To avoid possible damage to the lower front panel overlay (label), do not attempt to attach the lower front panel label until "Step 20. Install the Cable Bracket Mount" on page 32.

1. See "Downloading the Online PNA Service Guide" on page 8.

Figure 21 Replacing the Front Panel's Lower Dress Panel and label




## Step 26. 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 Guide[1].

– 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.

1. See "Downloading the Online PNA Service Guide" on page 8.

## Step 27. Install the Overlay

To see an image of the front panel overlay (N5227-80020) click the Chapter 6 bookmark “Front Panel Assembly, Front Side, All Options” in the PDF Service Guide[1]. New parts are listed in Table 2 on page 10.

1. **Remove the protective backing from the new front panel overlay (N5227-80020).**
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.**

## Step 28. Install the Front Panel Jumper Cables

Install twelve W36 front panel jumper cables (N5245-20155) - use 6 new jumpers and reuse 6 old jumpers. To see an image of the front panel jumper cables, click the Chapter 7 bookmark “Removing and Replacing the Front Panel Assembly” in the PDF Service Guide[1].

## Step 29. 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 30. Reinstall the Inner Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide[1].

## Step 31. Reinstall the Outer Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide[1].

## Step 32. 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.

1. See “Downloading the Online PNA Service Guide” on page 8.

### 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 33. Enable Options 401

**Procedure Requirements**

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

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

**Option Enable Procedure**

1. Locate the email(s) from Keysight which contain license file attachments. These emails are a result of "Step 1. Obtain a Keyword and Verify the Information" on page 15.
2. Copy the license file(s) from the email(s) to the **root directory** of the USB flash drive.
   More than one license file may be copied to the USB flash drive.

**NOTE** A single license file may contain more than one feature.

3. Insert the USB flash drive to the PNA's USB drive slot. Within 5 seconds, the PNA should display a small "New licenses installed" message.

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

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

4. Disconnect the USB flash drive from the PNA.
5. On the analyzer, click or press to open the KLM software from your PNA’s Windows taskbar by pressing **Start** > **More Programs** > **Keysight License Manager folder** > **Keysight License Manager** and verify the options are correct.

### Option Verification Procedure

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

1. Start the Network Analyzer program.
2. Once the Network Analyzer program is running:
   - Press **Help** > **About NA** and verify that Option 401 is listed in the PNA application.

**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 4.

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

## Step 34. Perform Post-Upgrade Adjustments and Calibration

**Adjustments**

NOTE

**IMPORTANT!**

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

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

- 10 MHz frequency reference adjustment
- EE default adjustment: Src 2 Synth Only
- synthesizer bandwidth adjustment (only run if the EE default adjustment is insufficient)
- source adjustment
- IF gain adjustment
- receiver characterization
- receiver adjustment
- IF response adjustment (Option S93090xA/B, S93093A/B, or S93094A/B Only)

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

To view this service guide information, click the Chapter 3 bookmark “Tests and Adjustments” in the PDF Service Guide[1].

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.

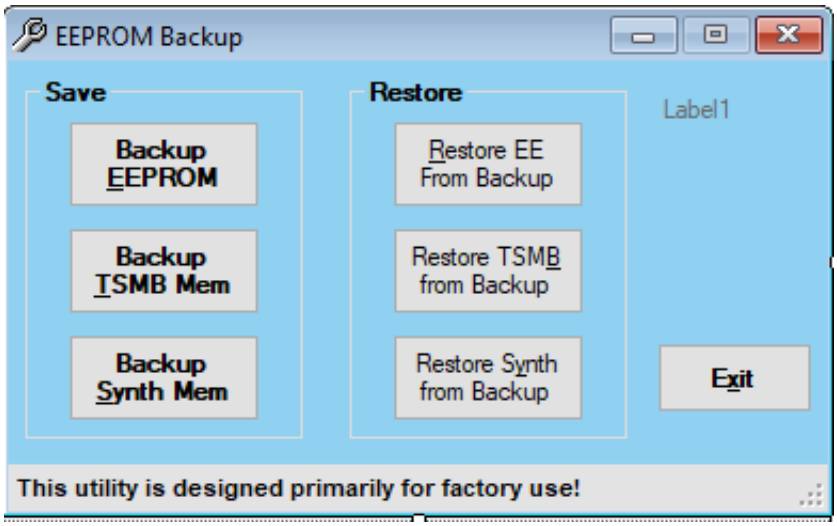
1. See “Downloading the Online PNA Service Guide” on page 8.

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.

Figure 22 EEPROM Backup Menu




## Operator's Check

Perform the Operator's Check to check the basic functionality of the analyzer. For instructions, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

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 Guide[1].

## Step 35. 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 8.

This information is subject to change
without notice.
© Keysight Technologies 2009-2022
Edition 2, January 2022

N5225-90117

www.keysight.com