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# **Keysight - N5244/5A&B Add Second Source Capability For Version 6 Synthesizers (For Models With Version 6 Synthesizers Only) - Installation Guide**

To Upgrade N5244/5A&B Series

Option 217 to Option 222 and

Option 219 to Option 224

(900 Hz/10 MHz - 43.5 GHz)

(900 Hz/10 MHz - 50 GHz)

Upgrade Kit Order Numbers:

N5244BU- 224 and N5245BU- 224

Keysight Kit Number: N5245-60111

This is the Installation Guide for the N5244/5A&B Series Microwave Network Analyzers.

# Notices

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### CAUTION

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NOTICE: This document contains references to Agilent Technologies. Agilent's former Test and Measurement business has become Keysight Technologies. For more information, go to **[www.keysight.com](http://www.keysight.com)**.





## Description of the Upgrade

### 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.

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### 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.

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This upgrade converts your standard 2-port configurable test set analyzer (N5244A/B Option 217 or N5245A/B Option 217) to an N5244/5A Option 222 or N5244/5B Option 222 and (N5244A/B Option 219 or N5245A/B Option 219) to an N5244A/B Option 224 or N5245A/B Option 224 by adding:

- a second source assembly
- a second 13.5 GHz synthesizer board
- two additional doublers
- source outputs routed to the front panel
- source outputs routed to the rear panel
- a mechanical switch to each source port channel
- a source combiner to the port 1 channel
- rear-panel test set inputs

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 6.**

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## Getting Assistance from Keysight

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

### Contacting Keysight

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

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

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

#### NOTE

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

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### 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](http://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.

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### NOTE

#### IMPORTANT!

- This document contains references to legacy A27/A28 mixer brick assemblies. Your model instrument may have either legacy assemblies or the new parts installed.
  - 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 <sup>a</sup>.
- 

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 Guide<sup>1</sup>.

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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.

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### 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, refer to the <https://www.keysight.com/us/en/assets/9018-01616/installation-guides/9018-01616.pdf> (A models, N5242-90006) or <https://www.keysight.com/us/en/assets/9018-04534/installation-guides/9018-04534.pdf> (B models, N5242-90024).

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### 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.

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To enable the option product, you must request license key(s) 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 determine your new HostID, Keysight personnel should use the new model number with the utility at go to

<http://mktwww.srs.is.keysight.com/field/service/network/pna/upgrades.html>. Non-Keysight personnel should contact Keysight at <http://www.keysight.com/key/contactus>.

- Host ID



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, 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 8**.

## Downloading the Online PNA Service Guide

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

1. Go to [www.keysight.com](http://www.keysight.com).
2. In the Search box, enter the model number of the analyzer (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<sup>1</sup>.

### ESD Equipment Required for the Installation

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

## Tools Required for the Installation

Description	Qty	Part Number
T-6 TORX driver - set to 4 in-lbs (0.45 N.m)	1	N/A
T-8 TORX driver - set to 6 in-lbs (0.68 N.m)	1	N/A
T-10 TORX driver - set to 9 in-lbs (1.02 N.m)	1	N/A
T-20 TORX driver - set to 21 in-lbs (2.38 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench- set to 10 in-lbs (1.13 N.m)	1	N/A
5/16-in (8 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 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
9/16-in (15 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 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
1/4-in (6 mm) open end wrench	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 and the bias tees. The bias tees should be torqued to 9 in-lbs. And, on the front and rear bulkhead connectors, use a 5/16 inch nutsetter or open end torque wrench set to 21 in-lb.

## About Installing the Upgrade

Products affected	N5244A/B Option 217/219 and N5245A/B Option 217/219
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 6**.

**Table 1** Contents of Upgrade Kit N5245-60111

Ref Desig.	Description	Qty	Part Number
-	Installation note (this document)	1	N5245-90111
-	Software Entitlement Certificate	1	5964-5145
A10	26.5 GHz source (2) assembly	1	5087-7780
A12	Doubler assembly, port 3	2	5087-7349
A13	Doubler assembly, port 4		
A17	13.5 GHz source 2 synthesizer board	1	N5240-60074
A50	Port 1 mechanical switch	3	N1811-60031
A51	SRC2 OUT1 mechanical switch		
A53	Port 3 mechanical switch		
A54	Combiner	1	11667-60021
-	Bracket for combiner	1	N5245-00020
-	Bracket for mechanical switches	3	N5245-00014
-	Bracket for cables	1	N5245-00022
-	Machine screw, M3.0 x 8, pan head (to attach cable bracket to deck)	2	0515-0372
-	Machine screw, M2.0 x 20, pan head (to attach mechanical switches to brackets)	6	0515-1992
-	Machine screw, M2 x 14, pan head (to attach combiner to bracket)	2	0515-0661
-	Machine screw, M3 x 6, pan head (6 to attach switch assemblies to deck; 2 to attach combiner bracket to deck)	12	0515-0430
-	Machine screw, M4.0 x 10, pan head (2 to attach source 2 assy to chassis; 2 to attach A12 doubler 3 to chassis; 2 to attach A13 doubler 4 to chassis)	6	0515-0380
-	Machine screw, M3.0 x 18, pan head (to attach source bracket N5247-20136)	1	0515-0666
-	Machine screw, W/PATCH-LK 90-DEG, M3.0 x 20, pan head (to attach source bracket N5247-20136)	2	0515-2078
-	SMA Male straight, termination 50 ohm	2	1250-4261
-	Cable clamp	5	1400-1334
-	Bulkhead connectors	2	5063-1700

Description of the Upgrade  
Items Included in the Upgrade Kit

**Table 1**                      **Contents of Upgrade Kit N5245-60111**

Ref Desig.	Description	Qty	Part Number
-	Washers for bulkhead connectors	2	2190-0016
-	Nuts for bulkhead connectors	2	08360-20133
-	Cap-protective, 1/4 –36 threads	1	5188-5406
-	Front panel overlay – “A” models (Option 224)	1	N5245-80005
-	Front panel overlay – “B” models (Option 224)	1	N5245-80027
-	Front panel overlay – “B” models (Option 222)	1	N5245-80028
-	Dust cap for test port	2	1401-0214
-	Dust cap for test port	2	1401-0225
-	Termination, 2.4 mm 50 GHz load	1	0955-2394
W2	A10 source (2) P1 to A17 13.5 GHz source (2) synthesizer J1207	1	N5245-20100
W7	A10 source (2) P5 to A12 port 3 doubler	1	N5245-20034
W8	A10 source (2) P3 to A13 port 4 doubler	1	N5245-20035
W9	A10 source (2) P4 to A12 port 3 doubler	1	N5245-20032
W10	A12 port 3 doubler to A13 port 4 doubler	1	N5245-20033
W13	A12 port 3 doubler to W14	1	N5245-20036
W15	A13 port 4 doubler to W16	1	N5245-20036
W16	Front panel SRC 2 OUT 2 to W15	1	N5245-20053
W77	A14 frequency ref (J7) to A17 13.5 GHz (source 2) synth (J5)	1	N5242-60030
W105	A50 port 1 mechanical switch to W11	1	N5245-20064
W106	A50 port 1 mechanical switch to A29 port 1 reference coupler	1	N5245-20065
W107	A50 port 1 mechanical switch to PORT 1 SW SRC OUT (J11)	1	N5245-20068
W108	Rear-panel PORT 1 COMB THRU IN (J10) to A54 combiner	1	N5245-20094
W109	Rear-panel PORT 1 COMB ARM IN (J9) to A54 combiner	1	N5245-20093
W110	A50 port 1 mechanical switch to A54 combiner	1	N5245-20067
W111	A51 SRC2 OUT1 mechanical switch mechanical switch to W13	1	N5245-20058
W112	Front panel SRC 2 OUT 1 to A51 SRC2 OUT1 mechanical switch	1	N5245-20078
W113	A51 SRC2 OUT1 mechanical switch to PORT 3 SW SRC OUT (J8)	1	N5245-20069
W114	Rear-panel PORT 3 SW TSET IN (J7) to A51 SRC2 OUT1 mechanical switch	1	N5245-20070
W119	A53 port 2 mechanical switch to W17	1	N5245-20063

Table 1 Contents of Upgrade Kit N5245-60111

Ref Desig.	Description	Qty	Part Number
W120	A53 port 2 mechanical switch to A32 port 2 reference coupler	1	N5245-20062
W121	A53 port 2 mechanical switch to PORT 2 SW SRC OUT (J2)	1	N5245-20071
W122	A53 port 2 mechanical switch to PORT 2 TSET IN (J1)	1	N5245-20072
W123	Rear panel jumper	3	N5245-20155
-	Bracket, source	1	N5247-20136

**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 the A24 IF Multiplexer Motherboard."
- "Step 7. Remove the Some Existing Cables."
- "Step 8. Assemble the A50, A51, and A53 Mechanical Switch Assemblies."
- "Step 9. Install the Mechanical Switch Assemblies."
- "Step 10. Assemble and Install the A54 Combiner Assembly."
- "Step 11. Install the Source 2 Front Panel Connectors."

- “Step 12. Install Bracket to A10 26.5 GHz Source 2 Assembly.”
- “Step 13. Assemble the A10 26.5 GHz Source 2 Assembly.”
- “Step 14. Assemble and Install the A12 and A13 Doubler Assemblies.”
- “Step 15. Install the A10 26.5 GHz Source 2 Assembly and Cables.”
- “Step 16. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables.”
- “Step 17. Install the New Cables.”
- “Step 18. Install Rear Panel Hardware.”
- “Step 19. Reinstall the A24 IF Multiplexer Board.”
- “Step 20. Reinstall the A23 Test Set Motherboard.”
- “Step 21. Remove the Old Lower Front Panel Overlay.”
- “Step 22. Reinstall Front Panel Assembly.”
- “Step 23. Install the New Lower Front Panel Overlay.”
- “Step 24. Reinstall the Inner Cover.”
- “Step 25. Reinstall the Outer Cover.”
- “Step 26. Remove Option 217 (Option B Models Only) or 219 Licenses (A and B Models).”
- “Step 27. Enable Option 224.”
- “Step 28. Perform Post-Upgrade Adjustments and Calibration.”
- “Step 29. 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 8**.

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 15**.

### 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 6**.

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## Step 2. Remove the Outer Cover

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

## Step 3. Remove the Inner Cover

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

## Step 4. Remove the Front Panel Assembly

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

## Step 5. Remove the A23 Test Set Motherboard

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A23 Test Set Motherboard” in the PDF Service Guide<sup>1</sup>.

## Step 6. Remove the A24 IF Multiplexer Motherboard

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A24 IF Multiplexer Board” in the PDF Service Guide<sup>1</sup>.

## Step 7. Remove the Some Existing 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

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

### 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 in the order listed. To see an image showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, Standard 2-Port Configuration, Option 219 (S/N Prefixes <6021)” in the PDF Service Guide<sup>1</sup>.

These cables may be discarded – they will not be reinstalled (Option 217/219).

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

Description of the Upgrade  
Installation Procedure for the Upgrade

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

These cables must be saved - they will be reinstalled (Option 217/222 Only).

- W18 (N5245-20106) A32 test port 2 reference coupler to W17
- W12 (N5245-20045) A29 test port 1 reference coupler to W11

These four cables must be saved - they will be reinstalled All Options).

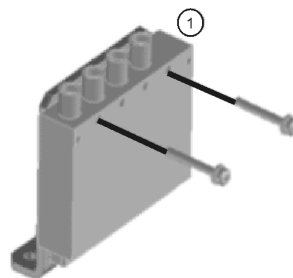
- W98 (N5245-20056) A46 port 1 receiver attenuator to A27 mixer brick (A)
- W43 (N5245-20009) A37 reference mixer switch to A27 mixer brick (R1)
- W47 (N5245-20119) Front panel REF 2 RCVR R2 IN to A27 mixer brick (R2)
- W104 (N5245-20057) A49 port 2 receiver attenuator to A27 mixer brick (B)

## Step 8. Assemble the A50, A51, and A53 Mechanical Switch Assemblies

Refer to **Figure 1** for this step of the procedure. New parts are listed in **Table 1 on page 11**.

**Figure 1** Mechanical Switch Assembly (0515-1992, N1811-60031, N5245-00014)

① Prefab switches N1811-60031 X3 to brackets N5245-00014 X3 as shown. Secure with screws 0515-1992 X6, two screws to each switch. Torque to 6 in-lbs.



N5245\_005\_02



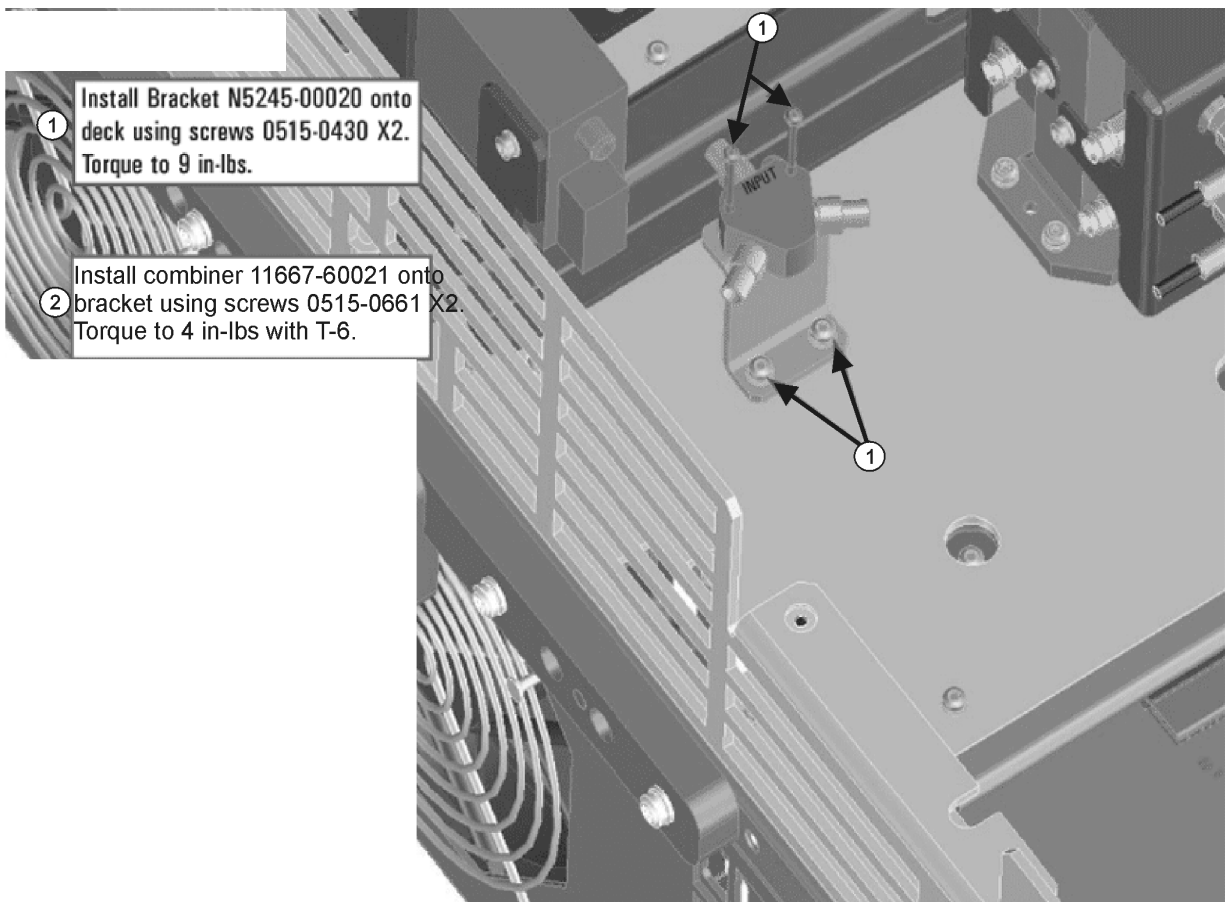
## Step 9. Install the Mechanical Switch Assemblies

Install the A50, A51, and A53 mechanical switches. For instructions, click the Chapter 7 bookmark, “Removing and Replacing the A50-A53 Mechanical Switches and the A54 Combiner” in the PDF Service Guide<sup>1</sup>. New parts are listed in **Table 1 on page 11** of this document.

## Step 10. Assemble and Install the A54 Combiner Assembly

Refer to **Figure 2** for this step of the procedure. New parts are listed in **Table 1 on page 11**.

**Figure 2** A54 Combiner Assembly and Installation (0515-0430, 0515-0661, 11667-60021, N5245-00020)



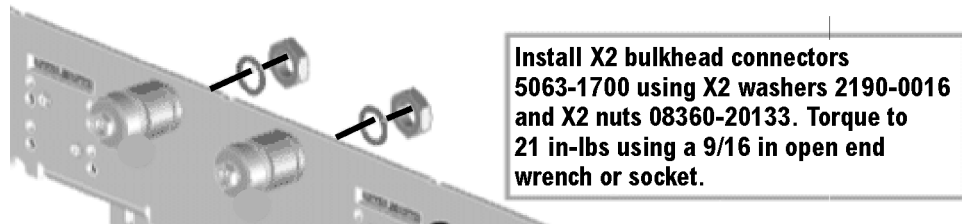
N5245\_005\_03

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

## Step 11. Install the Source 2 Front Panel Connectors

Refer to **Figure 3** for this step of the procedure. New parts are listed in **Table 1** on page 11.

**Figure 3** Source 2 Front Panel Connectors Installation (2190-0016, 5063-1700, 08360-20133)

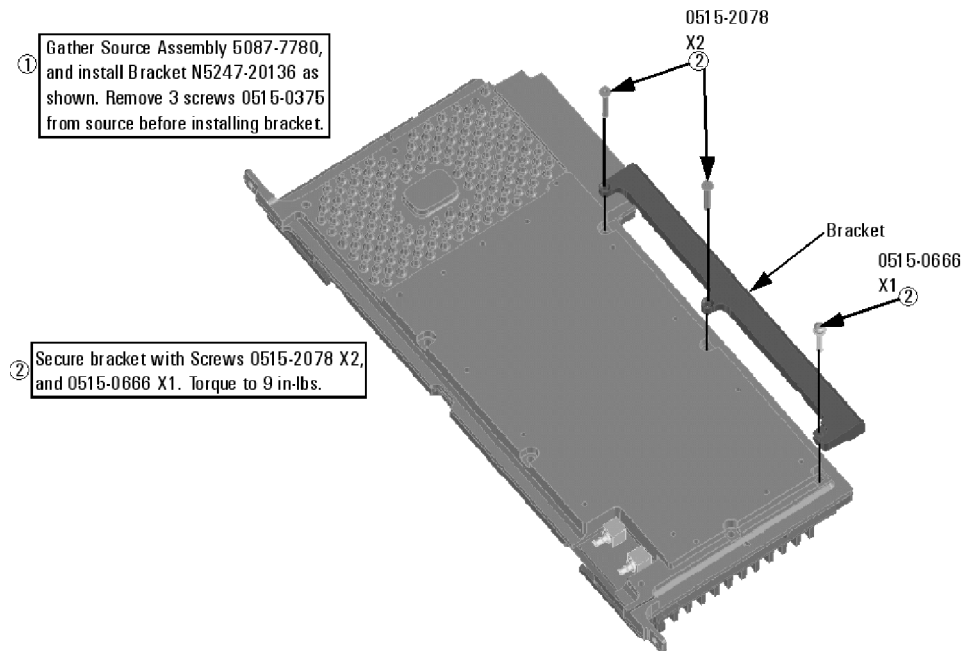


N5245\_005\_04

## Step 12. Install Bracket to A10 26.5 GHz Source 2 Assembly

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

**Figure 4** A10 Source 2 Assembly Bracket Installation (0515-0375, 5087-7780, N5247-20136)

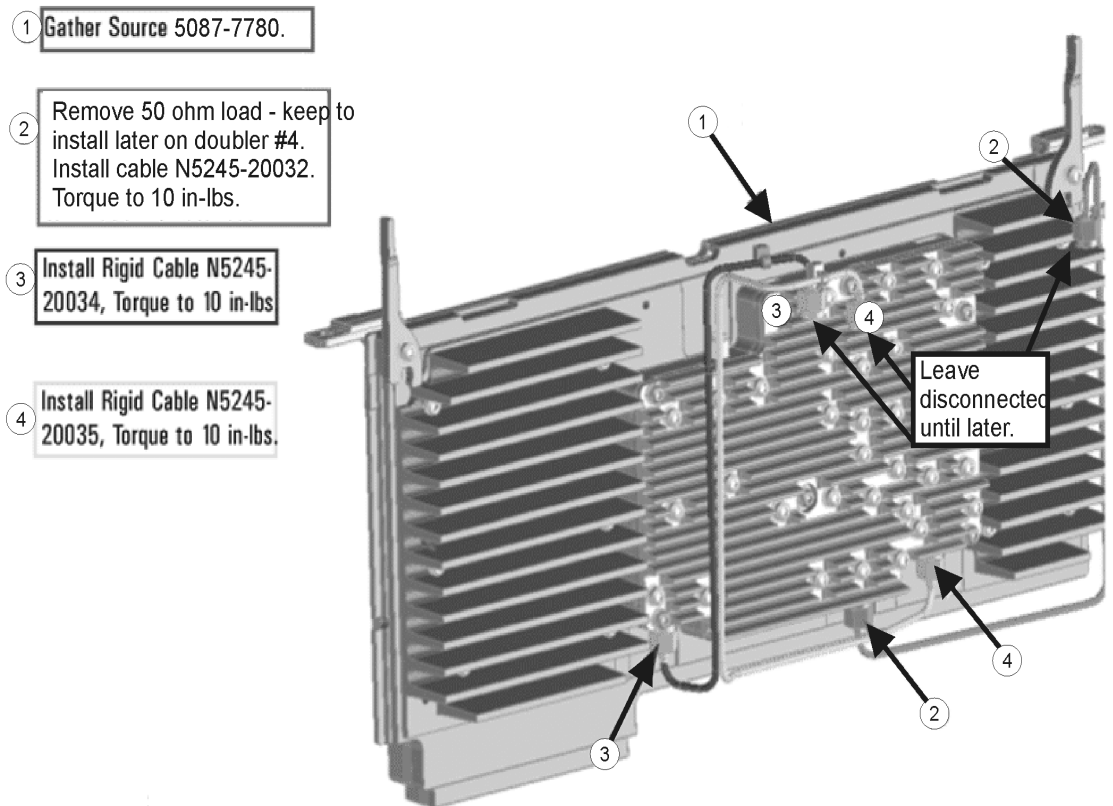


N5247\_106\_39

### Step 13. Assemble the A10 26.5 GHz Source 2 Assembly

Follow the four instructions shown in **Figure 5**.

**Figure 5**      A10 Source 2 Assembly (5087-7780, N5245-20032, N5245-20034, & N5245-20035)

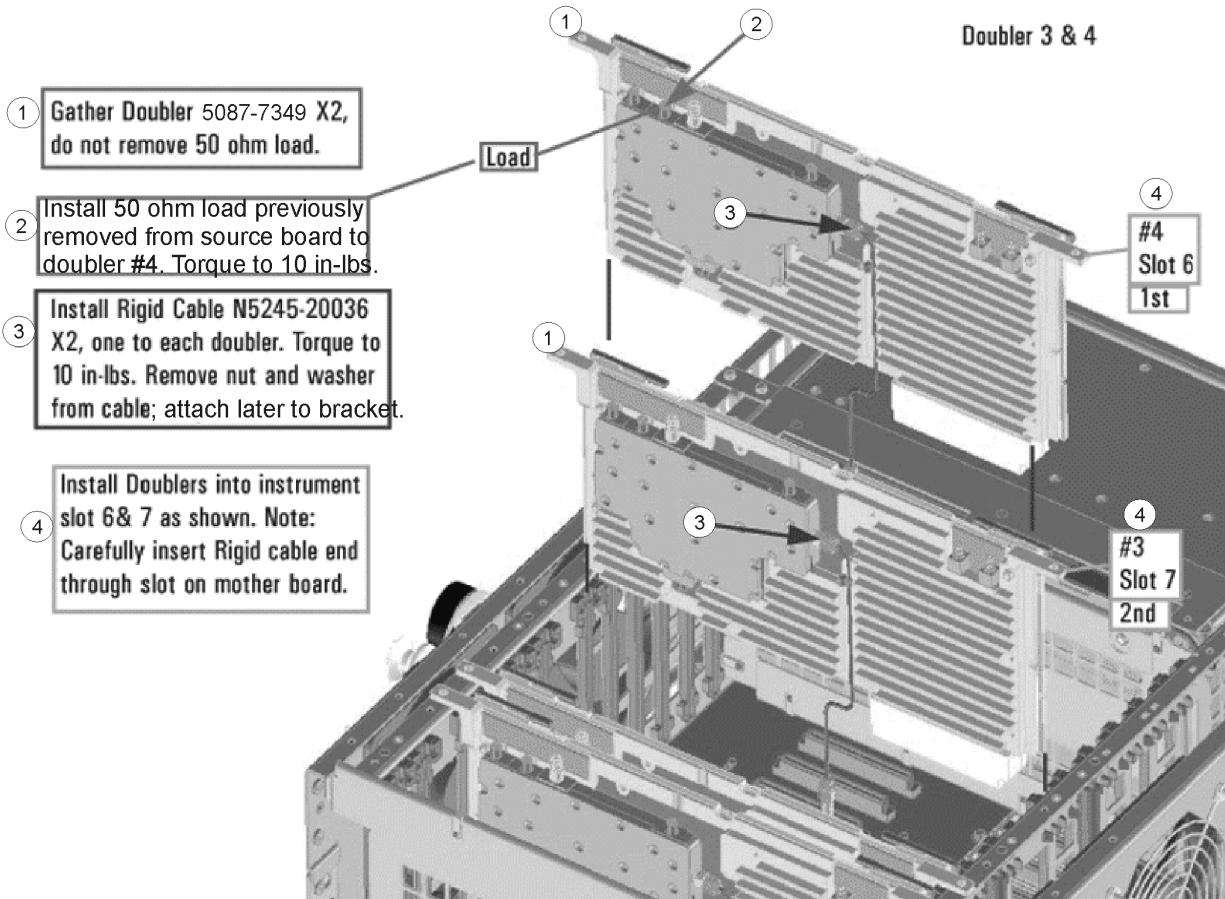


N5245\_016\_38

## Step 14. Assemble and Install the A12 and A13 Doubler Assemblies

Follow the four instructions show in **Figure 6**.

Figure 6      A12 and A13 Doubler Assemblies Installation (5087-7349, N5245-20036)

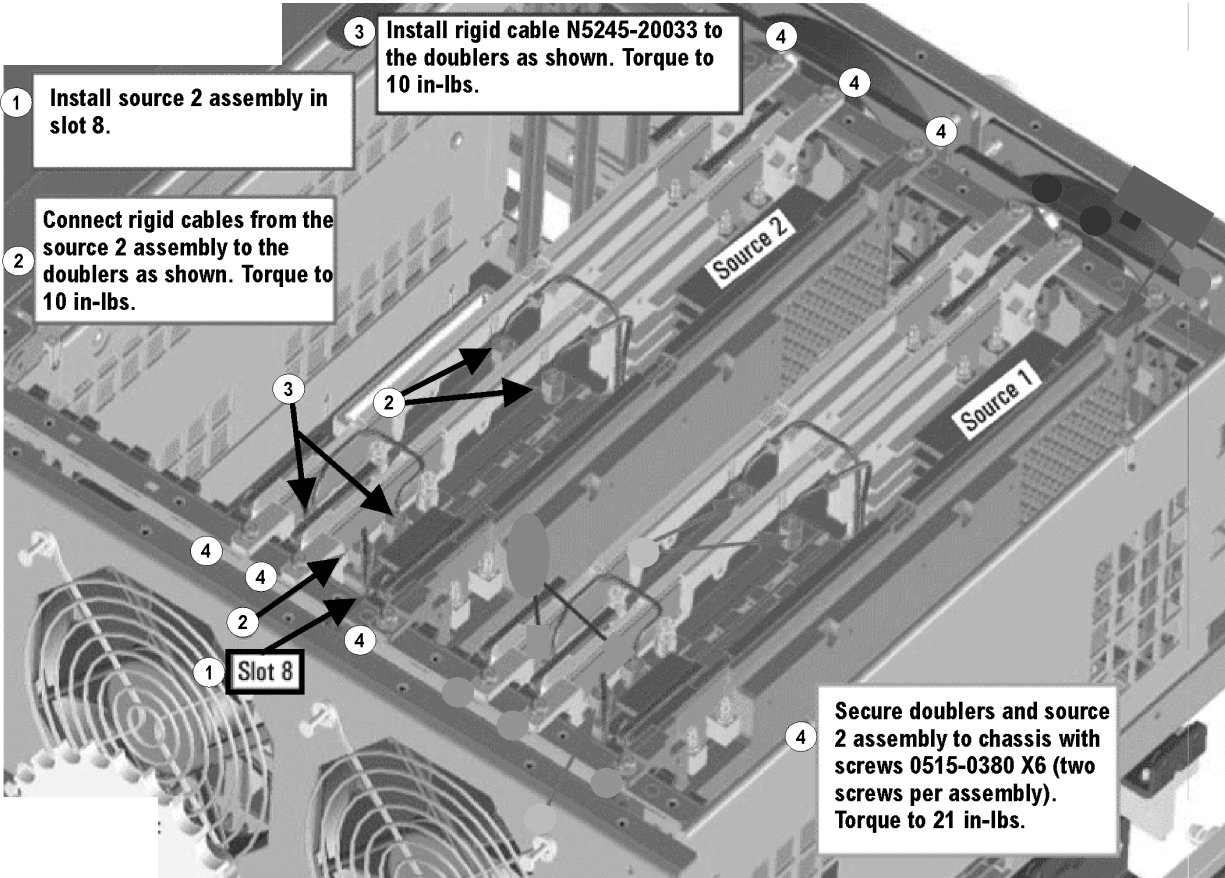


N5245\_015\_37

## Step 15. Install the A10 26.5 GHz Source 2 Assembly and Cables

Follow the four instructions shown in **Figure 7**.

Figure 7 A10 Source 2 Assembly Installation (0515-0380, N5245-20033)



N5245\_015\_39

## Step 16. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables

1. Install gray cable W77 (N5242-60030) to connector J5 of the 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. To see an image showing the location of the A17 board in the motherboard, click the Chapter 6 bookmark “Top Assemblies, All Options” in the PDF Service Guide<sup>1</sup>.
3. Connect cable W2 (N5245-20100) between the A10 source 2 board and the A17 (source 2) synthesizer board, positioning the cable in the wire looms. Tighten the cable connectors to 10 in-lbs using a 5/16-in torque wrench.
4. Connect the loose end of new gray flex cable W77 (N5242-60030) on the A14 frequency reference board (J7). (The other end of this cable was previously connected to J5 of the source 2 synthesizer board.)

---

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



## Step 17. Install the New Cables

### CAUTION

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

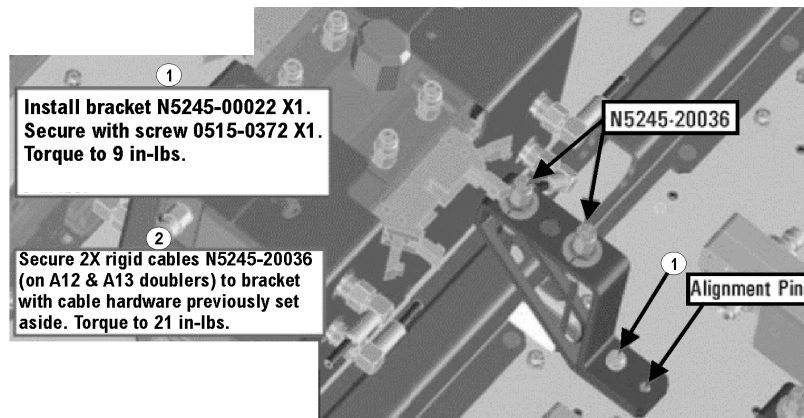
To see an image showing the location of these cables, click the Chapter 6 bookmarks for your instrument's s/n prefix: "Bottom RF Cables, 2-Port Configuration, Option 224" in the PDF Service Guide<sup>1</sup>. New parts are listed in **Table 1 on page 11**.

Install the following new cables in the order listed.

Follow the two instructions shown in **Figure 8** in this document.

Figure 8

### Semigridd Cables Installation (N5245-20036 x2)



N5245\_015\_32

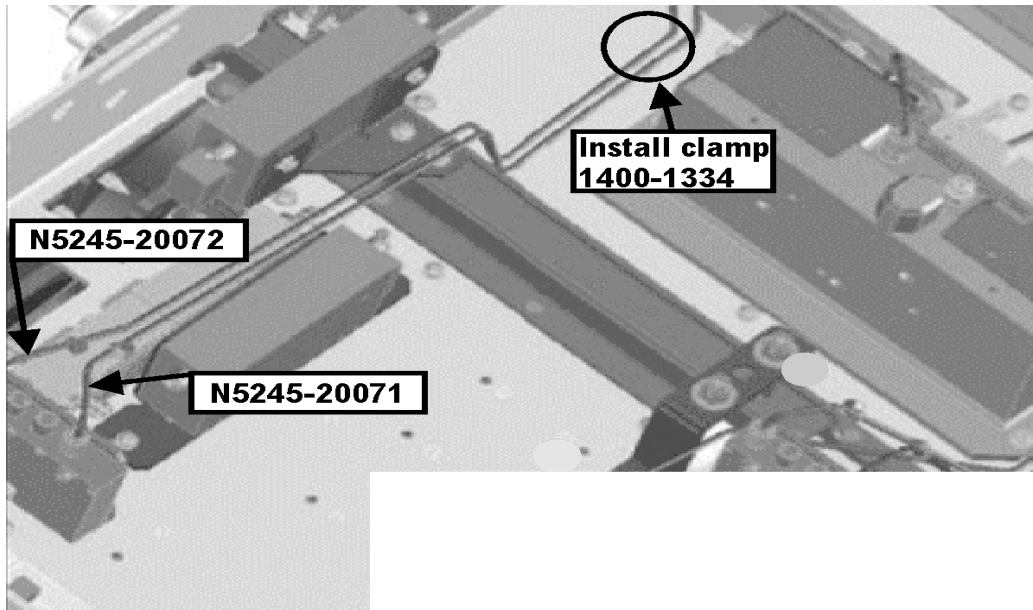
- W13 (N5245-20036) A12 port 3 doubler to W14 (connected to the doubler in an earlier step)
- W15 (N5245-20036) A13 port 4 doubler to W16 (connected to the doubler in an earlier step)
- W122 (N5245-20072) A53 port 2 mechanical switch to PORT 2 TSET IN (J1)
- W121 (N5245-20071) A53 port 2 mechanical switch to PORT 2 SW SRC OUT (J2)

\* As shown in **Figure 9**, install a clamp (part number 1400-1334) to secure W121 (N5245-20071) and W122 (N5245-20072).

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

Figure 9

Location of Cable Clamp to Secure W121 (N5245-20071) and W122 (N5245-20072)



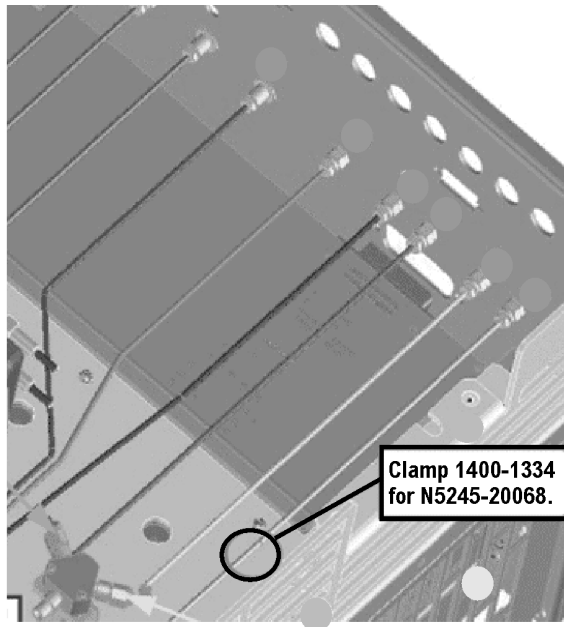
N5245\_005\_01

- W114 (N5245-20070) Rear-panel PORT 3 SW TSET IN (J7) to A51 SRC2 OUT1 mechanical switch
- W113 (N5245-20069) A51 SRC2 OUT1 mechanical switch to PORT 3 SW SRC OUT (J8)
- W109 (N5245-20093) Rear-panel PORT 1 COMB ARM IN (J9) to A54 combiner
- W108 (N5245-20094) Rear-panel PORT 1 COMB THRU IN (J10) to A54 combiner
- W107 (N5245-20068) A50 port 1 mechanical switch to PORT 1 SW SRC OUT (J11)

\* As shown in **Figure 9-1**, install clamp part number 1400-1334 to secure W107 (N5245-20068).



Figure 9-1 Location of Cable Clamp to Secure W107 (N5245-20068)



N5245\_010\_23

- W120 (N5245-20062) A53 port 2 mechanical switch to A32 port 2 reference coupler
- W119 (N5245-20063) A53 port 2 mechanical switch to W17
- W106 (N5245-20065) A50 port 1 mechanical switch to A29 port 1 reference coupler
- W105 (N5245-20064) A50 port 1 mechanical switch to A29 port 1 reference coupler
- W111 (N5245-20058) A51 SRC2 OUT1 mechanical switch mechanical switch to W13
- W47 (reuse) (N5245-20119) Front panel REF 2 RCVR R2 IN to A27 mixer brick (R2)
- W43 (reuse) (N5245-20009) A37 reference mixer switch to A27 mixer brick (R1)
- W110 (N5245-20067) A50 port 1 mechanical switch to A54 combiner
- W98 (reuse) (N5245-20056) A46 port 1 receiver attenuator to A27 mixer brick (A)
- W104 (reuse) (N5245-20057) A49 port 2 receiver attenuator to A27 mixer brick (B)
- W16 (N5245-20053) Front panel SRC 2 OUT 2 to W15

- W112 (N5245-20078) Front panel SRC 2 OUT 1 to A51 SRC2 OUT1 mechanical switch

## Step 18. Install Rear Panel Hardware

To see an image of the rear panel assembly, click the Chapter 6 bookmark “Rear Panel Assembly, All Options” in the PDF Service Guide<sup>1</sup>.

1. Secure seven hex nuts on the rear panel bulkhead connectors to 21 in-lbs using a 9mm nut bit.
2. Go back and re-torque the seven hex nuts to 21 in-lbs using a manual torque wrench.
3. Install the 2.4 mm 50 GHz termination (0955-2394) on J7, port 3.
4. Install three rear panel jumpers (N5245-20155) between the following connector pairs:
  - SW TSET IN (J1) and SW SRC OUT (J2)
  - COMB ARM IN (J10) and SW SRC OUT (J11)
  - COMB ARM IN (J9) and SW SRC OUT (J8)

### NOTE

Two hole plugs (6960-0523) remain in the rear panel.

---

## Step 19. Reinstall the A24 IF Multiplexer Board

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A24 IF Multiplexer Board” in the PDF Service Guide<sup>1</sup>.

## Step 20. Reinstall the A23 Test Set Motherboard

For instructions on reinstalling the board, click the Chapter 7 bookmark “Removing and Replacing the A23 test set motherboard” in the PDF Service Guide<sup>1</sup>.

If not already done in a previous step, install the following new wire harnesses in the order listed. To see an image showing their location, click the Chapter 6 bookmark with your s/n prefix “Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 423” in the PDF Service Guide<sup>1</sup>. New parts are listed in **Table 1 on page 11**.

1. Wire harness (part of mechanical switch assembly), A23 test set motherboard J101 to A50 port 1 mechanical switch
2. Wire harness (part of mechanical switch assembly), A23 test set motherboard J104 to A51 SRC2 OUT1 mechanical switch
3. Wire harness (part of mechanical switch assembly), A23 test set motherboard J102 to A53 port 2 mechanical switch

## Step 21. Remove the Old Lower Front Panel Overlay

Refer to **Figure 10** for this step of the procedure. New parts are listed in **Table 1 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 7) 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.

### NOTE

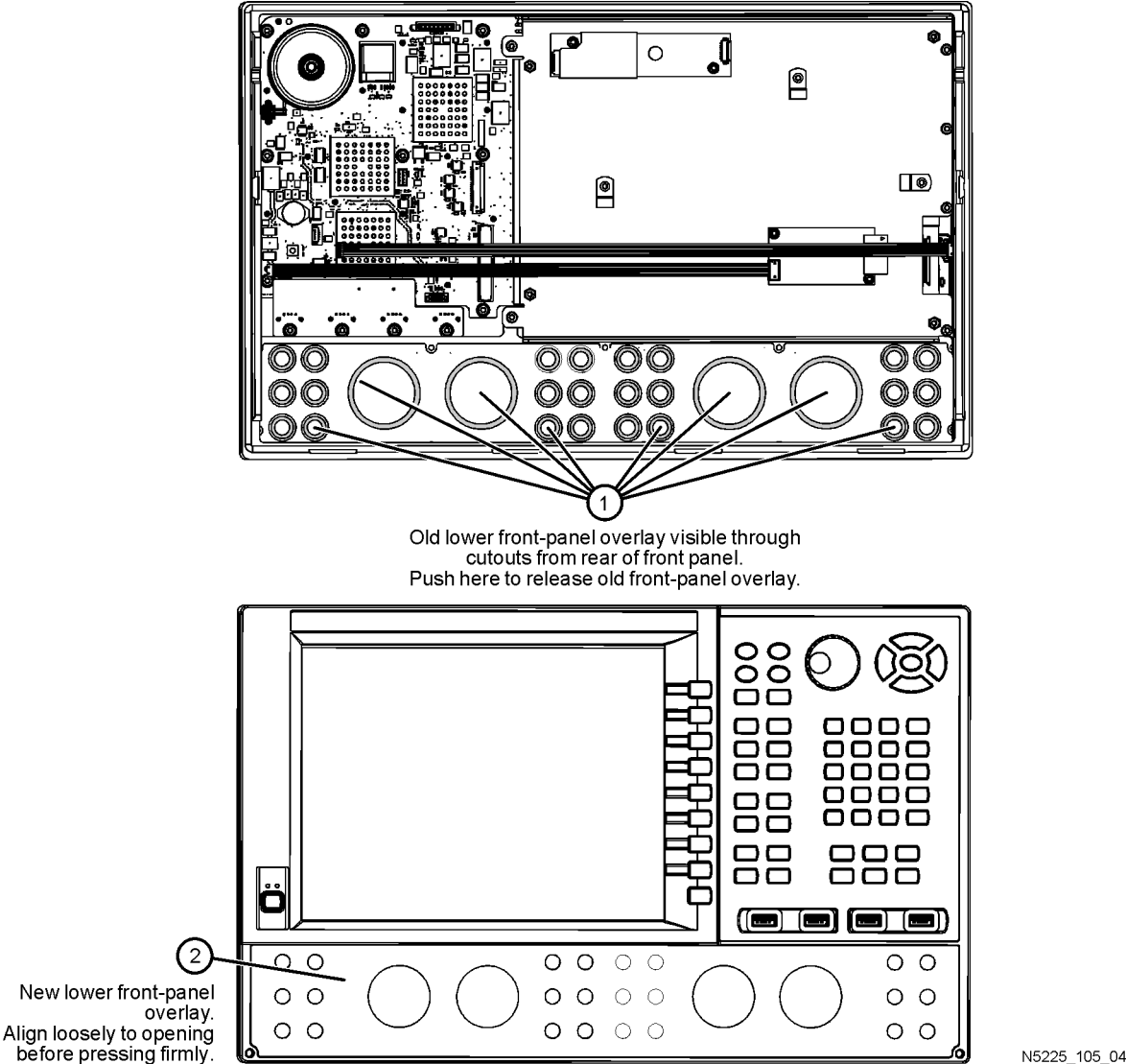
#### IMPORTANT!

To avoid possible damage to the lower front panel overlay, do not attempt to attach the lower front panel label until “**Step 15. Install the A10 26.5 GHz Source 2 Assembly and Cables**” on page 21.

---

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

Figure 10 Lower Front Panel Overlay Replacement



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

## Step 23. Install the New Lower Front Panel Overlay

Refer to **Figure 10 on page 28** for this step of the procedure. Although a 4-port PNA is shown in the graphic, the concept is the same for the 2-port PNA. New parts are listed in **Table 1 on page 11**.

1. Remove the protective backing from the new front panel overlay, N5245-80005 (A models) or N5245-80027 (B models) – (item ②).
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.
4. Reinstall jumper cables.

## Step 24. Reinstall the Inner Cover

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

## Step 25. Reinstall the Outer Cover

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

## Step 26. Remove Option 217 (Option B Models Only) or 219 Licenses (A and B Models)

### NOTE

**IMPORTANT!** For A model instruments, skip to **“Step 27. Enable Option 224”**.

### 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 9**.

For “A” models, refer to **“A Model Option 219 License Removal Procedure” on page 30.**

For “B” models refer to **“B Model Option 217 or 219 License Removal Procedure” on page 30.**

#### A Model Option 219 License Removal Procedure

For B models, refer to **“B Model Option 217 or 219 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 **219**.
4. Click **Remove**.

#### B Model Option 217 or 219 License Removal Procedure

For A models, refer to **“A Model Option 219 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 Select Desired Option list, click **217** or **219**.
4. In the Keysight License Manager dialog box that appears, press or click **Yes** to confirm delete.
5. A message displays stating that the option removal was successful.
6. Restart the PNA Analyzer application: Press **File > Exit**.
7. In the Exit NA Application dialog box that opens, press **OK**.

### Step 27. Enable Option 224

#### Procedure Requirements

- The analyzer must be powered up and operating to perform this procedure.
- The Network Analyzer program must be running.
- A keyboard and mouse must be connected to the network analyzer.

Choose one of the following:

For “A” models, refer to:

- “Option Enable Procedure for “A” Model Instruments” on page 31 and
- ““A” Model Option Verification Procedure” on page 31

For “B” models refer to:

- “Option Enable Procedure for “B” Model Instruments ” on page 32 and
- ““B” Model Option Verification Procedure” on page 32

### 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 224 - 2nd Src w/Combiner & Switches.
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 “224” is listed after “Options:” in the display. Click OK.

#### NOTE

If Option 224 has not been enabled, perform the "Option Enable Procedure for “A” Model Instruments" again. If the option is still not enabled, contact Keysight Technologies. Refer to “Getting Assistance from Keysight” on page 6.

---

## 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 8](#).
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

Once 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 219 is listed in the PNA application.

### NOTE

If the option(s) have not been enabled or if Option 217/219 has not been removed, contact Keysight Technologies. Refer to [“Getting Assistance from Keysight” on page 6](#).

---



3. After successful installation of all upgrades, some features require some adjustments to ensure the instrument meets its specified performance. Refer to the Adjustments (i.e., Diagnostic Tools, Utilities, and Adjustments) topic in the PNA Online Help:  
<https://rfmw.em.keysight.com/wireless/helpfiles/N52xxB/help.htm>.

## Step 28. Perform Post-Upgrade Adjustments and Calibration

### Adjustments

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

#### 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.

- 
- 10 MHz frequency reference adjustment
  - EE default adjustment: Synth Src2 only (Version 6 synthesizers)
  - synthesizer bandwidth adjustment (run this adjustment, only if EE default adjustment is not sufficient)
  - IF gain adjustment
  - source adjustment
  - receiver characterization
  - receiver adjustment
  - IF response adjustment (For A models: Options 090, 093, or 094 only. For B models: Options S93090xA/B, S93093A/B, or S93094A/B Only.)
  - noise figure adjustment (For A models: Option 029. For B models: Option 029 with option S93029A 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<sup>1</sup>.

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

## EEPROM Backup

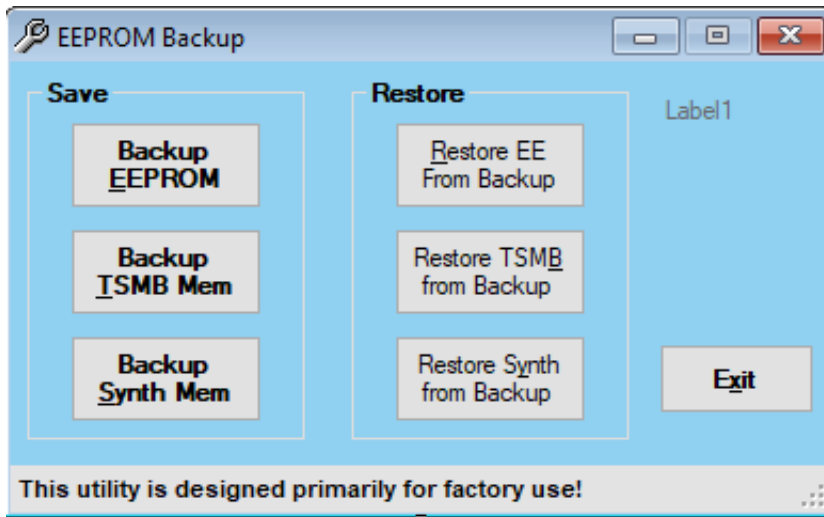
The analyzer uses arrays of correction constants to enable the analyzer to produce accurate, leveled source signals and receive clean test signals. These constants are stored in non-volatile EEPROM memory and in flash memory files.

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.

Figure 11      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<sup>1</sup>.

If you experience difficulty with the basic functioning of the analyzer, contact Keysight. Refer to **"Contacting Keysight" on page 6**.

## Calibration

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

## Step 29. Prepare the PNA for the User

1. If necessary, reinstall front jumper cables.
2. If necessary, reinstall 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**.

Description of the Upgrade  
Installation Procedure for the Upgrade





This information is subject to change  
without notice.

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