# Keysight Second Source, Combiner, and Mechanical Switches Upgrade Kit

To Upgrade PNA-X N5244A or N5245A Option 219 to Option 224

For Analyzers with Serial Numbers Prefixed MY/SG/US5150 and Below

Upgrade Kit Order Numbers: N5244AU-922 and N5245AU-922

Keysight Kit Number: N5245-60102

**KEYSIGHT**
TECHNOLOGIES

Installation Note

## WARRANTY STATEMENT

## DFARS/Restricted Rights Notice

## Safety Notes

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

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

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

# Description of the Upgrade

This upgrade converts your standard 2-port configurable test set analyzer (N5244A Option 219 or N5245A Option 219) to an N5244A Option 224 or N5245A 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

# Getting Assistance from Keysight

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

## Contacting Keysight

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

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

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

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### 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, email Keysight Component Test Division (CTD) Support at **support_ctd-soco@keysight.com**, or telephone the CTD Hotline at (707) 577-6802 and leave a voice mail message. Please include details of the problem.

# Getting Prepared

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

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

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

- A license key - refer to "License Key Redemption" below.

- A PDF copy or a paper copy of the PNA Service Guide - refer to "Downloading the Online PNA Service Guide" below.

- An ESD-safe work area - refer to "Protecting Your Workspace from Electrostatic Discharge" below.

- Correct tools - refer to "Tools Required for the Installation" on page 6.

- Enough time - refer to "About Installing the Upgrade" on page 6.

- Test equipment for the post-upgrade adjustments and full instrument calibration. To view the equipment list, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide[1].

## License Key Redemption

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

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

- From the certificate

  ❏ Order number

  ❏ Certificate number

- From your instrument

  ❏ Model number

  ❏ Serial number

  ❏ Host ID

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

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

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

## Downloading the Online PNA Service Guide

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

1. Go to *www.keysight.com*.

2. In the Search box, enter the model number of the analyzer (Ex: N5242A) and click **Search**.

3. Click *Technical Support > Manuals*.

4. Click *Service Manual*.

5. Click the service guide title to download the PDF file.

6. When the PDF of the Service Guide is displayed, scroll through the Contents section bookmarks to locate the information needed.

## Protecting Your Workspace from Electrostatic Discharge

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

### 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 |

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

## 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 cable connectors. On these, use a 9 mm nutsetter or open end torque wrench set to 21 in-lb.

## About Installing the Upgrade

Products affected . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .N5244A and N5245A Option 219

Installation to be performed by . . . . . . . . . . . . . . . . . . . . . . .Keysight service center or personnel qualified by Keysight

Estimated installation time . . . . . . . . . . . . . . . . . . . . . . . . . . .5.0 hours

Estimated adjustment time . . . . . . . . . . . . . . . . . . . . . . . . . . .0.5 hour

Estimated full instrument calibration time . . . . . . . . . . . . . . .4.5 hours

## Items Included in the Upgrade Kit

Check the contents of your kit against the following list. If any part is missing or damaged, contact Keysight Technologies. Refer to "Getting Assistance from Keysight" on page 3.

**Table 1      Contents of Upgrade Kit N5245-60102**

| Ref Desig. | Description | Qty | Part Number |
|---|---|---|---|
| -- | Installation note (this document) | 1 | N5245-90005 |
| A10 | 26.5 GHz source (2) assembly | 1 | 5087-7780 <br> Was 5087-7327 |
| A12 | Doubler assembly, port 3 | 2 | 5087-7349 |
| A13 | Doubler assembly, port 4 | | Was 5087-7318 |
| A17 | 13.5 GHz source 2 synthesizer board[a] | 3 | N5240-60076 <br> Was N5242-60166 |
| A50 | Port 1 mechanical switch | 3 | N1811-60031 <br> Was N1811-60009 |
| A51 | SRC2 OUT1 mechanical switch | | |
| A53 | Port 3 mechanical switch | | |
| A54 | Combiner | 1 | 11667-60021 <br> Was N5532-60002 |
| -- | 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) | 8 | 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 |
| -- | Cable clamp | 5 | 1400-1334 |
| -- | Bulkhead connectors | 2 | 5063-1700 |
| -- | Washers for bulkhead connectors | 2 | 2190-0016 |
| -- | Nuts for bulkhead connectors | 2 | 08360-20133 |
| -- | Front panel overlay | 1 | N5245-80005 |
| - | 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 |

**Table 1    Contents of Upgrade Kit N5245-60102**

| Ref Desig. | Description | Qty | Part Number |
|---|---|---|---|
| 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 |
| 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 Was N5245-20104 |

a. The three 13.5 GHz Synthesizer boards included in this kit are the RoHS compliant N5240-60076 boards. These new boards are not compatible with the old N5230-60002 13.5 GHz Synthesizer boards. If the boards installed in your PNA are the old N5230-60002, you must replace ALL of them with the N5240-60076 boards included in this kit - refer to your PNA Service Guide's chapter 7 for instructions. If your PNA already contains the new boards, scrap the two extra N5240-60076 boards included in this kit.

For the new N5240-60076 boards to function properly in your PNA, you must upgrade your PNA firmware to rev A09.33xx or above. Download PNA firmware at: http://na.support.keysight.com/pna/firmware/firmware.html.

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

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# Installation Procedure for the Upgrade

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

| 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 Board.

Step 7. Remove 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. Assemble the A10 26.5 GHz Source 2 Assembly.

Step 13. Assemble and Install the A12 and A13 Doubler Assemblies.

Step 14. Install the A10 26.5 GHz Source 2 Assembly and Cables.

Step 15. Install the A17 13.5 GHz (Source 2) Synthesizer Board and Cables.

Step 16. Install the New Cables.

Step 17. Install Rear Panel Hardware.

Step 18. Reinstall the A24 IF Multiplexer Board.

Step 19. Reinstall the A23 Test Set Motherboard.

Step 20. Replace the Lower Front Panel Overlay.

Step 21. Reinstall Front Panel Assembly.

Step 22. Position the Cables and Wires to Prevent Pinching.

Step 23. Reinstall the Inner Cover.

Step 24. Reinstall the Outer Cover.

Step 25. Enable Option 224.

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

Follow the instructions on the Option Entitlement Certificate supplied to obtain a license key for installation of this upgrade. Refer to "License Key Redemption" on page 4.

Verify that the model number, serial number, and option number information on the license key match those of the instrument on which this upgrade will be installed.

If the model number, serial number, or option number do not match those on your license key, you will not be able to install the option. If this is the case, contact Keysight for assistance before beginning the installation of this upgrade. Refer to "Contacting Keysight" on page 3.

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

## Step 2.     Remove the Outer Cover

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

## 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 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[1].

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

## Step 7.    Remove Some Existing Cables

| | |
|---|---|
| **NOTE** | 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" in the PDF Service Guide[1].

These two cables may be discarded - they will <u>not</u> be reinstalled.

   •   W18 (N5245-20049) A32 test port 2 reference coupler to W17

   •   W12 (N5245-20050) A29 test port 1 reference coupler to W11

These four cables must be saved - they will be reinstalled.

   •   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)

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1.  See .

## 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 7.

**Figure 1        Mechanical Switch Assembly**

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.
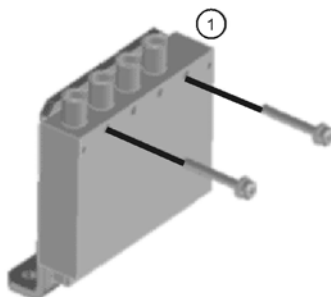
N5245_005_02

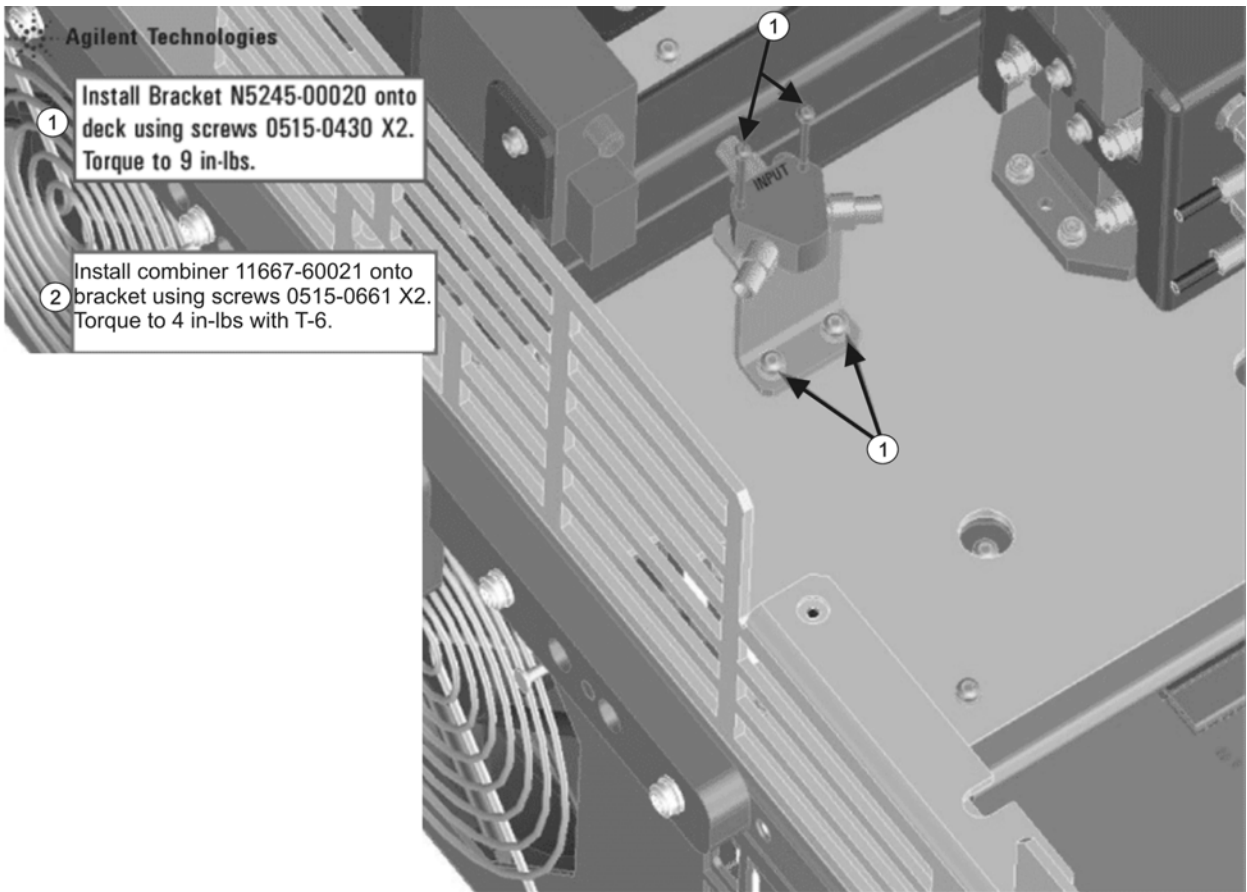## Step 9.    Install the Mechanical Switch Assemblies

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[1]. New parts are listed in Table 1 on page 7 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 7.

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

**Figure 2    A54 Combiner Assembly and Installation**



Install Bracket N5245-00020 onto deck using screws 0515-0430 X2. Torque to 9 in-lbs.

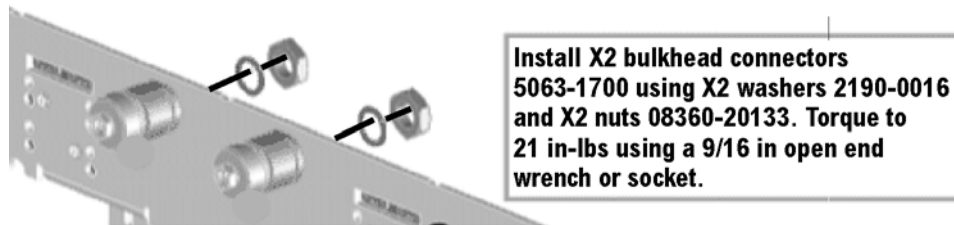Install combiner 11667-60021 onto bracket using screws 0515-0661 X2. Torque to 4 in-lbs with T-6.

N5245_005_03

## 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 7.

**Figure 3      Source 2 Front Panel Connectors Installation**



Install X2 bulkhead connectors
5063-1700 using X2 washers 2190-0016
and X2 nuts 08360-20133. Torque to
21 in-lbs using a 9/16 in open end
wrench or socket.

N5245_005_04

## Step 12.   Assemble the A10 26.5 GHz Source 2 Assembly

Follow the four instructions shown in Figure 4.
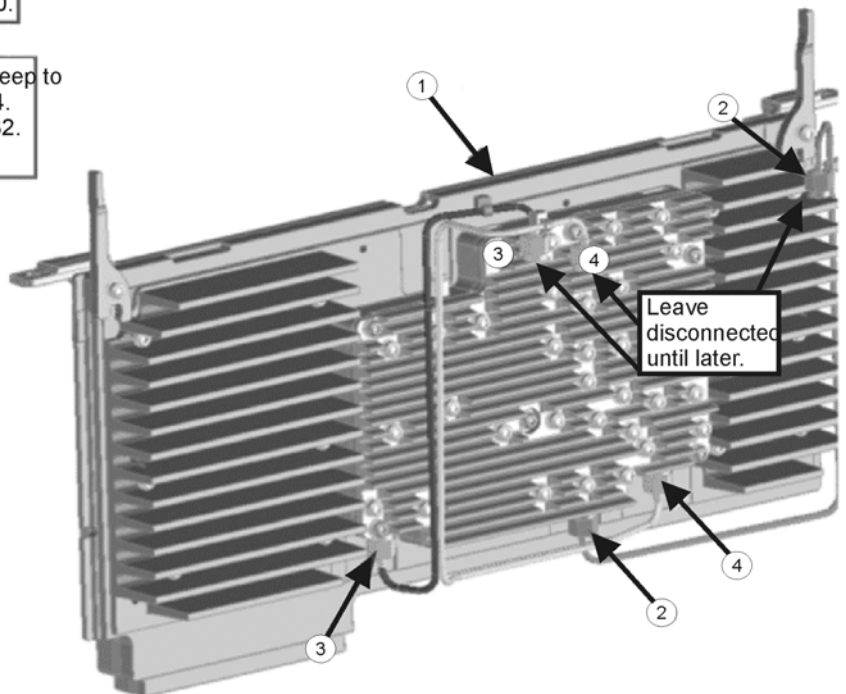
**Figure 4      A10 Source 2 Assembly**



1  Gather Source 5087-7780.

2  Remove 50 ohm load - keep to install later on doubler #4. Install cable N5245-20032. Torque to 10 in-lbs.

3  Install Rigid Cable N5245-20034, Torque to 10 in-lbs

4  Install Rigid Cable N5245-20035, Torque to 10 in-lbs.
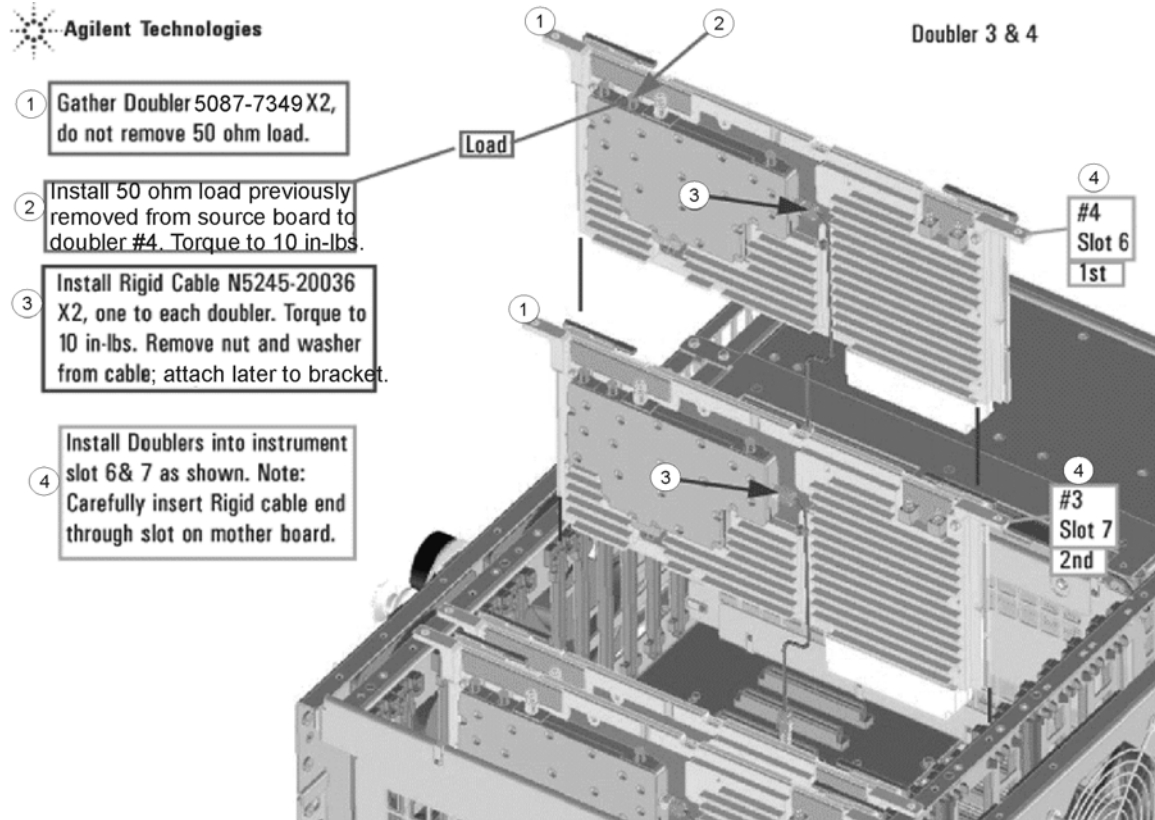
Leave disconnected until later.

N5245_016_38

## Step 13.    Assemble and Install the A12 and A13 Doubler Assemblies

Follow the four instructions shown in Figure 5.

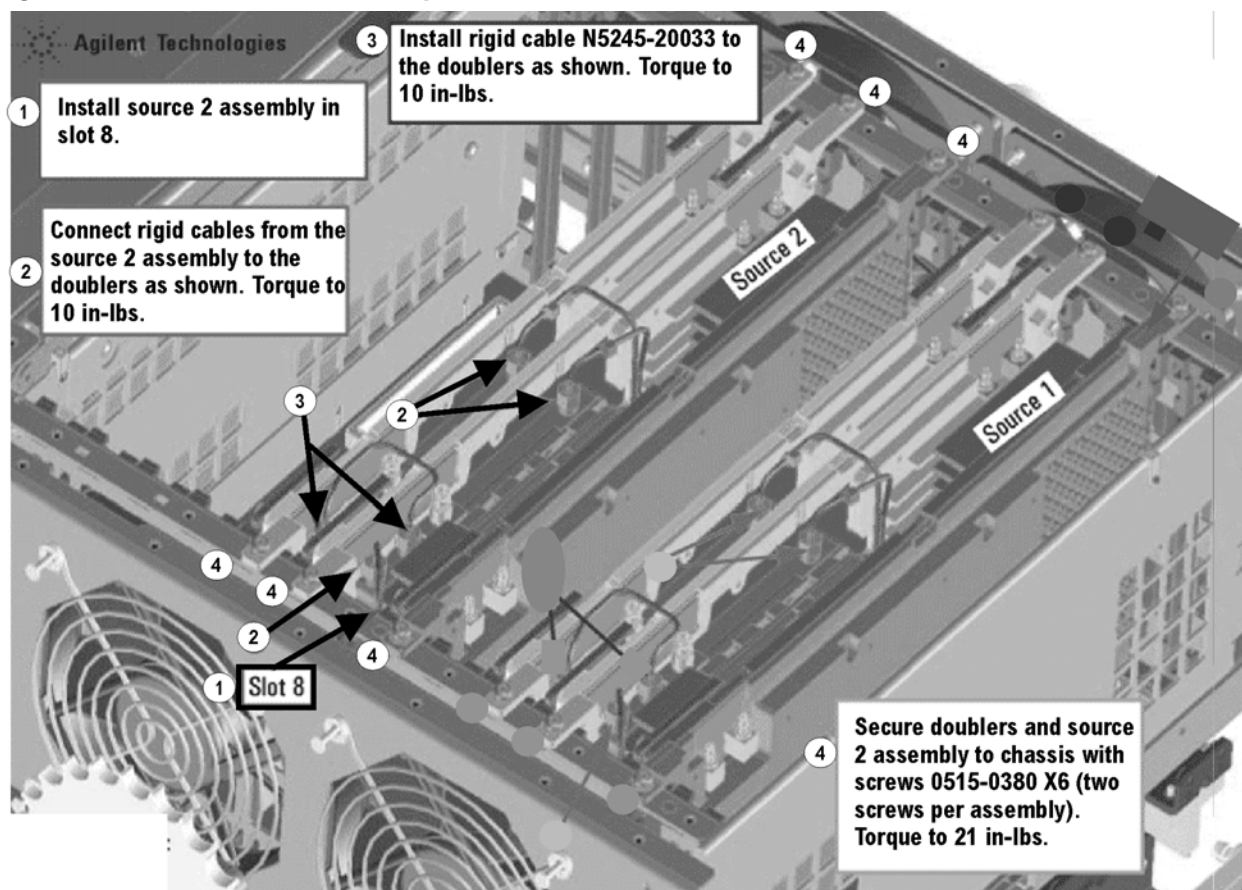**Figure 5      A12 and A13 Doubler Assemblies Installation**



N5245_015_37

## Step 14. Install the A10 26.5 GHz Source 2 Assembly and Cables

Follow the four instructions shown in Figure 6.

**Figure 6      A10 Source 2 Assembly Installation**



Agilent Technologies

**1** Install source 2 assembly in slot 8.

**2** Connect rigid cables from the source 2 assembly to the doublers as shown. Torque to 10 in-lbs.

**3** Install rigid cable N5245-20033 to the doublers as shown. Torque to 10 in-lbs.

Source 2

Source 1

Slot 8

**4** Secure doublers and source 2 assembly to chassis with screws 0515-0380 X6 (two screws per assembly). Torque to 21 in-lbs.

N5245_015_39

## Step 15. 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 (N5230-60002). 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[1].

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.)

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

| NOTE | The three 13.5 GHz Synthesizer boards included in this kit are the RoHS compliant N5240-60076 boards. These new boards are not compatible with the old N5230-60002 13.5 GHz Synthesizer boards. If the boards installed in your PNA are the old N5230-60002, you must replace ALL of them with the N5240-60076 boards included in this kit - refer to your PNA Service Guide's chapter 7 for instructions. If your PNA already contains the new boards, scrap the two extra N5240-60076 boards included in this kit. |
| --- | --- |
| | For the new N5240-60076 boards to function properly in your PNA, you must upgrade your PNA firmware to rev A09.33xx or above. Download PNA firmware at: http://na.support.keysight.com/pna/firmware/firmware.html. |

## Step 16.    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. |
| --- | --- |

| 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. |
| --- | --- |

**Install the Semirigid Cables**

To see an image showing the location of these cables, click the Chapter 6 bookmarks "Bottom RF Cables, 2-Port Configuration, Option 224" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 7.

Install the following new cables in the order listed.

• Follow the two instructions shown in Figure 7 in this document.

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

**Figure 7**      **Semirigid Cables Installation**
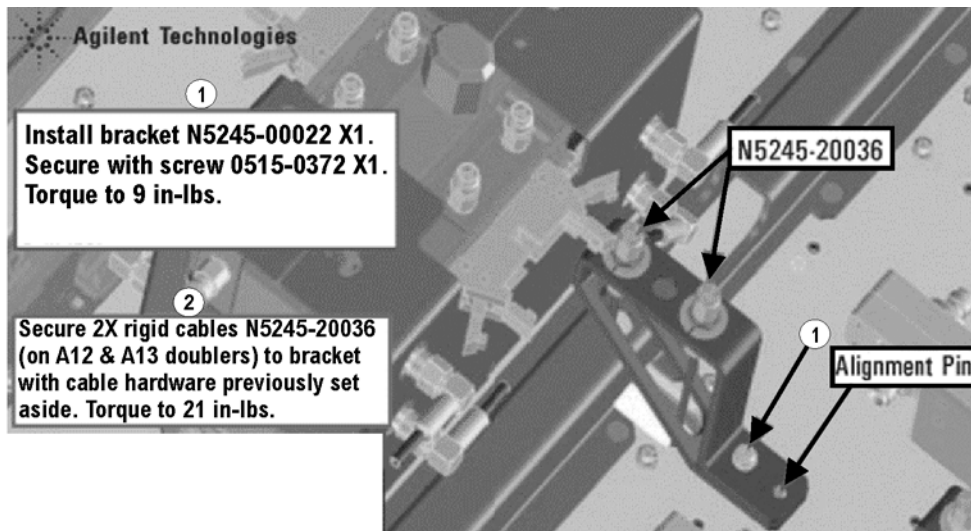


N5245_015_32

- 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 8, install a clamp (part number 1400-1334) to secure W121 (N5245-20071) and W122 (N5245-20072).

**Figure 8**       Location of Cable Clamp to Secure W121 (N5245-20071) and W122 (N5245-20072)
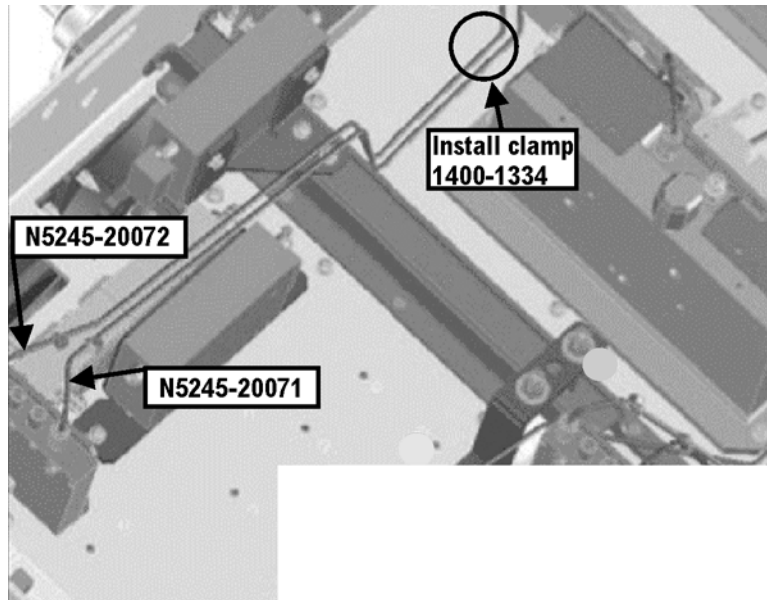


N5245_005_01

- 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, install clamp part number 1400-1334 to secure W107 (N5245-20068).

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



Clamp 1400-1334 for N5245-20068.
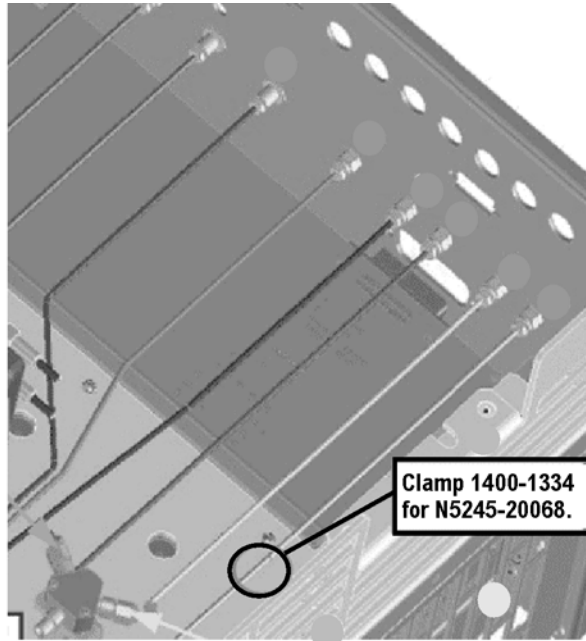
N5245_010_23

- 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 17. 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[1].

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 18. 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[1].

## Step 19. Reinstall 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. |
| --- | --- |

1. 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].

2. 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 "Bottom Ribbon Cables and Wire Harnesses, 4-Port, Option 423" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 7.

    •  Wire harness (part of mechanical switch assembly), A23 test set motherboard J101 to A50 port 1 mechanical switch

    •  Wire harness (part of mechanical switch assembly), A23 test set motherboard J104 to A51 SRC2 OUT1 mechanical switch

    •  Wire harness (part of mechanical switch assembly), A23 test set motherboard J102 to A53 port 2 mechanical switch
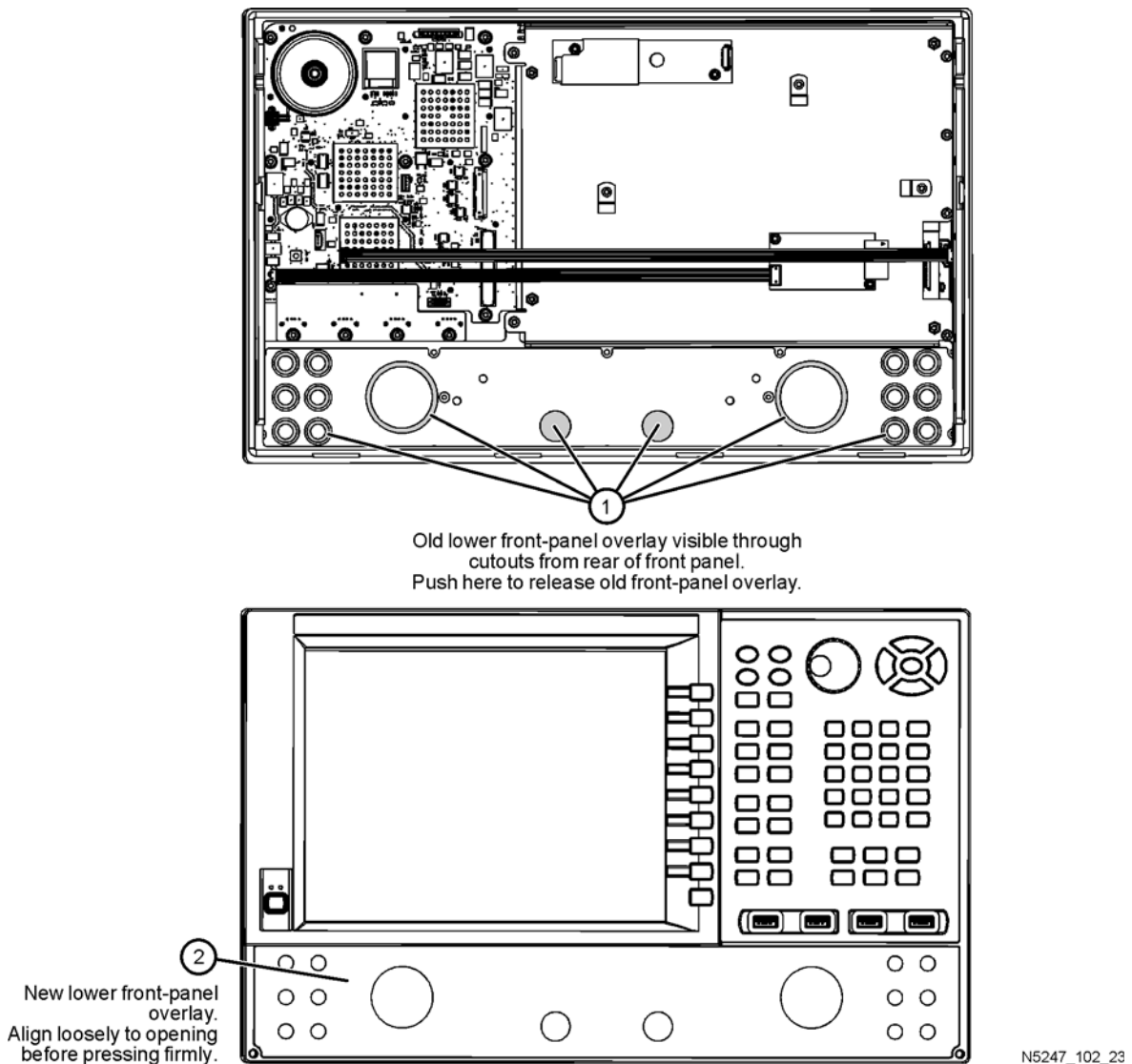
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1. See "Downloading the Online PNA Service Guide" on page 5.

## Step 20. Replace the Lower Front Panel Overlay

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

1. From the back side of the front panel, use a blunt object in the cutouts in the lower front dress panel to push on the old overlay (item ①) and separate it from the front dress panel.

2. From the front side of the front panel, pull off the overlay completely and discard it.

3. Remove any adhesive remaining on the front panel.

4. Remove the protective backing from the new front panel overlay, N5242-80005 (item ②).

5. 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.

6. Once the overlay is in place, press it firmly onto the frame to secure it.

**Figure 10    Lower Front Panel Overlay Replacement**



Old lower front-panel overlay visible through cutouts from rear of front panel. Push here to release old front-panel overlay.

New lower front-panel overlay. Align loosely to opening before pressing firmly.

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## Step 21.  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].

## Step 22.  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 23.  Reinstall the Inner Cover

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

## Step 24.  Reinstall the Outer Cover

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

## Step 25.  Enable Option 224

**Procedure Requirements**

- The analyzer must be powered up and operating to perform this procedure.

- The Network Analyzer program must be running.

- Obtain a license key for installation of this upgrade by following the instructions on the supplied Option Entitlement Certificate.

**Option Enable Procedure**

1. To start the option enable utility, press UTILITY System , then Service , then Option Enable . An option enable dialog box will appear.

2. Click the arrow in the **Select Desired Option** box. A list of available options will appear.

3. In the **Select Desired Option** list, click **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**.

**Option Verification Procedure**

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

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**.

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**NOTE**     If Option 224 has not been enabled, perform the "Option Enable Procedure" again. If the option is still not enabled, contact Keysight Technologies. Refer to "Getting Assistance from Keysight" on page 3.

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## Step 26.    Perform Post-Upgrade Adjustments and Calibration

**Adjustments**

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

- source adjustment
- receiver adjustment

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.

**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 3.

**Calibration**

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

## Step 27.    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.

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

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