Keysight - N5244/5A&B Add 4-Port Capability For Version 6 Synthesizers (For Models With Version 6 Synthesizers Only) - Installation Guide

To Upgrade N5244/5A&B Series
Option 419 to Option 423 -
(900 Hz/10 MHz - 43.5 GHz)
(900 Hz/10 MHz - 50 GHz)
Upgrade Kit Order Numbers:
N5244AU- 927 and N5245AU- 927
N5244BU- 423 and N5245BU- 423
Keysight Kit Number: N5245-60104

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

Notices

Trademark Acknowledgments

Manual Part Number

N5245-90007

Edition

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Warranty

Technology Licenses

U.S. Government Rights

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.

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

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Description of the Upgrade

NOTE	If you had an A model PNA28-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.

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.

This upgrade converts your standard 2-port configurable test set analyzer N5244B Option 417 or N5245B Option 417 to an N5244B Option 423 or N5245B Option 423 and N5244A/B Option 419 or N5245A/B Option 419 to an N5244A/B Option 423 or N5245A/B Option 423 by adding:

— a mechanical switch to each source port channel.

— a source combiner to the port 1 channel.

— rear-panel test set inputs.

— source outputs routed to the rear panel.

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.

KEYSIGHT
TECHNOLOGIES

Getting Assistance from Keysight

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

Contacting Keysight

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

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

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

If You Have Problems With the Upgrade Kit Contents

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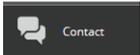
Getting Prepared

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.

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[1].

License Key Redemption

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

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

If you are unfamiliar with the licensing process, 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).

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

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

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

— From the certificate

  — Order number

  — Certificate number

— From your instrument

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

  — Model number

  — Serial number

— **A models ONLY:** From the online Keysight HostID utility

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

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

http://www.na.support.keysight.com/pna/upgrades.html and, using the HostID utility, enter the PNA serial number and your new, upgraded PNA model number - N5244/5A or N5244/5B.

— Host ID

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

You will need to provide an email address, Keysight will promptly email your A model license key(s) or a for a B model, license key file(s) attachment message. Refer to "License Key Redemption" on page 7.

Verify the License Contents

Refer to the license message you received from Keysight:

If the model number, serial number, or option number do not match those on the license message you received from Keysight, you will not be able to install the license key file. If this is the case, contact Keysight for assistance. Refer to "Getting Assistance from Keysight" on page 6.

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].

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 8.

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
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 and N5245A/B Option 417/419
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 6.

Table 1   Contents of Upgrade Kit N5245-60104

Ref Desig.	Description	Qty	Part Number
--	Installation note (this document)	1	N5245-90007
--	Software Entitlement Certificate (provided separately)	1	5964-5145
--	China RoHS Addendum	1	9320-6722
A50	Port 1 mechanical switch		
A51	Port 3 mechanical switch	4	N1811-60033
A52	Port 4 mechanical switch		
A53	Port 2 mechanical switch		
A54	Combiner	1	11667-60021
--	Cap, protective	1	5188-5406
--	Bracket for combiner	1	N5245-00020
--	Bracket for mechanical switches	4	N5245-00014
-	Machine screw, M2.0 x 20, pan head (to attach mechanical switches to brackets)	8	0515-1992
--	Machine screw, M2 x 14, pan head (to attach combiner to bracket)	2	0515-0661
--	Machine screw, M3 x 6, pan head (8 to attach switch assemblies to deck; 2 to attach combiner bracket to deck)	10	0515-0430
--	Cable clamp	2	1400-1334
--	Dust cap for test port	4	1401-0214
--	Termination, 2.4 mm 50 GHz load	1	0955-2394
--	Rear panel cable guard	2	N5247-00027
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 port 3 mechanical switch mechanical switch to W13	1	N5245-20058

Table 1   Contents of Upgrade Kit N5245-60104

Ref Desig.	Description	Qty	Part Number
W112	A51 port 3 mechanical switch to A30 port 3 reference coupler	1	N5245-20059
W113	A51 port 3 mechanical switch to PORT 3 SW SRC OUT (J8)	1	N5245-20069
W114	Rear-panel PORT 3 SW TSET IN (J7) to A51 port 3 mechanical switch	1	N5245-20070
W115	A52 port 4 mechanical switch to W15	1	N5245-20060
W116	A52 port 4 mechanical switch to A31 port 4 reference coupler	1	N5245-20061
W117	A52 port 4 mechanical switch to PORT 4 SW SRC OUT (J4)	1	N5245-20092
W118	A52 port 4 mechanical switch to PORT 4 SW TSET (J3)	1	N5245-20091
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	4	N5245-20155

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

Installation Procedure for the Upgrade

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

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

NOTE Some of the following figures provided in this procedure contain bias tees. Bias tees are included in the Option 219/419 upgrade kits and can be ignored for Options 217/417 and 222/422.

Overview of the Installation Procedure

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

"Step 2. Remove the Outer Cover."

"Step 3. Remove 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, A52, 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 Cables."

"Step 12. Install Rear Panel Hardware."

"Step 13. Reinstall the A24 IF Multiplexer Board."

"Step 14. Reinstall the A23 Test Set Motherboard."

"Step 16. Reinstall Front Panel Assembly."

"Step 18. Install the Front Panel Jumper Cables."

"Step 19. Position the Cables and Wires to Prevent Pinching."

"Step 20. Reinstall the Inner Cover."

"Step 21. Reinstall the Outer Cover."

"Step 23. Enable Option 423."

"Step 24. Perform Post-Upgrade Adjustments and Calibration."

"Step 25. 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 7.

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 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 (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.

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 8.

Step 7. Remove 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. To see an image showing the location of these cables, click the Chapter 6 bookmark "Bottom RF Cables, Standard 2-Port Configuration, Option 419, S/N Prefixes <6021" in the PDF Service Guide[1].

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

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

— W14 (N5245-20043) A30 port 3 reference coupler to W13

— W16 (N5245-20044) A31 port 4 reference coupler to W15

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

These cables must be saved - they will be reinstalled.

— W21 (N5245-20008) A29 port 1 reference coupler to A37 reference mixer switch

— W22 (N5245-20014) A33 port 1 coupler to front-panel Port 1 CPLR ARM

— W25 (N5245-20116) A30 port 3 ref coupler to front-panel REF 3 SOURCE OUT

— W29 (N5245-20117) A31 port 4 ref coupler to front-panel REF 4 SOURCE OUT

— W43 (N5245-20009) A37 reference mixer switch to A27 mixer brick (R1)

— W45 (N5245-20021) REF 4 RCVR R4 IN to A28 mixer brick (R4)

— W46 (N5245-20115) REF 2 RCVR R2 IN to A27 mixer brick (R2)

— W52 (N5245-20013) A25 HMA26.5 to A26 splitter

— W82 (N5245-20077) A38 port 1 source attenuator to front-panel Port 1 SOURCE OUT

— W83 (N5245-20076) Front-panel Port 1 CPLR THRU to A42 port 1 bias

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1. See .

tee

— W84 (N5245-20085) A42 port 1 bias tee to A33 port 1 coupler

— W86 (N5245-20027) A39 port 3 source attenuator to front-panel Port 3 SOURCE OUT

— W90 (N5245-20028) A40 port 4 source attenuator to front-panel Port 4 SOURCE OUT

— W94 (N5245-20031) A41 port 2 source attenuator to front-panel Port 2 SOURCE OUT

— W95 (N5245-20030) A45 port 2 bias tee to A36 port 2 coupler

— W97 (N5245-20054) Front-panel Port 1 RCVR A IN to A46 port 1 receiver attenuator

— W98 (N5245-20056) A46 port 1 receiver attenuator to A27 mixer brick (A)

— W99 (N5245-20073) Port 3 RCVR C IN to A47 port 3 receiver attenuator

— W100 (N5245-20066) A47 port 3 receiver attenuator to A28 mixer brick (C)

— W101 (N5245-20074) Port 4 RCVR D IN to A48 port 4 receiver attenuator

— W102 (N5245-20075) A48 port 4 receiver attenuator to A28 mixer brick (D

— W103 (N5245-20055) Port 2 RCVR B IN to A49 port 2 receiver attenuator

— W104 (N5245-20057) A49 port 2 receiver attenuator to A27 mixer brick (B)

Step 8. Assemble the A50, A51, A52, 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 (N1811-60033, N5245-00014, 0515-1992)

① Prefab switches N1811-60033 X4 to brackets N5245-00014 X4 as shown. Secure with screws 0515-1992 X8, two screws to each switch. Torque to 6 in-lbs.
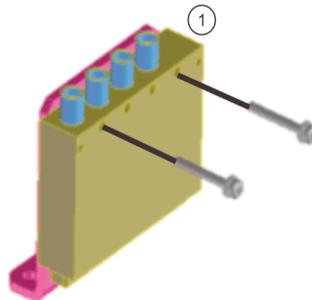
N5245_007_01

## Step 9. Install the Mechanical Switch Assemblies

Install the A50, A51, A52, and A53 mechanical switches (N1811-60033). 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 11 of this document.

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

Step 10. Assemble and Install the A54 Combiner Assembly

Follow the two instructions shown in **Figure 2** in this document. New parts are listed in **Table 1 on page 11** of this document.

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

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.
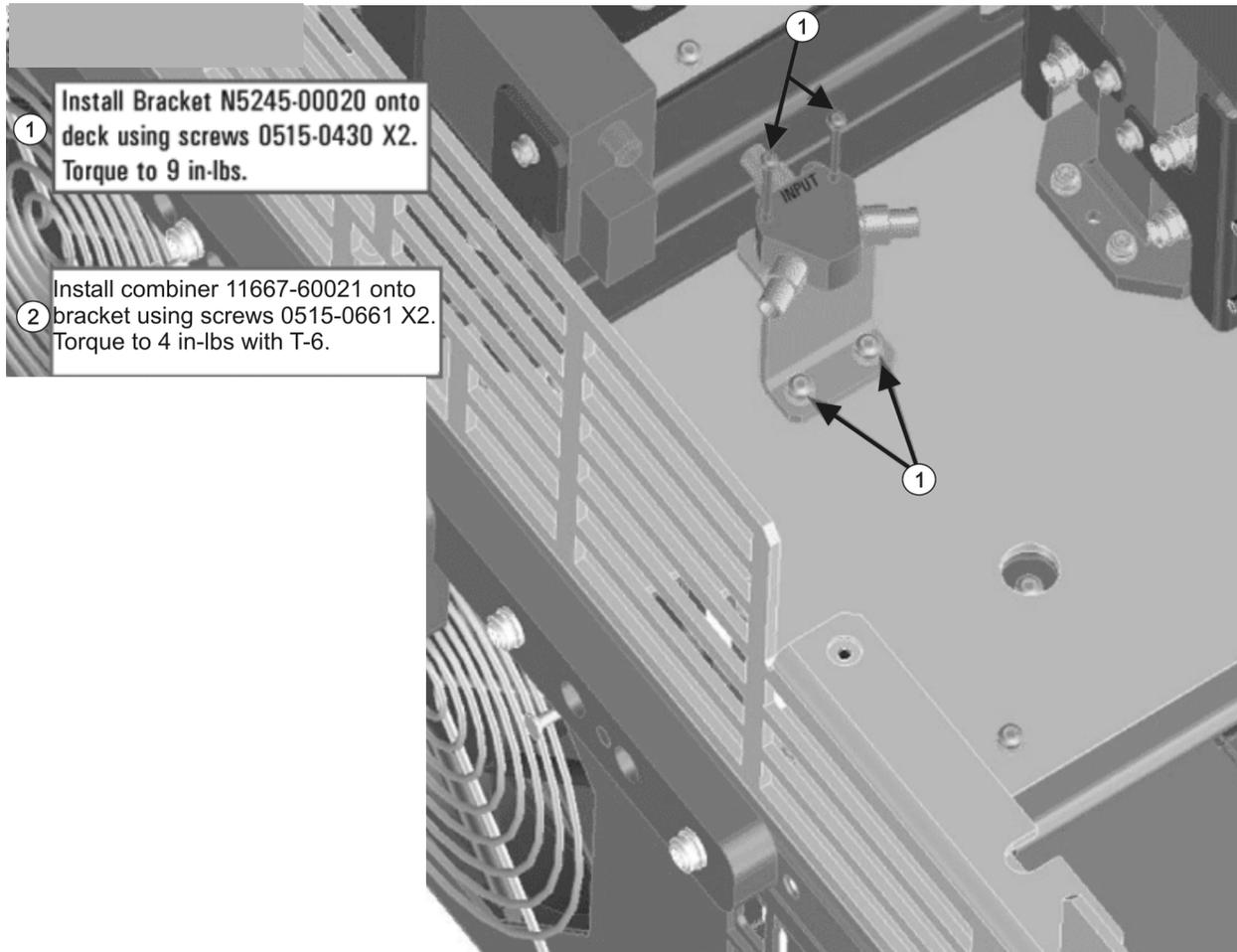
N5245

Step 11. Install the Cables

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

Install the Semirigid Cables

To see an image showing the location of these cables, click the Chapter 6

bookmarks "Bottom RF Cables, 2-Port Configuration, Option 423**, S/N Prefixes** <**6021**" in the PDF Service Guide[1]. New parts are listed in Table 1 on page 11.

Install the following new cables in the order listed.

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

Figure 3   Location of Cable Clamp to Secure W121 (N5245-20071) and W122 (N5245-20072)
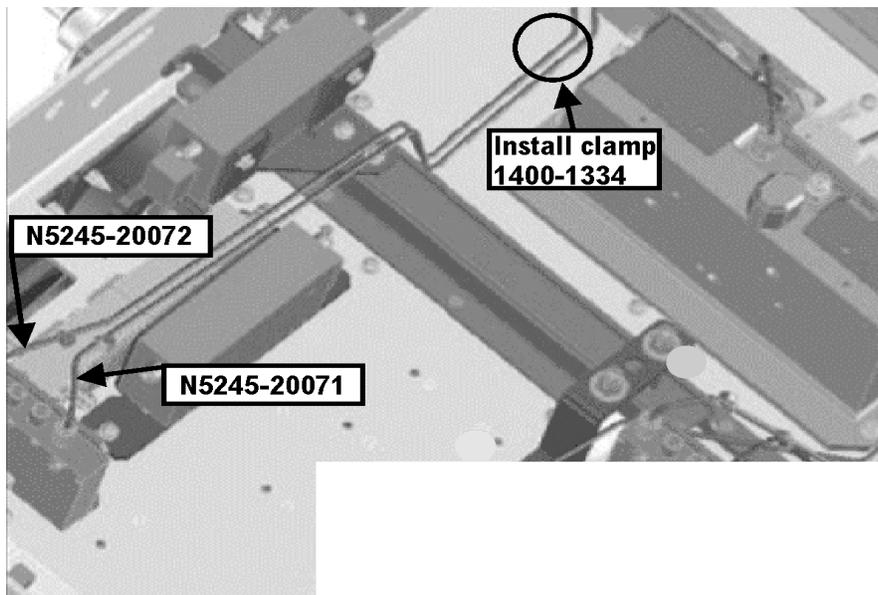
N5245_005_01

— W118 (N5245-20091) A52 port 4 mechanical switch to PORT 4 SW TSET (J3)

— W117 (N5245-20092) A52 port 4 mechanical switch to PORT 4 SW SRC OUT (J4)
— W114 (N5245-20070) Rear-panel PORT 3 SW TSET IN (J7) to A51 port 3 mechanical switch

*** Install a protective cap (5188-5406) on the rear panel connector of W114. ***

— W113 (N5245-20069) A51 port 3 mechanical switch to PORT 3 SW SRC OUT (J8)

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

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

Figure 4   Location of Cable Clamp to Secure W107 (N5245-20068)

Clamp 1400-1334 for N5245-20068.
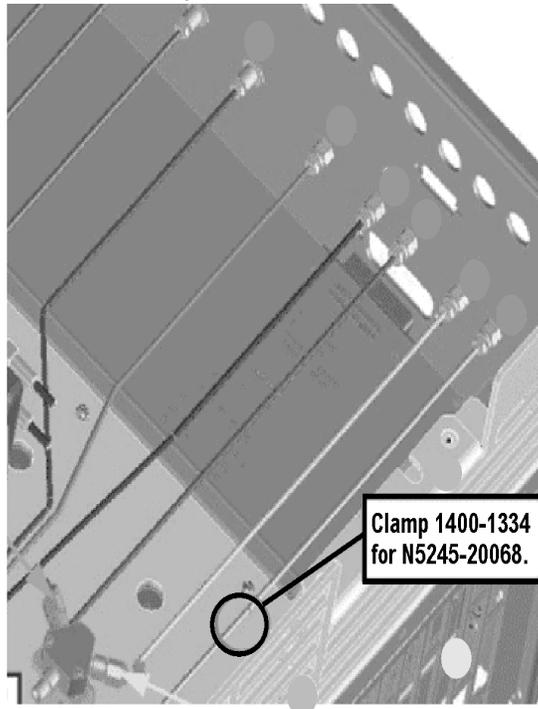
— W84 (reuse) (N5245-20085)A42 port 1 bias tee to A33 port 1 coupler

— W120 (N5245-20062)A53 port 2 mechanical switch to A32 port 2 reference coupler

— W116 (N5245-20061)A52 port 4 mechanical switch to A31 port 4 reference coupler

— W112 (N5245-20059)A51 port 3 mechanical switch to A30 port 3 reference coupler

— W25 (reuse) (N5245-20116) A30 port 3 ref coupler to front-panel REF 3 SOURCE OUT

— W106 (N5245-20065) A50 port 1 mechanical switch to A29 port 1 reference coupler

— W103 (reuse) (N5245-20055)Port 2 RCVR B IN to A49 port 2 receiver attenuator

— W95 (reuse) (N5245-20030)A45 port 2 bias tee to A36 port 2 coupler

— W43 (reuse) (N5245-20009)A45 port 2 bias tee to A36 port 2 coupler

— W94 (reuse) (N5245-20031)A41 port 2 source attenuator to front-panel Port 2 SOURCE OUT

— W46 (reuse) (N5245-20115)REF 2 RCVR R2 IN to A27 mixer brick (R2)

— W101 (reuse) (N5245-20074) Port 4 RCVR D IN to A48 port 4 receiver attenuator

— W90 (reuse) (N5245-20028) A40 port 4 source attenuator to front-panel Port 4 SOURCE OUT

— W45 (reuse) (N5245-20021) REF 4 RCVR R4 IN to A28 mixer brick (R4)

— W29 (reuse) (N5245-20117) A31 port 4 ref coupler to front-panel REF 4 SOURCE OUT

— W99 (reuse) (N5245-20073) Port 3 RCVR C IN to A47 port 3 receiver attenuator

— W86 (reuse) (N5245-20027) A39 port 3 source attenuator to front-panel Port 3 SOURCE OUT

— W83 (reuse) (N5245-20076) Front-panel Port 1 CPLR THRU to A42 port 1 bias tee

— W22 (reuse) (N5245-20014) A33 port 1 coupler to front-panel Port 1 CPLR ARM

— W97 (reuse) (N5245-20054) Front-panel Port 1 RCVR A IN to A46 port 1 receiver attenuator

— W82 (reuse) (N5245-20077) A38 port 1 source attenuator to front-panel Port 1 SOURCE OUT

— W21 (reuse) (N5245-20008) A29 port 1 reference coupler to A37 reference mixer switch

— W119 (N5245-20063) A53 port 2 mechanical switch to W17

— W105 (N5245-20064) A50 port 1 mechanical switch to W11

— W110 (N5245-20067) A50 port 1 mechanical switch to A54 combiner

— W102 (reuse) (N5245-20075) A48 port 4 receiver attenuator to A28 mixer brick (D

— W100 (reuse) (N5245-20066) A47 port 3 receiver attenuator to A28 mixer brick (C)

— W115 (N5245-20060) A52 port 4 mechanical switch to W15

— W111 (N5245-20058) A51 port 3 mechanical switch to W13

— W104 (reuse) (N5245-20057) A49 port 2 receiver attenuator to A27 mixer brick (B)

— W98 (reuse) (N5245-20056) A46 port 1 receiver attenuator to A27 mixer brick (A)

— W52 (reuse) (N5245-20013) A25 HMA26.5 to A26 splitter

Step 12. 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 four rear panel jumpers (N5245-20155) between the following connector pairs:

   — SW TSET IN (J1) and SW SRC OUT (J2)

   — SW TSET IN (J3) and SW SRC OUT (J4)

   — COMB ARM IN (J10) and SW SRC OUT (J11)

   — COMB ARM IN (J9) and SW SRC OUT (J8)

Step 13. 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 14.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].

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, S/N Prefixes <6021" in the PDF Service Guide. 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 J102 to A51 port 3 mechanical switch

— Wire harness (part of mechanical switch assembly), A23 test set motherboard J103 to A53 port 4 mechanical switch

— Wire harness (part of mechanical switch assembly), A23 test set motherboard J104 to A53 port 2 mechanical switch

Step 15. Remove the Old Lower Front Panel Overlay

Refer to Figure 1 on page 17 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 ①) and separate it from the front dress panel.

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

3. Remove any adhesive remaining on the front panel.

CAUTION To avoid possible damage to the lower front panel overlay (label), do not attempt to attach the lower front panel label until "Step 17. Install the New Lower Front Panel Overlay" on page 25.

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

Figure 5   Lower Front Panel Overlay Replacement
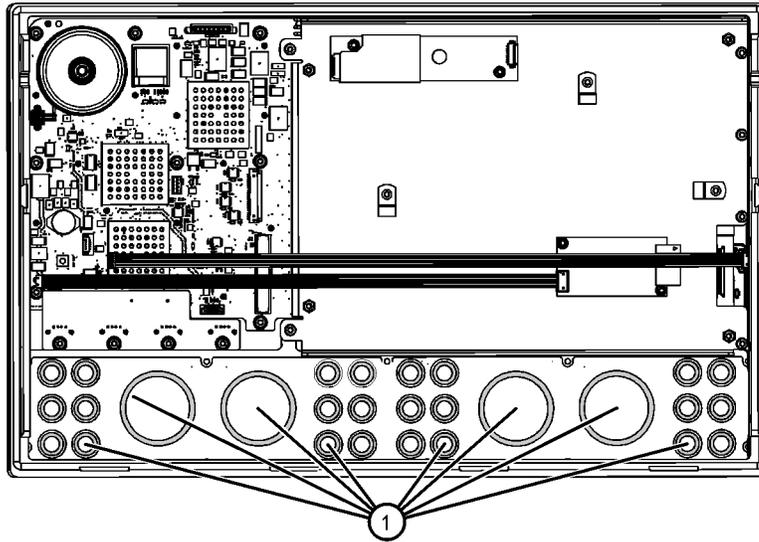
Old lower front-panel overlay visible through
cutouts from rear of front panel.
Push here to release old front-panel overlay.
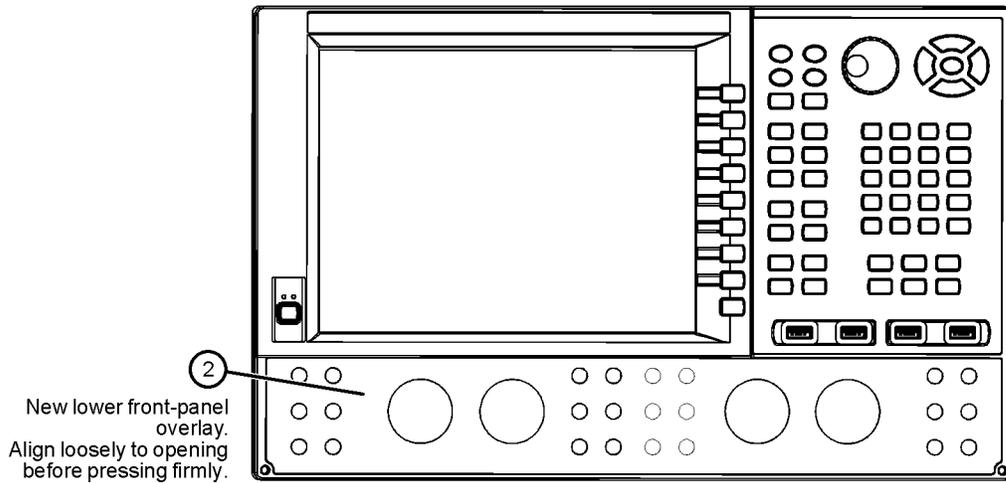
New lower front-panel
overlay.
Align loosely to opening
before pressing firmly.

N5225_105_04

Step 16. 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].

1. Remove the protective backing from the new front panel overlay, N5227-80005 for N5224/5A models or N5227-80020 for PNA N5224/5B models or N5242-80025 for PNA-X N5244/5B (item ①).

2. Starting from either side, loosely place the overlay in the recess on the lower front panel, ensuring that it fits tightly against the edges of the recess.

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

4. 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.

Step 17. Install the New Lower Front Panel Overlay

Refer to Figure 5 on page 24 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, N5227-80015 for "A" models and N5227-80028 for "B" models (item ①).

2. Starting from either side, *loosely* place the overlay in the recess on the lower front panel, ensuring that it fits tightly against the edges of the recess.

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

4. 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.

Step 18. Install the Front Panel Jumper Cables

— Install twelve W36 front panel jumper cables (N5245-20155) - use 12 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 19. Position the Cables and Wires to Prevent Pinching

On the top side of the PNA, carefully position the gray flex cables so they can't be pinched between the covers and the rails.

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

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 20. Reinstall the Inner Cover

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

Step 21.Reinstall the Outer Cover

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

Step 22. Remove Option 417 (B Models Only) or 419 License

NOTE	**IMPORTANT!** For A model instruments, skip to "Step 23. Enable Option 423".

Procedure Requirements

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

— The Network Analyzer program must **not** be running.

— A keyboard and mouse must be connected to the network analyzer.

A Model Option 417 or 419 License Removal Procedure

For B models, refer to "B Model Option 417 or 419 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 417 or 419.

4. Click Remove.

B Model Option 417 or 419 License Removal Procedure

For A models, refer to "A Model Option 417 or 419 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 23. Enable Option 423

Procedure Requirements

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

— The Network Analyzer program must **not** be running.

— A keyboard must be connected to the network analyzer.

For "A" models, refer to "Option Enable Procedure for "A" Model Instruments" on page 27.

For "B" models refer to "Option Enable Procedure for "B" Model Instruments " on page 28.

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 **423** - 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 "422" or "423" is listed after "Options:" in the display. Click OK.

NOTE	If Option 423 has not been enabled, perform the "Option Enable Procedure for "A" Model Instruments" again. If the option is 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 7.

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. Verifying and editing the license file:

   For these steps, refer to the example in Figure 5-1 on page 29.

4. Connect the USB flash drive to the PNA. 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.

5. If you still have issues:

   a. Verify your USB flash drive is connected to a PC.

b. Open your license file using a text read/write program similar to Notepad.

c. If you have more than one licensed feature, delete the feature that is **not** required for this upgrade. (e.g., in this case N5242B-423 is the correct upgrade. So, N5242B-422 is to be deleted from the text file.)

Figure 5-1 Editing a Keysight License File Using a Text Editor.
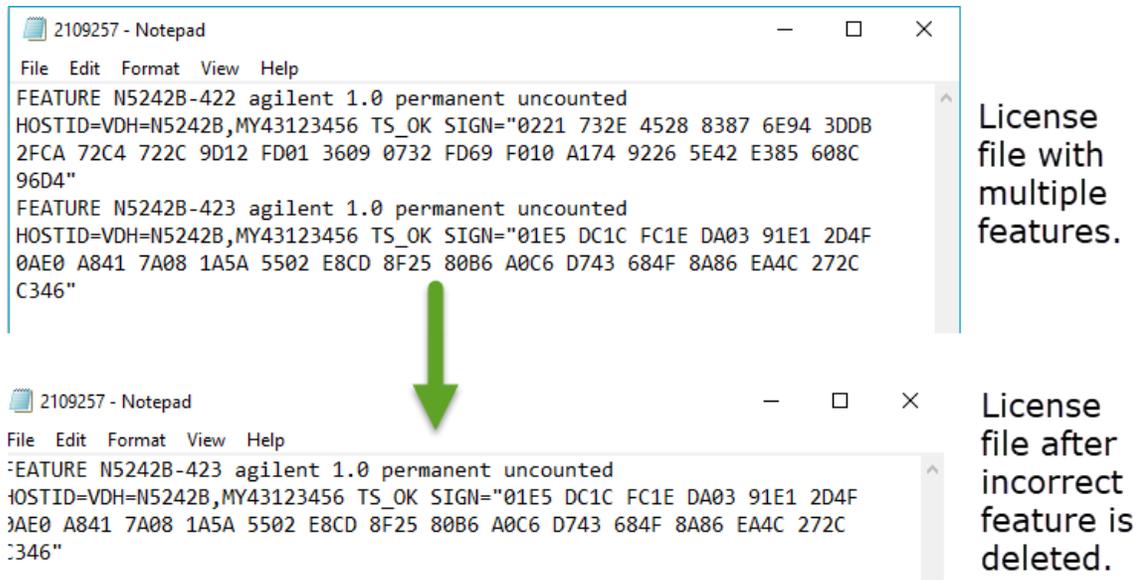
NOTE The figure above may not contain your specific features and is an example only. In this example N5242B-422 is the incorrect feature. N5242B-423 is the correct feature

4. Re-save the text license file to the root directory of your USB flash drive.

5. Verify that only the single correctly edited text license file is in the root directory of your USB drive.

6. Eject your USB flash drive and remove the USB flash drive from your PC.

6. Disconnect the USB flash drive from the PNA.

7. On the analyzer, click or press to open the KLM software from your PNA's Windows taskbar by pressing **Start** > **More Programs** > **Keysight License Manager folder** > **Keysight License Manager** and verify the options are correct.

"B" Model Option Verification Procedure

NOTE	If the option(s) have not been enabled or if your older options have not been removed, contact Keysight Technologies. Refer to "Getting Assistance from Keysight" on page 6.

1. Start the Network Analyzer program.

2. Once the Network Analyzer program is running:

    — Press **Help** > **About NA** and verify that Option 419 or 423 is listed in the PNA application.

3. After successful installation of all upgrades, some features require some adjustments to ensure the instrument meets its specified performance. Refer to the 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 24. 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 LO only (Version 6 synthesizers)

— source adjustment

— IF gain 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/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.

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.

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

Figure 6   EEPROM Backup Menu
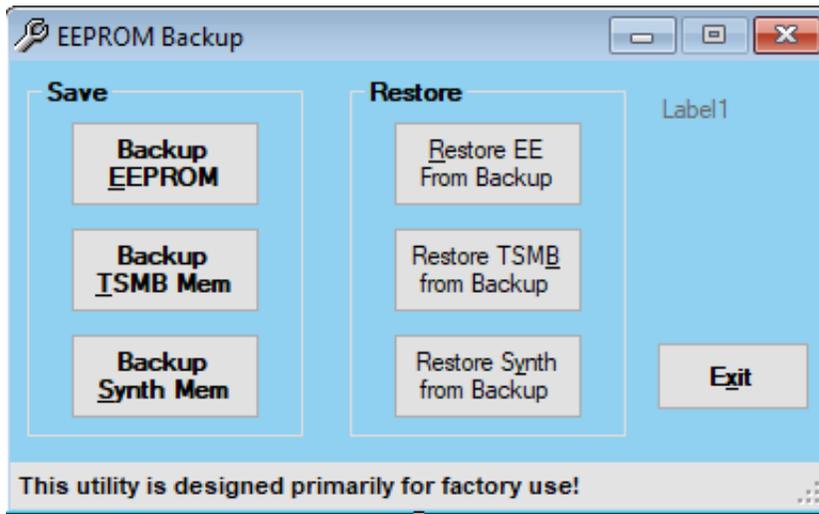
Operator's Check

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 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[1].

Step 25. 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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