To Upgrade PNA-X N5244A or N5245A with Option 423, N5244B Option 422 or Option 423, N5245B Option 422 or Option 423 to include Option 029

Upgrade Kit Order Numbers: N5244AU-929, N5245AU-929, N5244BU-429 and N5245BU-429

Keysight Kit Number: N5245-60119
Notices

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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.

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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.
Description of the Upgrade

**NOTE**

N5244/45A and N5244/5B PNAs with serial number prefixes <5201 cannot upgrade to Option 029. N5244/5A and N5244/5B PNAs with serial number prefixes >5200, have hardware that supports Option 029.

**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.

**IMPORTANT!** For N5244/5B models, Option 029 requires Noise Figure Measurements Option S93029A. Option S93029A is not included with this kit. If you need to order Option S93029A, contact Keysight. Refer to “Contacting Keysight” on page 6.

**NOTE**

This kit may contain either a N5245-60124 noise figure boards (with tabs, for models with s/n prefix of 5201 or greater) or for models with a s/n prefix 5200 or lower a N5245-60124 board (without tabs). Refer to Table 1 on page 10.

**NOTE**

This kit may contains references to bias tees. Bias tees only apply to Option 423.

This upgrade adds noise figure measurement capability to your Option 422, 423, or 425 4-port analyzer by adding Option 029 which includes:

- a noise down converter and noise receiver
- a bypass switch in ports 1 and 2
Description of the Upgrade
Getting Assistance from Keysight

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 link.
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.

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

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

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**License Key Redemption**

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 [Keysight Software Manager](http://www.keysight.com/find/softwaremanager).

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

To enable the option product, 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](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

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

Getting Prepared

- 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
  - Host ID

- A models ONLY: From the online Keysight HostID utility

  Part of the OEC procedure to obtain the 12-digit license key online requires you to provide the HostID number of the PNA. This HostID number is NOT the one currently shown on the PNA. To find your new HostID, go to http://www.na.support.keysight.com/pna/upgrades.html and, using the HostID utility, enter the PNA serial number and your new, upgraded PNA-X model number - N5241A, N5242A, or N5245A.
  
    - 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, to which Keysight will promptly email your license key file. 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:

2. In the Search box, enter the model number of the analyzer (Ex: N5245B) and click Search.
3. Click Technical Support > Manuals.
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.
Description of the Upgrade
Getting Prepared

Protecting Your Workspace from Electrostatic Discharge

For information, click on the Chapter 1 bookmark, “Electrostatic Discharge Protection” in the PDF Service Guide.

ESD Equipment Required for the Installation

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

Tools Required for the Installation

<table>
<thead>
<tr>
<th>Description</th>
<th>Qty</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-10 TORX driver (set to 9 in-lbs)</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>T-20 TORX driver (set to 21 in-lbs)</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>5/16-in torque wrench (set to 10 in-lbs)</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>5/16-in torque wrench (set to 21 in-lbs)</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>9 mm nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m)</td>
<td>1</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Use a 5/16-in torque wrench set to 10 in-lbs on all cable connections except the front and rear panel bulkhead connectors. Torque these connections to 21 in-lb.

About Installing the Upgrade

<table>
<thead>
<tr>
<th>Products affected</th>
<th>N5244A/B and N5245A/B Option 422, 423, or 425</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation to be performed by</td>
<td>Keysight service center or personnel qualified by Keysight</td>
</tr>
<tr>
<td>Estimated installation time</td>
<td>5.0 hours</td>
</tr>
<tr>
<td>Estimated adjustment time</td>
<td>0.5 hours (Option 425 LFE 1.5 hours)</td>
</tr>
<tr>
<td>Estimated full instrument calibration time</td>
<td>7.0 hours (Option 425 LFE 8.0 hours)</td>
</tr>
</tbody>
</table>

1. See “Downloading the Online PNA Service Guide” on page 8.
Description of the Upgrade
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 N5245-60119

<table>
<thead>
<tr>
<th>Ref Desig.</th>
<th>Description</th>
<th>Qty</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Installation note (this document)</td>
<td>1</td>
<td>N5245-90119</td>
</tr>
<tr>
<td></td>
<td>Software Entitlement Certificate</td>
<td>1</td>
<td>5964-5145</td>
</tr>
<tr>
<td></td>
<td>China RoHS Addendum</td>
<td>1</td>
<td>9320-6722</td>
</tr>
<tr>
<td>Assemblies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A9</td>
<td>Noise receiver board</td>
<td>5201 and above: 1</td>
<td>N5245-60124</td>
</tr>
<tr>
<td>A9</td>
<td>Noise receiver board</td>
<td>5150 and below: 1</td>
<td>N/A</td>
</tr>
<tr>
<td>A23</td>
<td>Test set, motherboard PCA</td>
<td>1</td>
<td>N5245-60157</td>
</tr>
<tr>
<td>A56 &amp; A57</td>
<td>Bypass switch, port 1 and port 2</td>
<td>2</td>
<td>N1811-60033</td>
</tr>
<tr>
<td>A59</td>
<td>Noise downconverter (receiver)</td>
<td>1</td>
<td>5087-7344</td>
</tr>
<tr>
<td>A64</td>
<td>Tuner</td>
<td>1</td>
<td>5087-7345</td>
</tr>
<tr>
<td>Hardware/Miscellaneous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Machine screw, M3.0 x 8, pan head (to attach noise converter assembly to chassis left side, x1, install bracket to chassis right side, x2)</td>
<td>3</td>
<td>0515-0372</td>
</tr>
<tr>
<td></td>
<td>Machine screw, M4.0 x 10, pan head</td>
<td>2</td>
<td>0515-0380</td>
</tr>
<tr>
<td></td>
<td>Machine screw, M2.5 x 25, pan head (to attach switch &amp; tuner to bracket, x2)</td>
<td>5</td>
<td>0515-0667</td>
</tr>
<tr>
<td></td>
<td>Machine screw, M2.5 x 20, pan head (to attach switch bracket to chassis x2)</td>
<td>5</td>
<td>0515-1992</td>
</tr>
<tr>
<td></td>
<td>Machine screw, M3.0 x 14, pan head (to attach bracket to noise converter x3)</td>
<td>3</td>
<td>0515-2994</td>
</tr>
<tr>
<td></td>
<td>Cable tie</td>
<td>1</td>
<td>1400-0249</td>
</tr>
<tr>
<td></td>
<td>Cable clamp</td>
<td>1</td>
<td>1400-1334</td>
</tr>
<tr>
<td></td>
<td>Dust cap for test port</td>
<td>4</td>
<td>1410-0214</td>
</tr>
<tr>
<td></td>
<td>Bracket, for A59 bridge and down converter, port 1</td>
<td>1</td>
<td>N5245-00032</td>
</tr>
<tr>
<td></td>
<td>Bracket, for A56 port 1 noise bypass switch, port 2</td>
<td>1</td>
<td>N5245-00034</td>
</tr>
<tr>
<td></td>
<td>Lower front panel overlay, N5244/5A Option 423 with Option 029</td>
<td>1</td>
<td>N5245-80023</td>
</tr>
<tr>
<td></td>
<td>Lower front panel overlay, N5244/5B Option 422/423/425 with Option 029</td>
<td>1</td>
<td>N5245-80031</td>
</tr>
</tbody>
</table>
## Description of the Upgrade

Items Included in the Upgrade Kit

### Cables

<table>
<thead>
<tr>
<th>Ref Desig.</th>
<th>Description</th>
<th>Qty</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>W125</td>
<td>RF cable, A57 port 2 noise bypass switch to A36 test port 2 coupler</td>
<td>1</td>
<td>N5245-20138</td>
</tr>
<tr>
<td>W159</td>
<td>RF cable, A33 port 1 coupler to A56 Port 1 noise bypass switch</td>
<td>1</td>
<td>N5245-20162</td>
</tr>
<tr>
<td>W161</td>
<td>RF cable, Front panel port 1 CPLR THRU to A56 port 1 noise bypass switch</td>
<td>1</td>
<td>N5245-20151</td>
</tr>
<tr>
<td>W162</td>
<td>Front panel port 1 CPLR THRU to A56 port 1 noise bypass switch</td>
<td>1</td>
<td>N5245-20153</td>
</tr>
<tr>
<td>W163</td>
<td>RF cable, A64 tuner to A56 port 1 noise bypass switch</td>
<td>1</td>
<td>N5245-20149</td>
</tr>
<tr>
<td>W164</td>
<td>RF cable, A64 tuner to A56 port 1 noise bypass switch</td>
<td>1</td>
<td>N5245-20148</td>
</tr>
<tr>
<td>W165</td>
<td>RF cable, A42 port 1 bias tee to A56 port 1 noise bypass switch</td>
<td>1</td>
<td>N5245-20152</td>
</tr>
<tr>
<td>W166</td>
<td>RF cable, A57 port 2 noise bypass switch to port 2 CPLR THRU</td>
<td>1</td>
<td>N5245-20080</td>
</tr>
<tr>
<td>W167</td>
<td>RF cable, A57 port 2 noise bypass switch to A45 port 2 bias tee (Opt. 224 with 029 only)</td>
<td>1</td>
<td>N5245-20105</td>
</tr>
<tr>
<td>W168</td>
<td>RF cable, A59 noise downconverter to A57 port 2 noise bypass switch</td>
<td>1</td>
<td>N5245-20146</td>
</tr>
<tr>
<td>W169</td>
<td>RF cable, A59 noise downconverter to A57 port 2 noise bypass switch</td>
<td>1</td>
<td>N5245-20147</td>
</tr>
<tr>
<td>W171</td>
<td>RF cable, A59 noise downconverter to A9 noise board</td>
<td>1</td>
<td>N5245-20144</td>
</tr>
<tr>
<td>W172</td>
<td>Coaxial cable, A59 noise downconverter assembly J3 to A9 noise board J1</td>
<td>1</td>
<td>N5245-60020</td>
</tr>
<tr>
<td>W173</td>
<td>RF cable, A59 noise downconverter to A9 noise board</td>
<td>1</td>
<td>N5245-20145</td>
</tr>
<tr>
<td>W174</td>
<td>RF cable, A28 mixer brick to A59 noise downconverter</td>
<td>1</td>
<td>N5245-20143</td>
</tr>
<tr>
<td>W175</td>
<td>Coaxial cable, A59 noise downconverter assembly J2 to A9 noise board J5</td>
<td>1</td>
<td>N5245-60019</td>
</tr>
<tr>
<td>W189</td>
<td>RF cable, A57 port 1 noise bypass switch to Bias T, port 1 (Option 425 only)</td>
<td>1</td>
<td>N5245-20189</td>
</tr>
<tr>
<td>W190</td>
<td>A57 port 2 noise bypass switch to Bias T, port 2 (Option 425 only)</td>
<td>1</td>
<td>N5245-20188</td>
</tr>
</tbody>
</table>

Ribbon cable, A64 tuner J9 to A23 test set motherboard J7

Ribbon cable, A59 noise downconverter J1 port 1 to A23 test set motherboard J550

### 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.
Description of the Upgrade
Installation Procedure for the Upgrade

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.

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 Existing Test Set Cables.”
“Step 6. Replace the A23 Test Set Motherboard.”
“Step 7. Assemble the A59 Noise Downconverter (Receiver) and Bracket and Install to the Chassis.”
“Step 8. Install the A59 Noise Downconverter (Receiver) and Bracket Onto the Chassis.”
“Step 9. Install the A57 Noise Switch (Port 2) to Bracket and Attach Cables to A59 Noise Downconverter (Receiver) Assembly.”
“Step 10. Install the A56 Noise Switch (Port 1), A64 Tuner to Bracket, and Bracket to the Chassis.”
“Step 11. Install the A9 Noise Receiver Board.”
“Step 12. Install the New Test Set Cables.”
“Step 13. Remove the lower front panel overlay.”
“Step 14. Reinstall the Front Panel Assembly.”
“Step 15. Install the New Lower Front Panel Overlay.”
“Step 16. Position the Cables and Wires to Prevent Pinching.”
“Step 17. Reinstall the Inner Cover.”
“Step 18. Reinstall the Outer Cover.”
“Step 19. Remove Option 028 License.”
“Step 20. Enable Option 029.”
Description of the Upgrade

Step 1. Obtain a Keyword and Verify the Information

“Step 21. Verify the PNA Analyzer Program is Running with the Correct Options.”

“Step 22. Perform Post-Upgrade Adjustments and Calibration.”

“Step 23. 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.

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 6.

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

NOTE

If the model number, serial number, or option number do not match those on your license key file, you will not be able to install the option. If this is the case, contact Keysight for assistance before beginning the installation of this upgrade. Refer to “Contacting Keysight” on page 6.

Step 2. Remove the Outer Cover

CAUTION

This procedure is best performed with the analyzer resting on its front handles in the vertical position. Do not place the analyzer on its front panel without the handles. This will damage the front panel assemblies.

Refer to Figure 1 for this step of the procedure.

1. Disconnect the power cord (if it has not already been disconnected).

2. Remove the strap handles (item ①) by loosening the screws (item ②), with a T-20 TORX driver, on both ends until the handle is free of the analyzer.

3. Remove the foot locks (item ③) from the four bottom feet (item ④) and then remove the four bottom feet from the outer cover.

4. Remove the four rear panel feet (item ⑤) by removing the center screws (item ⑥) with a T-20 TORX driver.

5. Slide the outer cover toward the rear of the analyzer and remove it.
Step 3. Remove the Inner Cover

Refer to Figure 2 for this step of the procedure.

1. With a T-10 TORX driver, remove the 12 pan head screws (item ①).
2. With a T-10 TORX driver, remove the 9 flat head screws (item ②).
3. Lift off the cover.
Step 4. Remove the Front Panel Assembly

Refer to Figure 3 for this step of the procedure.

1. With a 5/16-in wrench, remove all front panel jumpers (item ①).

2. With a T-10 TORX driver, remove the screws (item ➁) from the sides of the frame.

Before removing the front panel from the analyzer, lift and support the front of the analyzer chassis.

3. Slide the front panel over the test port connectors.

4. Disconnect the front panel interface ribbon cable (item ③). The front panel is now free from the analyzer.
Description of the Upgrade
Step 4. Remove the Front Panel Assembly

Figure 3  Front Panel Assembly Removal
Step 5. Remove the Existing Test Set Cables

**CAUTION**

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

**NOTE**

Optional: If it is necessary to remove any of the DC cables (N5290-60091) ferrite bead clamps. Re-install using new clamps as space allows.

**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.

To see an image showing the location of some of the cables click the Chapter 6 bookmark “Top Cables, All Cables - All Options” in the PDF Service Guide¹. And, to see an image showing the location of the other cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 422”, “Bottom RF Cables, 4-Port, Option 423” in the PDF Service Guide, “Bottom RF Cables, 4-Port, or Option 425” in the PDF Service Guide¹.

1. Place the analyzer bottom-side up on a flat surface.

2. Remove the following cables in the order listed. Unless otherwise marked, discard these cables; they will not be reused.

   For all Option 422 analyzers (no bias tee option):
   - N5245-20099 Front panel port 1 CPLR THRU to A33 port 1 coupler
   - N5245-20097 Port 2 CPLR THRU to A36 port 2 coupler
   **IMPORTANT: Remove these and save for reuse.**
   - N5245-20098 Port 3 CPLR THRU to A34 port 3 coupler
   - N5245-20096 Front panel port 4 CPLR THRU to A35 port 4 coupler

   For all analyzers:
   **IMPORTANT: Remove these and save for reuse.**
   - N5245-20115 REF 2 RCVR R2 IN to A27 mixer brick (R2)
   - N5245-20031 A41 port 2 source attenuator to front-panel Port 2 SOURCE OUT
   - N5245-20019 A36 port 2 coupler to front-panel Port 2 CPLR ARM

1. See “Downloading the Online PNA Service Guide” on page 8.
Description of the Upgrade
Step 5. Remove the Existing Test Set Cables

For all Option 423 analyzers (includes bias tee option):

IMPORTANT: Remove this cable and save for reuse.
- N5245-20010 A32 port 2 reference coupler to front-panel REF 2 SOURCE OUT

Discard this cable:
- N5245-20030 Port 2 CPLR THRU to A45 port 2 bias tee

For all Option 425 analyzers (includes bias tee combiner option):

Optional: If it is necessary to remove any of the DC cables (N5290-60091) ferrite bead clamps. Re-install using new clamps as space allows.

IMPORTANT: Remove this cable and save for reuse.
- N5245-20010 A32 port 2 reference coupler to front-panel REF 2 SOURCE OUT

Discard this cable:
- N5245-20030 Port 2 CPLR THRU to A45 port 2 bias tee
- N5245-20095 W58 – A28 mixer brick to 50 ohm load (1250-4261)
- N5245-20077 W82 – A38 port 1 source attenuator to front-panel Port 1 SOURCE OUT
- N5245-20178 W176 – A71 Bias T combiner port 1 CPLR THRU
- N5245-20179 W179 – A74 Bias T combiner port 1 to CPLR THRU
Step 6. Replace the A23 Test Set Motherboard

IMPORTANT! If you already have a N5245-60157 test set motherboard installed, skip this step.

IMPORTANT! 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.

Remove the A23 Test Set Motherboard (N5245-60003)
For instructions, click the Chapter 7 bookmark "Removing and Replacing the A23 Test Set Motherboard" in the PDF Service Guide\(^1\).

Install the A23 Test Set Motherboard (N5245-60157)
For instructions, click the Chapter 7 bookmark “Removing and Replacing the A23 Test Set Motherboard” in the PDF Service Guide\(^1\).

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1. See “Downloading the Online PNA Service Guide” on page 8.
Step 7. Assemble the A59 Noise Downconverter (Receiver) and Bracket and Install to the Chassis

Refer to Figure 4 for this step of the procedure. New parts are listed in Table on page 10.

1. Position the new noise downconverter receiver (item ①) on a new bracket as shown (item ②).

2. Secure the noise downconverter receiver to its bracket using three screws (item ②) for each.

Figure 4  Noise Receiver and Bracket Assembly (5087-7344, N5245-00032, & 0515-2994)
Step 8. Install the A59 Noise Downconverter (Receiver) and Bracket Onto the Chassis

Refer to Figure 5 for this step of the procedure. New parts are listed in Table 1 on page 7.

1. Install the Noise Converter to chassis (item ①) using 3 existing screws, and add one screw (item ②) as shown in Figure 5. Leave screws loose.

Figure 5
Install Noise Receiver and Bracket Assembly onto Chassis (0515-0372)
Step 9. Install the A57 Noise Switch (Port 2) to Bracket and Attach Cables to A59 Noise Downconverter (Receiver) Assembly

Refer to Figure 6 for this step of the procedure. New parts are listed in Table 1 on page 7.

1. Install the A57 Switch to the switch bracket using two screws (item ①). Torque to 6 in-lbs.

2. Plug in switch harness (Item ➁) to downconverter J41 port 2.

3. Install ribbon cable (Item ③ - N5245-60018) to J1 on the noise assembly as shown in Figure 6. Later the other end plugs into the A23 test set motherboard.

4. Connect coax cable (Item ④ - N5245-60019) to J2 on the noise assembly as shown in Figure 6. Later the other end connects to the noise board.

5. Connect coax cable (Item ⑤ - N5245-60020) to ‘J3 IF out’ on the noise assembly as shown in Figure 6. Later the other end connects to the noise board.

Figure 6 Install the A57 Switch/Bracket to Chassis and Attach Cables to the A59 Noise Receiver Assembly (N1811-60033, N5245-60018, N5245-60019, N5245-60020, & 0515-0372)
Step 10. Install the A56 Noise Switch (Port 1), A64 Tuner to Bracket, and Bracket to the Chassis

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

1. Install the bracket (item ① – N5245-00034) to the chassis using two screws. Leave loose.

2. Install switch (Item ② – N1811-60033) and tuner to bracket. Secure with two screws. Torque to 9 in-lbs.

3. Plug in switch harness (Item ③) to downconverter J42 port 1.

4. Plug in ribbon cable (Item ④ – N5245-60021) to J9 on the A64 tuner.

Figure 7

Install the A56 Noise Switch (Port 1) to Bracket and Attach Cables to A64 Tuner Assembly (N5245-00034, N1811-60033, N5245-60021, 0515-0372, & 0515-0667)
Step 11. Install the A9 Noise Receiver Board

Refer to Figure 8 for this part of this step of the procedure. Although only Option 422 is shown in the illustration, Option 224 is similar in appearance. New parts are listed in Table 1 on page 10.

1. Place the analyzer top-side up on a flat surface.

2. Insert the A9 noise receiver board in the analyzer as shown. Make sure it is fully seated in the motherboard connector.

Figure 8 Noise Receiver Board Installation
Step 12. Install the New Test Set Cables

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

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.

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.

Refer to Figure 9 on page 29 through Figure 15 on page 33 for this step of the procedure. Although only Option 423 is shown in the illustrations, Option 422 is similar in appearance (i.e., bias tees do not apply to Option 422). To see an image showing the location of these cables, click the appropriate Chapter 6 bookmark (Ex: “4-Port Configuration, Options 422/029”) in the PDF Service Guide. New parts are listed in Table 1 on page 10.

1. Connect the following wire harness and ribbon cables:

The reference designators in this step correspond to the figures Figure 9 on page 29 through Figure 15 on page 33. But, some of the previous steps are provided for your reference.

Connect the following, by referring to Figure 13 on page 31:

- ①—(N5245-20045) A59 noise downconverter to A9 noise board.
- ②—(N5245-20044) A59 noise downconverter to A9 noise board

Connect the following by referring to Figure 14 on page 32 (See also Figure 6 on page 22.):

- ①—(N5245-60020) Verify A59 noise downconverter assembly J3 to A9 noise board J1.
- ②—(N5245-60019) Verify A59 noise downconverter assembly J2 to A9 noise board J5

Connect the following by referring to Figure 15 on page 33 (See also Figure 6 on page 22 and Figure 7 on page 23.):

- ①—(N5245-60018) A59 noise receiver to the A23 test set motherboard J550

1. See “Downloading the Online PNA Service Guide” on page 8.
Description of the Upgrade
Step 12. Install the New Test Set Cables

2. Install the following semirigid cables in the order listed. Use a 5/16-in torque wrench set to 10 in-lbs to tighten all cable connectors.

If bias tee option is not installed (Option 422 with 029):

Loosen the noise microcircuit to install cables N5245-20138, N5245-20031, and N5245-20019. Re-torque connectors to 10 in-lbs. after the cables have been installed.

- W125 (N5245-20138) A57 port 2 noise bypass switch to A36 test port 2 coupler

All model analyzers:

- W94 (reuse) (N5245-20031) A41 port 2 source attenuator to front-panel Port 2 SOURCE OUT
- W34 (reuse) (N5245-20019) A36 port 2 coupler to front-panel Port 2 CPLR ARM

If the bias tee option is installed (Option 423 with 029):

Loosen the noise microcircuit to install cables N5245-20010 and N5245-20105. Re-torque connectors to 10 in-lbs. after the cables have been installed.

- W167 (N5245-20105) A57 port 2 noise bypass switch to A45 port 2 bias tee
- W33 (reuse) (N5245-20010) A32 port 2 reference coupler to front-panel REF 2 SOURCE OUT

All model analyzers:

- W166 (N5245-20080) A57 port 2 noise bypass switch to port 2 CPLR THRU
- W168 (N5245-20146) A59 noise downconverter to A57 port 2 noise bypass switch
- W169 (N5245-20147) A59 noise downconverter to A57 port 2 noise bypass switch
- W46 (reuse) (N5245-20115) REF 2 RCVR R2 IN to A27 mixer brick (R2)

Verify the switch-tuner screws are loose, before installing cables N5245-20148 and N5245-20149. Re-torque connectors to 10 in-lbs. after the cables have been installed.

- W164 N5245-20148 A64 tuner to A56 port 1 noise bypass switch
Description of the Upgrade
Step 12. Install the New Test Set Cables

— W163 N5245-20149 A64 tuner to A56 port 1 noise bypass switch

If the bias tee combiner (LFE) option is installed (Option 425 with 029):

Loosen the noise microcircuit to install cables N5245-20010 and N5245-20188. Re-torque connectors to 10 in-lbs. after the cables have been installed.

NOTE

Optional: If it is necessary to remove any of the DC cables (N5290-60091) ferrite bead clamps. Re-install using new clamps as space allows.

— W190 (N5245-20188) A57 port 2 noise bypass switch to Bias T, port 2. Refer to Figure 10 on page 30.

All model analyzers:

— W166 (N5245-20080) A57 port 2 noise bypass switch to port 2 CPLR THRU
— W168 (N5245-20146) A59 noise downconverter to A57 port 2 noise bypass switch
— W169 (N5245-20147) A59 noise downconverter to A57 port 2 noise bypass switch
— W46 (reuse) (N5245-20115) REF 2 RCVR R2 IN to A27 mixer brick (R2)

NOTE

Verify the switch-tuner screws are loose, before installing cables N5245-20148 and N5245-20149. Re-torque connectors to 10 in-lbs. after the cables have been installed.

— W164 N5245-20148 A64 tuner to A56 port 1 noise bypass switch
— W163 N5245-20149 A64 tuner to A56 port 1 noise bypass switch

If bias tee option is not installed (Option 422 with 029):

— W159 N5245-20162 A33 port 1 coupler to A56 Port 1 noise bypass switch

If the bias tee option is installed (Option 423 with 029):

— W165 N5245-20152 A42 port 1 bias tee to A56 port 1 noise bypass switch

All model analyzers:

— W162 N5245-20153 Port 1 CPLR THRU to A56 port 1 noise bypass switch
— W161 N5245-20151 A38 port 1 source attenuator to front panel port 1 SOURCE OUT
Description of the Upgrade
Step 12. Install the New Test Set Cables

- W174 N5245-20143 RF cable, A28 mixer brick to A59 noise downconverter

**If bias tee option is not installed (Option 422 with 029):**
- W24 (reuse) N5245-20098 Port 3 CPLR THRU to A34 port 3 coupler
- W28 (reuse) N5245-20096 Port 4 CPLR THRU to A35 port 4 coupler

**If the bias tee combiner (LFE) option is installed (Option 425 with 029):**
- W189 (N5245-20189) A57 port 1 noise bypass switch to Bias T, port 1. Refer to Figure 11 on page 30.

3. Position the analyzer as shown in Figure 9 on page 29 through Figure 15 on page 33 (fans facing upwards) and loosely install the following cables. Route each of the cables through the opening in the test set deck to the top side of the analyzer. The other ends will be connected in the next step.
   - W173 (N5245-20145) A59 noise downconverter to A9 noise board
   - W171 (N5245-20144) A59 noise downconverter to A9 noise board
   - W175 (N5245-60018) Flexible cable, A59 noise receiver to the A23 test set motherboard J550
   - N5245-60019 Flexible cable, A59 noise downconverter assembly J2 to A9 noise board J5
   - N5245-60020 Flexible cable, A59 noise downconverter assembly J3 to A9 noise board J1
   - W172 (N5245-60021) Flexible cable, A64 tuner to A23 test set motherboard J7

Refer to Figure 9 on page 29 through Figure 15 on page 33 for this part of this step of the procedure. Although only Option 423 with 029 is shown in the illustration, Option 422 with 029 is similar in appearance, but does not have any bias tees. New parts are listed in Table 1 on page 10.

4. The analyzer should be positioned on its left side (fans facing upwards) as shown.

5. Connect semirigid cables W171 (item ②) and W173 (item ①) as indicated in Figure 13 on page 31. Torque connectors to 10 in-lbs.

6. Connect flexible cable W172 (item ①) and W175 (item ②) as indicated in Figure 14 on page 32.

7. Connect flexible cable N5245-60018 (item ①) and N5245-60021 (item ②) as indicated in Figure 15 on page 33.

8. Go back and torque the connectors on the other ends of W171 and W173 to 10 in-lbs.
Description of the Upgrade
Step 12. Install the New Test Set Cables

Figure 9  New Test Set Cable Installation, Part 1 (Option 423 with 029 Shown)

*Other end connects to noise bypass switch where W165 connects for Option 423 with 029.*

(Some parts removed for clarity.)
Description of the Upgrade

Step 12. Install the New Test Set Cables

Figure 10  Option 425 with 029 (only): Install (N5245-20188)

Figure 11  Option 425 with 029 (only): Install (N5245-20189)

Figure 12  If necessary, re-install cable clamps onto the DC bias cables (i.e., shown in blue). (1400-1391 (x2))
Description of the Upgrade
Step 12. Install the New Test Set Cables

Figure 13   Option 425 (only): Install (N5245-20188)

1. Install N5245-20145 Noise Board
2. Install N5245-20144 Noise Board

A9 Noise board
Description of the Upgrade
Step 12. Install the New Test Set Cables

Figure 14  New Test Set Cables Installation, Part 3 (N5245-60019, N5245-60020)

1. Connect the other end of the down converter N5245-60020 gray cable to the J1 “IF IN”
2. Connect the other end of the downconverter N5245-60019 gray cable to the J5 “DET IN”

PART SEQUENCE:
1  2
Description of the Upgrade
Step 12. Install the New Test Set Cables

Figure 15    New Test Set Cable Installation, Part 4 (N5245-60018, N5245-60021)
Step 13. Remove the lower front panel overlay

Refer to Figure 16 for this step of the procedure. New parts are listed in Table 1 on page 10.

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.

**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 New Lower Front Panel Overlay” on page 36.

Figure 16  Lower Front Panel Overlay Replacement
Step 14. Reinstall the Front Panel Assembly

Before installing the front panel assembly onto the analyzer, lift and support the front of the analyzer chassis.

Refer to Figure 17 for this step of the procedure. New parts are listed in Table 1 on page 10.

1. Reconnect the ribbon cable (item ③) to the A1 front panel interface board.
2. Slide the front panel over the front-panel connectors.
3. With a T-10 TORX driver, reinstall the 12 screws (item ②) in the sides of the frame.

Figure 17 Front Panel Assembly Re-installation
Description of the Upgrade
Step 15. Install the New Lower Front Panel Overlay

Step 15. Install the New Lower Front Panel Overlay

Refer to Figure 16 on page 34 for the lower overlay and to Figure 17 on page 35 for the hex nuts installation for this step of the procedure. New parts are listed in Table 1 on page 10.

1. Remove the protective backing from the new front panel overlay, N5245-80023 (N5244/5A Option 423 with 029,) N5245-80031 (N5244/5B Option 422 with 029), or N5245-80030 (N5244/5B Option 423 with 029) — (item ➁).

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 all of the semirigid jumpers (item ➀) on the front-panel, and tighten each of the connectors using a 5/16-in torque wrench set to 10 in-lbs. Refer to Figure 17 on page 35.

Step 16. 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 17. Reinstall the Inner Cover

Refer to Figure 18 for this step of the procedure.

1. Position the inner cover on the analyzer.
2. With a T-10 TORX driver, install the 12 pan head screws (item ①).
3. With a T-10 TORX driver, install the 9 flat head screws (item ②).

Figure 18 Inner Cover Re-installation
Step 18. Reinstall the Outer Cover

**CAUTION**
This procedure is best performed with the analyzer resting on its front handles in the vertical position. Do not place the analyzer on its front panel without the handles. This will damage the front panel assemblies.

Refer to Figure 19 for this step of the procedure.

1. Slide the outer cover over the analyzer frame.
2. Install the four rear panel feet (item ⑤) by installing the center screws (item ⑥) with a T-20 TORX driver.
3. Install the four bottom feet (item ④) onto the bottom of the outer cover then install the foot locks (item ③).
4. Install the strap handles (item ①) by tightening the screws (item ②) on both ends of each strap handle with a T-20 TORX driver.

Figure 19 Outer Cover Re-installation
Step 19. Remove Option 028 License

If Option 28 is not loaded on your PNA, proceed to “Step 20. Enable Option 029” on page 39.

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.

Option 028 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 028.
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.

Step 20. Enable Option 029

Procedure Requirements

B models: For this step, you will need a USB flash drive.

– The analyzer must be powered up and operating to perform this procedure.
– The Network Analyzer program must be running.
– Refer to the license message you received from Keysight: Verify that the analyzer’s model and serial numbers match those on the license message you received from Keysight.
– Obtain your license key file(s) for installation of this upgrade by following the instructions on the supplied Software Entitlement Certificate.
– A keyboard must be connected to the network analyzer.
Description of the Upgrade
Step 20. Enable Option 029

Option Enable Procedure

- 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 40.
For "B" models refer to “Option Enable Procedure” on page 40.

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 029 - Noise Figure.
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 Enable Procedure for "B" Model Instruments

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

A license file may contain more than one feature.

1. Locate the email(s) from Keysight which contain license file attachments. These emails are the result of “Step 1. Obtain a Keyword and Verify the Information” on page 13.
2. Copy the license file(s) from the email(s) to a USB flash drive. More than one license file may be copied to the USB flash drive.
3. Verifying and editing the license file:

   For these steps, refer to the example in Figure 20 on page 41.
   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 20** Editing a Keysight License File Using a Text Editor.

*Note:* This figure 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.

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

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

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

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. Disconnect the USB flash drive from the PNA.
Description of the Upgrade
Step 21. Verify the PNA Analyzer Program is Running with the Correct Options

6. 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.

Step 21. Verify the PNA Analyzer Program is Running with the Correct Options

Verify that the Options Correct and are Enabled

Once the analyzer and Network Analyzer program are again running:

1. On the analyzer’s Help menu, click About Network Analyzer.

2. Verify that “029” is listed after “Options:” in the display. Click OK.

If if the option(s) have not been enabled or an older option has not been removed, contact Keysight Technologies. Refer to “Getting Assistance from Keysight” on page 6.
Step 22. Perform Post-Upgrade Adjustments and Calibration

Adjustments

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

- Default EE adjustment - select the LO Drive-NF adjustment and either adjust or initialize the values.
- Source Adjustment
- IF Gain Adjustment
- Receiver Characterization
- Receiver Adjustment
- IF Response Adjustment (N5244/5A with Option 090, 093, 094, or N5244/5B Option S93090xA/B, S93093A/B, or S93094A/B Only)
- Noise Figure Adjustment (N5244/5A with Option 029 or N5244/5B Option 029 with S93029A/B Only)

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

To view this service guide information, click the Chapter 3 bookmark “Tests and Adjustments” in the PDF Service Guide¹.

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

Operator’s Check

Perform the Operator’s Check to check the basic functionality of the analyzer. For instructions, click the Chapter 3 bookmark “Tests and Adjustments” in the PDF Service Guide¹.

If you experience difficulty with the basic functioning of the analyzer, contact Keysight. Refer to “Contacting Keysight” on page 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 Guide¹.

¹. See “Downloading the Online PNA Service Guide” on page 8.
Step 23. Prepare the PNA for the User

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