
Keysight - N5241/2/9A&B Source Combiner and Mechanical Switches Upgrade Kit (For Version 6 and Version 7 Synthesizers) - Installation Guide

To Upgrade N5241/2/9A&B Series
Option 417 or Option 419 to Option 423 -

For Analyzers with Serial Numbers
Prefixed MY/SG/US5201 and Above

Upgrade Kit Order Numbers: N5241AU-
927, N5242AU- 927, N5249AU- 927,
N5241BU- 423, N5242BU- 423,
N5249BU- 423

Keysight Kit Number: N5242-60104

This is the Installation Guide for the N5241/2/9A&B Series Microwave Network Analyzers.

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Keysight Second Source, Combiner, and Mechanical Switches Upgrade Kit

Keysight Kit Number: N5242-60104
Installation Note

Description of the Upgrade

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.

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.

NOTE

In June 2013, the N5241A/AS and N5242A/AS analyzers underwent significant hardware changes. Some components that have 2.4 mm connectors (bias tees, couplers, and some semi-rigid cables) were replaced with components that have 3.5 mm connectors.

If your analyzer’s serial number prefix is MY/SG/US5310 and below:

Your analyzer was originally shipped with 2.4 mm components. Bias tees with 2.4 mm connectors are no longer available, so the bias tees and connecting cables included in this kit have 3.5 mm connectors. Since they are interconnected, the 2.4 mm couplers and connecting cables in your analyzer must be replaced with the new 3.5 mm items included in this kit.

If your analyzer’s serial number prefix is MY/SG/US5321 and above:

Your analyzer was shipped with 3.5 mm components, so it is not necessary to replace the bias tees, couplers, and connecting cables. These items are included in this kit, but will not be used for your upgrade. Set them aside for possible use in the future.

Be very careful to use the appropriate hardware in your analyzer. Using the wrong hardware can ruin analyzer components, resulting in additional customer costs.

This upgrade converts your “A” Model Option 419 or “B” Model Option 417/419 4-port analyzer (with configurable test set, extended power range, and bias tees) to either an “A” Model Option 423 or a “B” Model Option 422/423 analyzer.

- mechanical switches
- source combiner
- additional new cables and connectors

Refer to “**Overview of the Installation Procedure**” on page 14.

CAUTION

This repair must be done at a service center or a self-maintainer service center! Refer to “**Getting Assistance from Keysight**” on page 6.

Getting Assistance from Keysight

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

Contacting Keysight

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

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

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

NOTE

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

If You Have Problems With the Upgrade Kit Contents

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

Keysight () link.

Getting Prepared

CAUTION

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

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

NOTE

IMPORTANT!

- This document contains references to legacy and to a new A21 HMA26.5 Multiplier/Amplifier assembly. Your model instrument may have a legacy HMA26.5 or a new HMA26.5 assembly. Both types of assemblies are compatible with this upgrade. This note is for your reference, because some figures contain legacy assemblies that your instrument may not have installed.
- If you want to verify your instrument's A21 HMA26.5 Multiplier/Amplifier, refer to [“Verify the Model/Version of HMA26.5 Installed” on page 9](#).
- See also, your instrument's PDF Service Guide ^a.

a. See [“Downloading the Online PNA Service Guide” on page 10](#).

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 [“Step 1. Obtain a Keyword and Verify the Information”](#) below.
- Correct tools - refer to [“Tools Required for the Installation” on page 11](#).
- Enough time - refer to [“About Installing the Upgrade” on page 12](#).
- 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 Guide¹.

1. See [“Downloading the Online PNA Service Guide” on page 10](#).

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

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

NOTE

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

To enable the option product, you must request license key(s) (A models) or license key file(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 determine your new HostID, Keysight personnel should use the new model number with the utility at go to <http://mktwww.srs.is.keysight.com/field/service/network/pna/upgrades.html>. Non-Keysight personnel should contact Keysight at <http://www.keysight.com/key/contactus>.

Getting Prepared

– 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 8**.

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**.

Verify the Model/Version of HMA26.5 Installed

This upgrade kit contains components for use with PNA models using the legacy HMA26.5 part number 5087-7765. If your PNA has the newer HMA26.5 part number N5240-60101 installed you may discard these parts:

- A22 splitter 5087-7139
- W42 N5222-20009
- W43 N5222-20007
- W44 N5222-20008

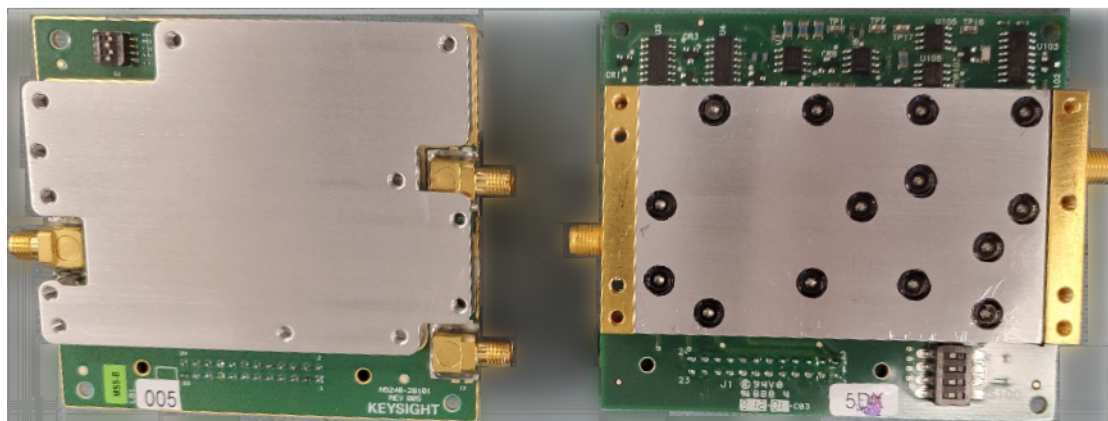
(If you have the legacy 5086-7765 HMA26.5, please discard the N5222-20126 semi-rigid cables. Refer to **Figure 1 on page 10**.)

The new N5240-60101 HMA26.5 has the splitter integrated into the assembly. Refer to **Figure 1 on page 10**.

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

New HMA26.5 -- N5240-60101
Requires (x1) Cable.

Legacy HMA26.5 -- 5087-7765
Requires A22 Splitter and (x3) Cables.



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 Guide¹.

ESD Equipment and Supplies Required for the Installation

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

Tools Required for the Installation

Description	Qty	Part Number
T-10 TORX driver (set to 9 in-lbs)	1	N/A
T-20 TORX driver (set to 21 in-lbs)	1	N/A
5/16-in torque wrench (set to 10 in-lbs)	1	N/A
5/16-in torque wrench (set to 21 in-lbs)	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.

1. See [“Downloading the Online PNA Service Guide” on page 10](#).

Items Included in the Upgrade Kit

About Installing the Upgrade

Products affected ^a	N5241A, N5242A, N5249A Option 419 and N5241B, N5242B, N5249B Option 417/419
Installation to be performed by	Keysight service center or personnel qualified by Keysight
Estimated installation time	5 hours
Estimated adjustment time	0.5 hours
Estimated full instrument calibration time	4.5 hours

- a. This upgrade is for models with Version 6 or Version 7 synthesizers. Version 7 dual-digital synthesizers (DDS) instruments have a s/n prefix 6201 and greater or instruments upgraded with N52xxBU-xS7.

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 N5242-60104^a

Ref Desig.	Description	Qty	Part Number
-	Installation note (this document)	1	N5242-90005
-	Software Entitlement Certificate (provided separately)	1	5964-5145
-	China RoHS Addendum	1	9320-6722
A46	Port 1 mechanical switch	4	N1811-60028
A47	Port 3 mechanical switch		
A48	Port 4 mechanical switch		
A49	Port 2 mechanical switch		
A50	Combiner (bridge)	1	5087-7757
-	Switch bracket	4	N5242-00009
-	Front panel overlay, 4-port (Option 423) - “A” Models	1	N5222-80006
-	Front panel overlay, 4-port (Option 423) - “B” Models	1	N5222-80013
-	Machine screw, M2.5 x 20, pan head (to attach mechanical switch to switch bracket)	8	0515-1992

Items Included in the Upgrade Kit

Table 1 Contents of Upgrade Kit N5242-60104^a

Ref Desig.	Description	Qty	Part Number
-	Machine screw, M3.0 x 20, pan head (to attach combiner to switch bracket)	2	0515-1410
-	Machine screw, M3.0 x 6, pan head (to attach switch bracket to analyzer)	8	0515-0430
-	Cable tie wrap	3	1400-0249
-	Bulkhead connector assembly for rear panel	11	1250-3805
W95	RF cable, W3 to A46 port 1 mechanical switch	1	N5242-20269
W96	RF cable, A46 port 1 mechanical switch to A25 test port 1 bridge	1	N5242-20264
W97	RF cable, A46 port 1 mechanical switch to rear-panel PORT 1 SW SRC OUT (J11)	1	N5242-20287
W98	RF cable, rear-panel PORT 1 COMB THRU IN (J10) to A50 combiner	1	N5242-20288
W99	RF cable, rear-panel PORT 1 COMB ARM IN (J9) to A50 combiner	1	N5242-20289
W100	RF cable, A50 combiner to A46 port 1 mechanical switch	1	N5242-20265
W101	RF cable, W5 to A47 port 3 mechanical switch	1	N5242-20266
W102	RF cable, A47 port 3 mechanical switch to A26 test port 3 bridge	1	N5242-20263
W103	RF cable, A47 port 3 mechanical switch to rear-panel PORT 3 SW SRC OUT (J8)	1	N5242-20282
W104	RF cable, rear-panel PORT 3 SW TSET IN (J7) to A47 port 3 mechanical switch	1	N5242-20281
W105	RF cable, W7 to A48 port 4 mechanical switch	1	N5242-20267
W106	RF cable, A48 port4 mechanical switch to A27 test port 4 bridge	1	N5242-20261
W107	RF cable, A48 port 4 mechanical switch to rear-panel PORT 4 SW SRC OUT (J4)	1	N5242-20283
W108	RF cable, rear-panel PORT 4 SW TSET IN (J3) to A48 port 4 mechanical switch	1	N5242-20284
W109	RF cable, W9 to A49 port 2 mechanical switch	1	N5242-20268
W110	RF cable, A49 port 2 mechanical switch to A28 test port 2 bridge	1	N5242-20262
W111	RF cable, A49 port 2 mechanical switch to rear-panel PORT 2 SW SRC OUT (J2)	1	N5242-20285
W112	RF cable, rear-panel PORT 2 SW TSET IN (J1) to A49 port 2 mechanical switch	1	N5242-20286
W113	Rear panel jumper	4	N5222-20091
W154	RF cable, front-panel REF 2 RCVR R2 IN to A23 mixer brick (R2)	1	N5242-20308

a. In addition to the upgrade kit, the shipment includes an Option Entitlement Certificate. Refer to **“License Key Redemption”** on page 8 for important information about this certificate.

NOTE

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

Installation Procedure for the Upgrade

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

WARNING

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

Overview of the Installation Procedure

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.

- "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 Some Cables."
- "Step 6. Assemble the Mechanical Switches."
- "Step 7. Install the Mechanical Switches."
- "Step 8. Remove the A19 Test Set Motherboard and the A20 IF Multiplexer Board."
- "Step 9. Install the Bulkhead Connectors and Jumpers on the Rear Panel."
- "Step 10. Install the Bulkhead Connectors in the Test Set Front Plate (For Analyzers with Serial Numbers Prefixed MY/SG/US5310 and Below)."
- "Step 11. Install the New Test Set Cables."
- "Step 12. Reinstall the A20 IF Multiplexer Board and the A19 Test Set Motherboard."
- "Step 13. Remove the Old Lower Front Panel Overlay."
- "Step 14. Reinstall the Front Panel Assembly."
- "Step 15. Install the New Lower Front Panel Overlay."
- "Step 16. Install Front Panel Jumpers."
- "Step 17. Position the Cables and Wires to Prevent Pinching."
- "Step 19. Reinstall the Outer Cover."

“Step 20. Remove Option 417 (B Models Only) or 419 Licenses.”

“Step 21. Enable Option 422 (B Models Only) or 423 Licenses.”

“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 8**.

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

Once the license key (A models) or license key file (B models) has been received and the information verified, you can proceed with the installation at **“Step 2. Remove the Outer Cover” on page 15**.

NOTE

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

Step 2. Remove the Outer Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide¹.

Step 3. Remove the Inner Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide¹.

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 Guide¹.

Step 5. Remove the A19 Test Set Motherboard

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A19 Test Set Motherboard” in the PDF Service Guide¹.

1. See **“Downloading the Online PNA Service Guide” on page 10**.

Step 5. Remove Some Cables

CAUTION

Be careful not to damage the center pins of the semi-rigid 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.

Refer to **Figure 2** for this step of the procedure.

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 with the s/n prefix for your instrument (i.e., S/N Prefixes <6021 or ≥6021), "Bottom RF Cables, Standard 4-Port Configuration, Option 417" or "Bottom RF Cables, Standard 4-Port Configuration, Option 419" in the PDF Service Guide¹.

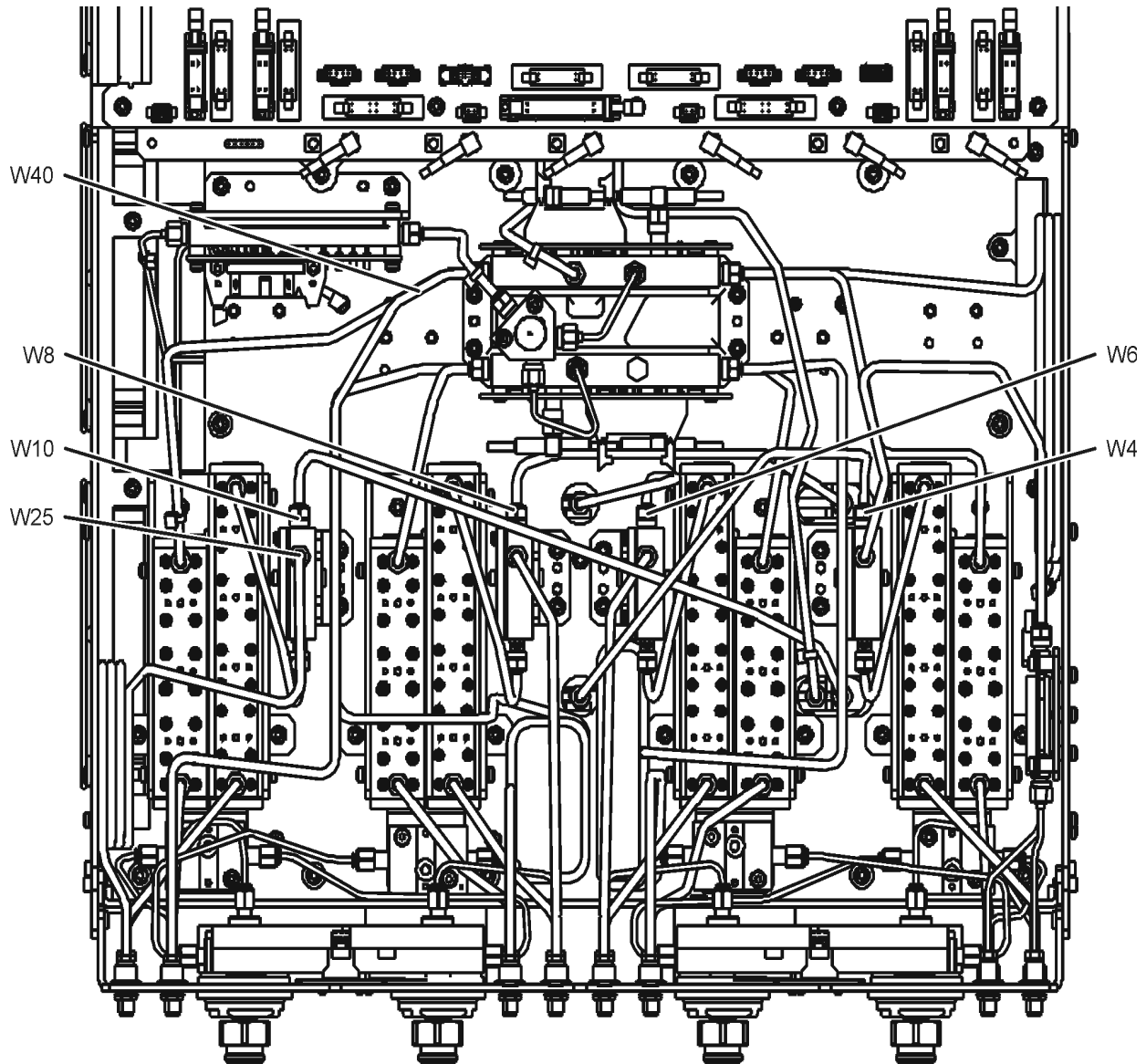
- W4 (from A5 26.5 GHz source 1 board OUT 1) to A25 port 1 bridge
- W6 (from A8 26.5 GHz source 2 board OUT 1) to A26 port 3 bridge
- W8 (from A8 26.5 GHz source 2 board OUT 2) to A27 port 4 bridge
- W10 (from A5 26.5 GHz source 1 board OUT 2) to A28 port 2 bridge
- W40 Front-panel REF 2 RCVR R2 IN to A23 mixer brick (R2)

For analyzers with serial numbers prefixed MY/SG/US5310 and below:

- W25 REF 2 SOURCE OUT to A28 port 2 bridge

1. See ["Downloading the Online PNA Service Guide" on page 10](#).

Figure 2 Existing Test Set Cables Removal¹



n5242_005_01

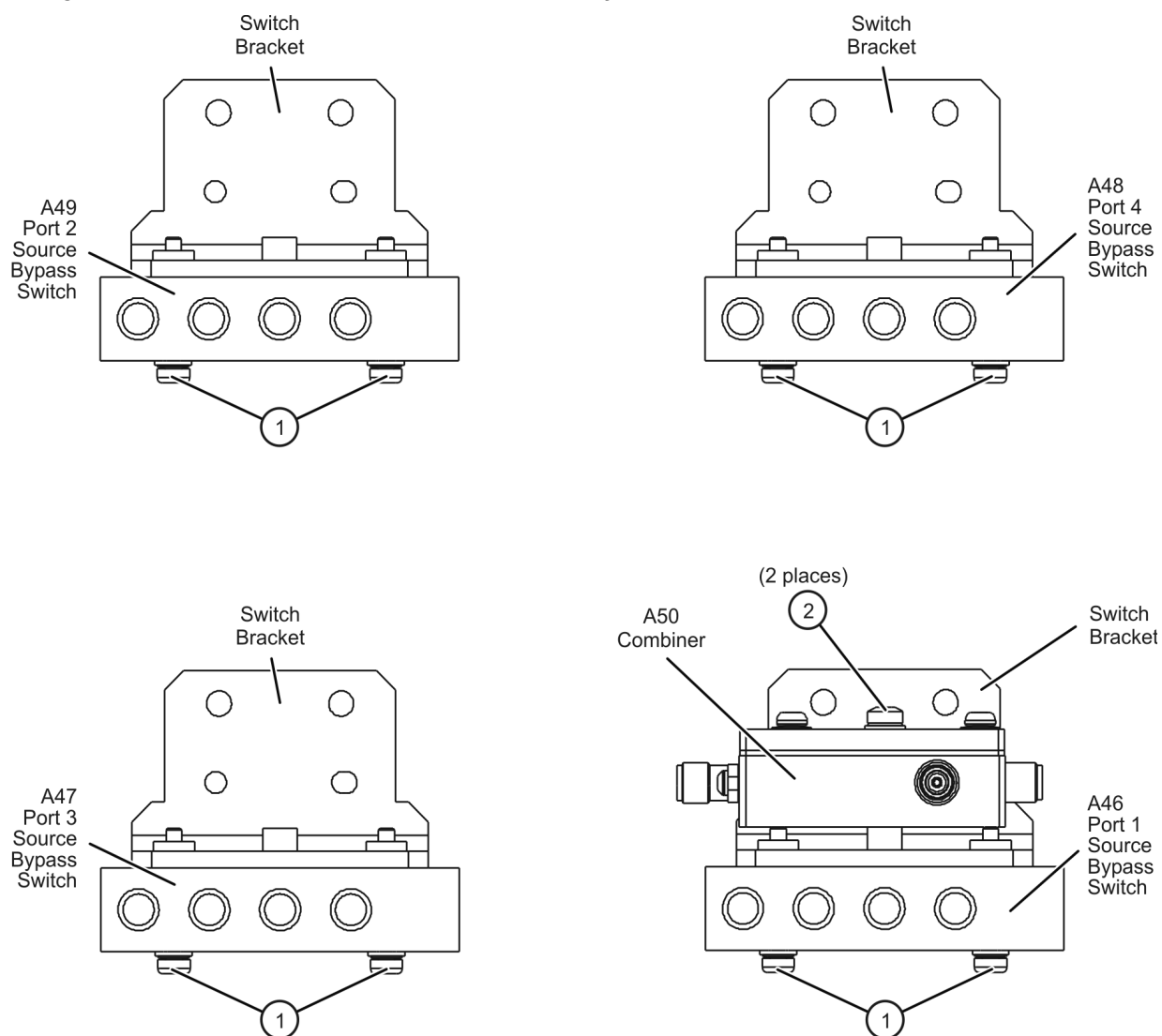
1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs with the older HMA26.5 or discard. If you are unclear which HMA26.5 assembly your PNA has installed, refer to [Figure 1 on page 10](#).

Step 6. Assemble the Mechanical Switches

Refer to **Figure 3** for this step of the procedure. New parts are listed in **Table 1 on page 12**.

1. Position each mechanical switch on a switch bracket as shown.
2. Secure each switch to its bracket using two screws (item ①, 0515-1992) for each. Make sure that the switches are oriented as shown.
3. Position the A50 combiner on one of the switch brackets as shown. This will be the bracket with the A46 port 1 mechanical switch.
4. Secure the A50 combiner to the bracket using two screws (item ②, 0515-1410). Make sure that the A50 combiner is oriented as shown.

Figure 3 Mechanical Switches Assembly (N1811-60020, 0515-1992, 0515-1410)



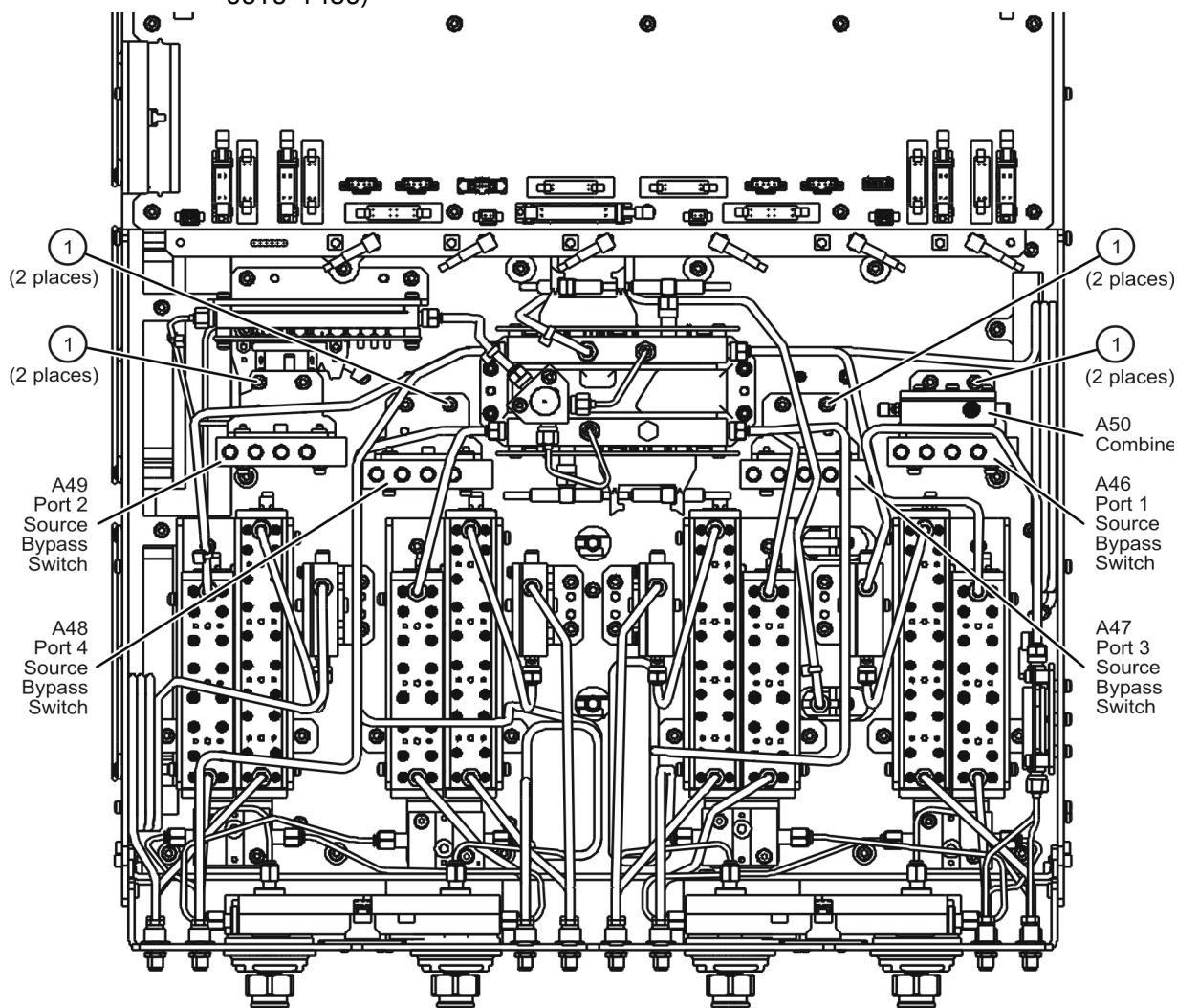
n5242_005_02

Step 7. Install the Mechanical Switches

Refer to **Figure 4** for this step of the procedure. New parts are listed in **Table 1 on page 12**.

1. Position the switch brackets (with the switches and combiner attached) in the analyzer as shown. Make sure that the switch bracket with the A50 combiner is in the location shown.
2. Secure the switch brackets to the analyzer test set deck using two screws (item ①, 0515-0430) each.

Figure 4 Mechanical Switches Installation into the Analyzer (5087-7757, 0515-1410, 0515-1430)¹



1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs with the older HMA26.5 or discard. If you are unclear which HMA26.5 assembly your PNA has installed, refer to **Figure 1 on page 10**.

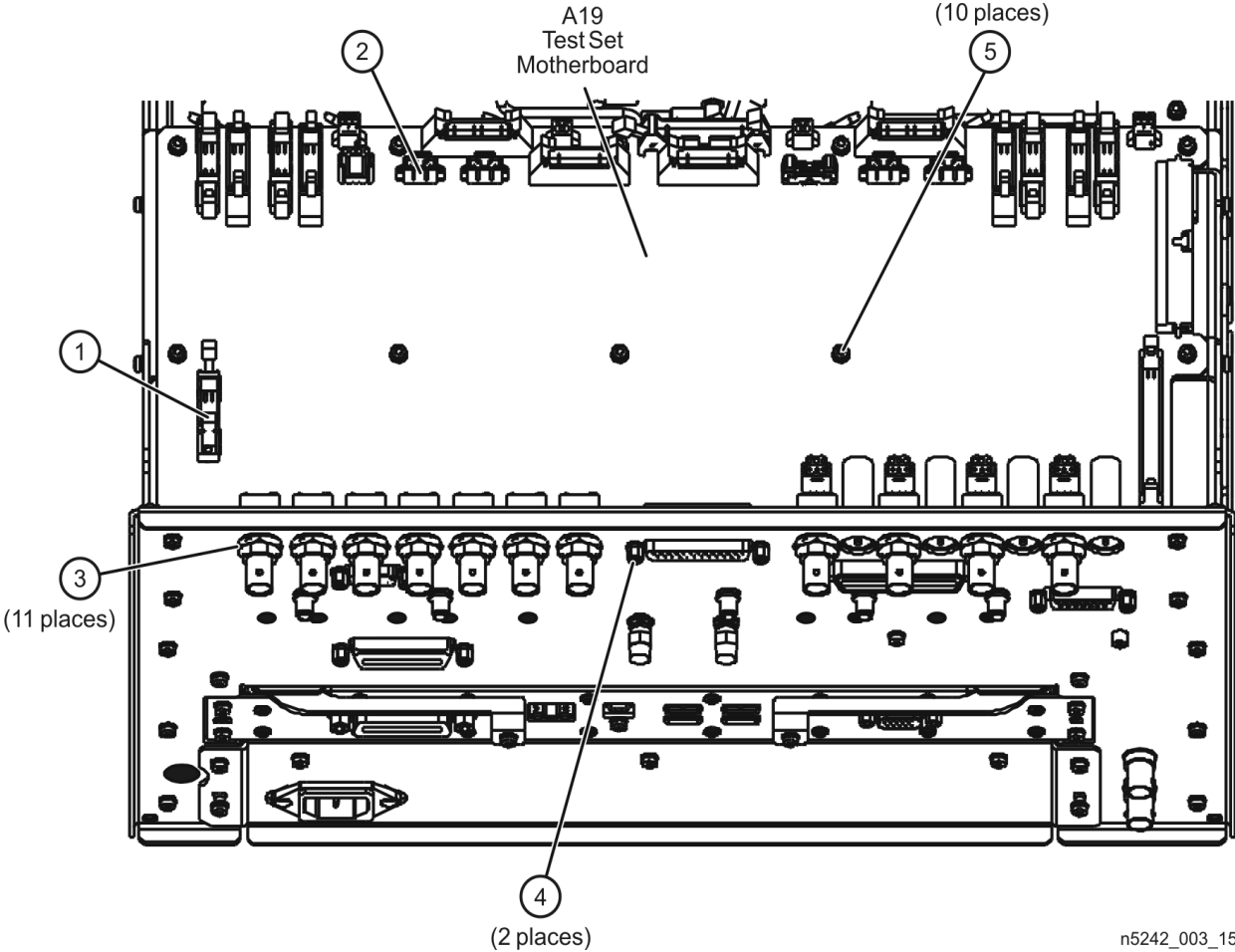
Step 8. Remove the A19 Test Set Motherboard and the A20 IF Multiplexer Board

Remove the A19 Test Set Motherboard

Refer to **Figure 5** for this part of this step of the procedure.

1. Disconnect ALL ribbon cables (item ①) and ALL wire harnesses (item ②) from the A19 test set motherboard. Make sure they are labeled for re-connection later.
2. Remove connector hardware (item ③) from 11 rear panel BNC connectors.
3. Remove connector hardware (item ④) from the rear panel TEST SET I/O connector.
4. Remove 10 screws (item ⑤) from the A19 test set motherboard.
5. Slide the A19 test set motherboard toward the front of the instrument until the rear panel BNC connectors are free of the rear panel, then lift the motherboard and remove it from the analyzer.

Figure 5 A19 Test Set Motherboard Removal



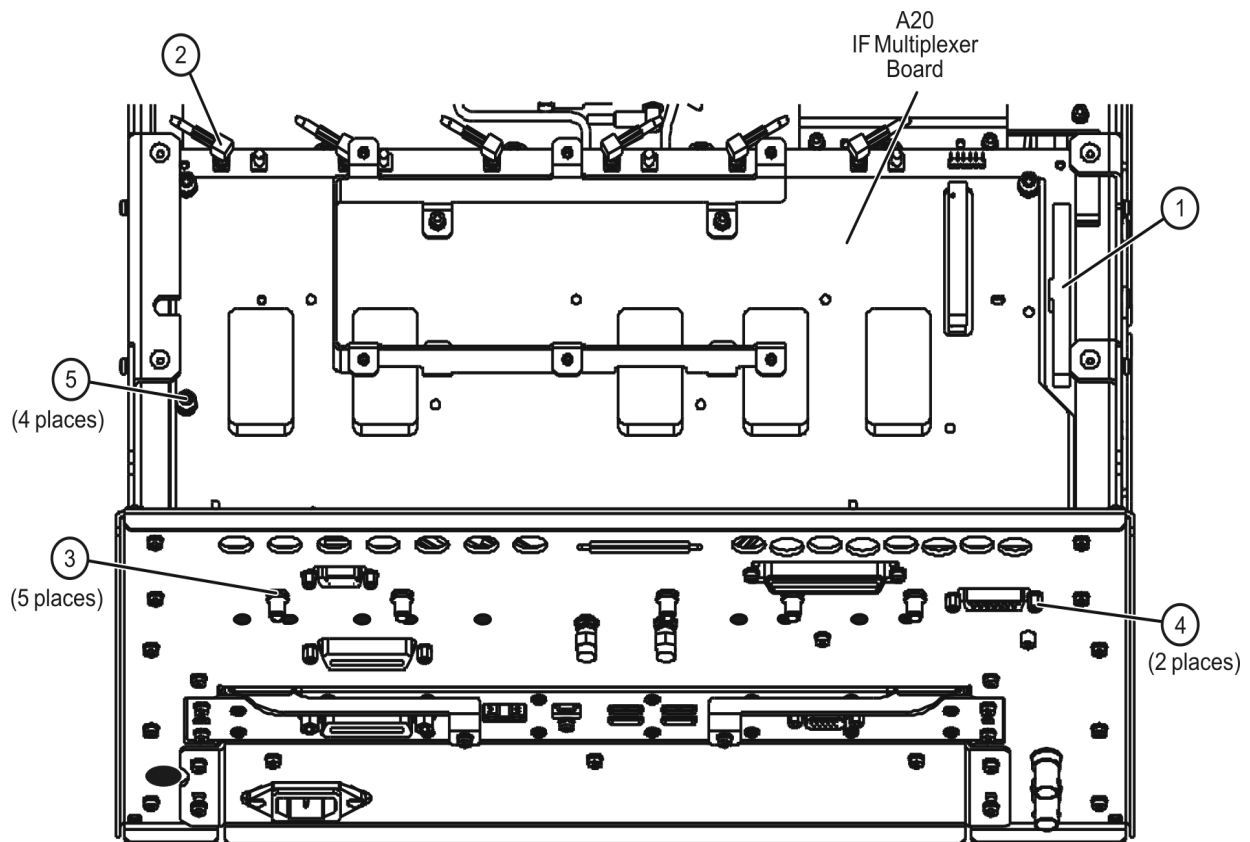
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Remove the A20 IF Multiplexer Board

Refer to **Figure 6** for this part of this step of the procedure.

1. Disconnect the ribbon cable (item ①) from the A20 IF multiplexer board.
2. Disconnect ALL gray flexible RF cables (item ②) from the A20 IF multiplexer board. Make sure they are labeled for re-connection later.
3. Remove connector hardware (item ③) from five rear panel RF connectors.
4. Remove connector hardware (item ④) from the rear panel PULSE I/O connector.
5. Remove four screws (item ⑤) from the A20 IF multiplexer board.
6. Slide the A20 IF multiplexer board toward the front of the instrument until the rear panel connectors are free of the rear panel, then lift the board and remove it from the analyzer.

Figure 6 A20 IF Multiplexer Board Removal

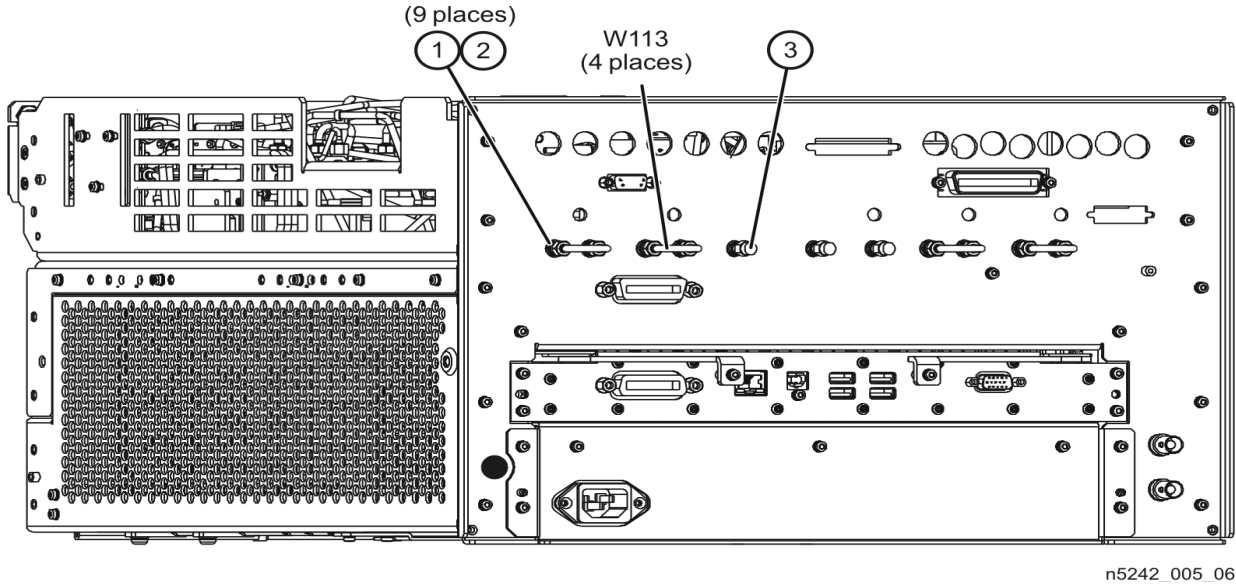


n5242_003_16

Step 9. Install the Bulkhead Connectors and Jumpers on the Rear Panel

1. Remove hole plugs from the following rear panel connector openings:
 - PORT 1–COMB ARM IN (J9) and COMB THRU IN (J10) and SW SRC OUT (J11)
 - SRC 2– SW SRC OUT (J8)
 - PORT 3–SW TSET IN (J7)
 - PORT 4–SW TSET IN (J3) and SW SRC OUT (J4)
 - PORT 2–SW TSET IN (J1) and SW SRC OUT (J2)
2. Refer to **Figure 7** for this part of this step of the procedure. New parts are listed in **Table 1 on page 12**.
3. Install bulkhead connectors, lock washers (item ①) and hex nuts (item ②) for the seven new rear panel cables. These cables will be installed later.
4. Using a 5/16-in torque wrench set to 21 in-lbs, tighten the hex nuts on the bulkhead connectors.
5. Install the three rear panel jumpers, W113, in the locations shown (and as listed below) and torque the jumper connectors to 10 in-lbs:
 - a. Jumper PORT 1 COMB THRU IN (J10) to PORT 1 SW SRC OUT (J11)
 - b. Jumper PORT 1 COMB ARM IN (J9) to SRC 2 SW SRC OUT (J8)
 - c. Jumper PORT 4 SW TSET IN (J3) to PORT 4 SW SRC OUT (J4)
 - d. Jumper PORT 2 SW TSET IN (J1) to PORT 2 SW SRC OUT (J2)
6. Install a 50-ohm termination (item ③) on the PORT 3 SW TSET IN (J7) connector, as indicated, and torque the termination connector to 10 in-lbs.

Figure 7 Bulkhead Connectors and Jumpers on Rear Panel



Step 10. Install the Bulkhead Connectors in the Test Set Front Plate (For Analyzers with Serial Numbers Prefixed MY/SG/US5310 and Below)

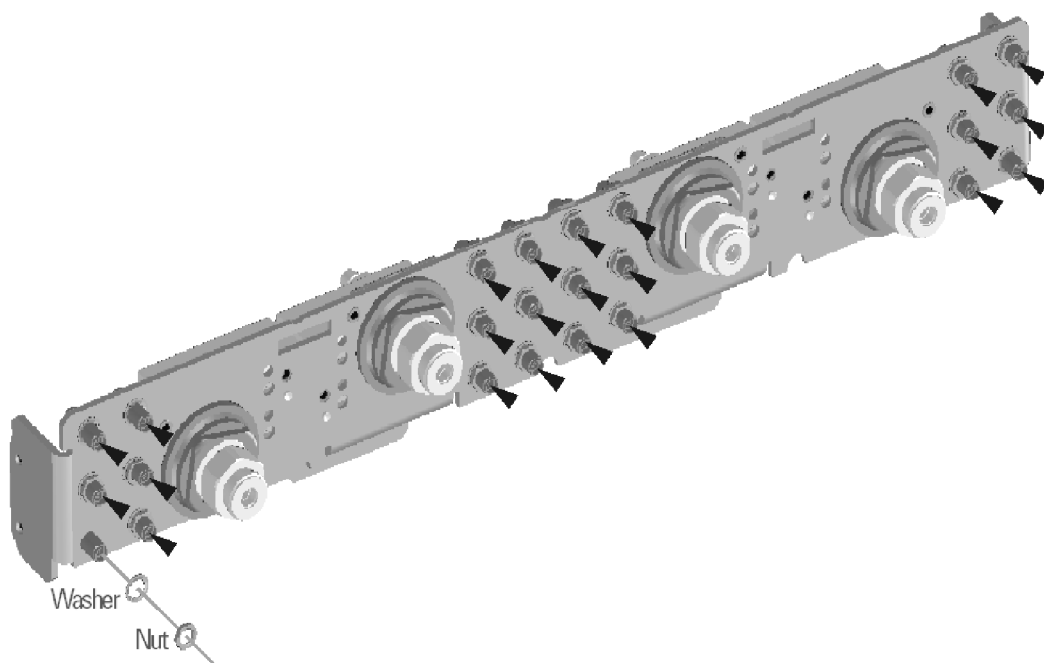
If your analyzer's serial number is MY/SG/US5321 and above, ignore this step.

Refer to **Figure 8** for this procedure. Some bulkhead connectors may already be installed on your analyzer's front plate. New parts are listed in **Table 1 on page 12**.

1. From the back side of the test set front plate, insert a bulkhead connector into a hole in the plate.
2. Install 1x washer and 1x nut. Hand tighten nut and ensure bulkhead connector hexagon nut, on the back side of test set front plate, is aligned to the test set sub-panel hexagon indent.
3. Repeat previous two steps for the remaining bulkhead connectors.
4. Torque nuts, on the front side of test set front plate, to 21 in-lbs.

Figure 8

Bulkhead Connectors Installation



N5242_004_09

Step 11. Install the New Test Set Cables

CAUTION

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

CAUTION

Be careful not to damage the center pins of the semi-rigid 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.

Refer to **Figure 9** for this part of this step. New parts are listed in **Table 1 on page 12**.

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

To see an image showing the location of these cables, click the Chapter 6 bookmark with the s/n prefix for your instrument (i.e., S/N Prefixes <6021 or ≥6021), "Bottom RF Cables, Standard 2-Port Configuration, Option 222" or "Bottom RF Cables, Standard 2-Port Configuration, Option 224" in the PDF Service Guide¹.

- W95(N5242-20269) W3 (from A5 26.5 GHz source 1 board) to A46 port 1 mechanical switch (connector 2)
- W96 (N5242-20264) A46 port 1 mechanical switch (connector 3) to A25 test port 1 bridge
- W97 (N5242-20287) A46 port 1 mechanical switch (connector 1) to rear-panel PORT 1 SW SRC OUT (J11)
- W98 (N5242-20288) Rear-panel PORT 1 COMB THRU IN (J10) to A50 combiner
- W99 (N5242-20289) Rear-panel PORT 1 COMB ARM IN (J9) to A50 combiner
- W100 (N5242-20265) A50 combiner to A46 port 1 mechanical switch (connector 4)
- W101 (N5242-20266) W5 (from A8 26.5 GHz source 2 board) to A47 port 3 mechanical switch (connector 2)
- W102 (N5242-20263) A47 port 3 mechanical switch (connector 3) to A26 test port 3 bridge
- W103 (N5242-20282) A47 port 3 mechanical switch (connector 1) to rear-panel SRC 2 SW SRC OUT (J8)

1. See "Downloading the Online PNA Service Guide" on page 10.

- W104 (N5242-20281) Rear-panel PORT 3 SW TSET IN (J7) to A47 port 3 mechanical switch (connector 4)
- W105 (N5242-20267) W7 (from A8 26.5 GHz source 2 board) to A48 port 4 mechanical switch (connector 2)
- W106 (N5242-20261) A48 port 4 mechanical switch (connector 3) to A27 test port 4 bridge
- W107 (N5242-20283) A48 port 4 mechanical switch (connector 1) to rear-panel PORT 4 SW SRC OUT (J4)
- W108 (N5242-20284) Rear-panel PORT 4 SW TSET IN (J3) to A48 port 4 mechanical switch (connector 4)
- W109 (N5242-20268) W9 (from A5 26.5 GHz source 1 board) to A49 port 2 mechanical switch (connector 2)

For analyzers with serial numbers prefixed MY/SG/US5310 and below:

- W25 (N5222-20038) A28 port 2 bridge to front-panel REF 2 SOURCE OUT

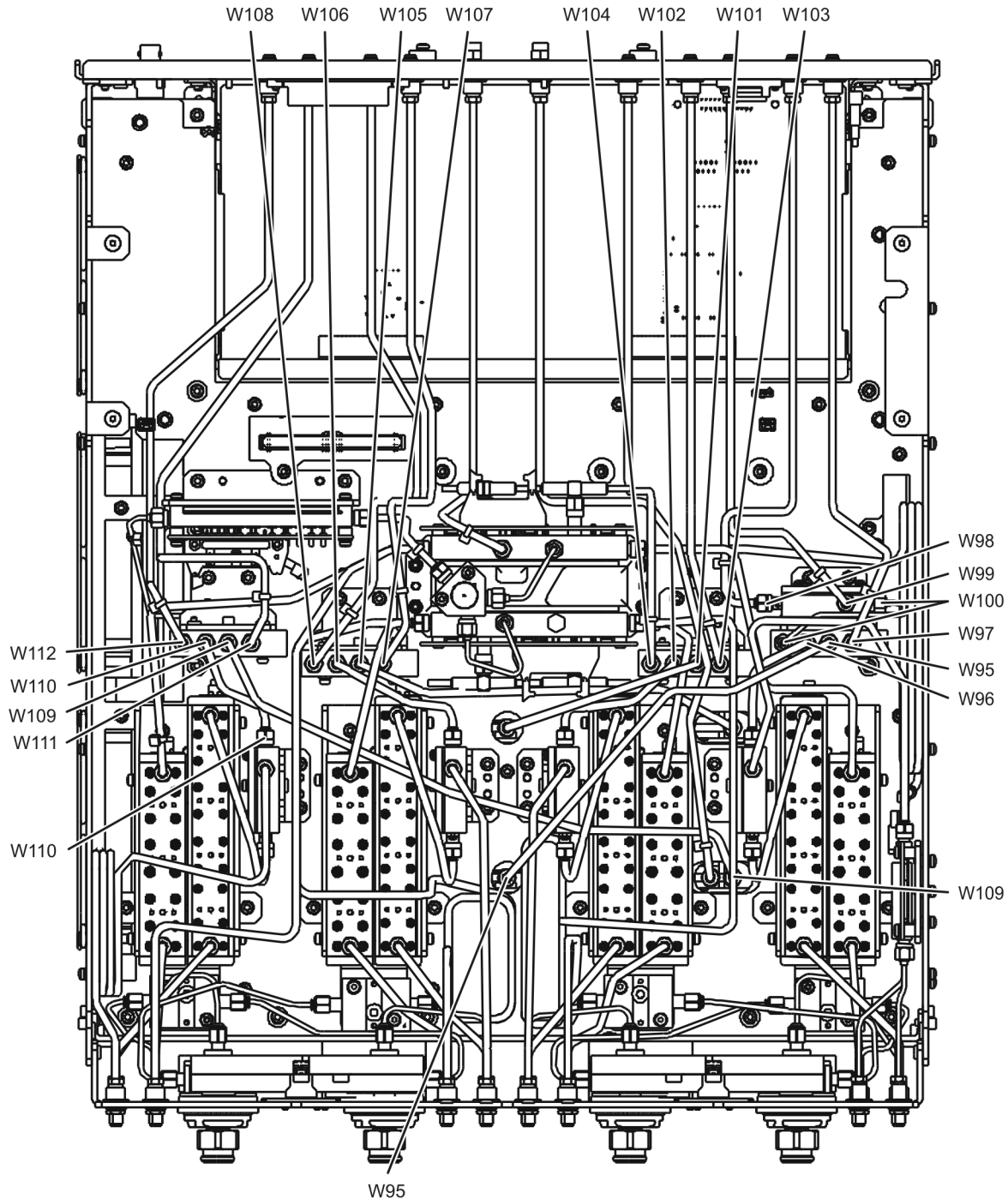
Secure W25 to the side of the deck with 1x cable tie wrap, part number 1400-0249 (included in the kit).

For all analyzer serial numbers:

- W154 (N5242-20308) front panel REF 2 RCVR R2 IN to A23 mixer brick (R2)
- W110 (N5242-20262) A49 port 2 mechanical switch (connector 3) to A28 test port 2 bridge
- W111 (N5242-20285) A49 port 2 mechanical switch (connector 1) to rear-panel PORT 2 SW SRC OUT (J2)
- W112 (N5242-20286) Rear-panel PORT 2 SW TSET IN (J1) to A49 port 2 mechanical switch (connector 4)

Figure 9

New Test Set Cable Installation¹



1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs with the older HMA26.5 or discard. If you are unclear which HMA26.5 assembly your PNA has installed, refer to [Figure 1 on page 10](#).

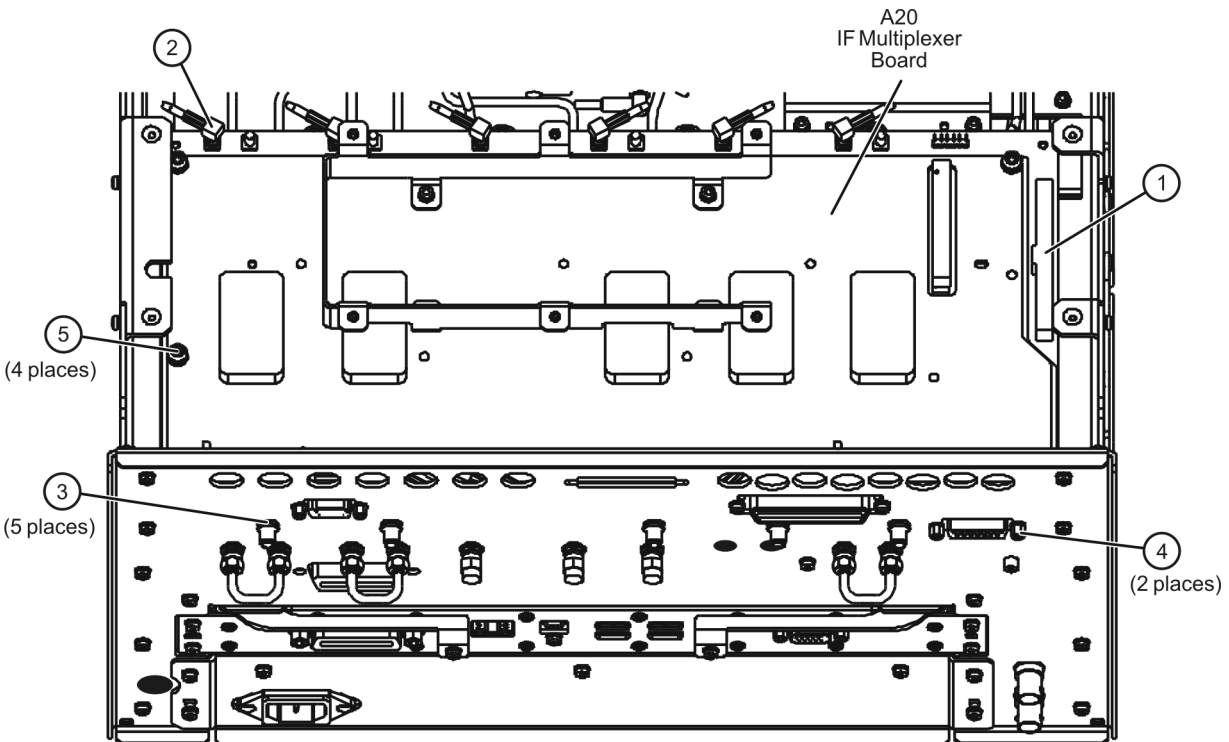
Step 12. Reinstall the A20 IF Multiplexer Board and the A19 Test Set Motherboard

Reinstall the A20 IF Multiplexer Board

Refer to **Figure 10** for this part of this step of the procedure.

1. Position the A20 IF multiplexer board in the analyzer and slide it toward the rear of the instrument until the rear panel connectors are completely through the rear panel.
2. Loosely reinstall four screws (item ⑤) in the A20 IF multiplexer board.
3. Reinstall connector hardware (item ③) on five rear panel RF connectors. Torque the hex nuts to 21 in-lbs.
4. Reinstall connector hardware (item ④) on the rear panel PULSE I/O connector. Torque the connector nuts to 6 in-lbs.
5. Torque the four screws (item ⑤) to 21 in-lbs.
6. Reconnect ALL gray flexible RF cables (item ②) to the A20 IF multiplexer board.
7. Reconnect the ribbon cable (item ①) to the A20 IF multiplexer board.

Figure 10 A20 IF Multiplexer Board Re-installation



n5242_003_17

Reinstall the A19 Test Set Motherboard

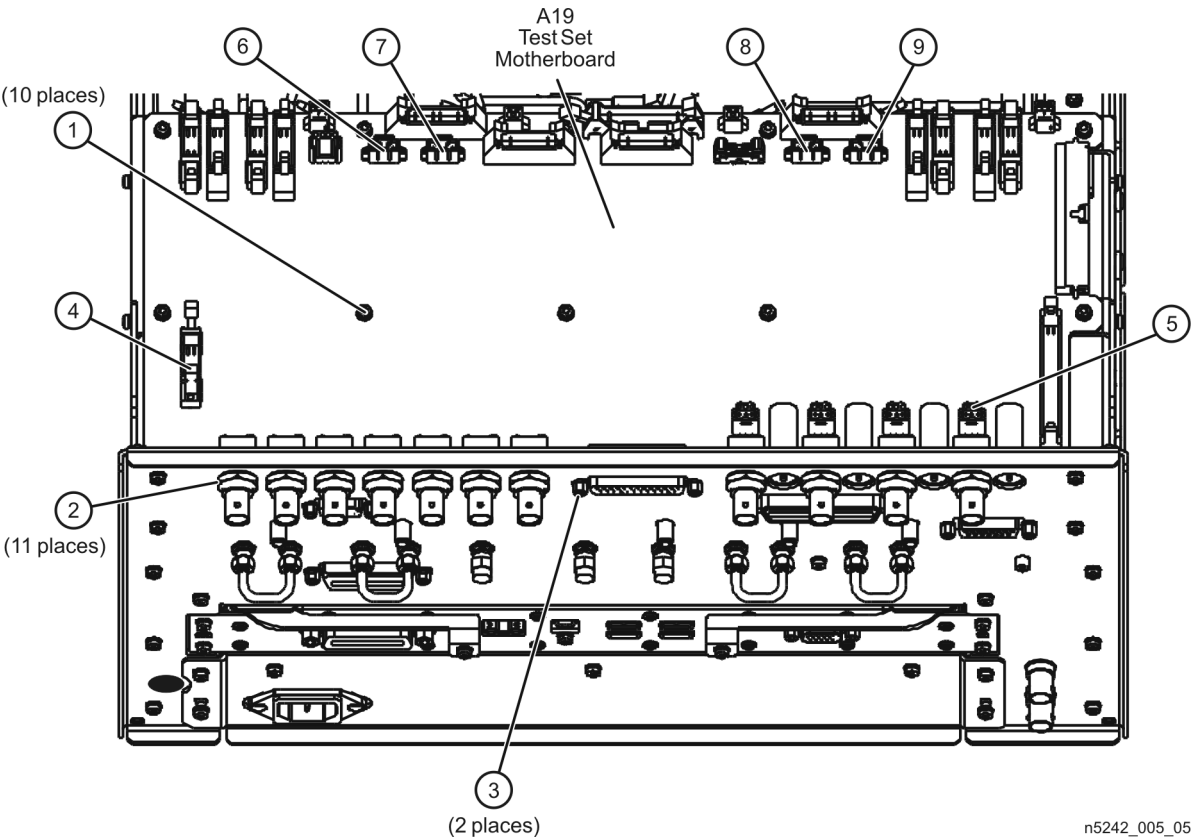
CAUTION

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

Refer to **Figure 11** for this part of this step of the procedure.

1. Position the A19 test set motherboard in the analyzer and slide it toward the rear of the instrument until the rear panel BNC connectors are completely through the holes in the rear panel.
2. Loosely reinstall 10 screws (item ①) in the A19 test set motherboard.
3. Reinstall connector hardware (item ②) on 11 rear panel BNC connectors. Torque hex nuts to 21 in-lbs.
4. Reinstall connector hardware (item ③) on the rear panel TEST SET I/O connector. Torque connector nuts to 6 in-lbs.
5. Torque the 10 screws (item ①) to 9 in-lbs.
6. Reconnect ALL ribbon cables (item ④) and ALL wire harnesses (item ⑤) to the A19 test set motherboard.
7. Connect the mechanical switch control cables to the A19 test set motherboard as follows: A46 to item ⑥ (J101), A47 to item ⑦ (J102), A48 to item ⑧ (J103), A49 to item ⑨ (J104). Refer, if necessary, to **Figure 4 on page 19** for locations of A46 through A49.

Figure 11 A19 Test Set Motherboard Re-installation



n5242_005_05

Step 13. Remove the Old Lower Front Panel Overlay

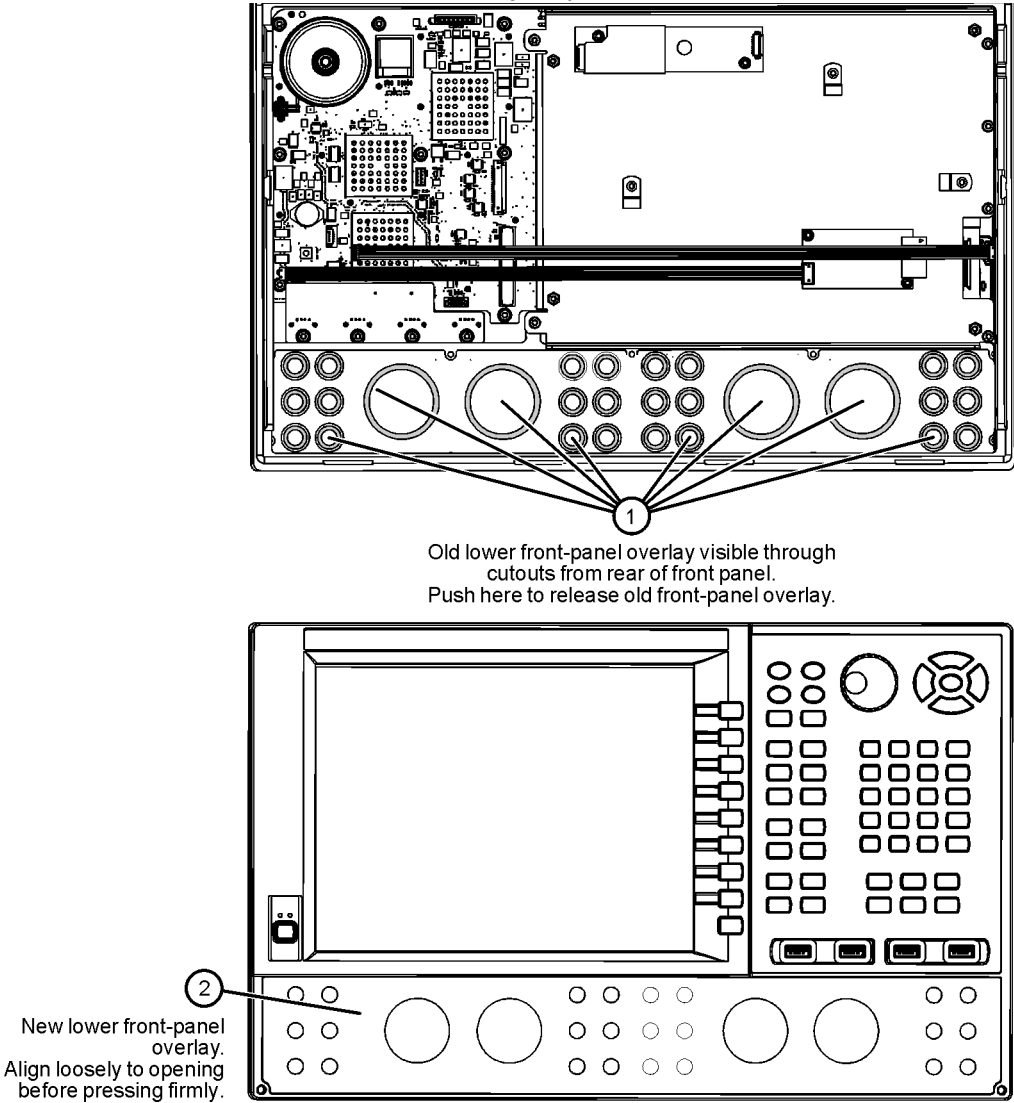
Refer to **Figure 12 on page 33** for this step of the procedure. Although a 4-port PNA is shown in the graphic, the concept is the same for the 2-port PNA. New parts are listed in **Table 1 on page 12**.

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.

NOTE

IMPORTANT! To avoid possible damage to the lower front panel overlay, do not attempt to attach the lower front panel label until **“Step 15. Install the New Lower Front Panel Overlay” on page 34**.

Figure 12 Lower Front Panel Overlay Replacement



N5225_105_04

Step 14. Reinstall the 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 Guide¹.

Step 15. Install the New Lower Front Panel Overlay

Refer to **Figure 12 on page 33** 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 12**.

1. Remove the protective backing from the new front panel overlay, N5222-80006 (A models) or N5222-80013 (B models) – (item ②).
2. Starting from either side, **loosely** place the overlay in the recess on the lower front panel, ensuring that it fits tightly against the edges of the recess.
3. Once the overlay is in place, press it firmly onto the frame to secure it.
4. 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 16. Install Front Panel Jumpers

- Install twelve W30 front panel jumper cables (N5222-20091) - 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 Guide¹. See also, **Figure 12 on page 33**.
- Install four new W113 rear panel jumper cables (N5222-20091). To see an image showing the location of this rear panel jumper, click on the Chapter 6 bookmark “Rear Panel Assembly, All Options” in the PDF Service Guide¹.
- Install the 2.4 mm 50 GHz termination (reuse) (1250-4261) on rear panel J7, port 3.

Step 17. 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.

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.

1. See **“Downloading the Online PNA Service Guide” on page 10**.

Step 18. Reinstall the Inner Cover

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide¹.

Step 19. 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.

For instructions, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide¹.

Step 20. Remove Option 417 (B Models Only) or 419 Licenses

NOTE

IMPORTANT! For A model instruments, skip to “[Step 21. Enable Option 422 \(B Models Only\) or 423 Licenses](#)”.

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.

For “A” models, refer to:

- “[A Model Option 419 License Removal Procedure](#)” on page 35
- “[“A” Model Option Verification Procedure](#)” on page 37

For “B” models refer to:

- “[B Model Option 417 or 419 License Removal Procedure](#)” on page 36
- “[“B” Model Option Verification Procedure](#)” on page 39

A Model Option 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.

1. See “[Downloading the Online PNA Service Guide](#)” on page 10.

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 **419**.
4. Click **Remove**.

B Model Option 417 or 419 License Removal Procedure

For A models, refer to [“A Model Option 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 21. Enable Option 422 (B Models Only) or 423 Licenses

Procedure Requirements

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

For “A” models, refer to:

- [“Option Enable Procedure for “A” Model Instruments” on page 36](#)
- [““A” Model Option Verification Procedure” on page 37](#)

For “B” models refer to:

- [“Option Enable Procedure for “B” Model Instruments” on page 37](#)
- [““B” Model Option Verification Procedure” on page 39](#)

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 **422...** or **423 - Combiner & Switches**. Click **Enable**.
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 422/423 has not been 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 the result of [“Step 1. Obtain a Keyword and Verify the Information” on page 15](#).
2. Copy the license file(s) from the email(s) to the **root directory** of the USB flash drive.
More than one license file may be copied to the USB flash drive.

NOTE

A single license file may contain more than one feature.

3. Insert the USB flash drive to the PNA-X’s USB drive slot. Within 5 seconds, the PNA-X 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.

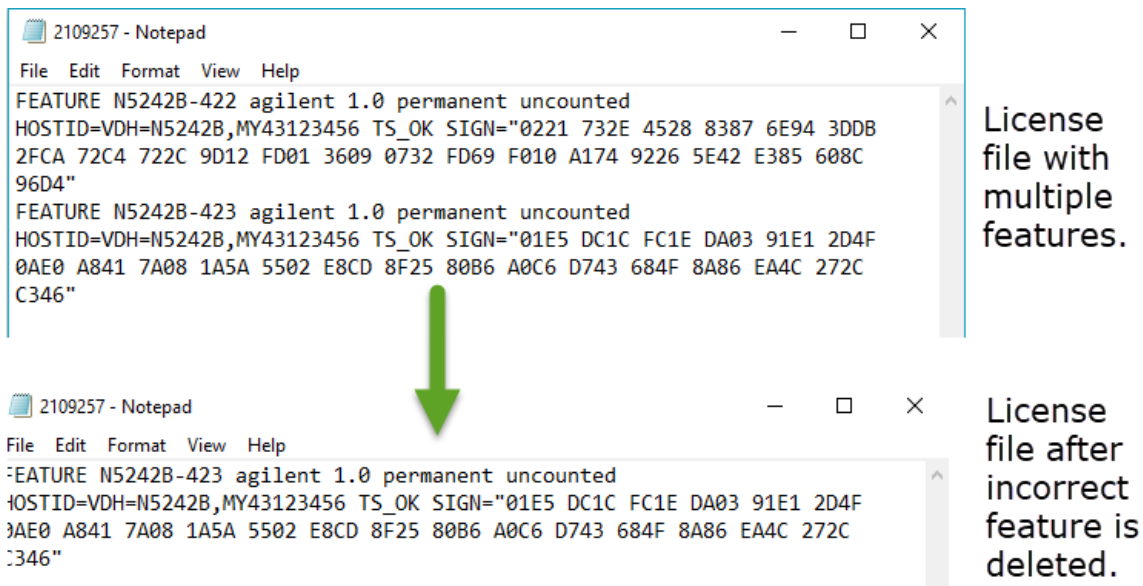
4. If you still have issues:

For these steps, refer to the example in **Figure 13 on page 38**.

- 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-422 is the correct upgrade. So, N5242B-422 is to be deleted from the text file.)

Figure 13 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.

NOTE

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

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

"B" Model Option Verification Procedure

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 422 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 22. Perform Post-Upgrade Adjustments and Calibration

Adjustments

NOTE

IMPORTANT!

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

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

- 10 MHz frequency reference adjustment
- source adjustment: Synth LO only (Version 6 synthesizers) or All Synthesizers (Version 7 synthesizers)
- synthesizer bandwidth adjustment (This test is only required when the EE default adjustment is not sufficient)

- 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 adjustment (For A models: Option 029. For B models: 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.

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.

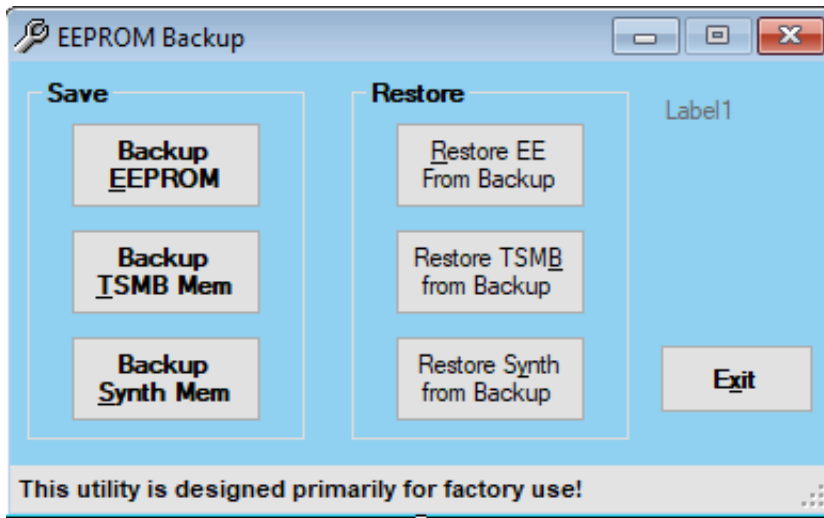
The adjustments listed here generate new correction constants. The analyzer must have a backup of this new data in case any of the data becomes corrupted.

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 Mme.
- Click Backup Synth Mem. (Applies to Version 7 Synthesizers Only)
- Click Exit when the program has finished.

1. See [“Downloading the Online PNA Service Guide” on page 10.](#)

Figure 14 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 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.

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.

Installation Procedure for the Upgrade



This information is subject to change
without notice.

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