

Keysight Add Low Frequency Extension (LFE) Upgrade Kit (For Version 6 and Version 7 Synthesizers)

To Upgrade PNA N5221/2B

Option 201 to Option 205

Upgrade Kit Order Number: N5221BU-205 and N5222BU-205

Keysight Kit Number: N5222-60120

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



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Safety Notes

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

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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Keysight Add Low Frequency Extension Upgrade Kit
Upgrade Kit Number: N5222-60120
Installation Note

Description of the Upgrade

This upgrade adds the following items to your N5221/2B with Option 201 network analyzer:

- LFE bias tee combiners
- PC assembly, low frequency extension (LFE)
- new cables

After installation of this upgrade, your analyzer will be an N5221/2B Option 205.

Refer to **“Overview of the Installation Procedure” on page 11.**

CAUTION

This repair must be done at a service center or a self-maintainer service center! Refer to **“Getting Assistance from Keysight” on page 3.**

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

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!

Before you begin this upgrade:

- Verify your instrument's firmware is: A.13.55 or greater.
- Verify your instrument's IF Multiplexer (IF MUX) board, has P4, P204, P404, P604, P804 connectors. If not, Keysight will purchase a new IF MUX board under factory warranty. Refer to your instrument's Service Guide, Chapter 7 bookmark "Removing and Replacing the A20 IF Multiplexer Board" in the PDF Service Guide^a.
- Version 6 Synthesizers Only: Verify your Synthesizer board is version H or greater. If not, refer to [Appendix A: "Synthesizer Board Upgrade \(N5240-60074 \(with Tabs\)/N5240-60076 \(Without Tabs\) Version F/G to Version H\)"](#).

a. See ["Downloading the Online PNA Service Guide" on page 7](#).

NOTE

IMPORTANT! Before you begin this upgrade:

- This document contains references to legacy and new A21 HMA26.5 Multiplier/Amplifier and A23/A24 mixer brick assemblies. Your model instrument may have either legacy assemblies or the new parts installed.
- To verify your instrument's A21 HMA26.5 Multiplier/Amplifier, refer to ["Verify the Model/Version of HMA26.5 Installed" on page 6](#).
- See also your instrument's PDF Service Guide ^a.

a. See ["Downloading the Online PNA Service Guide" on page 7](#).

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 8](#).
- Enough time - refer to ["About Installing the Upgrade" on page 8](#).

- 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.

License Key Redemption

NOTE

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

If you are unfamiliar with the licensing process, refer to the <https://www.keysight.com/us/en/assets/9018-04534/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 file(s) from the Keysight Software Manager:

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

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

- From the certificate
 - Order number
 - Certificate number
- From your instrument
 - Model number
 - Serial number

Using the information just gathered, you must request 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 license key file(s) as a message attachment.

1. See “[Downloading the Online PNA Service Guide](#)” on page 7.

Verify the Model/Version of HMA26.5 Installed

NOTE

Depending on the type of Option upgrade that was purchased, your parts kit may or may not include the following cable part numbers.

This upgrade kit contains components for use with PNA models using the legacy HMA26.5 part number 5086-7765. If your PNA has the newer HMA26.5 part number N5240-60101 installed you may discard these parts:

- A22 splitter 5067-4086
- W42 N5222-20009
- W43 N5222-20007
- W44 N5222-20008

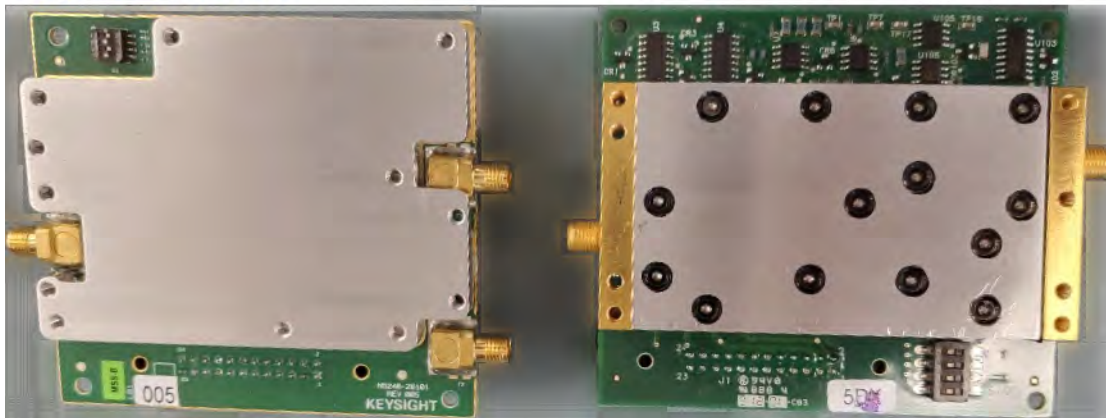
(If you have the legacy 5087-7765 HMA26.5, please discard the N5222-20126 semi-rigid cable. Refer to [Figure 1 on page 6](#).)

The new N5240-60101 HMA26.5 has the splitter integrated into the assembly. Refer to [Figure 1 on page 6](#).

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.



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 3](#).

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., N5232B) and click **Search**.
3. Click **Support** > **Keysight Product Support**.
4. In the **Search Support** area type your instrument's model number (e.g., N2222B).
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 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 |

1. See ["Downloading the Online PNA Service Guide" on page 7](#).

Tools Required for the Installation

| Description | Qty | Part Number |
|---|-----|-------------|
| T-10 TORX driver - set to 9 in-lbs (1.02 N.m) | 1 | N/A |
| T-20 TORX driver - set to 21 in-lbs (2.38 N.m) | 1 | N/A |
| 5/16-in (8 mm) nutsetter or open end torque wrench - set to 10 in-lbs (1.13 N.m) | 1 | N/A |
| 5/16-in (8 mm) nutsetter or open end wrench (to stabilize the bias tee combiner when torquing cables) | 1 | N/A |
| 5/16-in (8 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m) | 1 | N/A |
| T-6 TORX driver - set to 6 in-lbs (0.68 N.m) | 1 | N/A |
| T-20 TORX driver - set to 21 in-lbs (2.38 N.m) | 1 | N/A |
| 5/16-in (8 mm) nutsetter or open end torque wrench - set to 8 in-lbs (0.9 N.m) | 1 | N/A |
| 3/16-in (5 mm) nutsetter or open end torque wrench - set to 6 in-lbs (0.68 N.m) | 1 | N/A |
| 5/8-in (16 mm) nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m) | 1 | N/A |
| 9 mm nutsetter or open end torque wrench - set to 21 in-lbs (2.38 N.m) | 1 | N/A |
| 1/4-in (6 mm) open end wrench | 1 | N/A |

CAUTION

Use a 5/16-in torque wrench set to 10 in-lbs on all cable connections, except the front panel coupler to Bias-T combiner cable connections. Torque these to 8 in-lbs.

Additional exception: Torque the front and rear panel bulkhead connectors and these connections to 21 in-lb.

About Installing the Upgrade

| | |
|--|--|
| Products affected | N5221B and N5222B Option 201 |
| Installation to be performed by | Keysight service center or personnel qualified by Keysight |
| Estimated installation time | 4.0 hours |
| Estimated adjustment time | 2.0 hours |
| Estimated full instrument calibration time | 6.5 hours |

Items Included in the Upgrade Kit

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

CAUTION

This upgrade kit contains cables for Version 6 synthesizers and Version 7 direct digital synthesizer (DDS) assemblies. Please refer to your instrument's Service Guide, if you are unclear which assembly you have installed. Refer to **“Downloading the Online PNA Service Guide” on page 7**.

Table 1 Contents of Upgrade Kit N5222-60120

| Ref Desig. | Description | Qty | Part Number |
|---------------|--|-----|-------------|
| -- | Installation note (this document) | 1 | N5222-90110 |
| -- | Software Entitlement Certificate (provided separately) | 1 | 5964-5145 |
| -- | China RoHS Addendum | 1 | 9320-6722 |
| A71 | Port 1 LFE Bias-T combiner - port 1 | 2 | 5087-7403 |
| A74 | Port 2 LFE Bias-T combiner - port 2 | | |
| A75 | LFE PC assembly - 2-port | 1 | N5291-60005 |
| -- | Bracket (For port 1 26.5 GHz bias-T) | 1 | N5222-00001 |
| -- | Bracket (For port 2 26.5 GHz bias-T) | 1 | N5222-00002 |
| -- | Bracket, lower (For IF MUX/LFE) | 1 | N5240-00011 |
| -- | Cable clamp (A71 and A74 Bias Tee RF connector x2) | 2 | 5023-3299 |
| -- | clamps, cable (LFE DC bias cables) | 4 | 1400-1334 |
| -- | caps, protective (black) | 2 | 1401-0214 |
| -- | Nameplate – N5221B with Option 205 | 1 | N5221-80009 |
| -- | Nameplate – N5222B with Option 205 | 1 | N5222-80015 |
| -- | Lower Front panel overlay – Option 205 | 1 | N5222-80016 |
| -- | Machine screw, M3 x 8 mm, pan head ((x4) to attach bracket N5240-00011 to IF multiplexer (IF MUX) and (x4 – 2 each) Bias tee combiner assemblies to chassis) | 8 | 0515-0372 |
| -- | Machine screw, M3 x 14 mm, pan head (to attach A75 LFE board on standoffs) | 2 | 0515-0665 |
| -- | Machine screw, M3 x 25 mm, pan head (to attach to attach TSMB to deck) | 3 | 0515-0667 |
| -- | Machine screw, M3 x 6 mm, 90-DEG-Flat head (to attach port 1 and port 2 bias tee combiners to brackets (x2 each)) | 4 | 0515-1227 |
| -- | Machine screw, M2.5 x 14 mm, pan head (to attach cable clamps and cables N5240-60097 and N5240-60098 to port 1 and port 2 bias tee RF connectors) | 2 | 0515-2141 |

Description of the Upgrade
Items Included in the Upgrade Kit

Table 1 **Contents of Upgrade Kit N5222-60120**

| Ref Desig. | Description | Qty | Part Number |
|-------------------|---|-----|-------------|
| -- | Cable, coaxial SMB -f- right angle terminations, 100 mm (Connect P4 to A75 LFE board J14 and P604 to A75 LFE board J11) | 2 | 8120-5014 |
| -- | Cable, assembly, coaxial A06/A06, 205 mm long (Connect P204 to A75 LFE board J13) | 1 | 8120-5017 |
| -- | Cable A06/A06, 310G (Connect P804 to J12) | 1 | 8120-5021 |
| W181 | Port 1 CPLR THRU to A71 port 1 Bias combiner | 1 | N5222-20119 |
| W182 | A29 port 1 test coupler to A71 port 1 Bias combiner | 1 | N5222-20123 |
| W187 | Port 2 CPLR THRU to A74 port 2 Bias combiner | 1 | N5222-20120 |
| W188 | A32 Port 2 test coupler to A74 port 2 bias combiner | 1 | N5222-20124 |
| W191 ^a | A4 Synth Source 1 J102 to A70/A75 LFE board J20 | 1 | N5242-60078 |
| W193 ^a | A11 Synth LO J102 to A70/A75 LFE board J18 | 1 | N5242-60080 |
| W194 | Cable (short), assy, coaxial A70/A75 LFE J2 to A71 port 1 bias combiner (Port 1 bias combiner "RF-IN" to "Port1" A70 LFE board) | 1 | N5240-60098 |
| W197 | Cable (long), assy, coaxial A70/A75 LFE J3 to A74 port 2 bias combiner (Port 2 bias combiner "RF-IN" to "Port2" A70 LFE board) | 1 | N5240-60097 |
| W208 ^b | A70/A75 LFE board to A15 DD Synth Source 1 J12 | 1 | N5240-60112 |
| W210 ^b | A70/A75 LFE board to A15 DD Synth LO J13 | 1 | N5240-60113 |
| -- | Cable, ribbon assembly – MB/IFMUX/LFE/SMB (A14 system mother board J1 to A19 test set motherboard to A75 LFE board to A20 IF Multiplier board J1) | 1 | N5240-60089 |
| -- | Cable, DC, 2-pin to R/A SMP (Port 1 bias combiner DC to A19 Bias "Port1" and Port 2 bias combiner DC to A19 Bias "Port2".) | 2 | N5240-60091 |

- a. Version 6 synthesizers use these cables. If you have a Version 7 direct digital synthesizer (DDS) assembly installed, these cables may be discarded.
- b. Version 7 direct digital synthesizer (DDS) assemblies use these cables. If you have a Version 6 synthesizers installed, these cables may be discarded.

NOTE

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

Installation Procedure for the Upgrade

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

WARNING

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

Overview of the Installation Procedure

“Step 1. Obtain a Keyword and Verify the Information.”

“Step 2. Remove the Inner and Outer Covers.”

“Step 3. Inspect and (If Necessary) Remove the A4, A11, and A13 Synthesizer Boards, if They Are Not Version H (Required For Version 6 Synthesizers Only).”

“Step 4. Remove the Front Panel Assembly.”

“Step 5. Remove Some Bottom-Side (Test set) Cables.”

“Step 6. Remove the A19 Test Set Motherboard.”

“Step 7. Remove A20 IF Multiplexer (IF MUX) Board.”

“Step 8. Assemble the Bias Tee Combiner Assemblies.”

“Step 9. Install the A71 and A74 Bias Tee Combiner Assemblies.”

“Step 10. Connect the A14 Motherboard/IF Multiplexer (IF MUX)/Low Frequency Extension (LFE)/Test Set Motherboard (TSMB) Ribbon Cable (N5240-60089).”

“Step 11. Reinstall the A20 IF Multiplexer (IF MUX) Board and Connect the Motherboard / IF Multiplexer / Low Frequency Extension (LFE)/ Test set motherboard (MB/IF MUX/LFE/TSMB) ribbon cable (N5240-60089) and the IF MUX Rear Panel Hardware.”

“Step 12. Reinstall the Mixer Brick (MXB) Cables.”

“Step 13. Reinstall the handler, Power and Other I/O Assemblies.”

“Step 14. Attach Lower Bracket (N5240-00011) to IF MUX Board Shield.”

“Step 15. Connect and Route New Low Frequency Extension (LFE) Cables (8120-5014 (x2), 8120-5017 (x1), and 8120-5021 (x1)) to the on the IF Multiplexer (IF MUX) Board.”

“Step 16. Install A75 Low Frequency Extension (LFE) Board.”

“Step 17. Connect A71 and A74 Bias-Tee Combiner's New Cables to A75 Low Frequency Extension (LFE) Board and the Other Ends of the New Cables Connected to the IF Multiplier (IF MUX) Board.”

“Step 18. Install the New Bias Tee Combiner’s Semirigid Test Set Cables, the Blue Cables, and Install Cable Clamps Onto Ferrite Beads.”

“Step 19. Reinstall the A19 Test Set Motherboard.”

“Step 20. Install the A71 and 74 bias-Tee combiner’s Gray Low Frequency Extension (LFE) DC bias Cables and Route Cables.”

“Step 21. Install the Other End of the Bias-Tee Combiner Cables to the Source Synthesizer and LO Synthesizer Board Gray Cables.”

“Step 22. Remove the Old Lower Front Panel Overlay and Nameplate.”

“Step 23. Reinstall Front Panel Assembly.”

“Step 24. Install the New Lower Front Panel Overlay and Nameplate.”

“Step 25. Reinstall Front Panel Jumpers.”

“Step 26. DC Continuity Test the LFE Board and Test Ports.”

“Step 27. Position the Cables and Wires to Prevent Pinching.”

“Step 28. Reinstall the Inner and Outer Covers.”

“Step 29. Remove Option 201 License.”

“Step 30. Enable Option 205.”

“Step 31. Verify the PNA Analyzer Program is Running with the Correct Options.”

“Step 32. Perform Post-Upgrade Adjustments and Calibration.”

“Step 33. 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 5**.

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 file has been received and the information verified, you can proceed with the installation at **“Step 2. Remove the Inner and Outer Covers” on page 13**.

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 3**.

Step 2. Remove the Inner and Outer Covers

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

Step 3. Inspect and (If Necessary) Remove the A4, A11, and A13 Synthesizer Boards, if They Are Not Version H (Required For Version 6 Synthesizers Only)

NOTE

The N5240-60074 (with tabs) or N5240-60076 (without tabs) pretested synthesizer boards will both show Board P/N: N5240-63074 in the EEPROM window (as shown in [Figure 2 on page 14](#)).

If the synthesizer board part number displayed in the EEPROM Header window is not N5240-63074 (e.g. N5242-63150), you will need to order new synthesizer boards. Refer to [“Contacting Keysight” on page 3](#). Refer to [“Contacting Keysight” on page 3](#).

Verify that the synthesizer boards are all version H or greater.

1. If your synthesizer boards are all H or greater, on the PNA: Press **Utility > System > Service > Utilities > View EEPROM Headers**.
2. Verify the LO Synthesizer, Src1 Synth, and Src2 Synth boards are all version H or greater.

Refer to [Figure 2 on page 14](#).

1. See [“Downloading the Online PNA Service Guide” on page 7](#).

Figure 2 EERPOM Header Info Window

The screenshot shows a window titled "EEPROM Header Info" with a teal header bar. In the top right corner of the window, it says "Rev: A.03.01". Below the header is a section labeled "Assembly" containing a grid of radio buttons for selecting various components. The "LO Synthesizer" option is selected. Below this is a section for board information. "Board Name: Synthesizer Board" is displayed in a yellow box, with an "Edit" button to its right. Below the board name, several fields are listed: "Memory Type ID: 3", "Hardware ID: 0", "Serial Number: 00092", "Firmware Rev: H" (which is highlighted with a red rectangle), "Board P/N: N524063074", and "Checksum: 22459". To the right of these fields are "Vendor Code: 23", "Date Code: 1742", "Revision Code: 99", "Options (hex): 0001", and "Spare (hex): FFFF". Further to the right, there is a section labeled "Edit Requires Password" with a "1" and the text "EE Num". At the bottom right of the window is an "Exit" button.

| Assembly | | |
|---|------------------------------------|---------------------------------|
| <input checked="" type="radio"/> LO Synthesizer | <input type="radio"/> Src2 Synth | <input type="radio"/> ABC_50_P1 |
| <input type="radio"/> TestSet Motherboard | <input type="radio"/> Src1 Synth | <input type="radio"/> ABC_50_P2 |
| <input type="radio"/> IF Mux | <input type="radio"/> Src1 ABC | <input type="radio"/> ABC_50_P3 |
| <input type="radio"/> Frequency Reference | <input type="radio"/> GPIB | <input type="radio"/> ABC_50_P4 |
| <input type="radio"/> Src2 ABC | <input type="radio"/> Noise Figure | <input type="radio"/> N/A |

| | | |
|--------------------------------------|---------------------|-------------------------------------|
| Board Name: Synthesizer Board | | <input type="button" value="Edit"/> |
| | | Edit Requires Password |
| Memory Type ID: 3 | Vendor Code: 23 | |
| Hardware ID: 0 | Date Code: 1742 | |
| Serial Number: 00092 | Revision Code: 99 | 1 EE Num |
| Firmware Rev: H | Options (hex): 0001 | |
| Board P/N: N524063074 | Spare (hex): FFFF | |
| Checksum: 22459 | | <input type="button" value="Exit"/> |

3. If all of the boards are version H or greater, proceed to **“Step 4. Remove the Front Panel Assembly”**.

Else, you need to remove the synthesizer boards and proceed to step 4.

4. Removing the synthesizer boards for upgrading:

NOTE

IMPORTANT!

This step includes disconnecting and laying aside several gray cables. Ensure that they are labeled.

For instructions, click the Chapter 7 bookmark “Removing and Replacing the A4-A13 Boards” (i.e., refer to your PNA’s serial number prefix section) in the PDF Service Guide¹.

Save all mounting hardware (except the stabilizer bracket) for reuse.

Refer to **Appendix A: “Synthesizer Board Upgrade (N5240-60074 (with Tabs)/N5240-60076 (Without Tabs) Version F/G to Version H)”**.

1. See **“Downloading the Online PNA Service Guide” on page 7**.

Step 4. Remove the Front Panel Assembly

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

Step 5. Remove Some Bottom-Side (Test set) 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.

1. Place the analyzer bottom-side up on a flat surface.
2. Remove the following cables. To see an image showing the location of these cables, click the Chapter 6 bookmark “Bottom RF Cables, 4-Port, Option 201 (S/N Prefixes <6021)” or “Bottom RF Cables, 4-Port, Option 201 (S/N Prefixes ≥6021)” in the PDF Service Guide¹.
3. These cables may be discarded - they will not be reinstalled.
 - W114 (N5222-20068) Port 1 CPLR THRU to A29 port 1 coupler
 - W116 (N5222-20069) Port 2 CPLR THRU to A32 port 2 coupler

Step 6. 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 7](#).

Step 7. Remove A20 IF Multiplexer (IF MUX) Board

NOTE

IMPORTANT! This step includes disconnecting and laying aside several gray cables. Ensure that they are labeled.

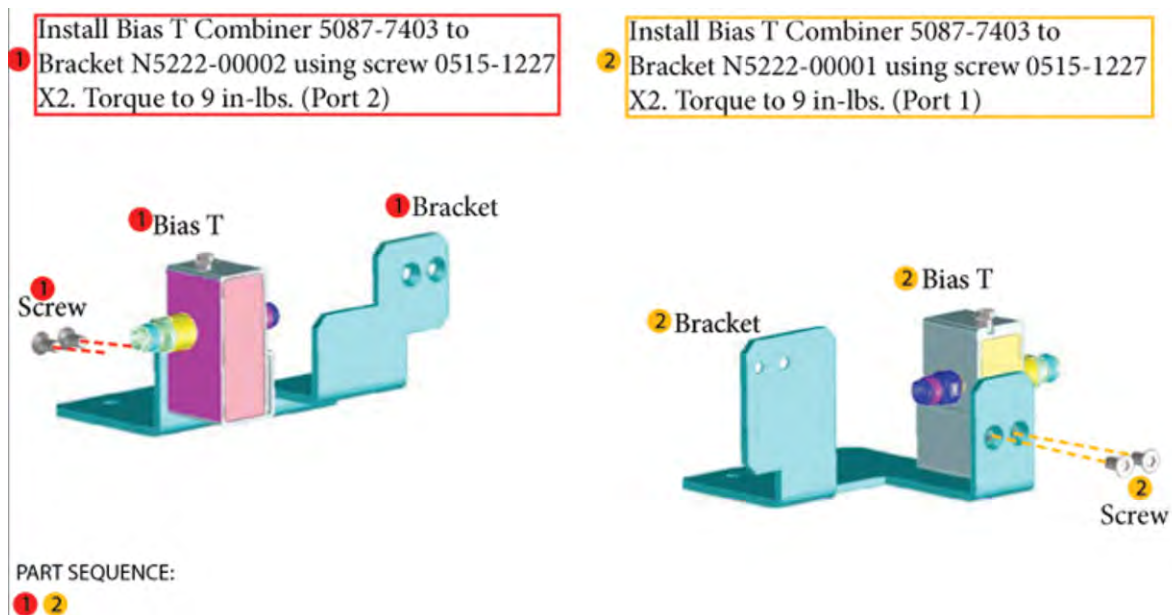
For instructions, click the Chapter 7 bookmark “Removing and Replacing the A20 IF Multiplexer Board” in the PDF Service Guide¹.

Save all mounting hardware (except the stabilizer bracket) for reuse.

Step 8. Assemble the Bias Tee Combiner Assemblies

Refer to **Figure 3** for this step of the procedure. New parts are listed in **Table 1 on page 9** (items ① and ②). Use a T-10 TORX driver to tighten all screws.

Figure 3 Bias Tee Combiner Assembly (N5222-00001 (Port 1), N5222-00002 (Port 2), 5087-7403, & 0515-1227)

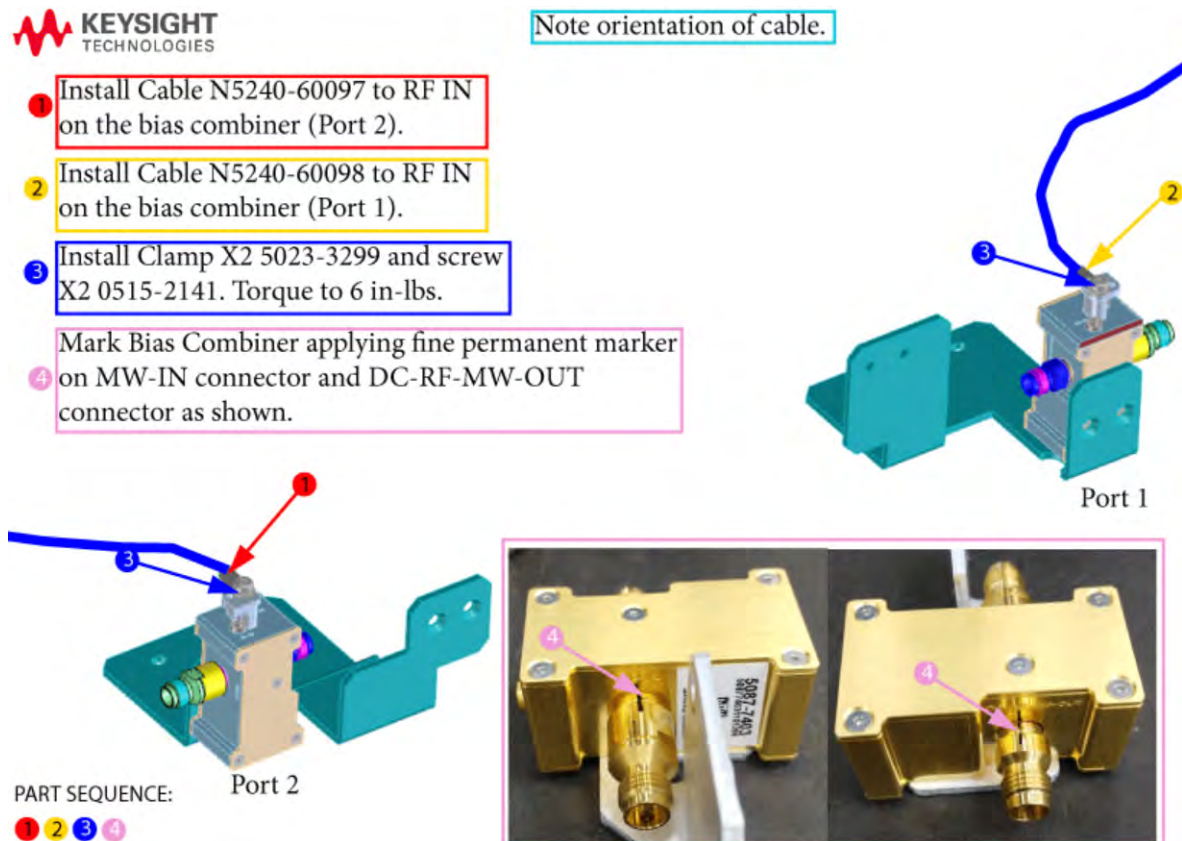


Step 9. Install the A71 and A74 Bias Tee Combiner Assemblies

Refer to **Figure 4** for this step of the procedure. See also the Chapter 6 bookmarks “Bottom Ribbon Cables and Wire Harnesses, 4-port, Option 205 (S/N Prefixes <6021)” or “Bottom Ribbon Cables and Wire Harnesses, 4-port, Option 205 (S/N Prefixes ≥6021)” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 9**.

1. Install the N5240-60097 cable as shown. Note the orientation of the cable (item ①).
2. Install the N5240-60098 cable as shown. Note the orientation of the cable (item ②).
3. Add 5023-3299 (x2) clamps and 0515-2141 (x2) clamp screws as shown (item ③). Torque to 6 in-lbs.
4. Mark bias combiner with fine permanent marker on MW-IN connector and DC-RF-MW-OUT (item ④).

Figure 4 Install cables and clamps to bias tee combiners (N5240-60098, N5240-60097, 5023-3299, and 0515-2141)



1. See “[Downloading the Online PNA Service Guide](#)” on page 7.

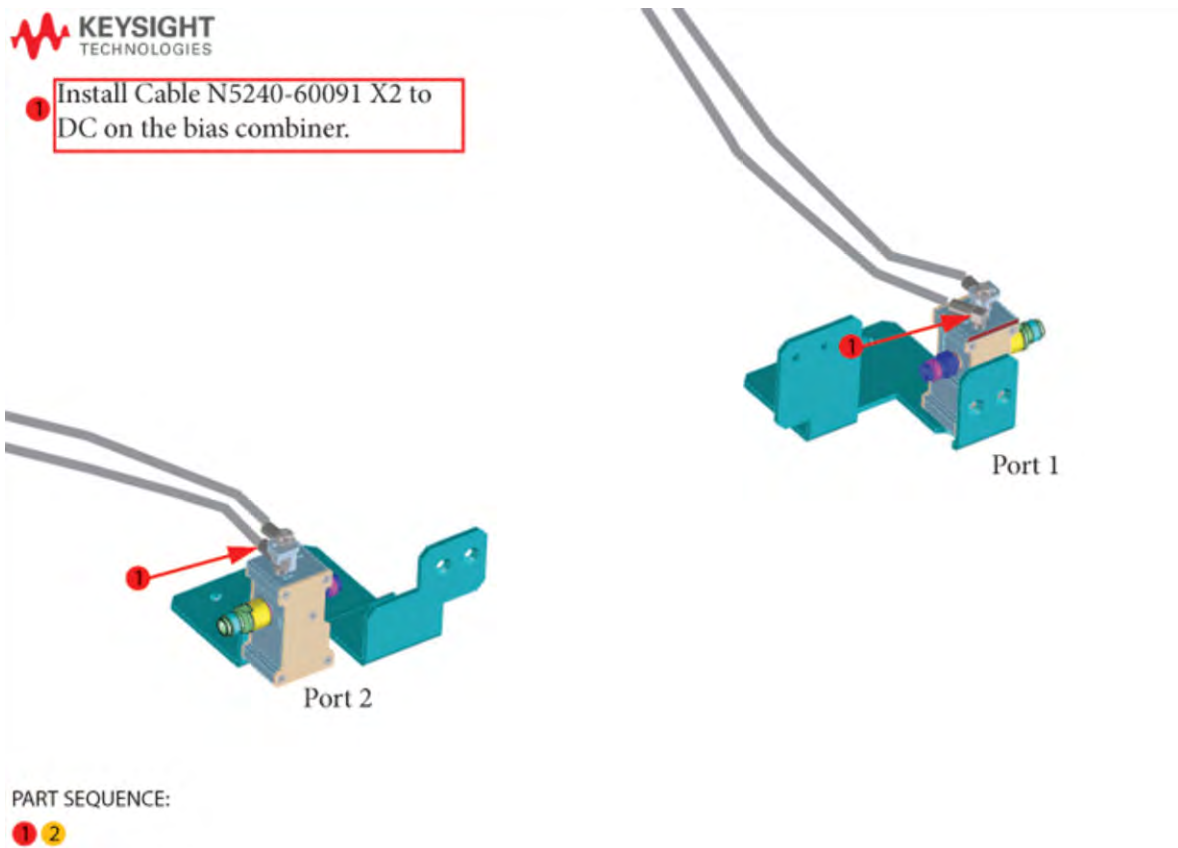
Refer to **Figure 5** for this step of the procedure. New parts are listed in **Table 1** on page 9.

NOTE

IMPORTANT! The N5240-60091 (x2) bias combiner cables only connect to the DC bias of the Bias Tee Combiner.

5. Install the N5240-60091 (x2) DC cables as shown (item ①).

Figure 5 Install DC cables to the bias tees (N5240-60091)

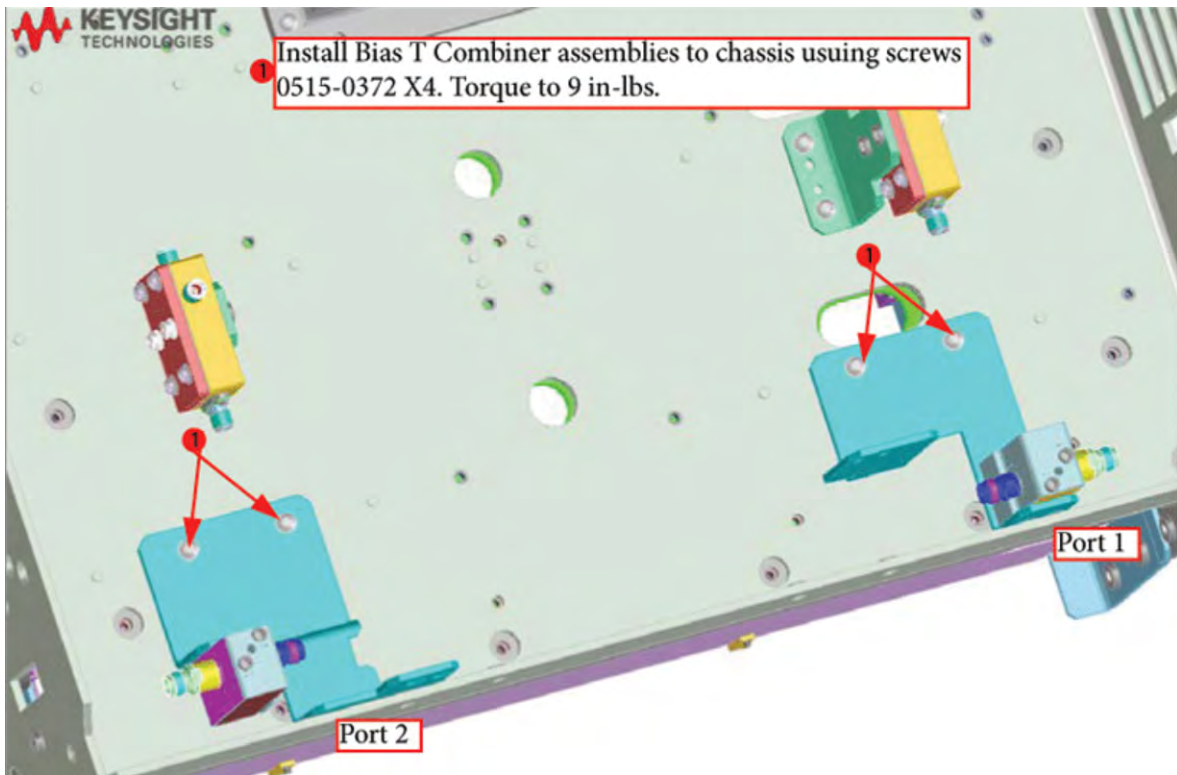


Description of the Upgrade
Installation Procedure for the Upgrade

Refer to **Figure 6** for this step of the procedure. New parts are listed in **Table 1 on page 9**. Torque to 9 in-lbs.

6. Install the bias tee combiner assemblies using 0515-0372 (x4) screws as shown.

Figure 6 Bias Tee Combiner Installation (0515-0372)



Step 10. Connect the A14 Motherboard/IF Multiplexer (IF MUX)/Low Frequency Extension (LFE)/Test Set Motherboard (TSMB) Ribbon Cable (N5240-60089)

Refer to **Figure 7** for this step of the procedure. New parts are listed in **Table 1** on page 9.

1. Remove the N5242-60004 Motherboard/IF MUX/Test set motherboard (TSMB)) ribbon cable from the A18 system motherboard connector J1 and discard this cable (item ①). Refer to **Figure 7** (N5240-60089 is shown, but N5242-60004 is similar).
2. Install the N5240-60089 ribbon cable to the A14 system motherboard J1 (item ①). Refer to **Figure 7**.

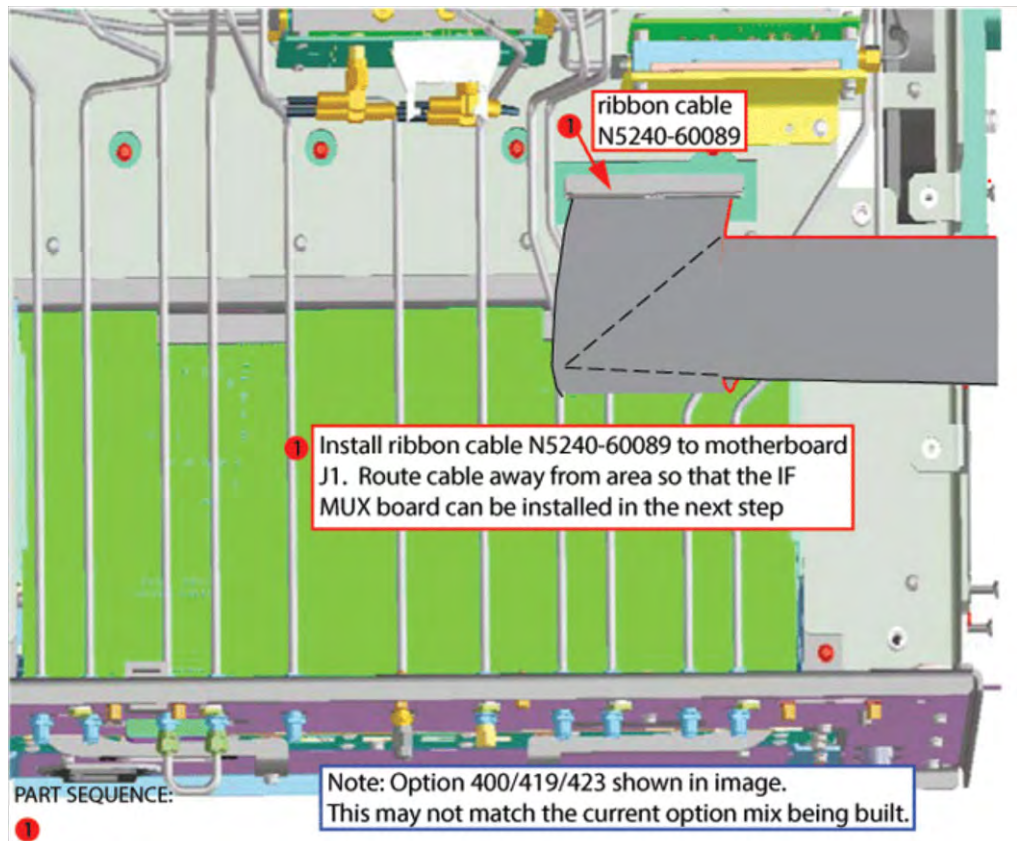
NOTE

IMPORTANT!

Be careful to route the cable as shown in **Figure 7** to avoid interference with the IF MUX board installation.

Figure 7

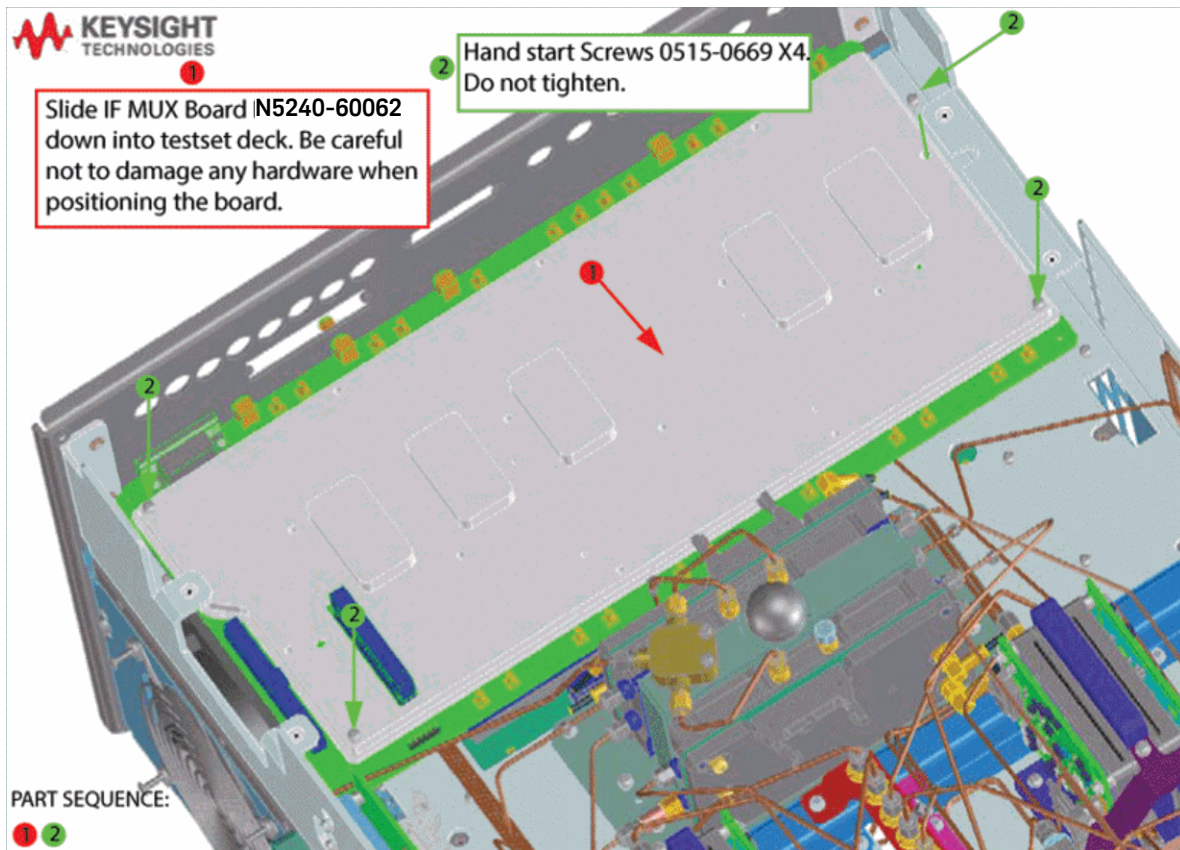
Install the Ribbon Cable on the A14 Motherboard (N5240-60089)



Step 11. Reinstall the A20 IF Multiplexer (IF MUX) Board and Connect the Motherboard / IF Multiplexer / Low Frequency Extension (LFE)/ Test set motherboard (MB/IF MUX/LFE/TSMB) ribbon cable (N5240-60089) and the IF MUX Rear Panel Hardware

1. Reinstall the IF MUX board (item ①) using 0515-0669 (x4) screws (item ②).
2. For now, hand tighten only (item ②). Refer to [Figure 8](#).

Figure 8 Reinstall the A20 IF MUX Board (N5240-60062 and 0515-0669)¹

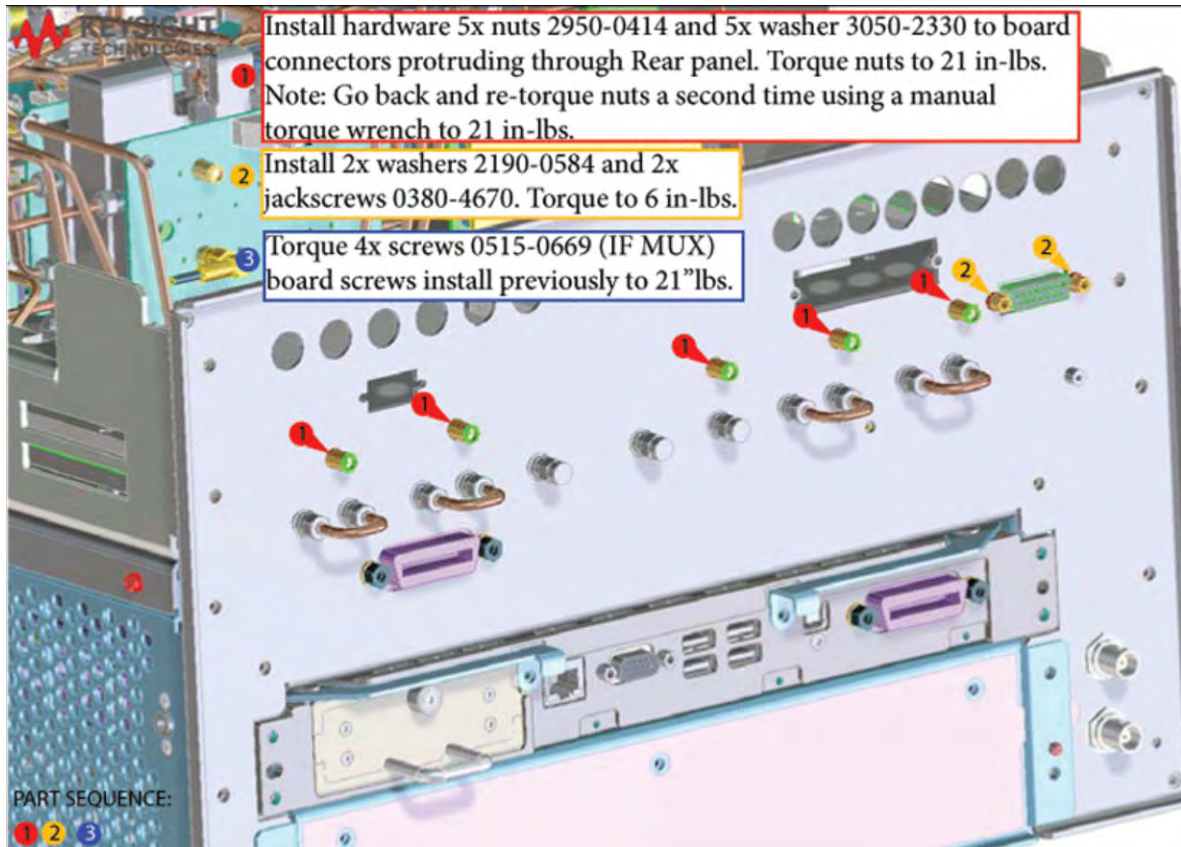


1. The A22 splitter (5087-7139) and N5222-20007, N5222-20008, and N5222-20009 cables are only used with a legacy HMA26.5 p/n: 5087-7765. If your PNA has a new N5240-60101 assembly installed, then set aside these parts as spares for use in other PNAs with the older HMA26.5 or discard. If you are unclear which HMA26.5 assembly your PNA has installed, refer to [Figure 1 on page 6](#).

3. Reinstall the IF MUX board rear panel connectors using the washers and nuts removed in **“Step 7. Remove A20 IF Multiplexer (IF MUX) Board” on page 16** (items ① and ②). Refer to **Figure 9**.
4. Torque the 0515-0669 IF MUX board screws that were previously hand-tightened to 21 in-lbs (item ③).

Figure 9

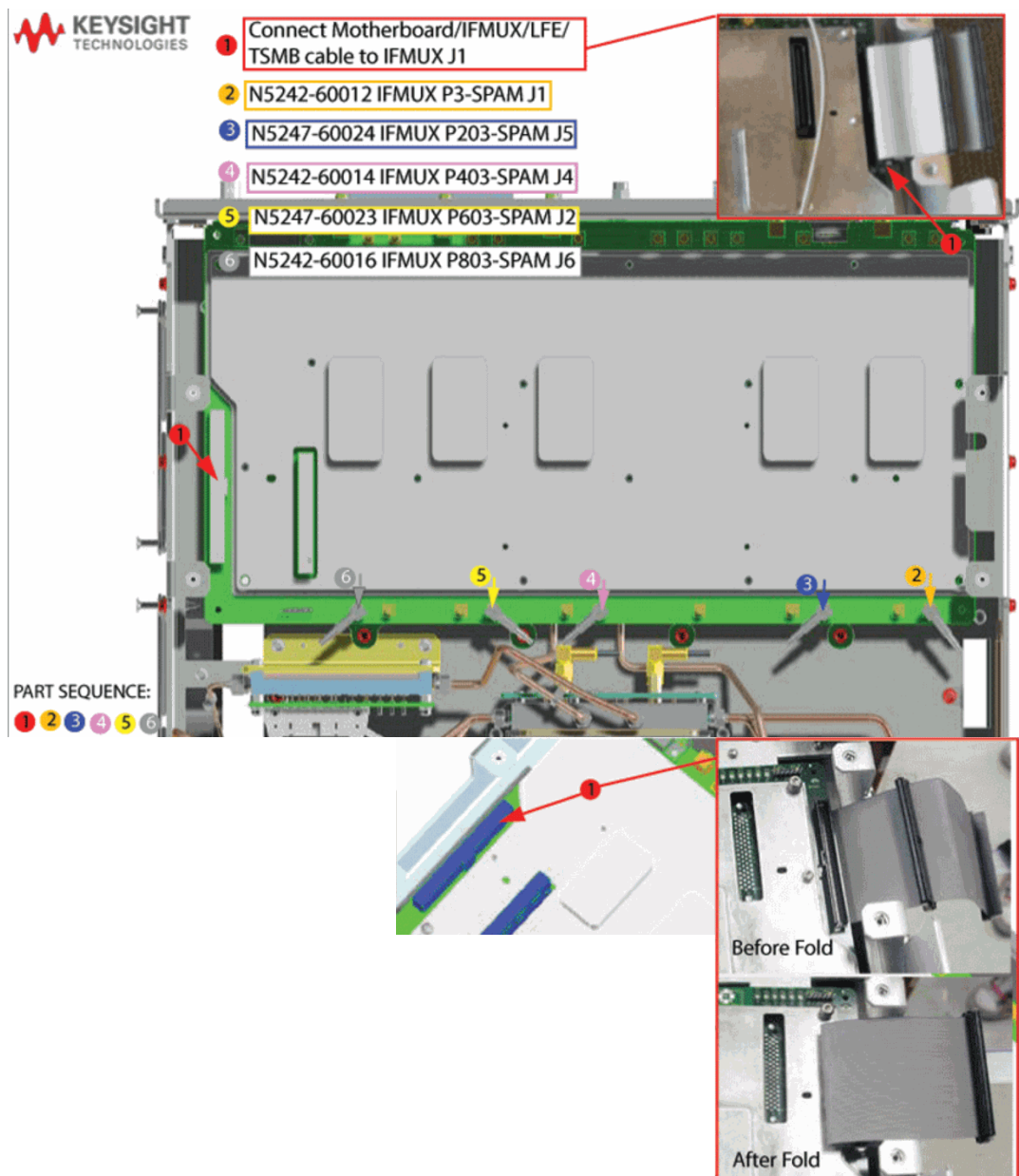
Reinstall the A20 IF MUX board rear panel hardware (N5240-60062 and 0515-0669)



5. Connect the N5240-60089 Motherboard/IF Multiplexer/Low Frequency Extension/Test set motherboard (i.e., MB/IF MUX/LFE/TSMB) ribbon cable to IF MUX J1 and fold as shown (item ①). Refer to **Figure 10 on page 23**.
6. Reconnect the IF Multiplexer /SPAM gray cables (N5242-60012, N5247-60024, N5242-60014, N5247-60023, and N5242-60016), to the A20 IF MUX board as indicated in **Figure 10 on page 23** (items ② through ⑥).

Figure 10

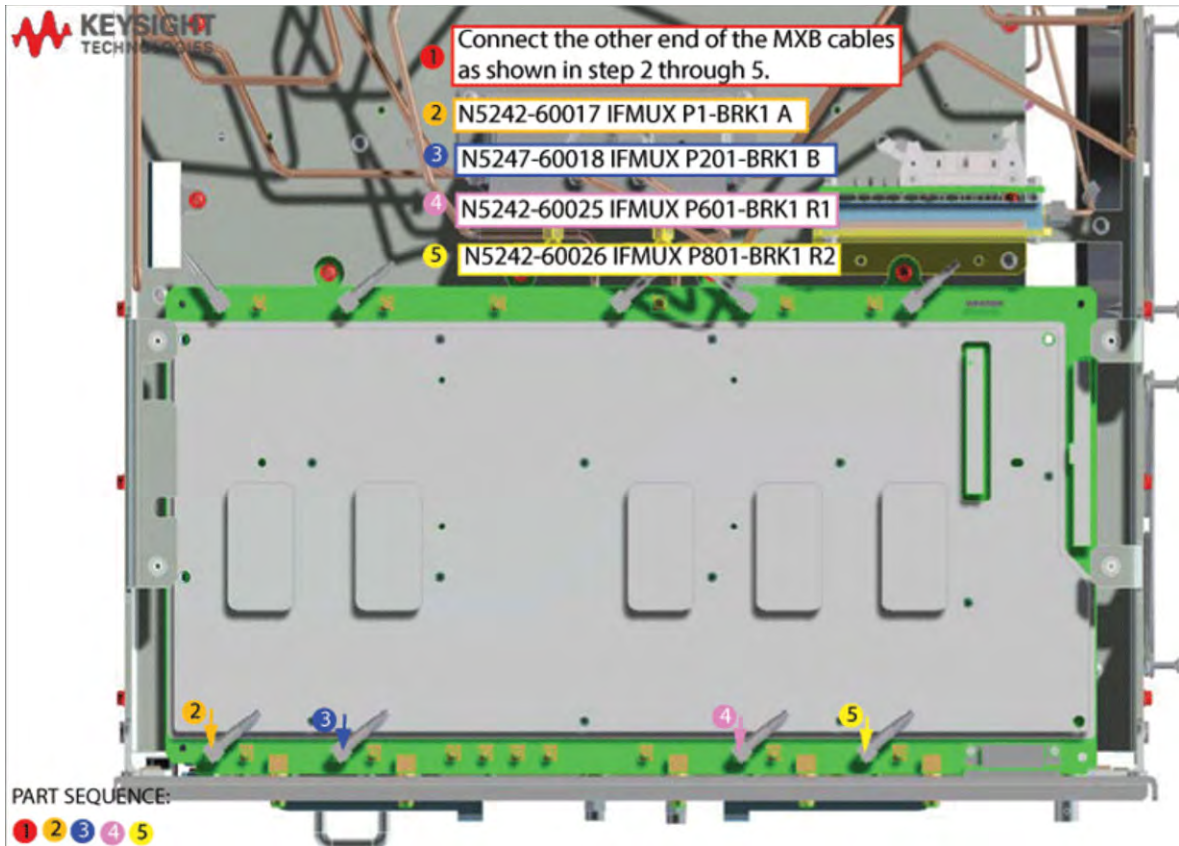
Connect the MB/IF MUX/ Low Frequency Extension (LFE)/TSMB ribbon cable to A20 IF MUX J1 (N5240-60089, N5242-60012, N5247-60024, N5242-60014, N5247-60023, and N5242-60016)



Step 12. Reinstall the Mixer Brick (MXB) Cables

Reconnect the other end of the mixer brick (MXB) cable (item ①) and all of the IF multiplexer (IF MUX) gray cables (IF MUX board as shown (items ② through ⑤)). Refer to **Figure 11**.

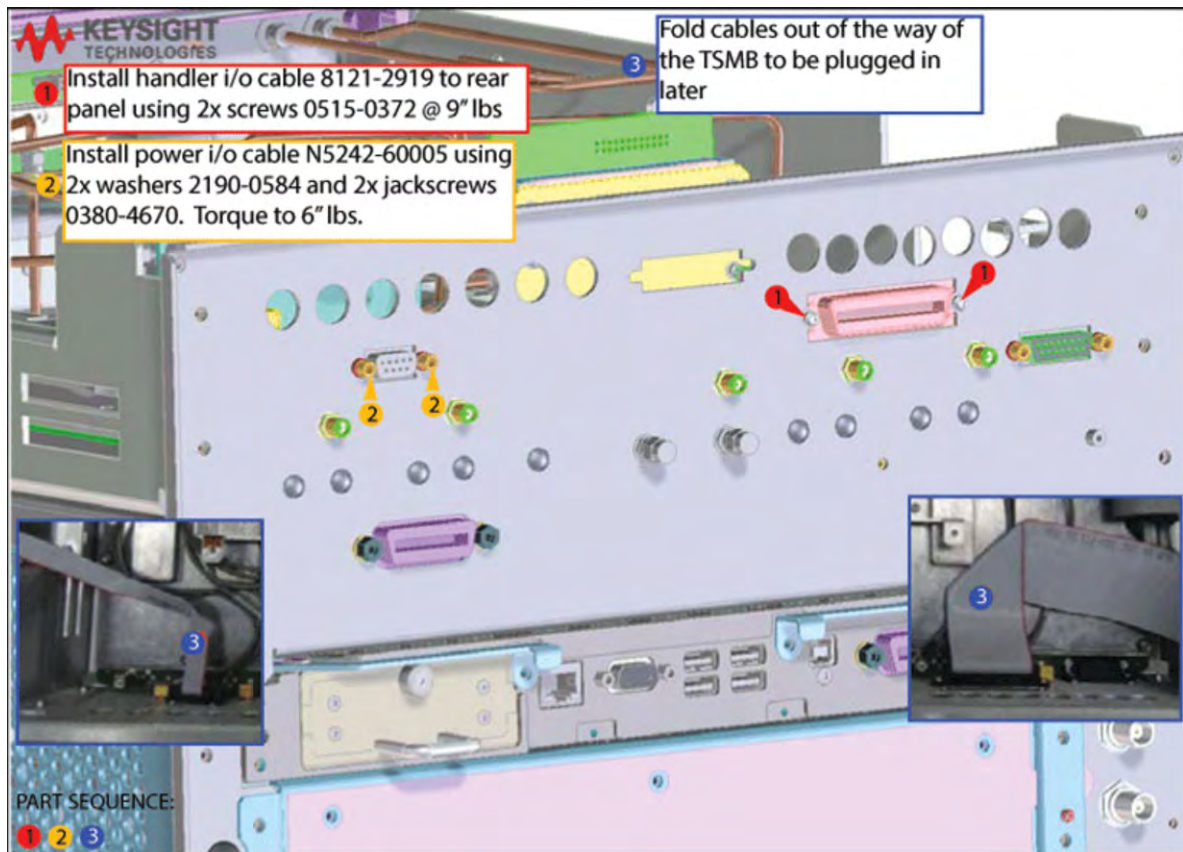
Figure 11 Reconnect other end of the IF gray cables to the IF MUX board



Step 13. Reinstall the handler, Power and Other I/O Assemblies

1. Reinstall the handler, power, and other I/O assemblies and fold cables out of the way of the LFE board to be plugged in (items ① and ③). Refer to **Figure 12**.

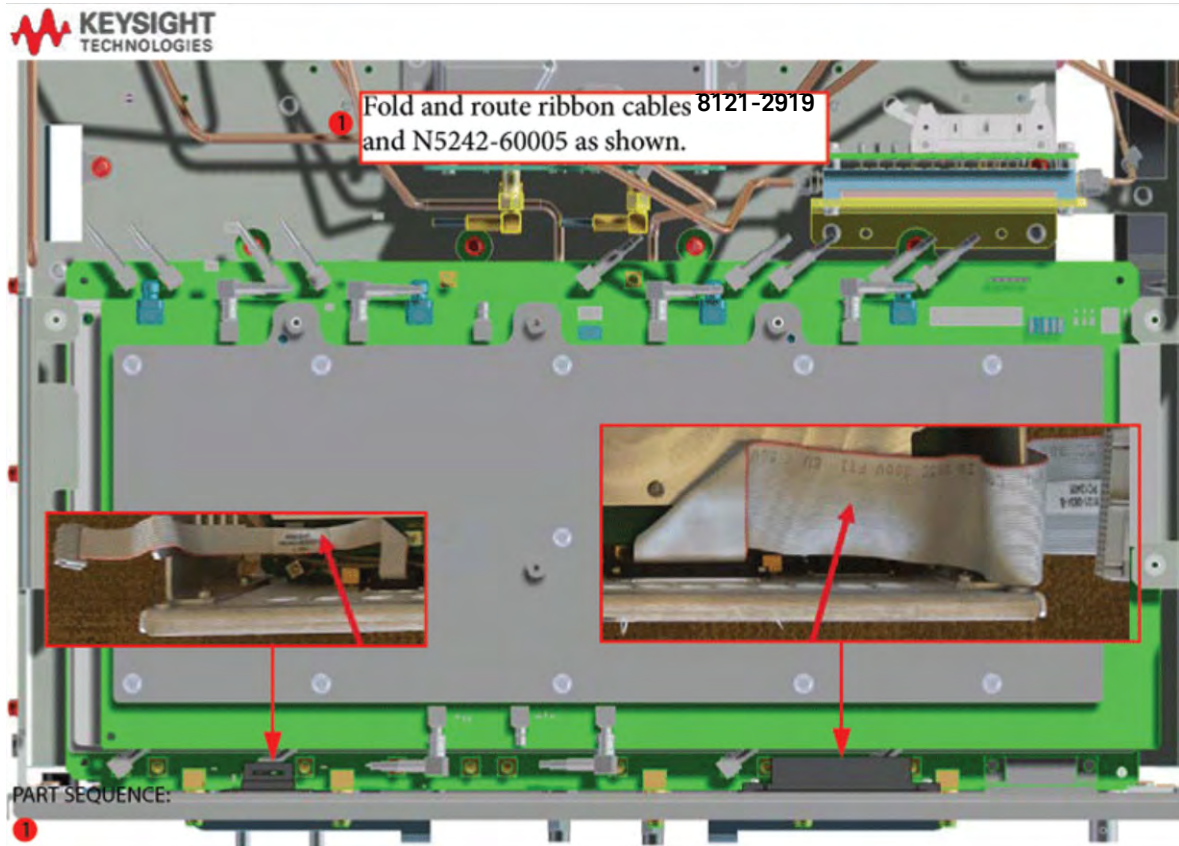
Figure 12 Reinstall handler I/O cable, I/O cable assembly, power I/O assembly, and I/O Cables.



2. Reinstall and route Power I/O and Handler I/O cables. Refer to **Figure 13**.

Figure 13

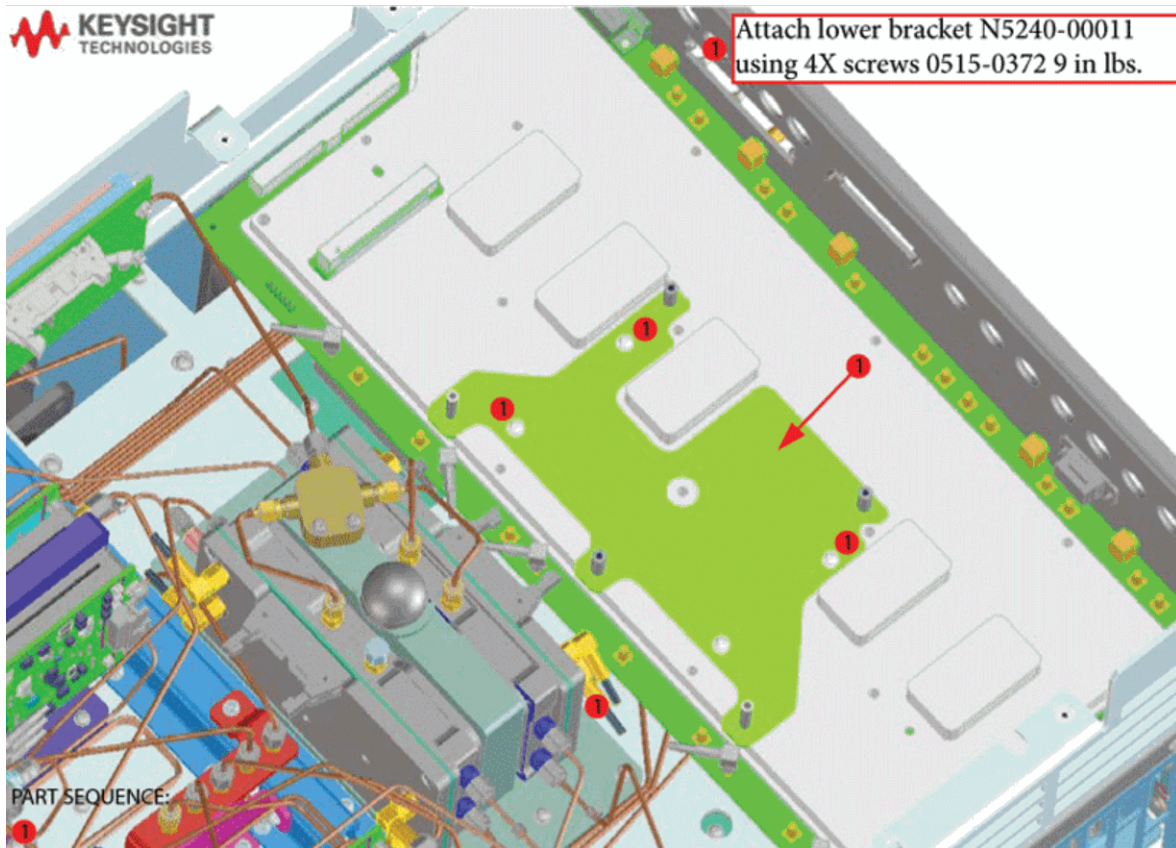
Reinstall and route the ribbon cables (8121-2919) and gray cable N5242-60005



Step 14. Attach Lower Bracket (N5240-00011) to IF MUX Board Shield

Attach N5240-00011 lower bracket to the IF MUX board using 0515-0372 (x4) screws. Torque to 9 in-lbs. Refer to **Figure 14**.

Figure 14 Attach lower bracket to IF MUX board (N5240-00011 and 0515-0372)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 6.

Step 15. Connect and Route New Low Frequency Extension (LFE) Cables (8120-5014 (x2), 8120-5017 (x1), and 8120-5021 (x1)) to the on the IF Multiplexer (IF MUX) Board

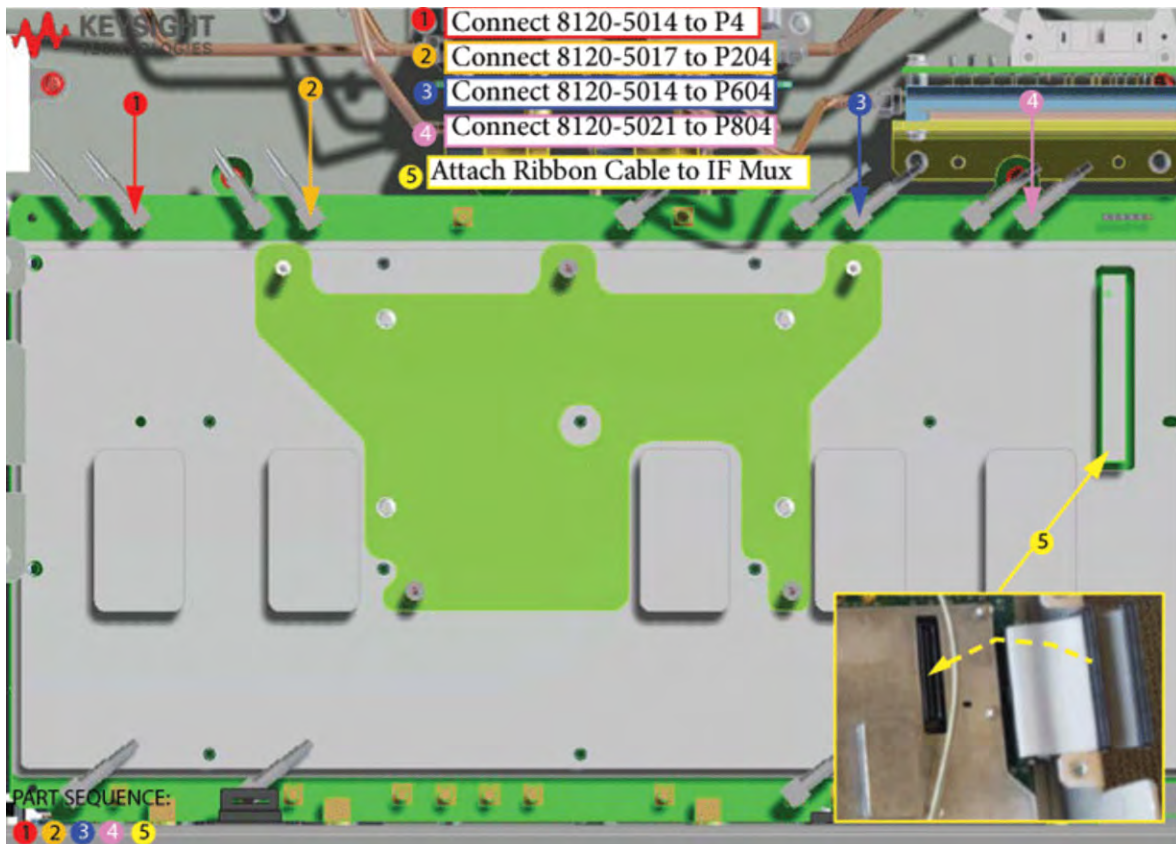
1. Connect and route the 8120-5014 (x2), 8120-5017 (x1), and 8120-5021(x1) cables and connect the N5240-60089 MB/IF MUX/LFE/TSMB ribbon cable as shown on the IF MUX board (items ① through ⑤). You will connect the other ends of the IF gray cables later on the process. Refer to **Figure 15**.

NOTE

When connecting the IF gray cables, be careful to look for the correct connector labels on the IF multiplexer (IF MUX) board.

Figure 15

Connecting and routing the gray cables and MB/IF MUX/LFE/TSMB ribbon cable (N5240-60089) on the IF MUX board (8120-5014 (x2), 8120-5017 (x1), and 8120-5021(x1))



2. Route the reconnected mixer brick (MXB) and IF multiplexer (IF MUX) gray cables that were reconnected in “Step 12. Reinstall the Mixer Brick (MXB) Cables” on page 24. Refer to Figure 16.

Figure 16 Routing the reconnected MXB and IF MUX Gray Cables on the IF MUX board

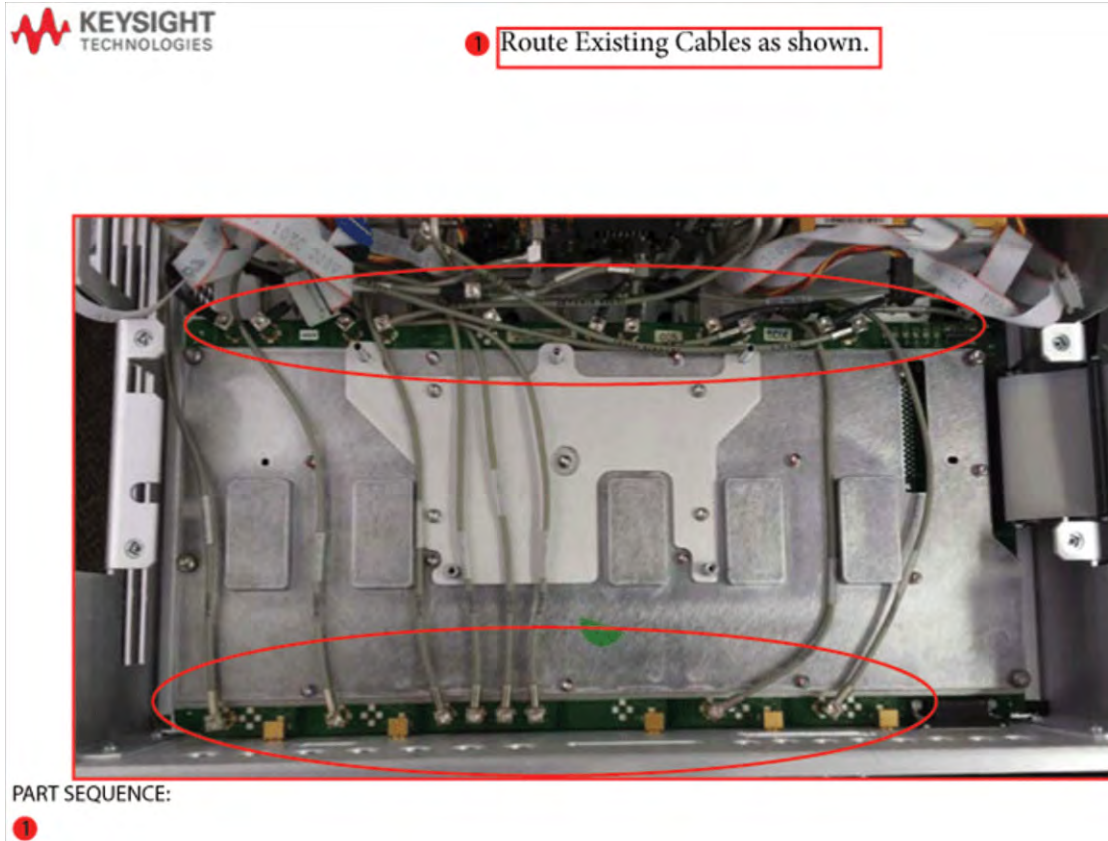
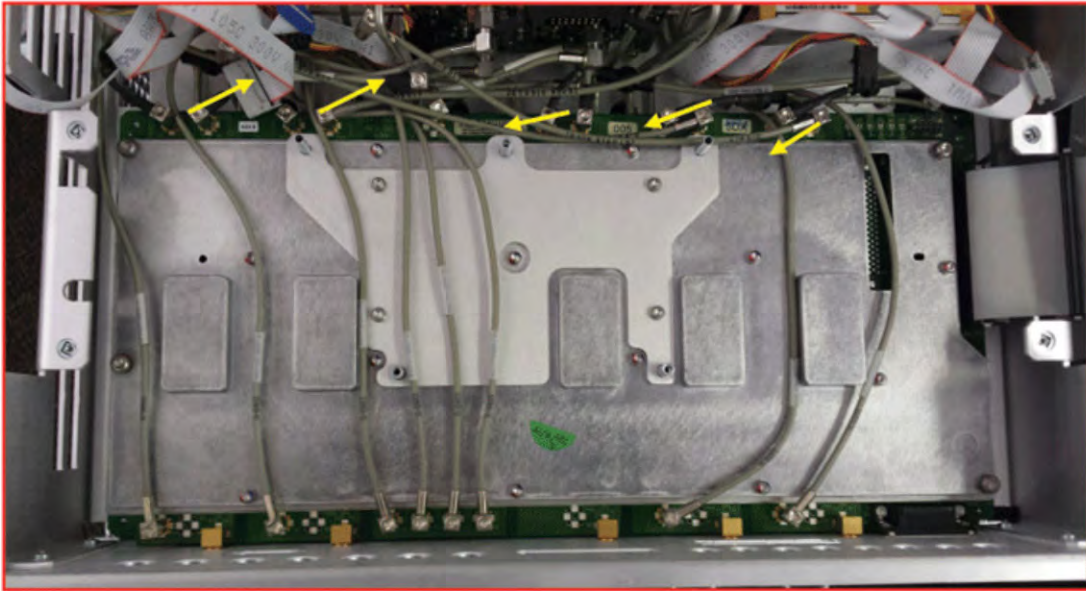


Figure 17 Routing the new low frequency extension (LFE) Gray Cables on the IF MUX board (8120-5014 (x2), 8120-5017 (x1), and 8120-5021(x1))



① Route LFE cables in direction of yellow arrows.

Note: Be sure that cables lay flat so they do not get pinched when installing the LFE board.



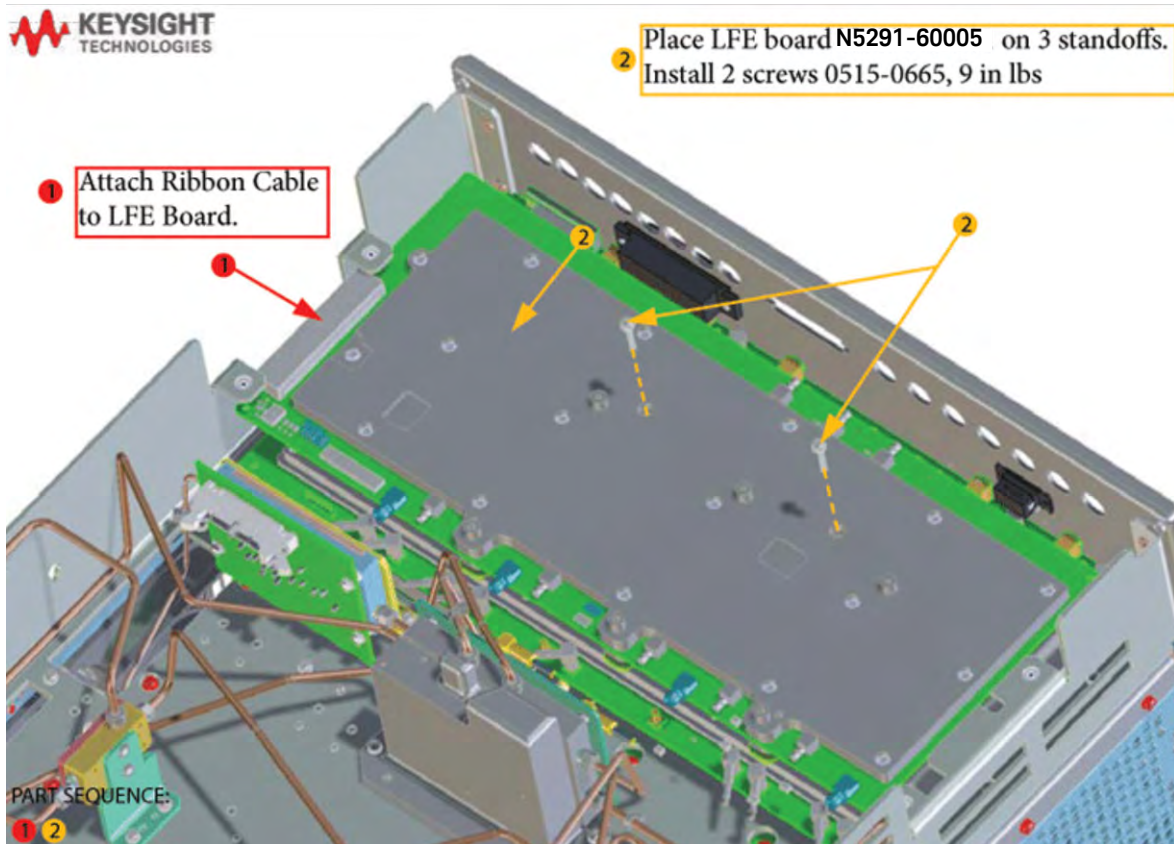
PART SEQUENCE:



Step 16. Install A75 Low Frequency Extension (LFE) Board

1. Install the A75 LFE board using the standoffs as a guide.
2. Connect N5240-60089 Motherboard / IF Multiplexer / LFE/ Test set motherboard (i.e., MB/IF MUX/LFE/TSMB) ribbon cable to LFE board J1 (item ①). Refer to **Figure 18**.
3. Install the N5291-60005 A75 LFE board using the 0515-0665 screws x2. Torque to 9 in-lbs (item ②). Refer to **Figure 18**.

Figure 18 Install the A75 LFE board (N5240-60089, N5291-60005 and 0515-0665)



Step 17. Connect A71 and A74 Bias-Tee Combiner's New Cables to A75 Low Frequency Extension (LFE) Board and the Other Ends of the New Cables Connected to the IF Multiplier (IF MUX) Board

1. Connect the (8120-5014 (x2), 8120-5017 (x1), 8120-5021 (x1)) IF gray cables item ① through item ④ as shown in **Figure 19 on page 33** (Version 6 synthesizers) and **Figure 20 on page 34** (Version 7 synthesizers). (i.e., one end was installed in **Figure 15 on page 28**.)
2. Then choose one of the following:
 - **Version 6 Synthesizers:** Connect the N5242-60078 Source 1 and N5242-60080 LO Source cables to the LFE board as shown – (items ⑤ and ⑥). The other end of the N5242-60078 and N5242-60080 cables are connected to the Source1 and LO Source boards in a later step. Refer to **Figure 19 on page 33** and **Figure 27 on page 44**.
 - **Version 7 Synthesizers:** Connect the N5240-60112 Source 1 and N5240-60113 LO Source cables to the LFE board as shown – (items ⑤ and ⑥). The other end of the N5240-60112 and N5240-60113 cables are connected to the Source1 and LO Source boards in a later step. Refer to **Figure 20 on page 34** and **Figure 28 on page 45**.

Figure 19

Version 6 Synthesizers: Connect A71–A74 bias-T combiners new cables to the A75 LFE board the other ends of the new LFE cables to the LFE Board (8120-5014 (x2), 8120-5017 (x1), 8120-5021 (x1), N5242-60078, and N5242-60080)

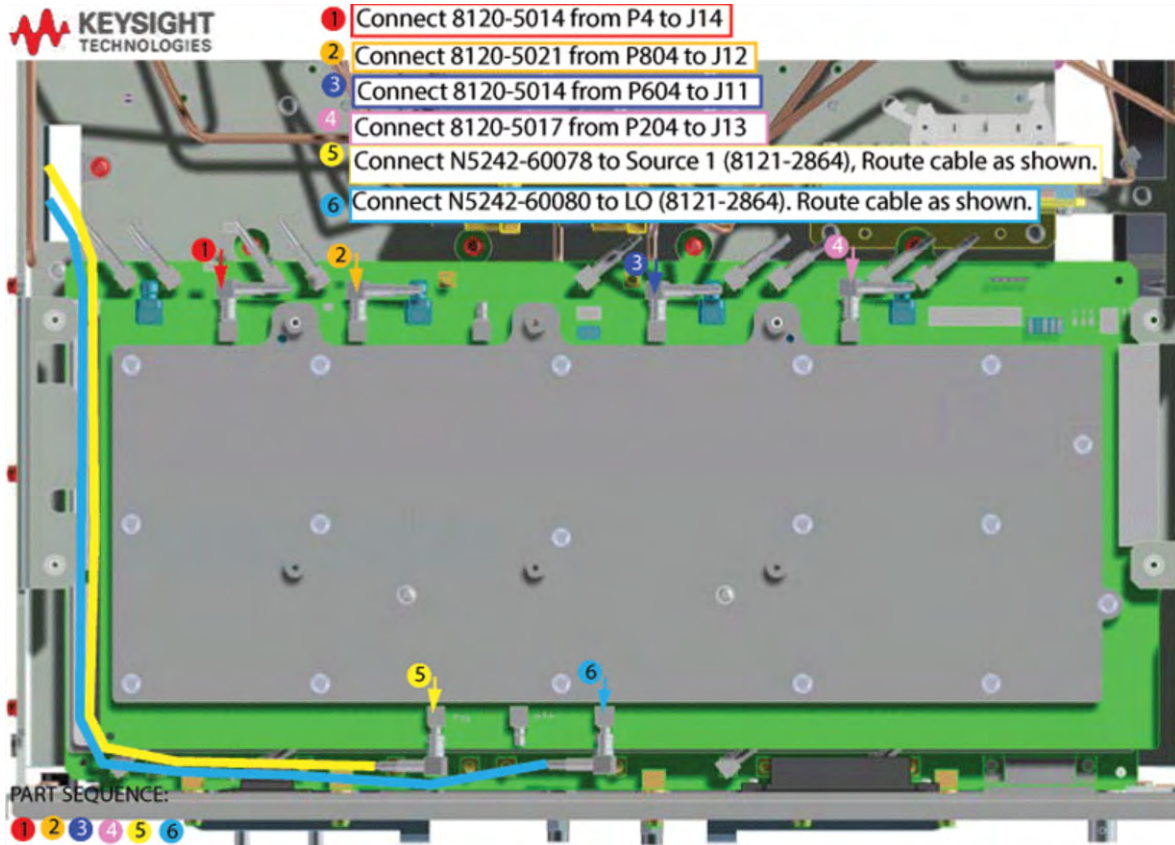
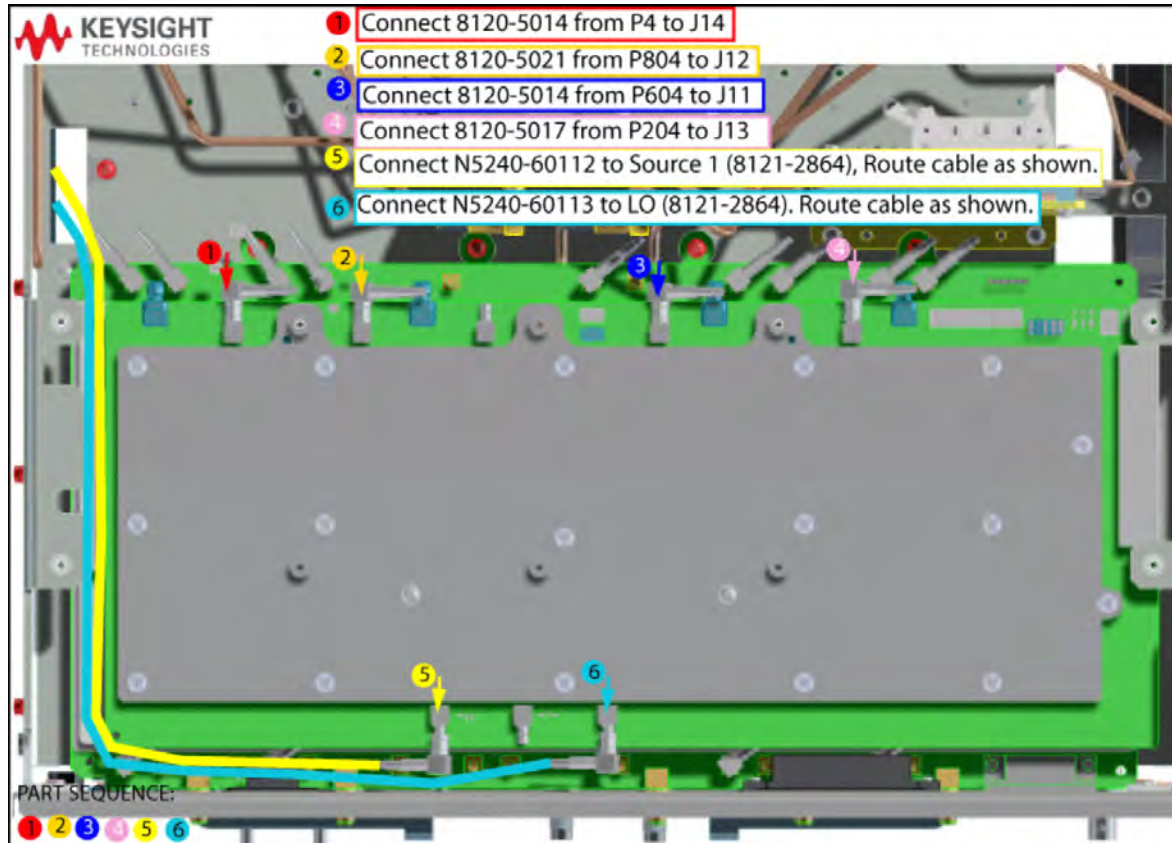


Figure 20

Version 7 Synthesizers: Connect A71–A74 bias-T combiners new cables to the A75 LFE board the other ends of the new LFE cables to the LFE Board (8120-5014 (x2), 8120-5017 (x1), 8120-5021 (x1), N5240-60112, and N5240-60113)



Step 18. Install the New Bias Tee Combiner's Semirigid Test Set Cables, the Blue Cables, and Install Cable Clamps Onto Ferrite Beads

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

To avoid damage when connecting and torquing the bias T combiner semirigid cables, always use a wrench to hold the bias T combiner connectors.

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.

This step contains the following:

- “Install the New Test Set Semi-rigid Cables” on page 35
- “Install New N5240-60097 and N5240-60098 Blue Bias-Tee Combiner Cables and Clamps from the A71 and A74 Bias Tees “RF-IN” to the A75 LFE Board “Port1” and “Port2” Connectors, and Cable Clamps Onto Ferrite Beads” on page 38

Install the New Test Set Semi-rigid Cables

To see an image showing the location of these cables, refer to **Figure 21 on page 36** and **Figure 22 on page 37**. See also the Chapter 6 bookmarks “Bottom RF Cables, 2-port Configuration, Option 205” (S/N Prefixes <6021)” or “Bottom Ribbon Cables and Wire Harnesses, 2-port, Option 205 (S/N Prefixes ≥6021)” in the PDF Service Guide. New parts are listed in **Table 1 on page 9**.

1. Install the following new cables in the order listed.

Refer to **Figure 21 on page 36**.

- ①–W181 (N5222-20119) Port 1 CPLR THRU to A71 port 1 Bias combiner
- ②–W182 (N5222-20123) A29 port 1 test coupler to A71 port 1 Bias combiner

Refer to **Figure 22 on page 37**.

- ①–W187 (N5222-20120) Port 2 CPLR THRU to A74 port 2 Bias combiner

- ②–W188 (N5222-20124) A32 Port 2 test coupler to A74 port 2 bias combiner

Figure 21 Install A71 port 1 bias-T semirigid cables (N5222-20119 and N5222-20123)

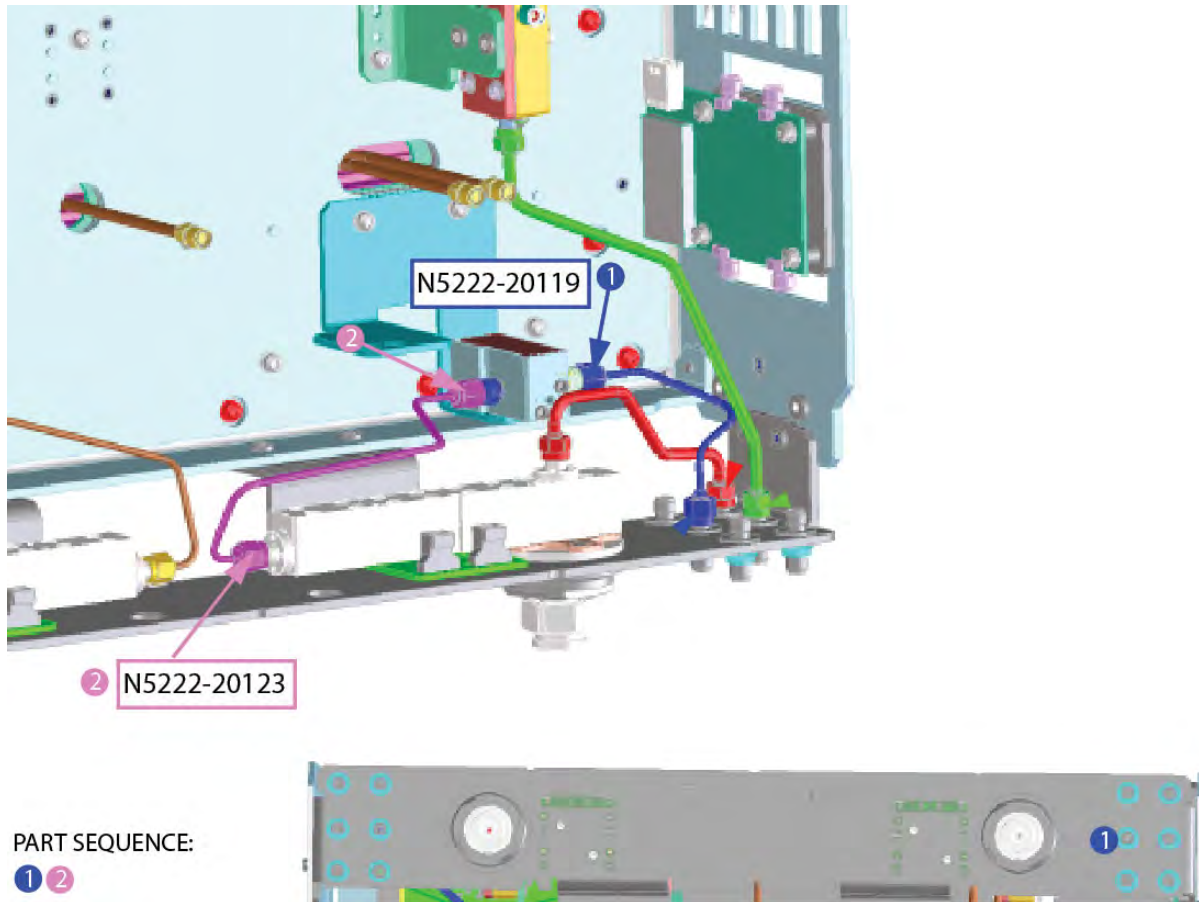
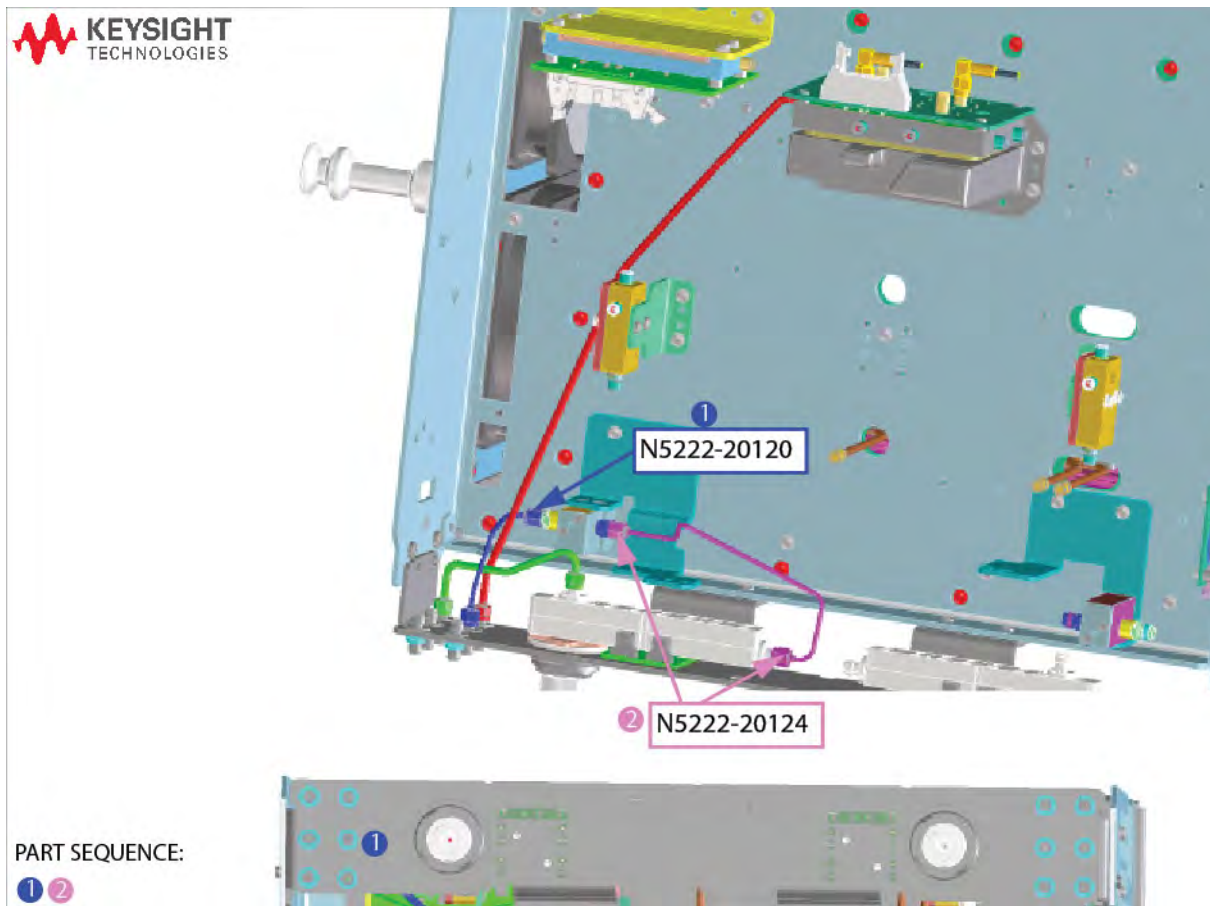


Figure 22 Install A74 port 2 bias-T semirigid cables (N5222-20120 and N5222-20124)



Install New N5240-60097 and N5240-60098 Blue Bias-Tee Combiner Cables and Clamps from the A71 and A74 Bias Tees “RF-IN” to the A75 LFE Board “Port1” and “Port2” Connectors, and Cable Clamps Onto Ferrite Beads

2. Install the W194 – N5240-60098 (x1) cable as shown. Note the orientation of the cable (item ①).
3. Install the W197 – N5240-60097 (x1) cable as shown. Note the orientation of the cable (item ②).
4. Route cables as shown.

Figure 23

Connect N5240-60097 and N5240-60098 from A71 and A74 Bias Tee Combiners to A75 LFE Board (N5240-60097 (x1) and N5240-60098 (x1))

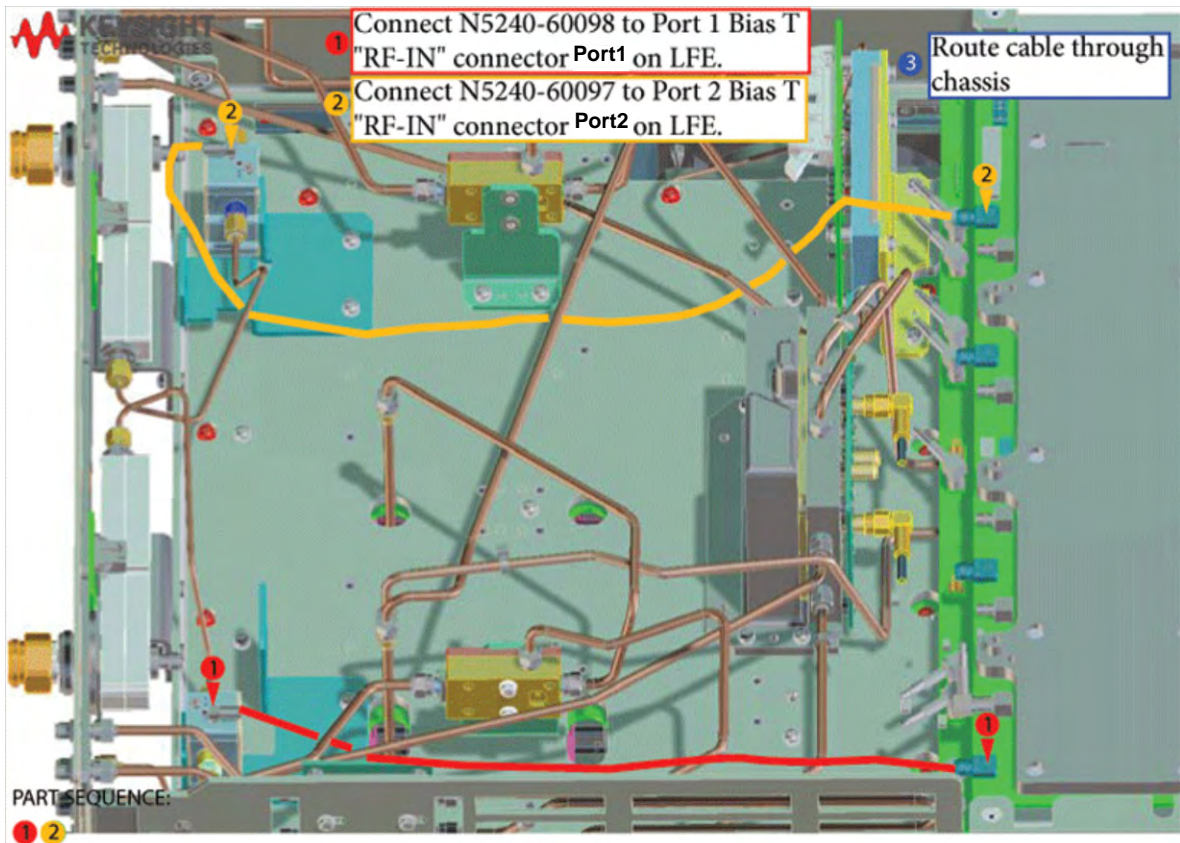


Figure 24 Connect N5240-60098 from A71 Bias Tee Combiner to A75 LFE Board and Install Clamps on Ferrite Beads (N5240-60098 (x1), 1400-1334 (x4), and 1400-1391 (x1))

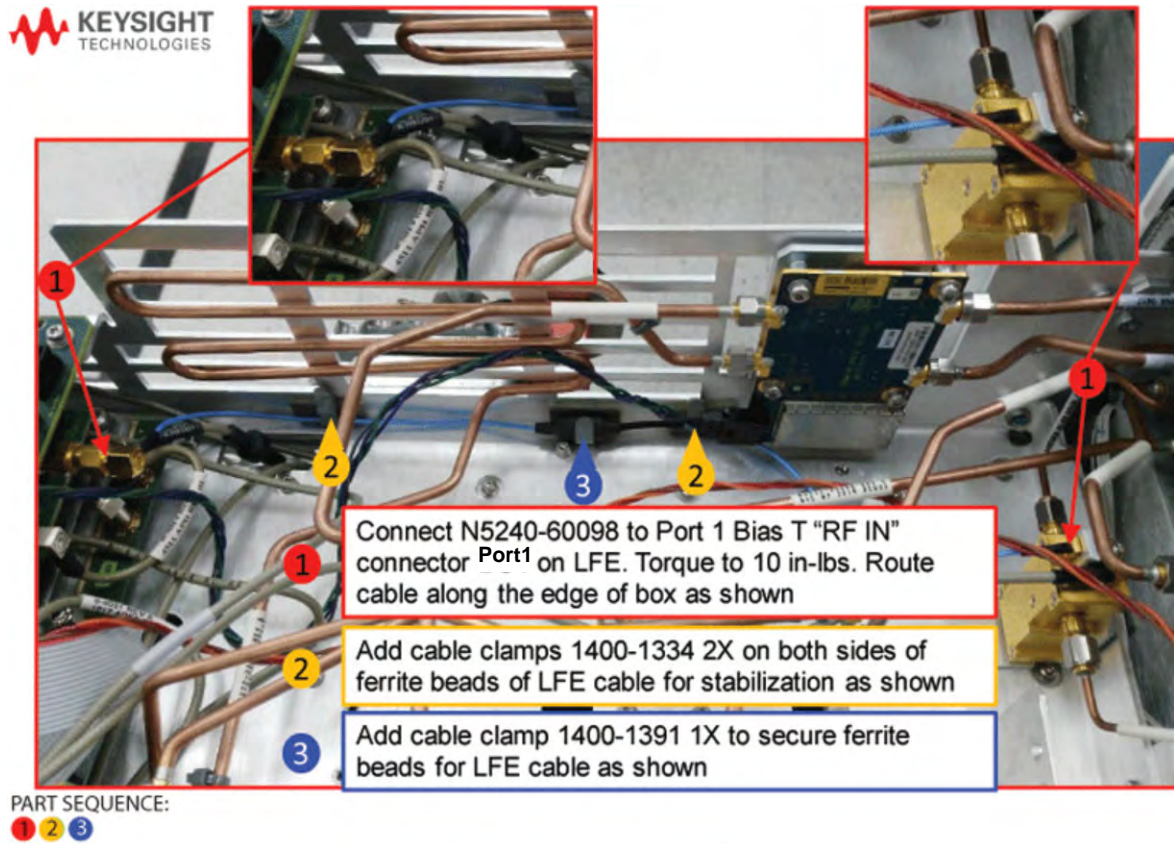
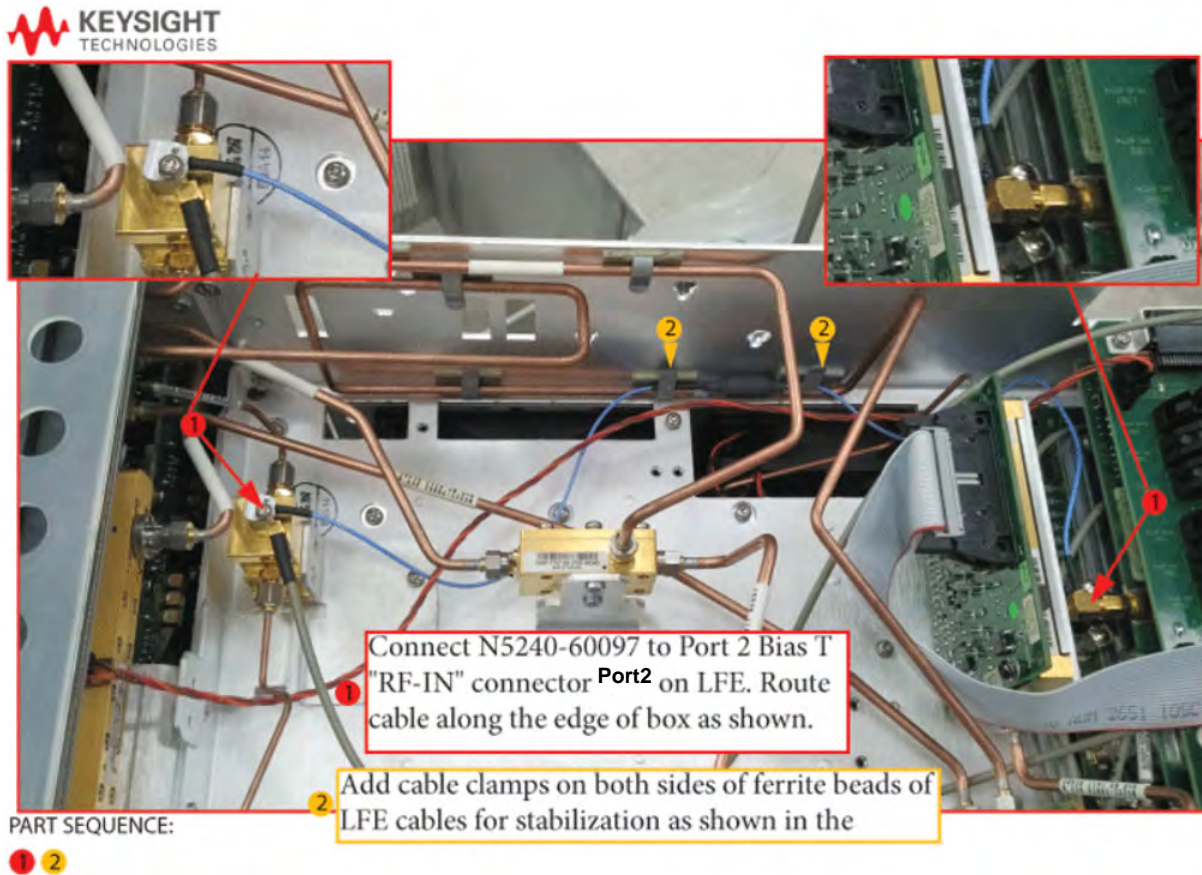


Figure 25 Install the clamps onto the port 2 bias cables (N5240-60097 and 1400-1334 (x2) as shown.



Step 19. Reinstall the A19 Test Set Motherboard

For instructions, click the Chapter 7 bookmark "Removing and Replacing the A19 Test Set Motherboard" in the PDF Service Guide.

NOTE

IMPORTANT!

Use the N5240-60089 ribbon cable from this kit in lieu of ribbon cable N5242-60004. Refer to [Table 1 on page 9](#).

Step 20. Install the A71 and 74 bias-Tee combiner's Gray Low Frequency Extension (LFE) DC bias Cables and Route Cables

This step contains the following:

- “Install the A71 and 74 bias-Tee combiner's Gray Low Frequency Extension (LFE) DC bias Cables” on page 41
- “Route Cables” on page 42

Install the A71 and 74 bias-Tee combiner's Gray Low Frequency Extension (LFE) DC bias Cables

To see an image showing the location of these cables, refer to **Figure 26 on page 42**. See also the Chapter 6 bookmarks “Bottom Ribbon Cables and Wire Harnesses, 2-port, Option 205 (S/N Prefixes <6021)” or “Bottom Ribbon Cables and Wire Harnesses, 2-port, Option 205 (S/N Prefixes ≥6021)” in the PDF Service Guide¹. New parts are listed in **Table 1 on page 9**.

NOTE

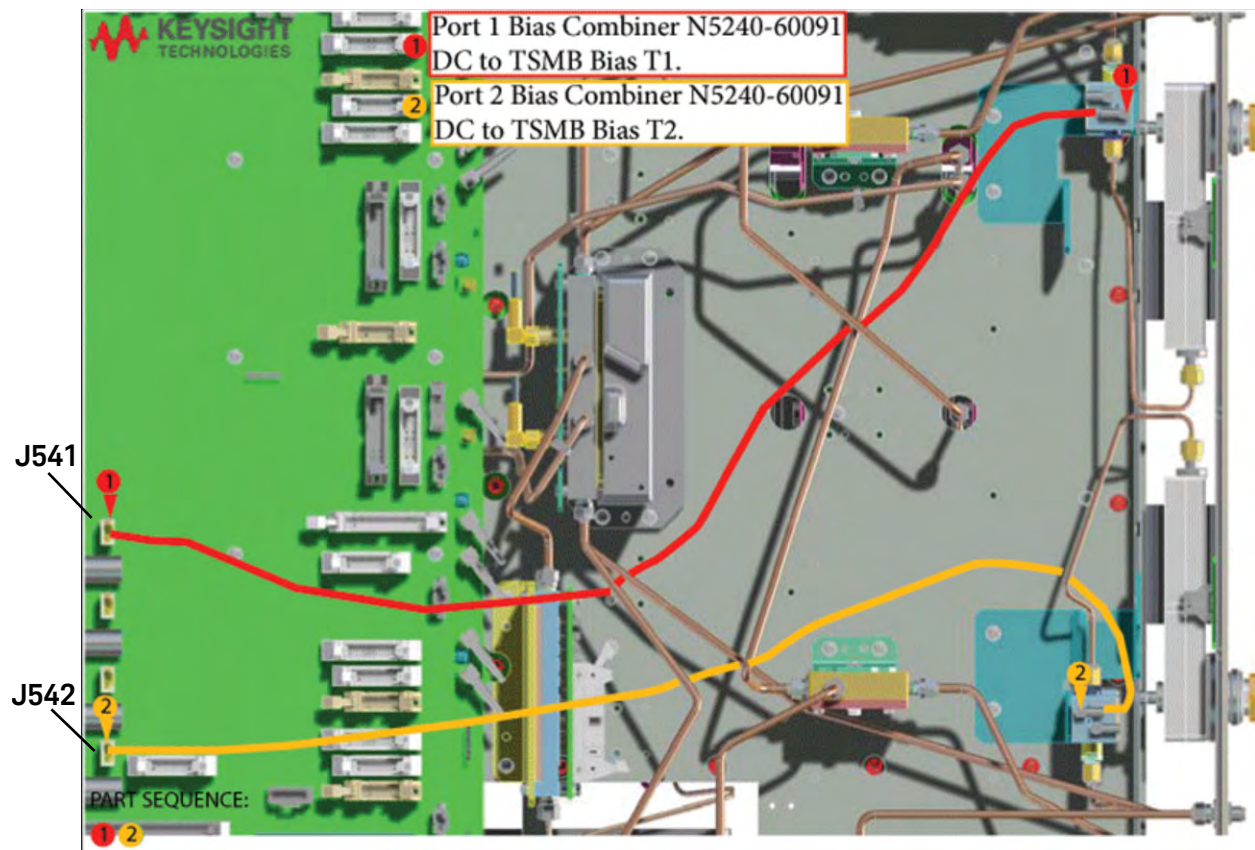
IMPORTANT!

The N5240-60091 bias combiner cables only connect to the DC bias of the Bias Tee Combiner.

5. Connect A71 and A74 gray DC cables to the test set motherboard (TSMB) as follows:
 - ① – (N5242-60091) A19 test set motherboard J541 to A71 port 1 bias-T combiner
 - ② – (N5242-60091) A19 test set motherboard J542 to A74 port 2 bias-T combiner

1. See “Downloading the Online PNA Service Guide” on page 7.

Figure 26 Install the A71 and A74 bias-Tee combiner's gray DC bias cables to the (N5240-60091)



Route Cables

6. Route bias cables as shown.

- Separate cables as much as possible.
- It is OK to cross the cables.
- Avoid running cables parallel or next to each other.
- Avoid tie wrapping to semirigid cables.

Refer to **Figure 26** on page 42.

Step 21. Install the Other End of the Bias-Tee Combiner Cables to the Source Synthesizer and LO Synthesizer Board Gray Cables

CAUTION

This upgrade kit contains cables for Version 6 synthesizers and Version 7 direct digital synthesizer (DDS) assemblies. Please refer to your instrument's Service Guide, if you are unclear which assembly you have installed. Refer to [“Downloading the Online PNA Service Guide” on page 7](#).

Refer to [Figure 27](#) and [Figure 28 on page 45](#). New parts are listed in [Table 1 on page 9](#).

1. The analyzer should be positioned on its left side (fans facing upwards) as shown.
2. Then choose from the following:
 - **Version 6 Synthesizers:** Connect N5242-60078 (item ①) and N5242-60080 (item ②) flexible cables as indicated in [Figure 27 on page 44](#).
 - **Version 7 Synthesizers:** Connect N5240-60112 (item ①) and N5240-60113 (item ②) flexible cables as indicated in [Figure 28 on page 45](#).

Figure 27

Version 6 Synthesizers: New test set cables. Connect the other end of the N5242-60080 and N5242-60078 cables

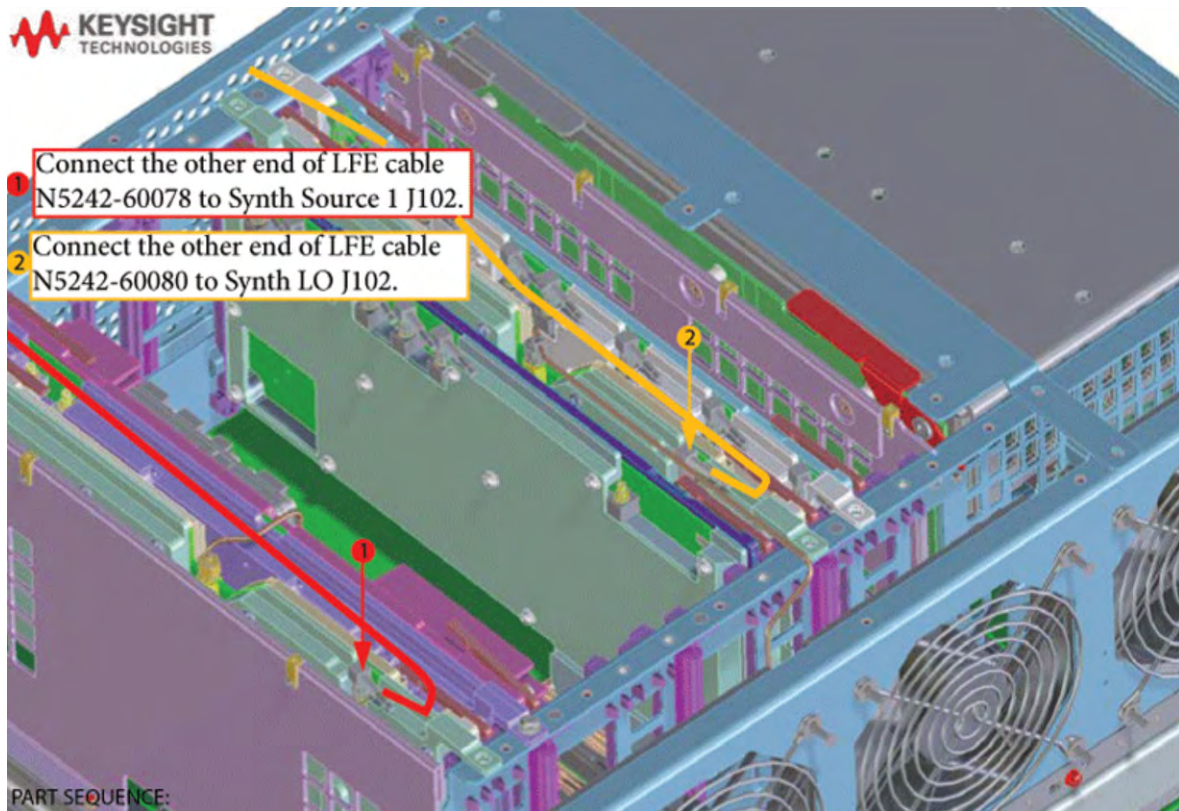
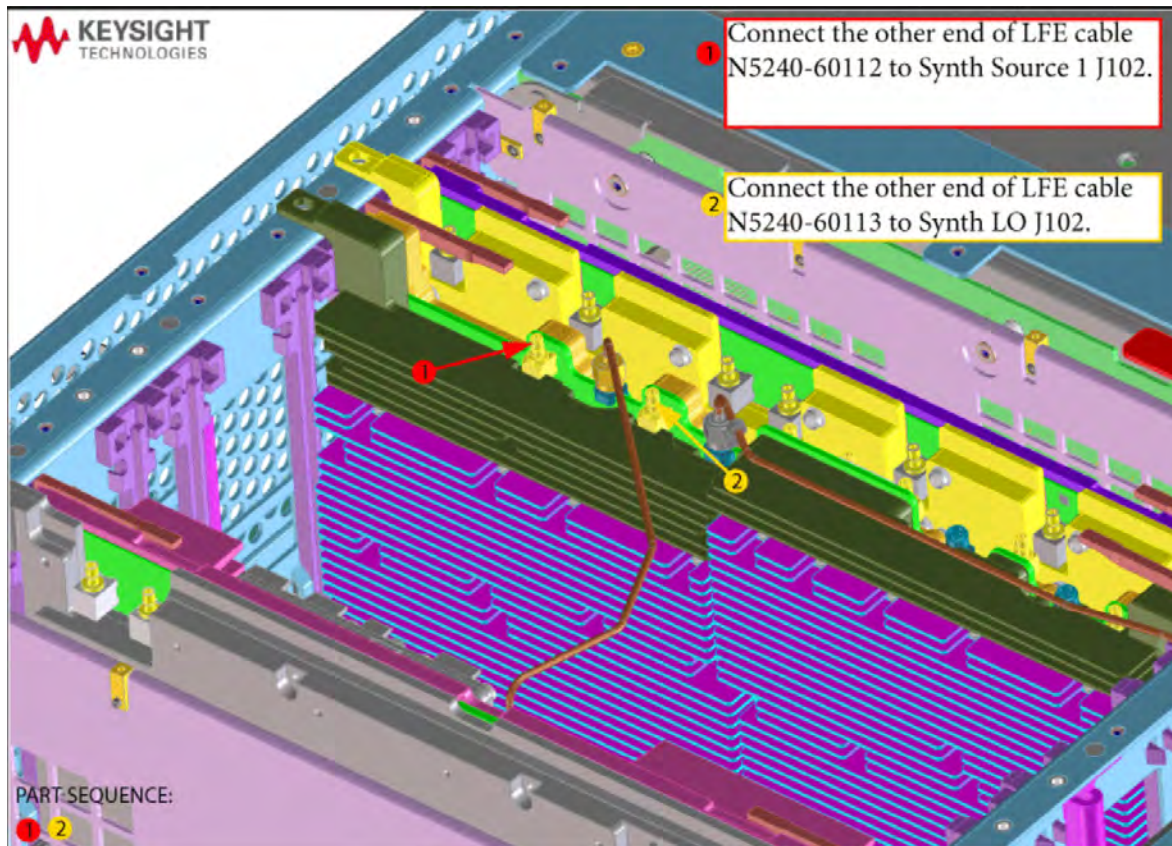


Figure 28

Version 7 Synthesizers: New test set cables. Connect the other end of the N5240-60112 and N5240-60113 cables



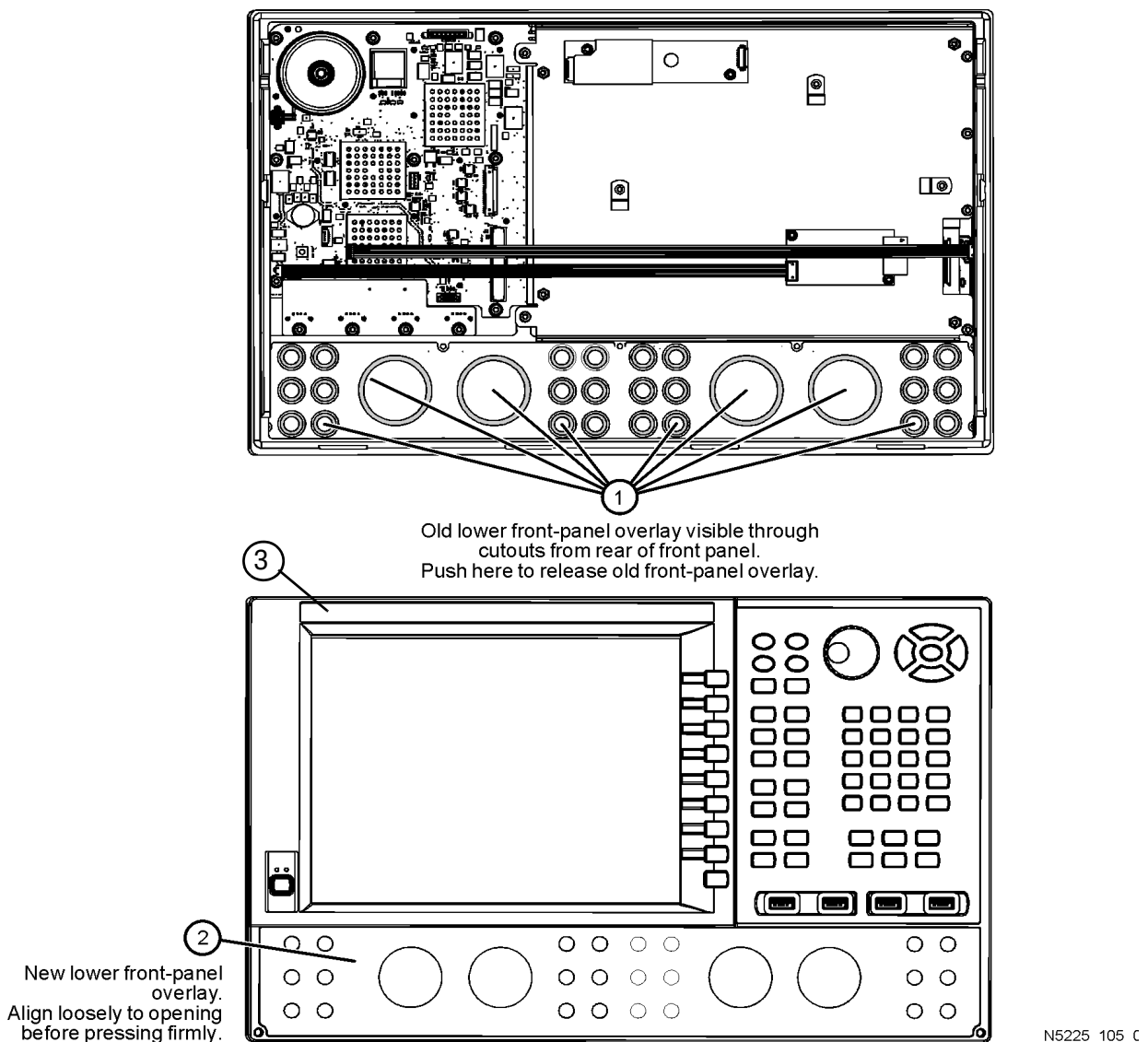
Step 22. Remove the Old Lower Front Panel Overlay and Nameplate

Refer to **Figure 29** for this step of the procedure. Although this figure shows a 4-port PNA, the concept is the same for a 2-port PNA. New parts are listed in **Table 1 on page 9**.

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 the nameplate from the front panel (item ③).
4. Remove any adhesive remaining on the front panel.

Figure 29

Lower Front Panel Overlay Replacement



Step 23. Reinstall Front Panel Assembly

For instructions on reinstalling the front panel assembly, click the Chapter 7 bookmark “Removing and Replacing the Front Panel Assembly” in the PDF Service Guide¹.

Step 24. Install the New Lower Front Panel Overlay and Nameplate

Refer to **Figure 29 on page 46** for this step of the procedure. New parts are listed in **Table 1 on page 9**.

1. Remove the protective backing from the new lower front panel overlay, N5222-80016 – (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. Remove the protective backing and Install the nameplate (N5221-80009 or N5222-80015, item ③).

Step 25. Reinstall Front Panel Jumpers

Reinstall the front panel jumper cables.

1. See “**Downloading the Online PNA Service Guide**” on page 7.

Step 26. DC Continuity Test the LFE Board and Test Ports

The DC continuity test verifies that the LFE board is installed correctly and does not have any opens or shorts in the DC path.

1. Using a DVM, connect one test probe to the center conductor of the RF port 1 on the front panel.
2. Connect the other test probe to the port 1 bias input (**BIAS 1 IN**) on the rear panel.
3. Verify the DVM measures $<10\Omega$.
4. Repeat these steps for each of the other test ports.

NOTE

If the DVM value is 0Ω or $>10\Omega$, then something is incorrectly installed or there is an open or short somewhere in the LFE board/cable path:

- Verify the cables installed in “[Step 18. Install the New Bias Tee Combiner’s Semirigid Test Set Cables, the Blue Cables, and Install Cable Clamps Onto Ferrite Beads](#)” on page 35 and “[Step 20. Install the A71 and 74 bias-Tee combiner’s Gray Low Frequency Extension \(LFE\) DC bias Cables and Route Cables](#)” on page 41 are connected correctly and not open or shorted.

Step 27. 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.

Step 28. Reinstall the Inner and Outer Covers

Reverse the instructions in the PDF Service Guide, click the Chapter 7 bookmark “Removing the Covers” in the PDF Service Guide.

Step 29. Remove Option 201 License

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.

Option 201 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 30. Enable Option 205

Procedure Requirements

NOTE

For this step, you will need a USB flash drive.
A single license file may contain more than one feature.

- 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.

Option Enable Procedure

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 12.
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's USB drive slot. Within 5 seconds, the PNA should display a small "New licenses installed" message.

Else, load the license key file(s), manually move your license file(s) to C:\Program Files\Agilent\licensing. It may take Keysight License Manager an extra ~5 seconds to enable the licenses.

NOTE

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

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

Step 31. Verify the PNA Analyzer Program is Running with the Correct Options

1. Start the Network Analyzer program.
2. Once the Network Analyzer program is running:
 - Press **Help** > **About NA** and verify that Option **205** is listed in the PNA application.

NOTE

If 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 3.

3. After successful installation of all upgrades, some features require some adjustments to ensure the instrument meets its specified performance. Refer to the following Web site:
<http://mktwww.srs.is.keysight.com/field/service/network/pna/>.

Step 32. 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
- EE default adjustment: Synth LO only (Version 6 synthesizers), All Synthesizers (Version 7 synthesizers)
- synthesizer bandwidth adjustment (This test is only required when the EE default adjustment is not sufficient)
- source adjustment
- IF gain adjustment
- receiver characterization
- receiver adjustment
- LFE Receiver Adjustment

- IF Response adjustment (Options S93090xA/B, S93093A/B, or S93094A/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.

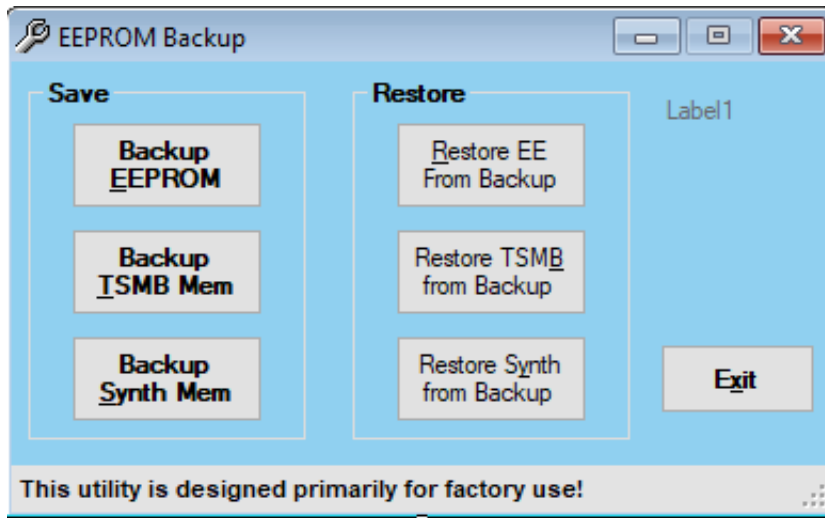
The adjustments listed here generate new correction constants. The analyzer must have a backup of this new data in case any of the data becomes corrupted.

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 Mem.
- 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 7](#).

Figure 30 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 3**.

Calibration

Although the analyzer functions, its performance relative to its specifications has not been verified. It is recommended that a full instrument calibration be performed using the analyzer's internal performance test software. To view information on the performance test software, click the Chapter 3 bookmark "Tests and Adjustments" in the PDF Service Guide¹.

1. See **"Downloading the Online PNA Service Guide" on page 7**.

Step 33. Prepare the PNA for the User

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

A: Synthesizer Board Upgrade (N5240-60074 (with Tabs)/N5240-60076 (Without Tabs) Version F/G to Version H)

CAUTION

STOP!!! Please read all content before proceeding with this upgrade procedure. This is a complex procedure that requires Keysight support training, before beginning any repairs! If you have not been properly trained by Keysight support personnel, attempting to do this procedure could result in damage to the synthesizer board and or the instrument! See also “[Step 3. Inspect and \(If Necessary\) Remove the A4, A11, and A13 Synthesizer Boards, if They Are Not Version H \(Required For Version 6 Synthesizers Only\)](#)” on page 13.

If you do not have the following equipment, do not attempt to the process in the Appendix, because you may damage the board and or your instrument. Stop and return the instrument to Keysight for repair. Refer to “[Getting Assistance from Keysight](#)” on page 3.

This process requires the following:

- Training by Keysight support personnel to perform this upgrade
- RoHS compliant soldering materials and components
- Variable power soldering iron for surface-mount components
- 10x magnifier or greater
- Else, you may damage your synthesizer board and/or your instrument

This section is only required if the synthesizer boards N5240-60074/76 are not a version H or greater. If your synthesizer boards do not require this modification, skip this process and continue to the “[Step 4. Remove the Front Panel Assembly](#)” on page 15. After this section is completed, your synthesizer board will be a version H synthesizer board. Refer to [Figure 2 on page 5](#).

Table 1 **Parts List for Synthesizer Board Upgrade Kit Modification^a**

| Part number | | Description |
|-------------|--------------|-------------|
| 0699-3947 | 1 k Ω | Resistor |
| 0161-4279 | 22 μ F | capacitor |

a. The factory will provide these items upon request.

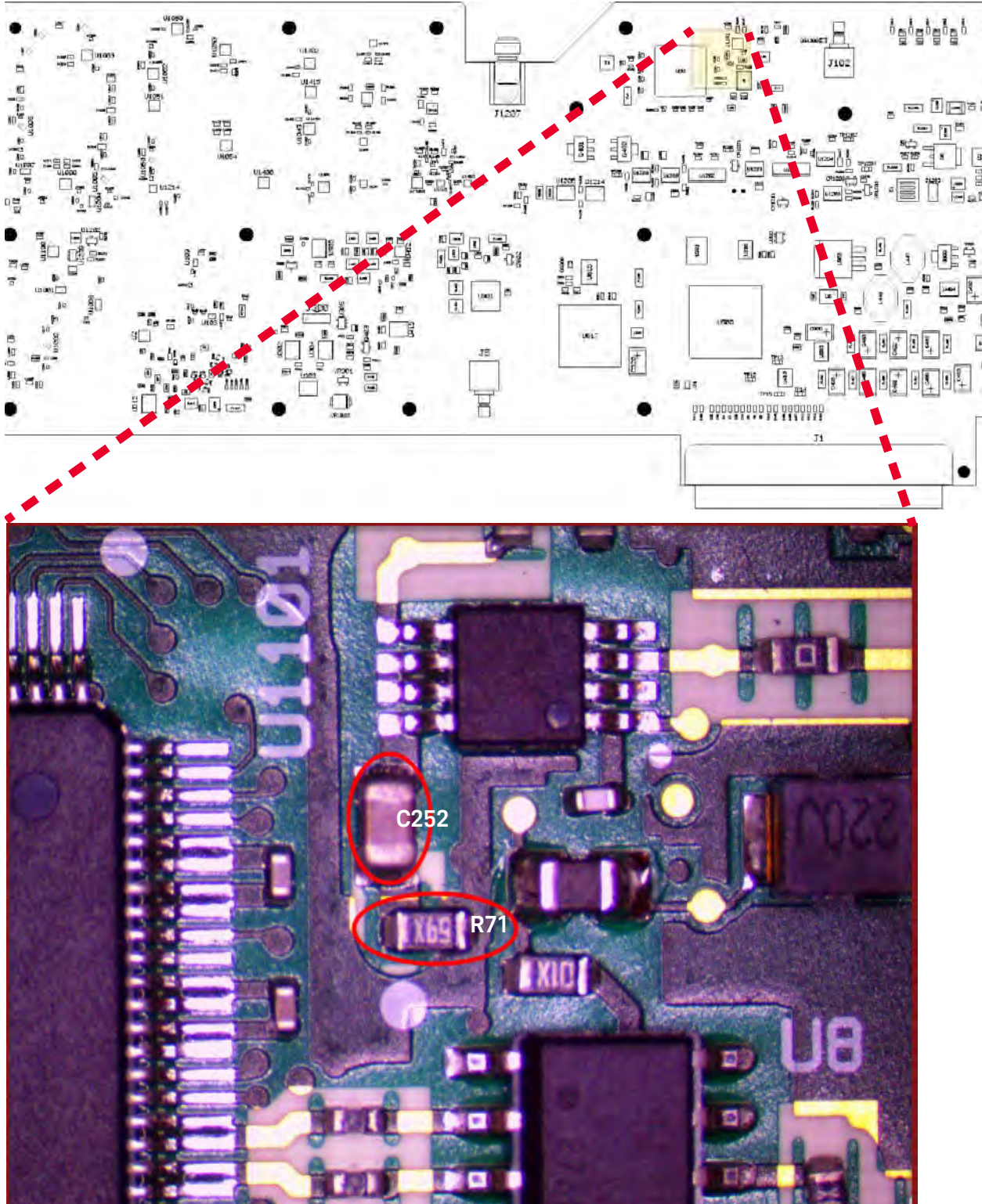
Procedure

1. If you have already removed your synthesizer board, proceed to step 2.
Else, to remove your synthesizer board, refer to the Service Guide for your instrument that can be downloaded from www.keysight.com.
2. Remove resistor R71. Refer to **Figure 1 on page 3**.
3. Clean pads.
4. Replace with resistor 1 k Ω (0699-3947). Refer to **Figure 1 on page 3**.
5. Remove capacitor C252.
6. Clean pads.

7. Replace with capacitor 22 μ F (0161-4279). Refer to **Figure 1** on page 3.

Figure 1

Remove old resistor and capacitor and replace with resistor 1 k Ω (0699-3947) and 22 μ F (0161-4279).



8. Re-assemble shield, screws, and torque:
 - M3 screws (0515-0372) to 9 in-lbs
 - M4 screws (0515-0669) to 21 in-lbs
9. Repeat steps 1 through 8 for all of the non-version H synthesizer boards.
10. Reinstall all upgraded version H synthesizer boards.
11. Power up the PNA and if necessary, start the PNA application.
12. Changing the EEPROM header data for your updated synthesizer board:
 - a. Press **Utility > System > Service > Utilities > View EEPROM Headers**.
 - b. In the **EEPROM Header Info** window that opens press **Edit**. Refer to **Figure 2 on page 5**.
 - c. In the window that opens: Enter the password (i.e., “tsunami”).
 - d. In the **Keysight PNA EEPROM Editor** window that opens: Scroll down to the **FW Revision:** box and select the “F” or “G” and replace by typing “H”. Refer to **Figure 3 on page 6**.
 - e. Press **Enter**. Refer to **Figure 3 on page 6**.
 - f. Press **Save Changes**. Refer to **Figure 3 on page 6**.
 - g. Repeat steps d through f for the other synthesizer boards requiring upgrade.
 - h. Press **Exit** to close the EEPROM Header Info window when you have completed updating all of the synthesizer boards and continue with **“Step 4. Remove the Front Panel Assembly.”**

Figure 2 EEPROM Header Info Window

EEPROM Header Info

Rev: A.03.01

Assembly

☒ LO Synthesizer

☐ TestSet Motherboard

☐ IF Mux

☐ Frequency Reference

☐ Src2 ABC

☐ Src2 Synth

☐ Src1 Synth

☐ Src1 ABC

☐ GPIB

☐ Noise Figure

☐ ABC_50_P1

☐ ABC_50_P2

☐ ABC_50_P3

☐ ABC_50_P4

☐ N/A

Board Name: Synthesizer Board

Edit

Edit Requires Password

Memory Type ID: 3

Hardware ID: 0

Serial Number: 00092

Firmware Rev: H

Board P/N: N524063074

Checksum: 22459

Vendor Code: 23

Date Code: 1742

Revision Code: 99

Options (hex): 0001

Spare (hex): FFFF

1

EE Num

Exit

Figure 3 EEPROM Editor Window

Keysight PNA EEPROM Editor - Use extreme caution!

Assembly

- ☒ LO Synthesizer
- ☐ TestSet Motherboard
- ☐ IF Mux
- ☐ Frequency Reference
- ☐ Src2 ABC
- ☐ Src2 Synth
- ☐ Src1 Synth
- ☐ Src1 ABC
- ☐ GPIB
- ☐ N/A
- ☐ N/A
- ☐ N/A
- ☐ N/A
- ☐ N/A
- ☐ N/A
- ☐ N/A

EE Header Information

| | Header Contents |
|------------------|-------------------|
| Serial Number | 00027 |
| Revision Code | 99 |
| FW Revision | H |
| Board Name | Synthesizer Board |
| Option Flags (h) | 0001 |
| Spare (h) | FFFF |

EE Data Information
Descriptions may not be accurate!

Save Changes Enter Exit

| | Data Description | Full Value | Byte 3 | Byte 2 | Byte 1 | Byte 0 |
|--------------|---------------------|------------|--------|--------|--------|--------|
| 57616 - E110 | Band 0 ALC Setting | 0 | 0 | 0 | 0 | 0 |
| 57617 - E111 | Band 1 ALC Setting | 0 | 0 | 0 | 0 | 0 |
| 57618 - E112 | Band 2 ALC Setting | 154667233 | 9 | 56 | 8 | 225 |
| 57619 - E113 | Band 3 ALC Setting | 154667232 | 9 | 56 | 8 | 224 |
| 57620 - E114 | Band 4 ALC Setting | 154667232 | 9 | 56 | 8 | 224 |
| 57621 - E115 | Band 5 ALC Setting | 154667232 | 9 | 56 | 8 | 224 |
| 57622 - E116 | Band 6 ALC Setting | 154667229 | 9 | 56 | 8 | 221 |
| 57623 - E117 | Band 7 ALC Setting | 154667230 | 9 | 56 | 8 | 222 |
| 57624 - E118 | Band 8 ALC Setting | 154667185 | 9 | 56 | 8 | 177 |
| 57625 - E119 | Band 9 ALC Setting | 148441265 | 8 | 217 | 8 | 177 |
| 57626 - E11A | Band 10 ALC Setting | 148703409 | 8 | 221 | 8 | 177 |
| 57627 - E11B | Band 11 ALC Setting | 148441265 | 8 | 217 | 8 | 177 |
| 57628 - E11C | Band 12 ALC Setting | 149096625 | 8 | 227 | 8 | 177 |
| 57629 - E11D | Band 13 ALC Setting | 148441265 | 8 | 217 | 8 | 177 |
| 57630 - E11E | Band 14 ALC Setting | 154011868 | 9 | 46 | 8 | 220 |
| 57631 - E11F | Band 15 ALC Setting | 154667234 | 9 | 56 | 8 | 226 |
| 57632 - E120 | Band 16 ALC Setting | 155322601 | 9 | 66 | 8 | 233 |

This information is subject to change
without notice.

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